


Rongxing Guo

# Cross-Border Management

Theory, Method and Application

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ISBN 978-3-662-45155-7                      ISBN 978-3-662-45156-4 (eBook)  
DOI 10.1007/978-3-662-45156-4  
Springer Berlin Heidelberg Dordrecht London

Library of Congress Control Number: 2014954354

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*To Ronglian, Rongzhong, Rong'ai, Shurong,  
Rongxun, and Rongmei—from all of whom  
I have learnt how to deal with multi-dimen-  
sional border problems within a big family*

# Preface

Globalization—an increasingly driving force behind the vibrant economies throughout the world since the last decades of the twentieth century—is shaping a new era of interactions among various political, cultural and economic groups. As a result, it is increasing the contacts between people across various boundaries—geographical, political and cultural. When people say that ‘the world is becoming smaller every day’, they are referring not only to the increased speed and ease of transportation and communications but also to the increased use of international and intercultural market to buy and sell goods. Today, the interactions among people with different national and cultural identities are deeper than ever before.

There is no doubt about the increasing awareness of the importance of cross-border transactions in our daily life. An increasing number of companies are now relying on production chains that straddle many politically and culturally distinctive areas. Raw materials and components may come from different linguistic or religious areas and be assembled in another, while marketing and distribution take place in still other venues. Consumers’ decisions in, for example, New York or Shanghai may become information that has an almost immediate impact on the products that are being made—and the styles that influence them—all over the world. The overall heightened presence of foreign goods, foreign producers and even foreign-owned assets causes many to question the impact and desirability of all international and intercultural economic transactions.

In this book, we assume that, due to the existence of various border barriers, production factors (such as labor, capital, technology, and information) cannot freely flow across, and are unevenly distributed between all sides of borders. This creates inequalities, disagreements, tensions and even armed disputes among various stakeholders. This book considers various types of borders. In brief, the objectives of this book are:

- To clarify whether existing management theories and methods can be effectively applied in an entity (which can be defined as either an independent state, a region, a community, a culture, or a firm) after the latter is increasingly interactive with the rest of the world;

- To develop qualitative and quantitative methods by which to help make optimal decisions for the entity and, in the meantime, to maximize the positive (or minimize the negative) effects of the decisions on the rest of the world; and
- To design workable cross-border cooperation plans and conflict-management schemes by which policy-makers can better cope with the challenges and problems resulting from the increasingly interactive world.

Along with the increasing interactions between different parts of the world, the application of existing traditional theories and methods may become less effective, if not ineffective. This is particularly so when policymakers and practitioners want to seek rational and optimal solutions to complicated cross-border tasks.

This book intends to present a new approach to managing the increasingly interactive world. The use of the word “new” has two meanings. The first relates to the intent that I prefer a new definition of borders (which are natural, institutional, functional, or mixed) to the traditional definitions of them. The second concerns the fact that in this book I will apply (and, where necessary, develop) analytical tools, methods and models that are different from those used in other similar books.

A truly cross-disciplinary title, this book covers various disciplines of the social sciences as well as those of natural and environmental sciences and information technology. In brief, the key features of this book include the following:

- Develop a so-called ‘cross-border’ framework by which to solve the bilateral and multilateral problems and challenges stemming from the increasingly interactive world.
- Measure—qualitatively or quantitatively—various effects of borders on global and local economic activities.
- Provide various solutions or options to an efficient cross-border management, many of which cannot be found in other books.
- Adopt end-of-chapter case studies in parallel with shorter, boxed examples in the text, all of which are focused on the current situations of and the recent progresses towards cross-border management.

This book is not intended to serve as a standard textbook for a specific discipline or course. Instead, it is a multidisciplinary text. Specifically, I hope that this three-in-one book will satisfy the needs of students and specialists coming from the following three disciplines:

- i. business administration
- ii. international relations
- iii. regional planning and resource management

Frankly, it is a challenging task for me to write such kind of book. And students of each discipline may not be interested in some chapters of this book—even though I believe that, given that the world is becoming increasingly interactive, students of one discipline will need more knowledge of other disciplines. In this book, Chaps. 4, 11 and 18 are not for students of regional planning and management; Chaps. 10 and

12 are not written for business administration students; and Chap. 15 is not for international relations students.

Throughout this book, both customary and metric systems are adopted. This is intended to help readers to have knowledge of the diversity of the real world—an issue with which cross-border management should deal. A table of conversion from some US customary units to metric units is provided in Pages 401 and 402 at the end of this book.



# Acknowledgements

Even though I began to write this book in early 2014, my research on cross-border issues can date back to as early as the late 1980s when I was a student. During the past decades, I have received encouragement and support from various organizations and individuals. They have been mentioned in my three early books: (i) “Border-Regional Economics,” which was published by Physica-Verlag in 1996 and was reprinted in 2013; (ii) “Cross-Border Resource Management”, which was published by Elsevier Science in its *Development in Environmental Science* series in 2005 (first edition) and 2012 (second edition); and (iii) “Territorial Disputes and Conflict Management: The Art of Avoiding War,” which was published by Routledge in its *Security and Conflict Management* series in 2012. Some ideas and material in the present book draw on the above three books. However, they are not simply done by the ‘copy-and-paste’ approach. Most of the content that appears in this book is completely new and original.

I would like to thank Dr. Javier Sanchez-Reaza (Regional Development Policy Division of the OECD) who kindly sent me many useful documents and materials relating to the US-Mexico border area. Thanks also go to Ms. Jose-Luis Alvarez-Galvan (OECD), Mr. Oliver Torres (State of Chihuahua, Mexico) and Mr. John F. Cook (mayor of El Paso, Texas, USA) for their logistical assistance in 2011. During the field-surveys in southern China in January 2014, I received generous help from the following individuals: Mr Jia Gaoshan (Shaoguan city, Guangdong province), Mr Sheng Yaodong (Zhanjiang city, Guangdong province), and Mr Gao Ming (Xinglong town, Sanya city, Hainan province).

The following individuals and organizations have provided photos and maps that have been adopted by this book. They are: Buddhi N. Shrestha of Bhumichitra Mapping, Kathmandu, Nepal (Fig. 12.1), Gao Ming of Heilongjiang Technology University, Harbin, Heilongjiang, China (Fig. 15.3), University of Texas Libraries, University of Texas at Austin (Fig. 1.3), the government of Hong Kong Special Administrative Region (Figs. 2.1b and 12.4), Commonwealth of Australia (Fig. 8.1), and U.S. Central Intelligence Agency, Washington, DC (Figs. 9.2, and 10.2). In addition, this book also uses photos published in the Wikimedia Commons, the original authors of which are: Frank Janssen (Fig. 1.2), Tos (Fig. 1.4), Historicair

(Fig. 6.1), Fly Navy (Fig. 12.2), Wladyslaw (Fig. 12.3), Benutzer (Fig. 15.1), James Reyes (Fig. 17.1), Seyon (Fig. 17.2), and an anonymous author (Fig. 15.2).

The data cited in Case 3 of Chap. 3 are provided by the Open Technology Institute of the New America Foundation. The major part of Case 6 of Chap. 6 is based on an article entitled “The East China Sea disputes: Context, claims, issues, and possible solutions” (*Asian Perspectives*, vol. 31(2007), pp. 127–167). Dr Dean J. Ouellette (Institute for Far Eastern Studies, Kyungnam University, Seoul, Republic of Korea, also Assistant Editor to the journal of *Asian Perspective*) has kindly granted me in his e-mail of July 30, 2014 to use this material without conditions.

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During the review and revision stage, the feedback and encouragement received from Mr. Toby Chai, Ms Lydia Wang and other editors and readers at Springer have helped us refine many parts of this research. However, all views and errors in this book certainly are mine only.

Huairou, Beijing, China Summer 2014

Rongxing Guo

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# List of Abbreviations

ADIZ	Air Defense Identification Zone
APEC	Asia-Pacific Economic Cooperation
ASEAN	Association of Southeast Asian Nations
B2B	Business-to-business
B2C	Business-to-consumer
BCP	Boundary Control Point
BDS	BeiDou System
CBP	Customs and Border Protection
CEPA	Closer Economic Partnership Arrangement
CJV	Cooperative Joint Venture
CPA	Comprehensive Peace Agreement
DMZ	Demilitarized zones
DNS	Domain Name System
DSB	Dispute Settlement Body
e-BCMS	electronic Border Control Management System
EEZ	Exclusive Economic Zone
EJV	Equity Joint Venture
EKC	Environmental Kuznets Curve
EU	European Union
FDI	Foreign Direct Investment
FTP	File Transfer Protocol
FTZ	Free Trade Zone
GFW	Great Firewall
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GTI	Greater Tumen Initiative
GWB	George Washington Bridge
HTTP	Hypertext Transfer Protocol
I2P	Invisible internet project
IBRU	International Boundaries Research Unit
ICC	International Court of Justice
ICEC	Information and Communications Ethics Committee

ICJ	International Court of Justice
ICRC	International Committee of the Red Cross
IDL	International Date Line
IGAD	Intergovernmental Authority on Development
IGCP	International Gorilla Conservation Program
IGO	International Governmental Organization
ILA	International Law Association
IMS-GT	Indonesia-Malaysia-Singapore Growth Triangle
IP	Internet Protocol
IUCN	World Conservation Union
JDZ	Joint Development Zone
JPDA	Joint Petroleum Development Area
LMB	Lower Mekong Basin
M&A	Mergers and Acquisitions
MDL	Military demarcation line
MOU	Memorandum of understanding
MRC	Mekong River Commission
NAFTA	North American Free Trade Agreement
NATO	North Atlantic Treaty Organization
NBA	Niger basin authority
NGO	Nongovernmental organization
OAS	Organization of American states
OMVS	Organization pour La Mise en valeur de Fleuve Sénégal
OPEC	Organization of Petroleum Exporting Countries
OSCE	Organization for Security and Cooperation in Europe
PCA	Permanent court of arbitration
PCIJ	Permanent court of international justice
POP	Post office protocol
PRS	Public regulated service
PTA	Preferential trade arrangement
SAARC	South Asian Association for Regional Cooperation
SADC	Southern Africa Development Community
SAR	Special administrative region
SARC	South Asian Association for Regional Cooperation
SEZ	Special Economic Zone
SIJORI-GT	Singapore-Johor-Riau Growth Triangle
SIS	Schengen Information System
TBA	Tri-border area
TCP	Transmission Control Protocol
TRADP	Tumen River Area Development Program
TSS	Traffic separation scheme
UNCLOS	United Nations Convention on the Law Of the Sea
UNMIK	United Nations Mission Interim in Kosovo
UNSC	United Nations Security Council
URL	Uniform Resource Locator

UTC	Coordinated universal time (French: Temps Universel Coordonné)
VIS	Visa Information System
VPN	Virtual Private Network
WTO	World Trade Organization

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# **Part I**

## **Theory**

# Chapter 1

## A World with Borders

In December 2013, I was travelling in southern China. I wanted to trace the changes of China's interprovincial borders that had occurred for the past decades. I had conducted a series of field surveys on those cross-border areas in the late 1980s when I was a graduate student. On my way to Jiujiang city, Jiangxi province, I found a new bridge—"No. 2 Changjiang Bridge of Jiujiang"—over the Yangtze river. In contrast to its modern-architectural design, the bridge was managed by a very special model, as I observed:

The bridge connects Jiangxi province in the south with Hubei province in the north, with a total length of less than 9 km. But it is operated via three toll stations. The fee for a passenger car running through the main bridge is 20 yuan (about US\$ 3.3), which is collected at the main toll station. However, on the southern and northern sections of the bridge, which are owned by Jiangxi and Hubei provinces, respectively, an additional five-yuan fee is charged each. This means that people must go through three toll gates in one bridge and pay a higher fee than in other places.

### 1.1 What are Borders?

Of course, cross-border-bridge problems do not merely exist in China; they can also be found in many other places of the world, including the United States.<sup>1</sup> But, before dealing in greater detail with these border-related problems, let us first pay some attention to one academic issue: what borders are.

---

<sup>1</sup> For example, the Fort Lee lane closure of the George Washington Bridge (GWB), from September 9–13, 2013, is a US political scandal in which politicians of New Jersey conspired to create traffic jams in Fort Lee, New Jersey, starting at a New York-bound entrance to the GWB—see Sect. 12.3 of Chap. 12 for more details.

### 1.1.1 *Traditional Definitions*

In the six celebrated English dictionaries—Webster’s Unabridged Dictionary (WUD), Collins English Dictionary (CED), the American Heritage Dictionary (AHD), Oxford Dictionary (OD), the Merriam-Webster Unabridged Dictionary (MWUD), and Macmillan Dictionary (MD)—there are quite similar definitions on the term “border.” In brief, border is defined as:

- i. “the line that separates one country, state, province, etc., from another” (WUD 2013)
- ii. “the dividing line or frontier between political or geographic regions” (CED 2009)
- iii. “the line or frontier area separating political divisions or geographic regions” (AHD 2009)
- iv. “a line separating two countries, administrative divisions, or other areas” (OD 2014)
- v. “a line separating one country or state from another” or “a boundary between places” (MWUD 2014)
- vi. “the official line separating two countries or states” (MD 2013).

Obviously, “border” refers as to a *line* in all these definitions. However, “border” sometimes has been defined as a narrow strip (or district or region) along or near the border between two areas (see, for example, WUD 2013; OD 2014). In addition, it is also usually defined as the part or edge of a surface or area that forms its outer boundary (WUD 2013; AHD 2009; MWUD 2014) or the edge or boundary of something, or band or pattern around the edge of something, or the part near it (OD 2014; MD 2013). In some unusual cases, ‘border’ also refers as to ‘the frontier of civilization’ (WUD 2013).

In the English language, the word ‘border’ has a sister word ‘boundary’. Both words can be used interchangeably. In addition, there is another similar word ‘frontier’: meaning “a border between two countries” (MWUD 2014). In Chinese language, ‘border’ (or ‘boundary’) and ‘frontier’ are written as ‘*bianjie*’ and ‘*bianjiang*’ in Pinyin forms, respectively. In both Chinese and English languages, ‘border’ has wider meanings in political geography than ‘frontier’—a term that refers to a special case of border used to denote the sovereign limits of and divisions between independent states. However, this difference may not exist in other languages. For example, in some European languages, only a single word is used for the terms ‘border’ and ‘frontier’, such as ‘*frontière*’ (French), ‘*Grenze*’ (German), ‘*frontera*’ (Spanish), and ‘*fronteira*’ (Portuguese).

### 1.1.2 *New Definition*

You might say that you are quite far away from borders and therefore your daily life has nothing to do with borders. Please be noted your daily life is involved in various

borders. And, if an inter-personal communication can be defined as a special kind of cross-border relations, I would say that when you talked to me, you were crossing a ‘border’, even if the latter is invisible.

In this book, I will use a wider definition on the term “border”. Specifically, borders can be classified into the following categories:

- i. Natural
- ii. Institutional (both formal and informal)
- iii. Functional
- iv. Mixed

By institution, it is usually composed of both formal and informal institutions. Formal institutions are legally introduced and enforced by state institutions, which are embedded in state operations based on laws that are enforced and monitored by the government. Informal institutions rely on enforcement methods not supported by the government. They also have roots in local communities and are embedded with existing customs, traditions, rules of conduct, and beliefs.

Functional borders are very common in the real world. They can be formed between any organizations, sectors, or other functional entities or fields. In contrast to an interdisciplinary study, which seeks to synthesize broad perspectives, knowledge, skills, interconnections, and epistemology in an educational setting, studies of interdisciplinarity—which can also be treated as a functional border area covering two or more different disciplines—raise to questions about how interdisciplinarity works (see Sect. 5.6 of Chap. 5 for more details).

However, most existing borders belong to the mixed category. For example, both the natural (represented by either border markers or other physical barriers) and the institutional (such as political and legal) components can be found in a single international border.

## 1.2 A World of Borders

Borders are also diversified in terms of the components that form the boundaries themselves. There are various methods (or techniques) that neighboring states can use to describe their political boundaries. And, in practice, more than one of them may be employed on different sectors of a single boundary. Technically, most of the international boundaries of the world can be classified into three categories: natural, artificial and invisible. Cross-border disputes often stem from common errors and intricacies in boundary description. Without clear definitions and/or bilateral (and, if necessary, multilateral) agreements concerning political boundaries, disputes might arise.<sup>2</sup>

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<sup>2</sup> See a case study at the end of this chapter for more details.

### 1.2.1 *Natural Borders*

Natural borders are identified by different natural barriers or screens (such as mountains, rivers, lakes, seas, bays or straits). As natural barriers, mountains, rivers, lakes, seas, bays and straits have been usually adopted by territorial rulers to serve as political borders.

#### a. Mountain

If a mountain exists between adjacent political regimes it usually serves as a natural border. Mountains, when serving as military borders, have the advantages of being easy to defend but difficult to attack, while they have the economic disadvantages for the relevant countries or regions to develop cross-border exchange and cooperation due to the geographic barriers. However, mountains are not necessarily great barriers to settlement. They in some cases could be centers of settlement in tropical forests and in deserts, and many so serve in middle and even high latitudes, if power, minerals, pasture, or timber are important.

Detailed description of mountain boundaries is needed. In general, a waterparting (or watershed in UK usage) is by no means always a barrier, or along a line of a hill or mountain, or even invisible. Its chief virtues as a political boundary are that it is precise, and that it separates drainage basins, which for many purposes are best treated as units under a single government.

Many mountains have been used to serve as political borders in the world: Switzerland, Italy and France jointly use the Alps to separate their territories. Argentina shares Andes Mountains with Chile, a geographically long and thin country along the Pacific Ocean. The Himalayas separates India, Nepal, Bhutan and China. The Pyrenees lies between Spain and France; the common borderland of Malaysia and Indonesia includes Upper Kapuas Mts and Iran Mts in Kalimantan.

#### b. River

Because rivers have distinctive extensions and that they are cadastral or property boundaries, the adoption of a river as an international boundary may have some advantages in respect to local government and the operation of farms, mines or other properties. When demarcating a border along a river between two political areas, it has been commonly suggested that the possible borderline may be set as the following:<sup>3</sup>

- i. the middle or median (that is, a line every point of which is equidistant from the nearest points on opposite shores at mean water or other specified stage)
- ii. the channel (if there is more than one channel, the main or principal channel might be the one used, the deepest, the widest, or the one carrying most water)
- iii. the thalweg (it is usually defined as the line of continuously deepest soundings in a river)
- iv. a bank, or
- v. an arbitrary line between turning points

<sup>3</sup> Cited from Jones (1943, pp. 106–108).



**Table 1.1** The principal rivers as inter-state borders, USA. (Source: World Atlas (1994) and author)

River	Length (mi)	State–state
Colorado	1450 <sup>a</sup>	California–Arizona–Nevada
Columbia	1200	Washington–Oregon
Connecticut	407	Vermont–New Hampshire
Delaware	301	New York–Pennsylvania–New Jersey
Mississippi	2348 <sup>b</sup>	Illinois–Missouri–Kentucky; Missouri–Tennessee–Arkansas–Mississippi–Louisiana
Missouri	1392 <sup>b</sup>	South Dakota–Nebraska–Iowa; Missouri–Nebraska–Kansas
Ohio	981	Illinois–Kentucky–Indiana; Kentucky–Ohio–West Virginia
Red	1270	Texas–Oklahoma
Savannah	301	South Carolina–Georgia
Snake	1078	Oregon–Idaho
Wabash	503	Indiana–Illinois–Kentucky

<sup>a</sup> A section of the river is located in Mexico

<sup>b</sup> The total length of entire Mississippi–Missouri is 3740 mi

Many rivers have been used to mark international borders. The Oder river flows between Germany and Poland. Bulgaria, Romania, Yugoslavia, Czech Republic and Hungary meet at the Danube. The Rio Grande river is the border between USA and Mexico. The Amur (known as Heilong-jiang in China), the Ussuri and the Argum rivers divide three sections of the Sino–Russian border.

Even inside independent countries there still are administrative borders that can be identified by rivers. For example, under topographical influence, Brazil is administratively divided by many internal rivers between Atlantic Ocean and Andes Mts. In ancient China, the Yellow river was used to separate Henan (south river) and Hebei (north river) provinces; but it is now used to define some sections of the boundaries between Shaanxi and Shanxi and between Henan and Shandong provinces. Table 1.1 shows various rivers used by the United States in as its inter-state borders.

### c. Lake

Characterized by clear segregations and convenient for water transportation, lakes are also regarded as suitable natural screens in which political borders may be established between adjacent regimes. A border along a shallow lake might follow the middle of the navigable channel, if one exists. In deeper lakes or shallow lakes without navigable channels, a median line may be defined as for a river (as mentioned above). Unless it is understood that a lake undergoes no significant changes of water level, it is wise to specify the water stage to which the description applies. If the boundary follows the bank of the lake, generally not a satisfactory arrangement, it is especially important to give the stage. Dams or other physical structures that raise or lower the lake level may change the banks and the median line. Without

bilateral or multilateral agreements concerning the boundaries between the waters and banks, disputes might arise.

A number of lakes constitute elements in the international borders of the world. The Five Great Lakes (Lake Superior, Michigan, Huron, Erie and Ontario) are located between Canada and the United States; Lake Khanka (Xingkai-hu) lies on the Sino–Russian border; Lake Buir Nur covers a section of the border between China and Mongolia; Lake Victoria separates Uganda, Kenya and Tanzania; Lake Tanganyik is the borders of Tanzania, Zambia, D.R. Congo and Burundi; Switzerland meets France and Italy at Lakes Geneva and Maggiore, respectively; Lago Titicaca is located between Peru and Bolivia.

#### d. Sea

Like lakes, seas also have a significant segregation and are suitable for water transportation. International borders can be easily established between the territorial and international seas. For example, the Sea of Azov straddles Russia and Ukraine and the Black Sea separates Bulgaria, Georgia, Romania, Russia, Turkey, and Ukraine. The Red Sea is surrounded by seven nations (Egypt, Eritrea, Israel, Jordan, Saudi Arabia, Sudan and Yemen). The Aral Sea lies between Kazakhstan and Uzbekistan.

It is worth noting that the exploration and exploitation of underground resources in internationally shared seas could lead to disputes. Examples would include the bilateral disputes in the Timor Sea (Australia vs. East Timor) and the East China Sea (China vs. Japan), and the multilateral disputes in the Spratly islands (China, Malaysia, the Philippines, Taiwan, and Vietnam).

#### e. Bay/gulf

A bay is often applied to very large tracts of water around which the land forms a curve; it can also be defined as part of a sea or lake indenting the shoreline. A gulf, which is generally known to be larger than a bay, refers to an arm of a sea or ocean partly enclosed by land, or a portion of an ocean or sea extending into the land or a partially land-locked sea.

In bays and gulfs, borders may either be navigable channels, medians, or arbitrary lines.

#### f. Strait/channel

Unlike a bay (or gulf) boundary, which reaches a seacoast on the one hand and continues through the sea on the other, a strait (or channel) boundary only connects with the sea(s).

## 1.2.2 *Artificial Borders*

If no significant natural barrier is available, or the natural screen is not suitable to serve as a border between two adjacent political units, an artificial border should be jointly established by the adjacent political units. Generally, artificial borders can be (a) an artificial barrier and (b) a geometrical line.

a. Artificial barrier

Stone tablets, walls and wire entanglements are commonly used to act as artificial barriers. These objects then serve as political borders. The former Berlin Wall is one example. The Wall was constructed following the territorial division of the post-war Germany by the European Advisory Commission. The Commission was established by the governments of the USA, the UK, and the former USSR, following the defeat of Germany in 1945. Berlin was divided into East and West Berlin under the jurisdiction of the occupying forces during the period of the Cold War. The border wall was finally removed in 1989 following the collapse of the Soviet Union.

As one of the greatest construction projects in the world, the Great Wall, or *Bi-anqiang* (border wall), was originally built during the Spring and Autumn Period (770–476 BC) and the Warring States Period (475–221 BC) in ancient China. Following the unification of the whole nation, Emperor Qinshi-huang (258–210 BC) began to renovate and connect the northern sections of the border walls in order to prevent the invasion from the Hunnish aristocrats (*xiongnu*) in the north. During the early period of the Ming dynasty (AD 1368–1644), the border wall was rebuilt many times. The latest version of the Wall—6700 km long—commenced at Jiayuguan in the west and ends at Shanhaiguan in the east (see Fig. 1.1).

The structure of the Wall is solid and well laid out, good for both attack and defence. At each strategic point there is a fortress constructed for garrison troops. The troops could go outside the wall to patrol, or when the situation required, to outflank the enemy from behind. At some main passes double walls were constructed. The Wall was built in line with the terrain: where the terrain is flat, the wall is several meters thick and high; where the mountain is steep, the wall is only less than a half



Fig. 1.1 The Great Wall of China. (Source: Copyright 2013 © by Rongxing Guo)

meter. On a mild slope between two steep points was cut sharp and stone blocks were laid. At the outer wall of the Great Wall buttresses and loopholes were distributed. In some strategic places three rows of holes were built for soldiers to shoot from three stances: standing, kneeling and prone. Protruding watchtowers were distributed in the wall at a different interval which was dependent on the strategic role. The watchtower is usually 10 m in height, mostly with two stories.

#### b. Geometrical line

A meridian boundary may be described as a line due north (or south) from a given point, or as the meridian north (south) from one point, or as the meridian of  $X^\circ$ ,  $Y$  min,  $Z$  s, west (or east) of Greenwich. A parallel might be described as the parallel of  $X^\circ$ ,  $Y$  min,  $Z$  s, north (or south) latitude, or as the parallel east (or west) from a given point. More generally, geometrical boundaries can be defined:

- By turning points or angles. This method requires detailed surveys and sufficiently accurate field data for the choice of major turning points or angles. The points or angles may be described by latitude and longitude or other coordinates, by bearings to landmarks, or in other precise terms.
- By courses and distances. This method may be suitable for boundaries in water bodies. It is sometimes combined with description by turning points. If this is done, one method should be stated to rule in case of contradiction. The turning point method is superior in that an error affects only two segments. An error in a course of distance affects all subsequent locations.

However, geometrical boundaries may prove difficult to describe precisely. The major difficulties arise from the fact that the earth is neither flat like a map nor perfectly spherical like a globe. Geometrical lines on flat maps may have very different properties from lines through corresponding points on the earth. These differences arise from the projection on a curved surface onto a plane (Jones 1943, p. 113).

The longest latitude border is the US–Canadian border on the 49th Parallel of the north latitude. The international border between Egypt and Sudan is the 22nd Parallel of the north latitude. The longitude lines are also used as international borders. Examples include those between Canada and Alaska/US along the 14th Parallel of the west longitude, between Egypt and Libya along the 25th Parallel of the east longitude, and between Indonesia and Papua New Guinea on the 14th Parallel of the east longitude. In addition, the 60°36'th Parallel of the west longitude marks the border of Argentina and Chile on Grande de Tierra del Fuego island off South America.

### 1.2.3 *Invisible Borders*

Borders are sometimes invisible. In general, a cultural boundary can be defined as one that separates two or more different cultures in contiguous geographic spaces. However, the boundaries between culture areas are not necessarily distinct; recog-

nizable cultures within a given area may contrast with those of neighboring ones, and if the boundaries are not sharply delineated, zones of composite culture or blended traits may make the transition from one to another a matter of gradation. Precisely, each culture possesses a common system of signifying and normative values, some shared basis (such as common history, language, race or ethnicity, and religion) through which people identify themselves as members of a single group, and the will or decision to be primarily self-identified as a member of a given community.

It should be remembered that sometimes the demarcation commission will feel constrained to fix the boundaries since some human features are too fuzzy to be identified. The disintegration of the former USSR caused political and cultural tensions between Russia and Ukraine, especially within their cross-border territory. Within Slobozhanskaya Ukraine and the component part—Kharkov region—ethnic diversity has created disputes between people. The region is known by various geographical names in the contiguous regions, by types of relief, names of human settlements, and rural areas. The most contentious issue is that of language. No agreement can be found over which language should be spoken and used in secondary and tertiary education, in curriculum development and for entrance examinations at higher education.

Israelis and Palestinians share a narrow territory along the eastern coast of Mediterranean Sea west of the Jordan river and the Dead sea. Cultural and religious conflicts between the two different groups of peoples have not stopped since the founding of the state of Israel. Even though a common geographical boundary may be settled in the future, the cultural separation between the two neighbors appears eternal. By way of contrast to these examples of internal strife and dissent, there is another landscape in the heart of west Europe where one may find a special Alpine country. In Switzerland different language groups live peacefully in cantons allocated to speakers of Swiss German, French, Italian, and Rhaeto-Romanic.

Until 40 years ago, Catholic and protestant establishments in the Netherlands were separate from one another as a result of Pillarization (*Verzuiling* in Dutch), a widespread politico-denominational segregation. Churches, supermarkets, and other public places were segregated by religious and political beliefs. One striking example, below, tells a story about a Catholic woman and her Protestant husband in a small town in the Netherlands, who were not allowed to be buried together (see Fig. 1.2):

All of this (Pillarization) sets the scene to the story of Protestant Colonel J.C.P.H van Aeffderson and Catholic noblewoman J.W.C van Gorkum. Their marriage would have caused a storm of scandal back in the nineteenth century. Not only was it religiously mixed, but they were from two very different social classes. However, despite all of the taboo in nineteenth century society, the couple's marriage lasted for 40 years, only ending with the colonel's death. Eight years later, when his wife passed away, her wishes dictated that she wanted to be buried next to her husband. Pillarization was still in effect at the time, and according to the law, this was impossible. However, with a little creative stonework, both Husband and wife were linked eternally together in a different way.<sup>4</sup>

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<sup>4</sup> Cited from Hong (2013).

**Fig. 1.2** Graves of a Catholic woman and her Protestant husband in Het Oude Kerkhof, Roermond, the Netherlands. (Source: Courtesy of Frank Janssen)



### 1.3 Borders: Political Hierarchy

When two entities (independent states, regions, communities, cultures, or firms) meet, a border will be automatically formed. Borders can generally be classified into different levels. Thus, there exist first-class (or independent state) border-areas, second-class (or dependent state, or provincial) border-areas, third-class (or municipality, or county) border-areas, and so on.

#### 1.3.1 *Independent-Country Level*

Independent countries are the highest form of political units in the world. An independent country must have a defined geographical scope (territory). At present, the existing independent countries of the world have territorially varied from as small as 0.5 km<sup>2</sup> (i.e., Vatican City) to as large as 17 million km<sup>2</sup> (i.e., the Russian Federation). Independent nations must also have citizens within the territory. As one of the largest countries in the world, China has already a population of 1.3 billion, whereas Nauru—also an independent country—only has a population of about ten thousand.

Independent countries are also diversified organizationally. The existing independent countries of the world can be divided into at least 16 categories of political status in the forms of governments and ruling powers. These are:

- Republic
- Constitutional Monarchy
- Parliamentary State
- Provisional Military Government
- Socialist Republic
- Federal Republic
- Monarchy
- Federal Parliamentary State
- Islamic Republic
- Transitional Military Republic
- Federal Islamic Republic
- Transitional Government
- Federal Constitutional Monarchy
- Federation of Monarchy
- Monarchical–Sacerdotal State
- Constitutional Monarchy under Military Rule

### ***1.3.2 Internally Independent Political-Entity Level***

Internally independent political entities are also known as quasi-independent political entities. They are independent in matter of internal affairs while under the protection of other independent political entities in matter of defence and/or foreign affairs. For example, Andorra is a coprincipality under the joint protection of Spain and France; Bhutan is a monarchy under Indian protection; The Cook islands are a self-governing territory under the protection of New Zealand; and Greenland is a self-governing territory under the Danish protection.

Hong Kong is also an example of an internally independent entity. Under the ‘Basic Law of the Hong Kong Special Administrative Region of the People’s Republic of China,’ Hong Kong became a Special Administrative Region (SAR) of China in 1997. The Basic Law was drafted in accordance with the Sino-British Joint Declaration on the Question of Hong Kong, signed between the Chinese and British governments on December 19, 1984. The Law stipulates the basic policies of the People’s Republic of China (PRC) towards the Hong Kong SAR. As agreed between the PRC and the United Kingdom in the Joint Declaration, in accordance with the “One Country, Two Systems” principle, socialism as practised in the PRC would not be extended to Hong Kong. Instead, Hong Kong SAR would continue its previous capitalist system and its way of life for a period of 50 years (that is, from 1997–2046 AD). A number of freedoms and rights of the Hong Kong residents are also protected under the Basic Law.

**Table 1.2** The first-class administrative regions, selected countries. (Source: Calculation by the author based on the maps of relevant countries)

Country	Name(s)	Number
Russia	ARP, S, FR	76
Canada	P, T	10
USA.	S, DC	51
China	P, AR, M, SAR	33
Brazil	P	25
Australia	S, CT	8
Kazakhstan	S	19
Ukraine	S	25
Spain	P	50
Turkmenistan	S	5
Uzbekistan	AR, S	13

*ARP* autonomous republic, *AR* autonomous region, *FR* frontier region, *S* state, *P* province, *SAR* special administrative region, *T* territory, *M* municipality directly under the central government, *CT* capital territory, *DC* district of Colombia

### 1.3.3 *Dependent Political-Entity Level*

These political units are generally regarded as the territories which are fully or partially subject to their respective mother states. For example, American Samoa, Guam, the Midway islands and the Virgin islands are unincorporated territories of USA; the Cayman islands, Bermuda, the British Indian Ocean Territory, Gibraltar, Montserrat, Pitcairn (including its dependencies), St. Helena (including its dependencies), South Georgia (including its dependencies), Turksand Caicos islands and Virgin islands are dependent territories of UK.

Within the independent political units, there usually exist various forms of administrative subdivisions. Specifically, administrative subdivisions directly under the central government of a country are called first-class administrative units, or province, or dependent state; the second-class administrative subdivisions directly under the first class administrative divisions are usually called municipality, county, etc.;... Table 1.2 gives some facts on the first-class administrative divisions for selected countries.

### 1.3.4 *Other Political-Unit Levels*

The word is with various borders. A neighborhood, probably the lowest level of political or economic unit, is a delineated area within physical boundaries where people identify their home and where they live out and organize their private lives. Since there are both physical and psychological barriers between neighborhoods, the boundaries of urban neighborhoods are often clear. Neighborhoods also have a



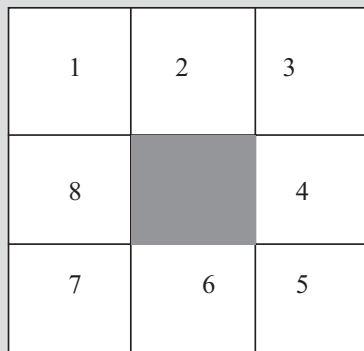
strong social component. People connect with their neighbors in many ways—security, cleanliness, the environment, social behavior, networks and conditions, access to basic services such as schools, doctors, transport and shops (Power 2004).

Two thousand years ago, the feudal rulers of China applied a special management system for rural households (see Box 1.1). This created much complicated structure of cross-border areas.

**Box 1.1 Jingtian-zhi—A Shared Cultivation System in Ancient China**

Two thousand years ago, the feudal rulers of China applied a land management system—called jing-tian zhi (the well-field system). The spatial organizational structure is similar to the two Chinese characters ‘jing’ (well) and ‘tian’ (land) combined together (see figure below). This system was first described by Mencius (c. 300 BC):

Each block of land should be divided into nine plots, the whole containing nine hundred *mu*. The central plot will be the public field and the eight households, each owing a hundred-*mu* farm, will collaborate in cultivating the public field. Not until the public land has been properly attended to, may each household attend to its private plot. This is how the countrymen should be required to learn.



This system established a public area, a commons, surrounded by eight households.

**1.4 Borders: Dimension and Structure**

**1.4.1 Spatial Dimension**

If the entities varying in number meet together, borders differing in spatial structure (or border dimension, that is, the number of borders) will be formed. In brief, borders with different spatial dimensions are as the following:

- *2-d border*. Borders of this kind encompass the majority of borders around the world, including the US–Mexican that runs for 3220 km from East to West and the military demarcation line (MDL) that divides North and South Korea around the 38th Parallel.
- *3-d border*. It is also called a “tri-border”. This kind of border can be found in the Tumen river delta where China, Russia and North Korea meet, in Lake Nyas is shared by Tanzania, Mozambique and Malawi in southeast Africa, in Lake Victoria between Tanzania, Uganda and Kenya.
- *4-d border*. It is also called a “quadri-border”. This kind of border can be found in Lake Chad between Chad, Cameroon, Nigeria and Niger in west Africa, and in Lake Michigan separating four states of Michigan, Wisconsin, Illinois, and Indiana in the USA.
- *5-d border*. This kind of border can be found in the Caspian Sea between Kazakhstan, Turkmenistan, Iran, Azerbaijan, and the Russian Federation; and on the Mts. Alps straddling France, Italy, Switzerland, Austria and Germany.
- *6-d border*. This kind of border can be found in the Black Sea between Turkey, Bulgaria, Romania, Ukraine, Russia, and Georgia; and in the Spratly islands in South China Sea between Brunei, China, Malaysia, the Philippines, Taiwan, and Vietnam.
- *7-d border*. This kind of border can be found in the Red Sea between Egypt, Eritrea, Israel, Jordan, Saudi Arabia, Sudan, and Yemen; and the Persian Gulf separating the United Arab Emirates, Qatar, Bahrain, Saudi Arabia, Kuwait, Iraq, and Iran.
- *8-d border*. This kind of border can be found in the South China Sea between China, Vietnam, Malaysia, Indonesia, Thailand, Brunei, the Philippines, and Taiwan.
- *9-d border*. This kind of border can be found in the Baltic Sea between Poland, Germany, Denmark, Sweden, Finland, Russia, Estonia, Latvia, and Lithuania.

### ***1.4.2 Convex and Concave Borders***

With different geometric properties, borders can be classified into two categories—convex and concave borders. It is not difficult to understand that political units with convex borders usually have the geographical disadvantages of being both hard to defend but easy to be attacked. Bordered by Egypt and Jordan, the State of Israel is shaped like a dagger pointing to the Gulf of Arabia in the south. The convex border of this state sharply makes Negev, the southern part of Israel, completely exposed to the Arab South. On the other hand, political units with concave borders will benefit more from the cross-border cooperation with the outside world than those with convex borders do.

The Strait of Hormuz (called Tangeh-ye Hormoz, in Persian and Maḏīq Hurmuz in Arabic) is a narrow, strategically important strait between the Gulf of Oman and the Persian Gulf. Iran lies along the north coast; on the south coast is the United

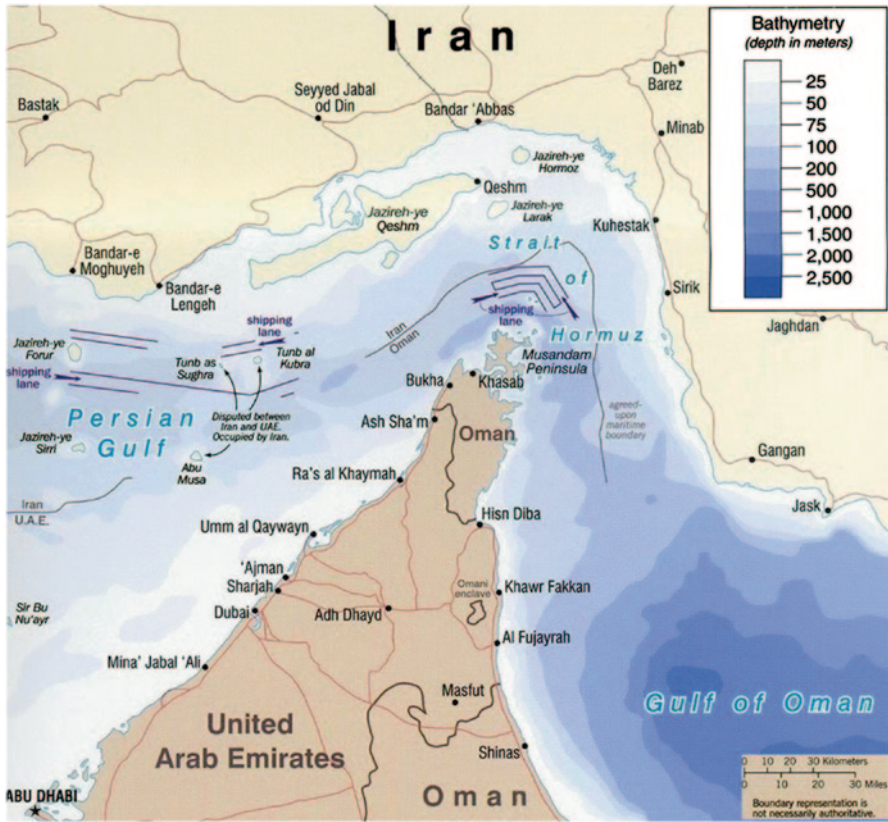


Fig. 1.3 Iran’s concave boundary along the Strait of Hormuz (Source: Courtesy of the University of Texas Libraries, University of Texas at Austin)

Arab Emirates and Oman. The Strait at its narrowest is 54 km wide. Ships moving through the Strait follow a Traffic Separation Scheme (TSS), which separates inbound from outbound traffic to reduce the risk of collision. The traffic lane is 10 km wide, including two 3 km-wide traffic lanes, one inbound and one outbound, separated by a 3 km wide separation median (see Fig. 1.3).

To traverse the Strait, ships pass through the territorial waters of Iran and Oman under the customary navigation rules as codified in the United Nations Convention on the Law of the Sea (UNCLOS). The Strait of Hormuz is the only sea passage to the open ocean for large areas of the petroleum-exporting Persian Gulf. With a *concave* coastal (border) line, Iran has the locational advantage to protect or attach the Strait. At present, about 14 tankers carrying 15.5 million barrels of crude oil pass through the Strait on an average day, making it one of the most strategically important choke points in the world. This represents 35% of the world’s seaborne oil shipments, and 20% of oil traded worldwide in 2011 (EIA 2011).

### 1.4.3 *Enclavated Borders*

There are still more borders. An enclavated border defines a territory that is independent from but is completely surrounded by another political unit. Unlike the other borders, which have both starting and ending points, enclavated borders are closed lines, which thus put enclaves into disadvantageous locations. Without appropriate agreement signed with its neighbor, an enclave cannot conduct any efficient communication and cooperation with the outside world.

Belgium and the Netherlands have one of the most complicated borders in the world. The border's complexity results from a number of equally complex mediaeval treaties, agreements, land-swaps and sales between the Lords of Breda and the Dukes of Brabant. For example, the Belgian exclaves of Baarle-Hertog consist of dozens of separate pieces of land. Apart from the main piece (called *Zondereigen*) located north of the Belgian town of Merksplas, there are 20 Belgian exclaves in the Netherlands and three other on the Dutch-Belgian border. There are also eight Dutch exclaves located within the Belgian exclaves (see Fig. 1.4).

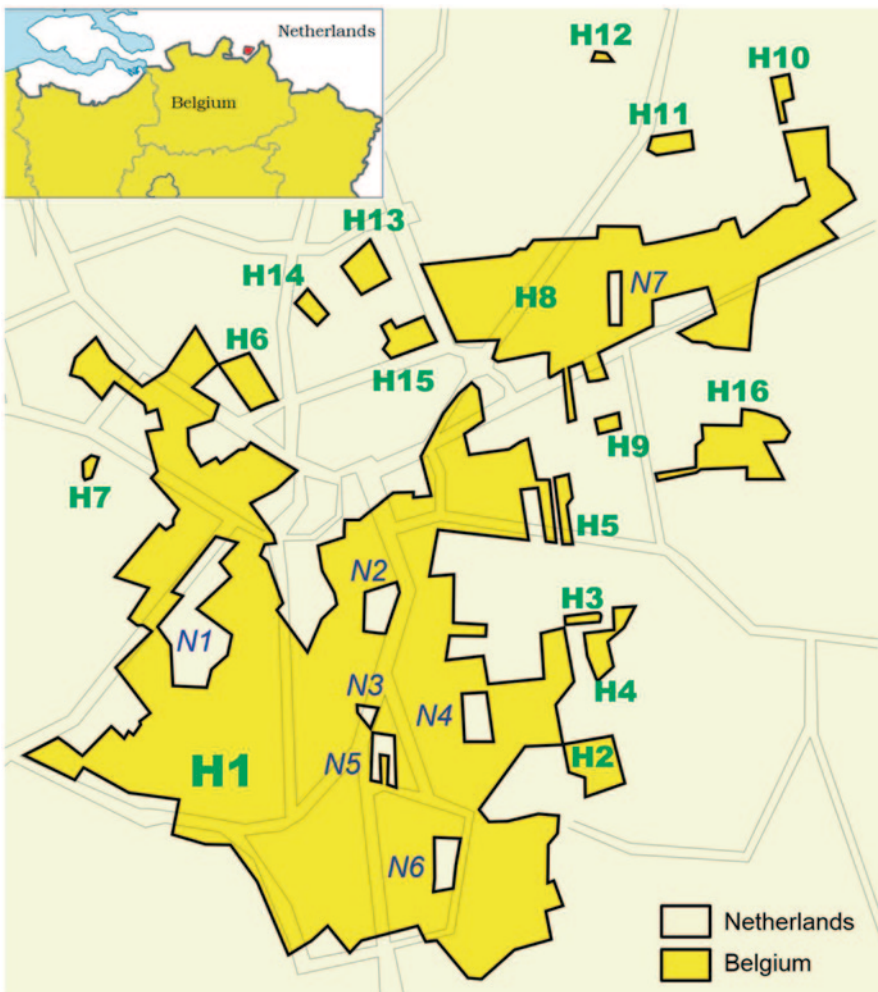
The 22 Belgian exclaves surrounded by the Netherlands include:<sup>5</sup>

- H1: with an area of 153.6448 ha, it is the largest Belgian exclave; boundary runs through numerous buildings
- H2: with an area of 2.4116 ha, it consists of farmland with a single point of connection (quadripoint) between exclaves H1 and H2
- H3: with an area of 0.3428 ha, it occupies part of a field; boundary runs through a shed in one instance
- H4: with an area of 1.476 ha, it consists of farmland; boundary runs through a house and three sheds
- H5: with an area of 0.9245 ha, it consists of farmland with a dwelling
- H6: with an area of 1.7461 ha, it has mixed land usage; boundary runs through a warehouse/factory
- H7: with an area of 0.2469 ha, its boundary runs through two dwellings, including the middle of one front door (giving it two house numbers: Loveren 2, Baarle-Hertog/Loveren 19, Baarle-Nassau)
- H8: with an area of 41.8781 ha, it is second largest Belgian exclave; boundary runs through a barn, a dwelling and two businesses
- H9: with an area of 0.4005 ha, its boundary runs through a printing factory/warehouse in an industrial area
- H10: with an area of 0.65 ha, it consists of farmland
- H11: with an area of 0.93 ha, it consists of farmland
- H12: with an area of 0.2822 ha, it consists of farmland
- H13: with an area of 1.5346 ha, its boundary runs through about 20 dwellings
- H14: with an area of 0.7193 ha, its boundary runs through about 13 dwellings
- H15: with an area of 1.7211 ha, its boundary runs through about 16 dwellings

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<sup>5</sup> The following text is based on Whyte (2004).

- H16: with an area of 4.4252 ha, its boundary runs through a house and three sheds, with three turning points inside just one shed
- H17: with an area of 14.9248 ha, it contains a portion of the former Turnhout–Tilburg rail line, now a cycle path
- H18: with an area of 2.9247 ha, it consists of farmland
- H19: with an area of 0.6851 ha, it consists of several ponds and a field
- H20: with an area of 1.1681 ha, it consists of farmland
- H21: with an area of 1.1845 ha, it consists of farmland
- H22: with an area of 0.2632 ha, it occupies part of a field, nationality was contested from the 1830s until 1995 (remained unallocated to either country in boundary treaty of April 26, 1974).



**Fig. 1.4** Where are the borders between Belgium and the Netherlands? (Source: Wikimedia Commons, provided by Tos 2008-4-15)

The eight Dutch counter-enclaves surrounded by Belgium include:<sup>6</sup>

- N1: with an area of 5.3667 ha, it contains a mix of dwellings and farmland; boundary of N1 and H1 runs through one building
- N2: with an area of 1.3751 ha, it contains 8 dwellings
- N3: with an area of 0.2863 ha, its boundary of N3 and H1 bisects the loading dock of a liquor store
- N4: with an area of 1.2324 ha, its boundary of N4 and H1 runs through a warehouse, with vacant Dutch land to the rear of the warehouse
- N5: with an area of 1.9212 ha, its boundary of N5 and H1 runs through a furniture showroom, a shed and a barn
- N6: with an area of 1.4527 ha, it consists of farmland with two buildings
- N7: with an area of 0.5812 ha, it occupies part of a field
- N8: with an area of 2.8528 ha, it is less than 50 m south of the Dutch border

#### ***1.4.4 Organizational Structure***

The above borders are not the whole world of borders that reflect the spatial complexity of borders. We can see more complicated political boundaries—most of which are invisible in physical landscape but still demonstrate the complicated scenarios of international politics and economics—around the world. An intergovernmental organization—sometimes rendered as an international governmental organization, both abbreviated as an IGO—is an organization composed primarily of several sovereign states (usually referred to as member states, each of which has border(s)—either physical or institutional—with the others), or of other intergovernmental organizations.

The IGOs are often called international organizations, although that term may sometimes include international nongovernmental organizations (NGOs) and/or multinational corporations. The main purposes of IGOs are to create a cross-border mechanism for the entire world—or part of it—to work more successfully together. In this current era of increasing globalization and interdependence of nations, IGOs have come to play a very significant role in international political systems and global governance. According to the Charter of the United Nations, the Missions of the United Nations are:

1. To maintain international peace and security, and to that end: to take effective collective measures for the prevention and removal of threats to the peace, and for the suppression of acts of aggression or other breaches of the peace, and to bring about by peaceful means, and in conformity with the principles of justice and international law, adjustment or settlement of international disputes or situations which might lead to a breach of the peace;

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<sup>6</sup> The following text is based on Whyte (2004).

2. To develop friendly relations among nations based on respect for the principle of equal rights and self-determination of peoples, and to take other appropriate measures to strengthen universal peace;
3. To achieve international cooperation in solving international problems of an economic, social, cultural, or humanitarian character, and in promoting and encouraging respect for human rights and for fundamental freedoms for all without distinction as to race, sex, language, or religion; and
4. To be a centre for harmonizing the actions of nations in the attainment of these common ends.<sup>7</sup>

Till present, IGOs have involved governments from every region of the world. Among the oldest IGOs are the United Nations, which replaced the League of Nations, the Universal Postal Union, and the North Atlantic Treaty Organization (NATO). Since the creation of the European Union (EU) in 1993, it has developed its competencies in the area of justice and home affairs, initially at an intergovernmental level and later by supranationalism. To this end, agencies have been established that coordinate associated actions, including cooperation of police forces, cooperation between prosecutors, and cooperation between border control authorities.

IGOs are established by treaty that acts as a charter creating the group. Treaties are formed when lawful representatives (governments) of several states go through a ratification process, providing the IGO with an international legal personality. IGOs in a legal sense should be distinguished from simple groupings or coalitions of states, such as the G8, the G20 or the Asia-Pacific Economic Cooperation (APEC). Such groups or associations have not been founded by a constituent document and exist only as task groups. Some major IGOs around the world are briefly reported as follows:

- Association of Southeast Asian Nations (ASEAN) (Establishment: August 8, 1967; membership: 10 states plus 2 observers)
- European Union (EU) (Establishment: December 1, 2009; Political centers: Brussels (de facto capital); membership: 28 states)
- North Atlantic Treaty Organization (NATO) (Establishment: April 4, 1949; headquarters: Brussels, Belgium; membership: 28 states)
- Organization for Security and Cooperation in Europe (OSCE) (Establishment: July 1973, renamed OSCE on January 1, 1995; secretariat Austria Vienna, Austria; membership: 57 states, plus 11 partners for cooperation)
- Organization of American States (OAS) (Establishment: April 30, 1948; headquarters Washington, D.C.; membership: 35 states)
- Organization of Petroleum Exporting Countries (OPEC) (Establishment: January 1961; headquarters: Vienna, Austria; membership: 12 states as of 2014)
- South Asian Association for Regional Cooperation (SAARC) (Establishment: December 8, 1985; headquarters: Nepal Kathmandu, Nepal; membership: 8 members plus 9 observers)

<sup>7</sup> Cited form "Charter of the United Nations: Chapter I: Purposes and Principles". Available at <http://www.un.org/en/documents/charter/chapter1.shtml>. Accessed on 15 Feb 2014.

- United Nations (Establishment: 1946; Headquarters: New York; membership: 193 states)
- World Health Organization (WHO) (Establishment: April 7, 1948; headquarters: Geneva, Switzerland; membership: 194 states as of 2013)
- World Trade Organization (WTO) (Establishment: January 1, 1995; Headquarters: Geneva, Switzerland; membership: 159 states)

In addition to the above IGOs, there have been other specialized IGOs with multiple participants (including independent states and governmental organizations (see Appendix for a list of specialized intergovernmental organizations).

## 1.5 Case 1. What is a Good Boundary?

Usually, boundaries are politically sensitive issue, especially when one or more countries or groups of people concerned adopt a confrontational strategy. Inappropriate boundary demarcation has usually led to territorial disputes, issues that have encompassed the major content of troubled relations between many neighboring nations. If governments or people have a stake in a disputed area then they are very sensitive about how this area is portrayed in maps. Documents on boundary description may be used by diplomats, lawyers, surveyors, cartographers, and field engineers.

In most cases it is difficult to say what constitutes a good international boundary. However, it is essential that in diplomatic notes, treaties, and other documents, the ambiguity in verbal description of international boundaries should be avoided. Usually, cases of discord of a serious nature have been caused by slight and unintentional ambiguities in the description of boundaries in formal documents. These flaws may be due to unfamiliarity with the peculiarities of the geographical features, human or natural, along which the boundary extends, or to lack of knowledge of the pitfalls in boundary description.

The following common errors and intricacies in boundary description are of particular noteworthy: (i) inappropriate terms and place names, (ii) vague geometrical features, (iii) intricate human and cultural features, and (iv) inconsistent or contradictory statements.

### 1. Inappropriate terms and place names

Most topographic terms (such as ‘crest’, ‘range’, ‘chain’, and ‘foothills’ of mountains, and ‘source’, ‘end’, ‘mouth’, ‘middle’, and ‘bank’ of rivers) are vague; sometimes they may have varied locations due to geological or hydrological changes. In an ideal boundary demarcation document the topographical terms used as boundaries should be specifically defined with detailed and, if possible, quantitative information. In addition, most existing names used for places have a long history; and they usually refer to areas rather than geographic coordinates. They are therefore not able to precisely define political boundaries.



If a mountain exists between adjacent political regimes it usually serves as a political boundary. Mountains, when serving as military borders, have the advantages of being easy to defend but difficult to attack. However, precipitous mountains, as political and administrative boundaries, do have the disadvantages for the relevant countries or regions to develop cross-border trade and economic cooperation. Detailed description of mountain boundaries is needed. In general, a waterparting (watershed in UK usage) is by no means always a barrier, or along a line of hills or mountains, or even visible. Its chief virtues as a political boundary are that it is precise, and that it separates drainage basins, which for many purposes are best treated as units under a single government. Some peculiarities of waterparting are:

- (i) They often lie well away from the zone of high peaks.
- (ii) Along the waterparting may be lakes and swamps with outlets in both directions.
- (iii) There may be streams and even large rivers which split and drain in two directions.
- (iv) The waterparting may be extremely crooked.
- (v) Underground drainage may prevent ready determination of the waterparting.
- (vi) Basins without drainage to the sea (due to evaporation) may bifurcate the waterparting.
- (vii) In extreme flat regions the waterparting may be hard to locate.<sup>8</sup>

In some circumstances, it is to invite trouble to say that a boundary follows ‘the highest crests which may divide the waters’. The phrase had once produced a threat of war between Argentina and Chile in the early twentieth century. Laguna del Desierto is a quasi-rectangular area between Mt. Fitzroy and Lake San Martín. It is surrounded by three main mountain ranges from north–northeast (in Argentina) to south–southwest (in Chile). There was a general agreement on the placement of the extreme points of the boundary. However, differences existed in the demarcation of the connecting line on the ground. In the second (toward the east) mountain range there are two headwaters: Rio Obstaculo, draining toward the Pacific; and a tributary of the Laguna Larga-Laguna del Desierto-Rio Las Vueltas (or Gatica)-lake Viedma system, on the Atlantic watershed.

## 2. Vague geometrical features

Use of geometrical terms like ‘parallel’ and ‘perpendicular’ is not suggested in boundary description. The terms, ‘foothills’ and ‘foot of the hills’ are vague and have been problematic. ‘Crest’ might refer to the waterparting (hydrographic crest), the high peaks (topographic crest), or the summits of steepest slopes (transportational or military crest). These three lines may be far apart. When demarcating a border along a river, it has been commonly suggested that the possible borderline should be set at the middle or median<sup>9</sup>, the thalweg (i.e., the line of continuously

<sup>8</sup> Cited from Jones (1943, p. 105).

<sup>9</sup> That is a line every point of which is equidistant from the nearest points on opposite shores at mean water or other specified stage.

deepest soundings in a river), a bank, or an arbitrary line between turning points. The reconnaissance of a river under consideration as a political boundary should cover the following points:

- (i) Is the river a suitable line of separation?
- (ii) Is it flowing between rock walls or is it shifting its bed or channel?
- (iii) Is there an obvious main channel? If not, which channel should contain the boundary?
- (iv) Are there islands of undermined sovereignty?
- (v) In different portions of the river, what line is most suitable as the boundary?
- (vi) To what stage of water should the description be referred?
- (vii) Will a permanent administration commission be needed?<sup>10</sup>

In some circumstances, to define a boundary along a river's channel may invite trouble if the river has more than one channel, or if there are hydrological changes to the main or principal channel (i.e., the deepest, the widest, or the one carrying most water) of the river. In 1911 the Sino–Russian boundary in the Argun river area follows the principle that boundary demarcation is according to the median line along the main water channel. Several years later, a new branch was formed. The result was an islet of 14 km<sup>2</sup> in area. After 1950, and as a result of the changing courses of the Hailar river—the upstream of the Argun river, the new branch became the mainstream of the Argun river. In the meantime, the old water channel of the Argun river ran dry, which helped some islets and sandbanks to 'move' to the Russian side of the Sino–Russian border.

### 3. Intricate human and cultural features

Precisely, each culture possesses a common system of signifying and normative values, some shared basis (such as common history, language, race or ethnicity, and religion) through which people identify themselves as members of a single group, and the will or decision to be primarily self-identified as a member of a given community. Since the end of the Cold War, there have been serious concerns about the role of culture in the formation of bilateral and multilateral relations. Some argue that the major cause of conflict in the post-Cold War era will be clashes between cultures or culturally-defined civilizations (Huntington 1993). In this scenario, cultural difference itself is the cause of violence. Intercultural conflict is usually attributed to the degree of cultural dissimilarity, since the latter implies a degree of difficulty that the disparate groups concerned have in communicating or cooperating with one another.

Culture not only provides the basis of identity (ethnicity, religion) and the mode of communication (language, ideas), but also distinguishes the motives for human behavior and the criteria of evaluation (good or bad, ugly or beautiful). Thus, political boundaries that are defined by intricate human and cultural features may bring about cross-border conflicts.

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<sup>10</sup> Cited from Jones (1943, p. 106).

#### 4. Inconsistent or contradictory statements

The United Nations Convention on the Law of the Sea (UNCLOS) is established to define coastal and maritime boundaries, to regulate seabed exploration not within territorial claims, and to distribute revenue from regulated exploration. Territorial sea is defined under the UNCLOS as the 12-nautical mile zone from the baseline or low-water line along the coast. The coastal state's sovereignty extends to the territorial sea, including its seabed, subsoil, and air space above it. Article 56 of the UNCLOS outlines parameters for the establishment of a country's exclusive economic zone (EEZ), which extends 200 nautical miles from the country's coastline. Article 56 gives sovereign rights for exploration, exploitation, conservation, and resource management of living and non-living natural resources of waters in the country's EEZ. Article 76 defines the continental shelf of a nation, which "comprises the seabed and subsoil of the submarine areas that extend beyond its territorial sea throughout the natural prolongation of its land territory to the outer edge of the continental margin or to a distance of 200 nautical miles..."<sup>11</sup>

However, the establishment of the UNCLOS parameters has also created the potential for overlapping claims in semi-enclosed seas. These claims could be further extended by any nation which could establish a settlement on the islands at these seas. Indeed, Article 121 of the UNCLOS, which states that "rocks that cannot sustain human habitation or economic life of their own shall have no exclusive economic zone or continental shelf," has flaws in identifying if the object is an islet or rock.

## 1.6 Appendix

A list of specialized intergovernmental organizations

### 1. Financial, trade, and customs organizations:

- Alliance for Financial Inclusion (AFI)
- African Development Bank
- Asian Development Bank
- Bank for International Settlements
- Black Sea Trade and Development Bank (BSTDB)
- Caribbean Development Bank (CDB)
- Inter-American Development Bank
- International Bureau of Weights and Measures (BIPM)
- International Fund for Agricultural Development (IFAD)
- International Monetary Fund (IMF)
- Islamic Development Bank (IDB)
- Netherlands Development Finance Company (FMO)

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<sup>11</sup> Cited from UNCLOS (1982).

- Nordic Development Fund (NDF)
- Nordic Investment Bank (NIB)
- OPEC Fund for International Development (OPEC Fund)
- Organization for Economic Cooperation and Development (OECD)
- International Organization for Economic Development (IOED)
- Organization of Petroleum-Exporting Countries (OPEC)
- West African Development Bank (BOAD)
- World Bank Group International Bank
- International Development Association (IDA)
- International Finance Corporation (IFC)
- Multilateral Investment Guarantee Agency (MIGA)
- International Centre for Settlement of Investment Disputes (ICSID)
- World Customs Organization (WCO)
- World Trade Organization (WTO)

2. Arms control, environmental and nuclear power organizations:

- Agreement for the Conservation of Albatrosses and Petrels (ACAP)
- Australia Group (AG)
- Conference on Disarmament
- European Atomic Energy Community
- Global Environment Facility (GEF)
- Intergovernmental Panel on Climate Change (IPCC)
- International Atomic Energy Agency
- International Centre for Synchrotron-Light for Experimental Science Applications in the Middle East
- ITER International Organization
- Korean Peninsula Energy Development Organization
- Missile Technology Control Regime (MTCR)
- Nuclear Energy Agency
- Nuclear Suppliers Group (NSG)
- Organization for Security and Cooperation in Europe (OSCE)
- Organization for the Prohibition of Chemical Weapons
- Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization
- The International Union for Conservation of Nature (IUCN)
- United Nations Atomic Energy Commission
- United Nations Environment Program (UNEP)
- Wassenaar Arrangement
- World Association of Nuclear Operators
- World Nature Organization (WNO)

3. Maritime and fisheries organizations:

- Antarctic Treaty Secretariat (ATS)
- Asia-Pacific Fishery Commission (APFIC)

- Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR)
- Commission for the Conservation of Southern Bluefin Tuna (CCSBT)
- Great Lakes Fishery Commission (GLFC)
- Indian Ocean Tuna Commission (IOTC)
- Inter-American Tropical Tuna Commission (IATTC)
- International Commission for the Conservation of Atlantic Tunas (ICCAT)
- International Council for the Exploration of the Sea (ICES)
- International Hydrographic Organization
- International Maritime Organization
- International Pacific Halibut Commission (IPHC)
- International Seabed Authority
- International Whaling Commission (IWC)
- Network of Aquaculture Centers in Asia-Pacific (NACA)
- North Atlantic Salmon Conservation Organization (NASCO)
- North Pacific Anadromous Fish Commission (NPAFC)
- North Pacific Marine Science Organization (PICES)
- Northwest Atlantic Fisheries Organization (NAFO)
- Pacific Salmon Commission (PSC)
- Southeast Asian Fisheries Development Center (SEAFDEC)
- Western and Central Pacific Fisheries Commission (WCPFC)

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## Chapter 2

# How Borders Affect the World

In 1989, rigged elections, an unprecedented wave of emigration and mass demonstrations eventually led to the collapse of the power structures of German Democratic Republic (or called East Germany as compared to West Germany—or formally called ‘Federal Republic of Germany’). After the resignation on October 18 of the head of state and of the communist party, Erich Honecker, the Berlin Wall came down. On November 9, 1989, the fifty-first anniversary of Hitler’s Crystal Night rampage against the synagogues, a most tricking event which symbolized the end of the Cold War era occurred in the Berlin Wall, as described later in Pond (1990, pp. 7–8):

At 7:00 p.m., Politburo member Gunter Schabowski told stunned reporters that East Germans could henceforth cross the border into West Germany... East Berliners, hearing the news, rushed to the exits to West Berlin that had been barred to them for twenty-eight years, and found them still barred. The crowds and the tension mounted over the next three hours. By 10:30 p.m., the East German border guards at four crossing points in the center of the city, still lacking instructions, did the unthinkable. These servants of the most rigidly prison code of obedience in the entire Soviet bloc took authority into their own hands and opened the gates... By 11:00 p.m., East Germany Interior Minister Frederick Dicker confirmed the desperate decision of the local commanders with an official order. The dike had been breached. It was no long possible to turn back the flood.

### 2.1 Good Border, Bad Border

Throughout history, physical terrain, political fiat, and conquest have divided the world into independent states and political entities as much as race, ethnicity, language and religion. The result is the man-made and sometimes arbitrary or even imposed boundaries.

### 2.1.1 *Story 1*

The territorial divisions of Germany after World War II by the Allies born an 1380 km long border line from Lubek to Hof, as well as two antagonistic neighboring states—East Germany and West Germany. Construction of the Berlin Wall in 1961 was a desperate—and effective—move by the East German authority to stop East Berliners escaping from the Soviet-controlled East German state into the West of the city, which was then occupied by the Americans, British and French. The former inner-German border region was characterized by a sinuous disregard for the realities of local topography, and daily patterns of social life and economic activity. Initially, during the short period of the inter-Allied cooperation and unrestricted cross-border movement, this was not considered to be so significant.

However, with the progressive intensification of the Cold War, the creation of separate currencies in 1948, and the foundation of the two German states in 1949, the boundary became a forbidden division between the two starkly different political and economic entities. In 1952, what then had become known as the *innerdeutsche Grenze* was sealed by East Germany against all but carefully supervised and controlled movement. It was at that time consolidated on the eastern side by the first rudimentary border fortifications, together with the creation of a 500 m wide ploughed “guard” strip. Bus and rail travel cross this border was curtained, and the East Germany began the process of tearing up road and railway crossings, eventually involving the disconnection of 32 railways, three autobahns, 31 main roads, 140 secondary roads, and innumerable minor roads and tracks (Bayerische 1981).

The inner-German separation which caused to the transportation network was severe, besides other ideological isolations. From the Shell Generalkarte 1:200,000 Sheet 14 (Geographischer Verlag), one may clearly discover the former frontier area which exacerbated its psychological impact and lengthened the reorientation of external communication links to new sources of supply and markets located elsewhere in West Germany or in foreign countries. For example, the extra distance created by the forbidden border amounted to a penalty of 150–200 km for industries in the Coburg-Hof salient of the northern Bavaria area (Braun and Maier 1983). The very limited number of crossing points along the frontier, coupled with the marked contrasts in the density of the road network, were also evident.<sup>1</sup>

### 2.1.2 *Story 2*

In ancient times, a bad border was always defined as the one through which foreign military forces could easily invade or conduct harassing and wrecking activities. As a result, many of this kind of borders were fortified: for example, the Roman *limes* and the Great Wall of China. In the meantime, a larger territory that a ruler

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<sup>1</sup> For details about what has happened since the removal of the inner-German border, see Case 2 at the end of this chapter.



occupies also implies a longer distance that its borders are from its ruler. This would undoubtedly result in higher costs that the ruler must pay for its establishment of those remote borders. In most unlucky circumstances, bad borders could eventually lead to the reduction of lifespan of an authoritarian regime.

In ancient China, compared with their predecessors, the Zhou dynasty (1046–221 BC), the Jin dynasty (AD 265–420), and the Song dynasty (960–1279), the Qin dynasty (221–206 BC), the Sui (AD 581–618), and the Yuan dynasty (AD 1279–1368) had enlarged their territories, respectively. However, they were also the shortest-lived dynasties in Chinese history (see Table 2.1). Historians have identified many exogenous factors that might lead to the collapses of these Chinese empires, which include, among others, the rulers' tyranny, harsh laws imposed on the lives of people, large expenditure on big projects (such as the Great Wall and the Grand Canal) and persecution of Confucianism. However, many of these factors could also be found in other, long-lived dynasties. Throughout history, Chinese political rulers have struggled to increase their territories through conquest. However, the enlarged territories (or, in other words, the increased distances that the borders are away from the rulers) per se are also an endogenous factor determining the lifespan of the Chinese regimes.

**Table 2.1** A comparison of China's three short-lived dynasties and their predecessors. (Source: Guo 2013b, p. 269)

Indicator	Qin (221–206 BC)	Sui (AD 581–618)	Yuan (1279–1368)
Capital city	Xian'yang (near Xi'an)	Chang'an <sup>a</sup> ; Luoyang <sup>b</sup>	Dadu (Beijing)
Length of lifespan (years), which is	15	37	89
Less than that of its predecessor by	810 (556) <sup>c</sup>	118	230
Distance between capital and farthest frontier (km) <sup>d</sup> , which is	2000	3200 <sup>a</sup> ; 3100 <sup>b</sup>	4000
Longer than that of its predecessor (km) by	800 <sup>e</sup> ; 1050 <sup>f</sup>	–300 <sup>a</sup> ; 1100 <sup>b</sup>	2000 <sup>g</sup> ; 2300 <sup>h</sup>
Area of territory (million km <sup>2</sup> ) <sup>i</sup> , which is	3.6	8.4	16.8
Larger than that of its predecessor (million km <sup>2</sup> ) by	0.2	–0.8 <sup>a</sup> ; 6.1 <sup>b</sup>	12.2 <sup>g</sup> ; 12.8 <sup>h</sup>
Major force for collapse	Endogenous	Endogenous	Endogenous
Compared to that of its predecessor	Endogenous	Exogenous and endogenous	Exogenous

<sup>a</sup>From AD 581 to 605, <sup>b</sup>From AD 606 to 618, <sup>c</sup>Figure within the parenthesis is based on that the Zhou dynasty does not include the “Warring States” period (from 475 to 221 BC), <sup>d</sup>Estimated by the author based on relevant maps of ancient China, <sup>e</sup>Based on the Western Zhou dynasty (1046 to 771 BC), <sup>f</sup>Based on the Eastern Zhou dynasty (771 to 221 BC), <sup>g</sup>Based on the North Song dynasty (AD 960 to 1127), <sup>h</sup>Based on the South Song dynasty (AD 1127 to 1279), <sup>i</sup>Available at://bbs.zanba.com/message/122377/122377304.html

In fact, the direct cause of the Qin's collapse was initially connected with a failed, long-distance trip of border patrol led by Chen Sheng and Wu Guang. For example, the following was reported in Sima Qian's (145–87 BC, 1997) famous book *Shiji* (historical records):

In 209 BC, Huhai, the second emperor of the Qin dynasty, ordered 900 people in the region of Huaihe river to Yuyang (today's Miyun county in northeast Beijing) to serve as border patrol. Chen Sheng and Wu Guang were appointed leaders of the troop. When people arrived in Dazexaing (in southwest of today's Anhui province), due to heavy rain, the roads were damaged and their trip to the destination was delayed. According to Qin's penal code, those in military service would be executed if they failed to keep their appointments. Since Chen and Wu had long been dissatisfied with their poverty-stricken life, and now faced the treats of death, they decided to initiate an uprising to 'save' themselves. Soon, they established their own regime entitled Zhangchu. Later, Chen and Wu were murdered by their subordination. And the rest of the army was surrendered to Liu Bang and Xiang Yu. In 206 BC, the Qin dynasty came to an infamous end.<sup>2</sup>

### 2.1.3 Story 3

In some circumstances, a bad border can be transformed into a good border. At the end of December 29, 2011, Samoa—which was formerly known as Western Samoa and used Coordinated Universal Time (French: Temps Universel Coordonné, UTC) UTC-11 (UTC-10 during the summer)—decided to advance to UTC+13 (UTC+14 during the summer), by skipping December 30. Before that decision, Samoa was, in effect, losing two business days every week with the region by being on the eastern side of the International Date Line (IDL). For example, while it's Friday in Samoa, it's Saturday in New Zealand, and when the Samoans are at church on Sunday, Australians are already conducting business in Sydney and Brisbane.

Samoa is a country encompassing the western part of the Samoan islands in the South Pacific. It became independent from New Zealand in 1962. The Samoa Time Zone observes standard time by subtracting eleven hours from UTC-11, which means that Samoa is far frontier of the Western Hemisphere. The zone includes the US territory of American Samoa, as well as the Midway islands and the uninhabited islands of Jarvis, Palmyra, and Kingman reef. The zone is one hour behind Hawaii–Aleutian Time Zone, one hour ahead of Howland and Baker islands, and 23 h behind Wake island Time Zone.

While the time difference put Samoa 21 h behind eastern Australia and 23 behind New Zealand, the change has put it an hour ahead of Wellington and three ahead of Sydney. The decision to move Samoa east of the international dateline was made 119 years ago to bring the island closer in line with major trading partners in the United States and Europe. However, Samoa's trading partners have dramatically changed and today they do a lot more business with New Zealand and Australia, China and other dynamic economies in the southwest Pacific.

<sup>2</sup> Excerpted from Sima (104 BC, 1997, pp. 558–560)—translated by author based on the Chinese text.

As a matter of fact, Samoa was not the first nation to change the time zone. For many years the International Date Line (IDL), that for historic reasons bisected the Republic of Kiribati into two halves in the Pacific Ocean, had been viewed as an annoying economic nuisance. The western part of the republic was always 24 h ahead of its eastern part, and there were only 4 days in each week when official business could be conducted between both parts. To put an end to this situation, the sparse Kiribati announced that on January 1, 1995 the IDL would henceforth run along the many-cornered eastern boundary of the republic. Republic of Kiribati was authorized to modify its time zones, since the line is simply established by international agreement and there are not treaties or formal agreements associated with the line, but that didn't necessarily mean that everyone would accept the change, especially when the latter could yield negative effects on the rest of the world. While sites like WorldTimeZone.com embraced the change, MapQuest.com did not.<sup>3</sup>

## 2.2 Viewing Borders from Two Sides

### 2.2.1 *From Proximity to Adjacency*

As the clearest symbol to territorial divisions, political borders physically and politically serve as the divisions of the world. In general, the special political and economic mechanisms of border regions stem from two facts:

- i. Border regions are located in the geographical margins of their respective political units (such as independent dependent states, provinces, municipalities, counties, etc.) and are usually far away from the core regions;
- ii. Each cross-border region, which is usually a complete, contiguous geographical area, is under the jurisdiction of two or more political authorities.

Obviously, the first fact suggests that, locationally, it is always technically and economically inefficient for regions with proximity to political borders to conduct exchanges and cooperation with their remote heartlands; while the second fact implies that there always exist cross-border separations and fragmentations between any pair of adjacent political/administrative regions.

“Proximity” and “adjacency” are different geographical terms. Mathematically, proximity can be measured as a continuous variable (i.e., distance) but adjacency can only be represented as a discontinuous variable (or dummy). In cross-border economic analysis, the two terms play differing roles. In clarifying how proximity and adjacency are distinguished to affect cross-border regions, Cattano and Grasland (1992) developed a framework in which the impacts of distance and borders were

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<sup>3</sup> For example, as noted by MapQuest.com, “To depict that Kiribati’s date and time decisions are applicable to the vast oceanic reaches between its component islands, where it actually has no legal jurisdiction, is both inaccurate and misleading.” (Rosenberg, 2008).

specified for two types of variables: state variables relating to the situation in certain places; and flow variables relating to the interaction between different places.

### ***2.2.2 Pros and Cons of Borders***

Indeed, sharing a common land border will always promote international trade and economic cooperation. For example, bilateral trade of France with the United Kingdom will be due to their proximity but with Germany will be further boosted by the effect of their common border in addition to their proximity. One of many ways to include ‘adjacency’ in the quantitative analysis of international trade is to treat it as a dummy variable. Following this analytical framework, Frankel et al.’s (1997a, p. 66) estimated coefficients on ‘adjacency’ range between 0.5 and 0.7. Because trade is specified in natural logarithmic form in their estimates, the way to interpret the coefficients on adjacency is to take the exponent: that is to say, two countries that share a common border will, *ceteris paribus*, increase their trade by about 65–101 % compared with two otherwise countries. Of course, all of this must be subject to the conditions that the trading partners on both sides of a border can mutually benefit from each other and that their common land border is an open one.

Political borders can lead to economic miracles. For the second half of the nineteenth and much of the twentieth centuries, Hong Kong and mainland China were separated by an international boundary marked by a river called Shenzhen (see Fig. 2.1). The Chinese characters, Shenzhen, mean a deep gutter. However, no one would have expected that the “gutter” had served as a forbidden frontier between the socialist China and the British Hong Kong in the mid-twentieth century, and have also served as a strong economic engine for Guangdong province since then. The proposal for establishing Special Economic Zones (SEZs) was finally approved by the National People’s Congress of China in 1980. Since then, in order to attract foreign investment, China and Guangdong province have enacted a series of “special” laws and regulations and favorable measures relating to the industrial and commercial registration, economic contract, technology import, labor and personnel, real estate, etc. for the Shenzhen SEZ.

Among the factors contributing to the rapid economic growth of Guangdong province, Guangdong’s geographical adjacency to Hong Kong and its cultural linkages to the dynamic economies in Southeast Asia are worthy of mention. As a coastal province, Guangdong has a huge number of natives and their descendants scattered in several dozens of countries and regions, particularly in Hong Kong and other Southeast Asian economies. During the past decades, especially since the handover of Hong Kong from the UK to China in 1997 and the implementation of the Closer Economic Partnership Arrangement (CEPA) in 2003, the development of Hong Kong has positively influenced that of Guangdong, and vice versa. On the other hand, the removal of the China–Hong Kong border has also generated some unwanted outcomes, resulting from different political or institutional systems that are adopted by both sides of the border (see Box 2.1).

**a****b**

**Fig. 2.1** The Shenzhen river—a once-ever forbidden border between Hong Kong and mainland China. **a** The early 1980s. **b** The 2010s. (Source: <http://www.dsd.gov.hk>. Courtesy of HKSAR)

### **Box 2.1 Cross-Border Students in Hong Kong**

The cross-border students (CBS) refer to those who were born in Hong Kong but live in mainland China. In every school day, they arrive in and exit from Hong Kong. In 2004, the number of the CBS was only 3803 (including kindergarteners and primary and secondary students); in 2012 it rose to 16,400. In the years to come, the number of the CBS will keep increasing.

At present, ways for the CBS to come to Hong Kong include the Cross Border School Coaches, nanny buses, and public transport. Since the pick-up/drop-off points at the current border control points are limited, students may

need to get on or off the coaches and nanny buses in crowded areas and are exposed to dangers of traffic accidents or kidnap.

There were only 620 Hong Kong-born Mainlanders (HKBMs) in 2001; however, the number has been 35,700 in 2011. According to a research report, 98 h of these HKBMs will be living in mainland China till the age of six years old; and 41 o of them will return back to Hong Kong to pursue their school courses.

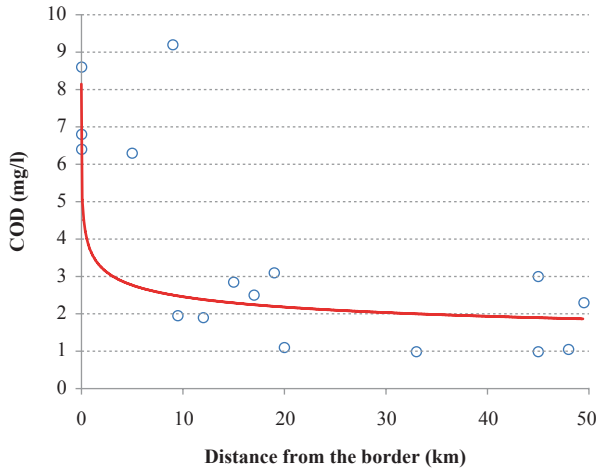
Language differences result in communication difficulty since many of the CBS are more fluent in Mandarin (the official language widely used in mainland China) than Cantonese (the official language used in Hong Kong). Thus, it is difficult for them to communicate with local students in Hong Kong. In addition, the difference between Hong Kong and mainland China's culture has led to difficulties for the CBS to adjust their identity. With a lack of understanding in Hong Kong's culture, systems and values, failure to naturalize in Hong Kong is common among the CBS.

(Source: Author based on Ling (2012) and Jia (2013).

However, 'borders' per se do have many negative effects. In the Lower Mekong Basin (LMB)—area that contains Cambodia, Lao PDR, north and northeast regions of Thailand and the Mekong delta of Vietnam, for example, water pollution is more serious in transnational border areas and than in other areas (see a case study at the end of Chap. 16 for a detailed analysis). In order to quantify the geographical effects of border on transnational water pollution, let us introduce a variable: "distance to the nearest border". According to the indicator of chemical oxygen demand (COD) of each water quality station and the distance between the station and the nearest international border site, we can find that the water pollution indicator tends to decrease with respect to the distance (see Fig. 2.2). Obviously, the above findings provide evidence in support of the view that water pollution is negatively related to the distance to the border.

### 2.2.3 *Views from Larger Extent*

Indeed, it is almost certain that sharing a common border is not good for cross-border environmental protection. In such circumstances, borders pose serious challenges to all stakeholders concerned. For example, even in the case of the US and Canada—two countries that share the longest undefended border in the world (in the sense of the absence of military forces)—efforts to jointly govern the water pollution of the rivers and lakes that either flow along or overlap their common border have required the negotiation of different treaties and agreements to date. Several international treaties deal with oceanic pollution, including the 1972 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter and the 1973 International Convention for the Prevention of Pollution from Ships. International controls and enforcement of the above treaties, however, are generally weak (Hart 2004). When fresh water and marine resources must be shared by unfriendly, authoritarian or even



**Fig. 2.2** The impacts of ‘distance’ on transnational water pollution. Notes: *COD* chemical oxygen demand, the unit of which are milligram per liter (mg/l). (2) The distance is measured by author on the basis of the map provided by the Mekong River Commission (MRC). (Source: Case study 16 of Chap. 16)

totalitarian nations, cross-border coordination in the exploitation and management of natural resources becomes an even more difficult—if not an impossible—task.

Usually, the socio-economic complexity of a border-area is positively related to the political level of the border(s) involved. For example, the higher the status of the border’s political level, the more complicated the structure of the border-area. A striking difference in the functions between international border-areas and intra-national border-areas is the nature of political dependence in the region. Unlike the situation in the dependent political units and other administrative subdivisions, no central administrative authority can enforce agreements between nations over the transnational issues.

In 1986 the West European nations amended the Treaty of Rome with the Single European Act. This Act provided for the removal of all remaining restrictions to the free flow of goods, services, capital and labor among member nations, so that the member nations became a single unified market at the beginning of 1993. This has produced substantial efficiency gains and other benefits for the European Union (EU). The static welfare benefits resulting from the formation of the EU are estimated to be 1 to 2% of GDP, while the dynamic benefits were estimated to be much larger (Cecchini 1988). The program also induced large amounts of foreign direct investment (FDI) from the other nations, especially the United States and Japan, in anticipation of a new increase in EU protectionism against outsiders. However, the efforts to unify all independent economies have not been successful in the entire territory of Europe. The Organization for Security and Cooperation in Europe (OSCE), including countries from at least three cultures (Eastern Orthodox, Islam and Western Christianity) with quite different values and interests, has faced major obstacles against its development of a significant institutional identity and a wide range of important activities.

## 2.3 Structural Complexity of Borders

A cross-border area is a geographical system governed by political rules and divided by two or more man-made boundaries. In this system, all sub-areas interact with each other. The elements of each sub-area, which include various political, economic and cultural factors, are correlated with each other in sequence. The whole geographical system provides a very complicated function with respect to the locations. The interactions between the various elements of all sub-areas are complex. In addition, cross-border areas are sometimes integrated and dynamic. The former emphasizes that all adjacent areas are geographically interdependent, whereas the latter describes the relationship between the state and time of systems.

### 2.3.1 Propositions

In order to examine the political and economic effects of borders, I assume that a geographical area is equally divided in size by  $N$  regimes, each of which has a different political system from the others. Furthermore, in order to make the analysis clearer and concrete, let us use the following assumptions:

1. All necessary production factors (such as labor force, capital, technology, natural resource, information, etc.) are both scarcely and unevenly distributed within the area.
2. The production factors can flow more freely within each sub-area than between the  $N$  sub-areas of the area when  $N \geq 2$ .
3. Each of the  $N$  sub-areas has at least one comparatively advantageous (or disadvantageous) sector over the other(s) when  $N \geq 2$ .
4. Transport and communication cost within each sub-area is too little to influence the preference of the sub-area in allocating its production factors.
5. The objective of each sub-area is to optimize its well being through the behavior of its agents.

In fact, Assumption 1 is not *ad hoc* in the real world. Assumption 2 is a basic law if border-related barriers exist. Since each sub-area is different and independent from the others, inter-area (cross-border) cooperation is more difficult and costly than intra-area cooperation. In the real world, Assumption 3 is the *sine qua non* for the sub-areas to develop cross-border cooperation after the border-related barriers are removed or reduced. Technically, Assumption 4, which is widely used in most spatial economic analyses, allows the intra-area cooperation to become profitable within each of the  $N$  sub-areas when  $N$  decreases (or, in other words, when the size of each sub-area increases). Finally, Assumption 5 serves as an indispensable condition under which the output of each sub-area and the total output of the area as a whole can be optimized, respectively.

Suppose that the degree to which a sub-area depends on the outside world is denoted by  $R$  and that the size of the sub-area is  $S$  (for simplicity,  $S$  is assumed to be expressed by  $\pi r^2$ , where  $r$  denotes the average radius of the sub-area). Deriving the differential of  $R$  with respect to  $S$ , we have



$$\frac{\partial R}{\partial S} = \frac{\partial R}{\partial r} \cdot \frac{\partial r}{\partial S} = \frac{\partial R}{\partial r} \cdot \frac{\partial r}{\partial(\pi r^2)} = \frac{1}{2\pi r} \cdot \frac{\partial R}{\partial r} \tag{2.1}$$

Since interdependence ( $R$ ) always decreases with respect to distance, so does it with respect to  $r$ . Consequently Eq. 2.1 becomes  $\partial R/\partial S < 0$ . As a matter of fact, since the number of sub-areas ( $N$ ) and the average size of each sub-area ( $S$ ) are negatively related to each other for the given area, we have  $\partial R/\partial N > 0$ . Finally, we have

**Proposition 1** The degree of cross-border dependence usually grows with respect to the number of sub-areas involved in the area.

Since adjacent political units—countries or sub-national administrative areas—are independent from each other, the adoption of a common standard and the coordination between them is unlikely to be emphasized. In order to have a concrete expression, let us simplify the scenario: suppose that the reliability of relations between any pair of sub-areas is expressed by  $r$  ( $0 \leq r < 1$ ). Thus, the aggregate reliability of cross-border relations ( $R$ ) of the area with  $N$  sub-areas can be expressed by

$$R(N) = r^{\sum_{i=1}^{N-1} i} \tag{2.2}$$

In Eq. 2.2,  $\sum_{i=1}^{N-1} i$  denotes the number of sub-area pairs of the  $N$ -d cross-border area. As Eq. 2.2 shows, since the value of  $r$  ranges between 0 and 1, the aggregate reliability of the cross-border relations is negatively associated with the number of sub-areas involved, that is,

$$R(N) < R(N - 1) < \dots < R(3) < R(2) \tag{2.3}$$

To make the demonstration more intuitive, let us assume that  $r$  has five values (0.99, 0.90, 0.50, 0.30 and 0.10). As shown in Table 2.2, when  $N > 3$ ,  $R$  will sharply decrease if  $r$  is less than 0.5. Consequently, we have

**Proposition 2.** The reliability of cross-border relations usually decreases with respect to the number of sub-areas involved.

**Table 2.2** Cross-border reliability scores ( $R$ ) with respect to the number of sub-areas ( $N$ ). (Source: Eq. 2.2)

$N$	$r=0.99$	$r=0.90$	$r=0.50$	$r=0.30$	$r=0.10$
2	0.99	0.90	0.50	0.30	0.10
3	0.97	0.73	0.13	0.03	0.00
4	0.94	0.53	0.02	0.00	0.00
5	0.90	0.35	0.00	0.00	0.00
6	0.86	0.21	0.00	0.00	0.00
7	0.81	0.11	0.00	0.00	0.00
8	0.75	0.05	0.00	0.00	0.00
9	0.70	0.02	0.00	0.00	0.00

It is often asserted that multilateral agreements become less effective as the number of independent participants involved increases (Barrett 1992, pp. 11–36). As the number of nations increases, so do the differences between them, which means that agreement on the basis of simple rules like uniform abatement levels without side payments, will then become very difficult to reach. Even if an agreement can be reached, it may not be sustainable. Below gives a couple cases in this regard.

### **2.3.2 Evidence: ‘1>27’**

In 2003, China committed to investing 200 million € (about US\$ 270 million) for the privilege of participating in the development of the Galileo—Europe’s global navigation satellite system (GNSS) program. But by 2007 it had been forced out of major decision-making because of security concerns and the collapse of the original financing plan for the program, which was to include public and private money. Almost at the same time, China announced that it would build a full-fledged GNSS called BeiDou system (BDS), which would transmit signals in the L1 band where GPS and Galileo military and public safety services are located. While the Galileo was falling behind schedule, China has moved forward and made rapid progress in the development of its own GNSS. What’s more, China had announced its plans to transmit signals on the wavelength that the Europe wants to use for Galileo’s Public Regulated Service (PRS), an encrypted frequency for governmental, immigration, public safety, and potentially military use.

According to Jean-Michel Fobe, President of Belgium’s Eutralex Aerospace and a man with some experience working with Chinese collaborators, the Chinese government sets its priorities and makes the decisions. Fobe added: “There is no argument, no negotiation. It’s not like here in Europe where 27 different opinions have to be brought together before we can do anything.” (Gutierrez 2012) This is the price of pan-European democracy. By way of contrast, China pays no such price. Today BDS, not Galileo, has become the third fully operational global satellite navigation system, after GPS (a United States’ Global Positioning System) and GLONASS (a Russian Global Navigation Satellite System). Despite years of effort, negotiations to resolve the signal overlap question have made Galileo little progress.

### **2.3.3 Evidence: ‘4>7’**

Within Africa there are two river-basin organizations which provide comparative examples of work on water management and conflict resolution. The Senegal River Authority (Organization pour La Mise en valeur de Fleuve Sénégal, or OMVS) was found in 1963 by four nations of Guinea, Mali, Mauritania and Senegal. The functions of the OMVS are navigation, promotion of irrigation and hydropower production and the authority to construct and operate joint projects (OMVS 1988). The OMVS successfully conciliated Senegal and Mauritania on the sharing of the

resources of the Senegal after the 1988 conflict in which farmers and herders on both sides of the river fought over the same land and water resources (Green Cross 2000, p. 84). The two dams constructed by the OMVS are owned jointly by the member states, as are the river seaports at the river mouth that the OMVS has developed and maintained.

However, as the case of the nearby river basin, the Niger, shows, good organization is not always sufficient for successful functioning. Cooperation in the Niger basin started in 1963 when seven out of the nine riparian states (Nigeria, Niger, Benin, Burkina Faso, Mali, Guinea, Sierra Leone, Algeria, and Cote d'Ivoire) signed the Act of Niamey. The structure of the Niger Basin Authority (NBA) is similar to the OMVS: secretariat, technical committee of experts and the Council of Ministers. However, unlike the OMVS, the NBA's performance was poor (Rangeley et al. 1994, pp. 43–48). The failure of the earlier multinational management organization, the Niger Commission, and its replacement, the NBA, could be the result of the heterogeneous composition of their seven member states. In 1980 this structure was reformed and an upper level of the Summit of Heads of State was added in order to improve performance, but this did not prove effective. The main reason was the fact that only a few of the nine states really shared a common interest in the joint development of that basin (Oforu-Amaah 1990, pp. 246–248).

## 2.4 Creating (Removing) Borders: Effects

Why are political borders formed? In general, there are two different mechanisms (or driving forces) for the formation of borders. The first category of borders, also usually the one that could be found in ancient times but rarely in modern times, relates to the limit to the influences or ability of political or military powers. This is quite natural to understand, since people could occupy—as vast as they could—the land in a populously sparse area. Finally, a border would be formed till the ruler was not able to obtain any more territory. The second category of borders concerns the results of bargaining, quarrelling, struggles or wars between two or more adjacent political or military powers. These borders represent the divisions between two or more political or military powers.

### 2.4.1 *Border-Related Barriers*

The social and economic development of any adjacent territory separated by a political border is not solely determined by one side of the border only. However, a political boundary is the power limits beyond which the ruling power cannot extend their political and economic influences. As a result of this locational characteristic, border regions have always been disadvantageously located.

Border-related barriers exist where the intensity of interaction suddenly drops. Border crossings are the points of intense interaction. In general, one can distinguish various reasons for the existence of the effects of cross-border barriers:

- i. weak or expensive infrastructure services in transport and communication for international links;
- ii. preferences by consumers for domestic rather than foreign products and internal travel rather than foreign destinations;
- iii. various types of government interventions; and
- iv. lack of information about foreign countries.

Rietveld (1993, pp. 47–59) offered a measure of international barriers in European countries. Specifically, he expressed this as a measure of service reduction between areas located in different countries as compared to areas located within the same country. He also measured the lack of accessibility due to border crossing by different modes of transportation and communications. To analyze the impact of borders, Ratti and Reichman (1993) formulated a theoretical hypothesis that emphasizes the overcoming of barriers through the construction of contact areas allowing interregional cooperation. After some necessary specifications, Ratti (1990, 1993, pp. 60–69) also developed two different approaches to overcome the existing barriers and border effects. These are specified as:

- a. A micro-economic approach which examines the frontier through the analysis of the economic actor's strategy behavior, and is based on the theory of industrial organization; and
- b. A meso-economic approach which considers the role of "frontier" within a specific supporting space or milieu.

#### ***2.4.2 Political Economy of Borders***

Tariffs, as one of the many border-related barriers, increase the cost of imports, leading to a decline in consumer surplus. It is hard to think of any benefits that consumers can obtain from increasing tariffs. Maybe in the long run consumers may benefit from the protection of domestic industries if these industries use the tariffs to improve domestic producers, who produce the good, will benefit from the introduction of tariffs. This is because it makes their domestic production relatively more attractive compared to the imports. However, it is argued that the restriction of competition encourages domestic firms to become inefficient. Therefore, in the long run, domestic firms may not make the necessary improvements that they would have done without tariffs. Also the introduction of high tariffs usually leads to retaliation. Therefore, other countries will place high tariffs on their imports, which will eventually impede both imports and exports.

Neoclassical economic theorists tend to view tariffs as distortions to the free market. Typical analyses find that tariffs tend to benefit domestic producers and government at the expense of consumers, and that the net welfare effects of a tar-

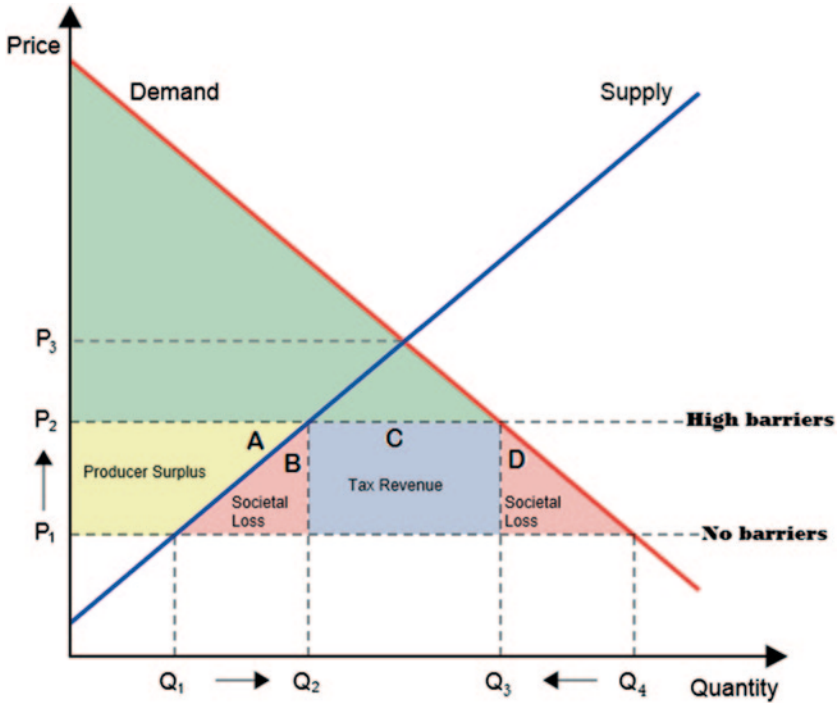


Fig. 2.3 Economic analysis of trade barriers

iff on the importing country are negative. Normative judgments often follow from these findings, namely that it may be disadvantageous for a country to artificially shield an industry from world markets and that it might be better to allow a collapse to take place.

Trade barriers have the effect of raising prices higher than they would otherwise be in the home country if it permitted free trade. They enhance the market shares of “protected” domestic producers and limit the volume of goods and services exported into the country from foreign origins. Prohibitive tariffs and non-tariff barriers can preclude and eliminate imports of some products altogether. Almost every student of international economics is familiar with the analytical diagram shown in Fig. 2.3 that depicts the static welfare effects of tariffs, quotas and other such trade restrictions.

The diagram depicts the economic effects of trade barriers in a country. If the country does not open door to the outside world, the price level would be set at  $P_3$  and this country would have no imports. All production and consumption would be domestic.

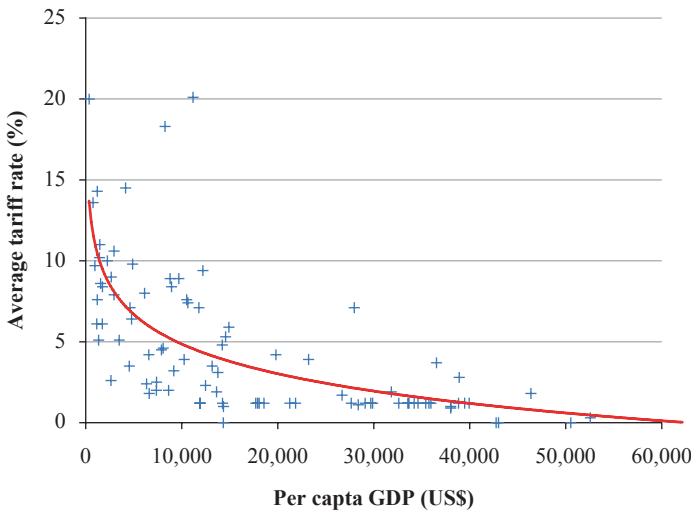
If a country has no barriers, the world price ( $P_1$ ), which is assumed to be lower than  $P_3$ , would prevail in the market. The country’s domestic producers would supply  $Q_1$ , and the country would import  $Q_4 - Q_1$  from the rest of the world. Trade barriers restrict the world supply in the country, and thus raise the price to  $P_2$ . Domestic production increases to  $Q_2$ , and imports are reduced to  $Q_3 - Q_2$ . The total area

(A+B+C+D) is a loss in consumer welfare due to the higher prices. The area A is called the ‘redistribution effect’, because domestic producers gain at the expense of domestic consumers. The area C is called the revenue effect. If the trade barrier is a tariff, then the government collects area C in the form of tax revenue. If the trade barrier is a quota, then area C may accrue to either the government, domestic importers, or foreign producers. It depends on the circumstances and relative powers in the market. The combined triangle areas (B+D) are known as the ‘deadweight loss’ of trade barriers. The deadweight loss of the triangles B and D can also be labeled ‘societal loss’ or ‘efficiency loss’. This cost is incurred because tariffs reduce the incentives for the society to consume and produce.

Trade barriers are the natural consequence of self-interest and political influence. Domestic producers and their workers tend to favor trade barriers as a shield against foreign competition. From government’s point of view, tariffs will increase its revenue. However, if the tariff rate is too high, there may no longer be any import of goods. Therefore, the government will not get any tariff revenue. Nevertheless, on the basis of the data from 92 nations, we may find that tariffs are lower amongst countries with higher GDP per capita (Fig. 2.4).

### 2.4.3 Quantifying Border Effects

How to quantitatively measure the effect of the sudden removal of a once-ever forbidden border on regional economic growth? Let us construct a simple mathematical formula.<sup>4</sup> Assuming that:



**Fig. 2.4** Tariff rate decreases with respect to per capita GDP. (Source: Author based on data released by Pettinger 2011)

<sup>4</sup> The economic effects of creating a new border can also be measured by the same formula described below.

1. there is a relatively backward nation that shares a land boundary with an advanced economy;
2. after the nation implements an open-door policy, only the region adjoining to the advanced economy is granted or has significant geographical advantages to pursue cross-border economic cooperation; and
3. the rest part of this nation cannot benefit from cross-border cooperation or at least not as much as the border region can.

Let  $a_t$  and  $b_t$  be the populations of the whole nation and of the border region at time  $t$ , respectively (since the border region is only a small part of the whole nation,  $b_t$  is always much less than  $a_t$ ); and  $x_t$  and  $y_t$  be the per capita income levels of the whole nation and of the border region at time  $t$ , respectively. When  $t=0$ , it denotes that there was no cross-border cooperation; and when  $x_0=y_0$ , it indicates that the nation is economically homogeneous before cross-border cooperation.

On the basis of the three assumptions made at the beginning of this section, the macroeconomic effects of cross-border cooperation can be roughly estimated as follows.

a. Absolute-term border effect

Using the absolute term to measure the effect of cross-border cooperation (denoted by  $Z_t$ ) at time  $t$ , we have:

$$Z_t = (y_t - y_0) - (x'_t - x'_0) \quad (2.4)$$

Where,  $x'_t$  and  $x'_0$  denote the per capita income levels of the rest of the nation at time  $t$  and 0, respectively, which are measured as the following:

$$x'_t = \frac{a_t x_t - b_t y_t}{a_t - b_t} \quad \text{and} \quad x'_0 = \left( \frac{a_0 x_0 - b_0 y_0}{a_0 - b_0} \right). \quad (2.5)$$

If the nation is economically homogeneous before the cross-border cooperation (i.e.,  $x_0=y_0$ ), Eq. 2.4 becomes

$$Z_t = \frac{a_t (\Delta y - \Delta x)}{a_t - b_t}, \quad \text{where } \Delta x = x_t - x_0 \text{ and } \Delta y = y_t - y_0. \quad (2.6)$$

If  $a_t$  is significantly larger than  $b_t$ , Eq. 2.6 can be further simplified as

$$Z_t \approx \Delta y - \Delta x, \quad \text{where } \Delta x = x_t - x_0 \text{ and } \Delta y = y_t - y_0. \quad (2.7)$$

b. Relative-term border effect

Using the relative term to measure the effect of cross-border cooperation (denoted by  $z_t$ ) at time  $t$ , which is also called the coefficient on cross-border cooperation (CBC) or the CBC coefficient, we have:

$$z_t = \frac{(y_t - y_0)}{(x'_t - x'_0)} \quad (2.8)$$

Where,  $x'_t$  and  $x'_0$  are represented by Eq. 2.5. If the nation is economically homogeneous before the cross-border cooperation (i.e.,  $x_0 = y_0$ ), Eq. 2.8 becomes

$$z_t = \frac{(a_t - b_t)\Delta y}{a_t\Delta x - b_t\Delta y}, \text{ where } \Delta x = x_t - x_0 \text{ and } \Delta y = y_t - y_0. \quad (2.9)$$

If  $a_t$  is significantly larger than  $b_t$ , Eq. 2.9 can be further simplified as

$$z_t \approx \frac{\Delta y}{\Delta x}, \text{ where } \Delta x = x_t - x_0 \text{ and } \Delta y = y_t - y_0. \quad (2.10)$$

Obviously, when the effect of cross-border cooperation is positive, we have  $Z_t > 0$  and  $z_t > 1$  (where  $t > 0$ ). Moreover, the larger the values of  $Z_t$  and  $z_t$ , the greater the effect of cross-border cooperation. However, care should be taken when the above methods are applied to estimate the economic effect of cross-border cooperation in countries that are not characterized by the three assumptions stated at the beginning of this section. If one or more of these assumptions do not exist, the results represented by the above equations may not be exact.

## 2.5 Case 2. Cross-Border Dynamics in the Unified Germany

After the fall of the Berlin Wall at the beginning of November 1989, a rapid East–West German unification process was set in train. Below are the most important stages:

- 7 December 1989: A round table—a forum of representatives from old and new parties and organizations—convenes under the auspices of church representatives to put forward proposals to resolve the national crisis.
- 19 December 1989: West German Chancellor Helmut Kohl arrives on his first official visit to the East Germany. In Dresden he is enthusiastically received with calls of “Helmut, Helmut” and chants of “Germany united fatherland”.
- 18 May 1990: Signing of a treaty for economic, currency and social union. Kohl sees this as “the birth of a free and united Germany”.
- 1 July 1990: Currency union implemented. East Germany changes to the D-Mark. People crossing the inner-German border are no longer subject to controls.
- 16 July 1990: Kohl and Soviet leader Mikhail Gorbachev announce a breakthrough in the alliance issue. Germany is to remain a member of NATO after reunification.



- 23 August 1990: The East German parliament approves the accession of the German Democratic Republic to the Federal Republic of Germany (West Germany) from October 3.
- 31 August 1990: The unification treaty is signed in East Berlin. Both parliaments ratify the treaty on September 20 by two-thirds majorities.
- 1 October 1990: Germany becomes fully sovereign. The Allies' special rights in Berlin are abolished as from 3 October.
- 3 October 1990: At midnight Germany's black, red and gold flag is hoisted in front of the Reichstag to the strains of the national anthem.<sup>5</sup>

Besides the political and national unification, the removal of the impenetrable border has created a dynamic socio-economic situation. Within the enlarged space-economy of the unified Germany, the former inner-German border-region has to compete with far more powerful concentrations of population and economic activity. From the locational point of view, the political and economic integration of adjacent nations can be seen as the integration of different factor endowments at different levels of development. More specifically, economic interdependence between former rival economies can be interpreted as supplying a certain amount of labor force, land, capital stock and technology to each side of the newly unified economy across the border that was previously closed. Eventually, the national wealth per capita in the enlarged territory will be equalized and upgraded.

Below are two geographical zones which were dreadfully identified in the former inner-German border and are now experiencing dramatic changes in the unified Germany.

The Bavarian section of the former inner-German border-region has demonstrated a vigorous economic growth since the removal of the border. This area connected three countries of West and East Germany and Czechoslovakia during the Cold War era. The employment trends indicate the strong upsurge of economic activity in the border zone following the frontier opening. This growth has largely occurred through the expansion of the existing firms, which have seen their businesses prospects transformed by the addition of new markets at local, regional, and national levels within East Germany. In addition, more than 80% of over 700 enterprises in the areas within the entire ZRG (i.e., Zonenrandgebiet, which included the Baltic coastland in east Schleswig-Holstein and the elongated strip of territory bordering on Czech Republic and was first designed in 1953 as a 30–60 km wide zone, running along the eastern border of the four Federal states of Schleswig-Holstein, Lower Saxony, Hesse, and Bavaria) had expanded their business as a result of frontier opening (Wild and Jones 1993; Jones and Wild 1994).

Berlin had a peculiar constitutional status during the Cold War era. Its eastern side was the apex of the centrally planned economy, while its western side followed the market capitalism and was heavily subsidized by the Federal government. The disappearance of this special status raised the process of modernization for the two spatial economies. After the World War II, the public sectors which had been under

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<sup>5</sup> Source: <http://www.london.diplo.de>. Accessed on January 3, 2012.

the control of the Berlin government before 1945, gradually split up following the establishment of the two independent states (i.e., the German Democrat Republic and the Federal Republic of Germany). Separate entities in both sides of the Berlin Wall were formed, with the governments of both cities exercising full ownership over them. To speed up the process of industrialization and urbanization of the unified Berlin, the Federal Republic's financial support for both sides of the city increased a great deal. Furthermore, water, electricity, gas, telecommunication and transport companies are busy marrying the two halves of the city through an investment program aimed at modernizing the entire infrastructure.

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## Chapter 3

# Managing Across Borders

During the Chinese history, attempts to control the Yellow river have been categorized by different strategic approaches. One strategy is to confine the river within a narrow channel by high levees. The narrow-channel concept carries the danger of active erosion of the levee, but it encourages the fast flow that keeps sediment in suspension, and therefore, allows only slow silting of the river bed. However, there is little reserve capacity for absorbing a major flood crest, and even the high levees will inevitably be overtopped. On the other hand, one might adopt a strategy of confining the river in a wider flood plain, between lower levees. This is cheaper to construct, but requires that more land be sacrificed to river control. It also permits a slower flow, and promotes silt deposition. Over time the river will inevitably build up its bed. However, there is much more reserve capacity for flood water in a wide channel, and there is room to build small diversion dams to keep the river course to the center of the channel, avoiding the problem of scouring against the levee foundations.

There was still a third approach to managing rivers in ancient times, which was criticized by Mencius (372–289 BC, 1999) as the egocentric flood-control measures taken by the upstream states. Mencius, known as the second sage of Confucianism, was born in the lower reaches of the Yellow river. He mentioned the following dialogue with Baigui (a minister of the state of Wei in today's Henan province):

Baigui said, 'My management of the waters is superior to that of Yu the Great.' Mencius replied, 'You are wrong, Sir. Yu's regulation of the waters was according to the natural laws of water. He, therefore, made the four seas their receptacle, while you make the neighboring states their receptacle. Water flowing out of its channels is called an inundation. The inundating waters are disastrous to the neighboring states, and what a benevolent man detests. You are wrong, my dear Sir!'<sup>1</sup>

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<sup>1</sup> Cited from Mencius (c. 300 BC, Gaozi II).

### 3.1 Doctrines and Obligations

Cross-border resource management is usually associated with two or more stakeholders. All such resources must exhibit the following two distinctive characteristics. First, from the perspective of efforts to manage resources and maintain environmental quality, they must constitute natural systems or meaningful units. Second, the cross-border resources must be affected by multiple jurisdictions and therefore fully or partially lie outside the jurisdiction of any one given regime. That is, any resource of this type must not be subject to the sole management of a single regime.

International laws and treaties provide the normative framework and procedures by which to coordinate behaviors, to control conflicts, to facilitate cooperation and to achieve common values among independent countries concerned. The international laws and treaties on natural and environmental resources, as a part of the international laws and treaties, are designed to regulate relationships between countries with respect to the exploitation and utilization of their shared common or cross-border resources. A piece of natural or environmental resource may be internationalized geographically, if it is linked with two or more territories of sovereign states; from the legal point of view, the resource is international if one single state does not have all the powers to exercise exclusive control over it.

The early doctrines on which cross-border management are based may include the following five aspects:

1. *The Doctrine of Absolute Sovereignty.* The Doctrine claims the absolute freedom of a country to exploit and utilize its own natural and environmental resources regardless of the effect of its actions on other riparian states.
2. *The Doctrine of Absolute Integrity.* This Doctrine stipulates that a country may not alter the natural state of natural and environmental resources passing through its territory in any manner that will affect the resources in the other country(ies).
3. *The Doctrine of Limited Territorial Sovereignty.* This Doctrine has been taken in resolving the majority of international resource disputes.
4. *The Doctrine of the Communalism of International Resources.* It assumes a communalism or cross-border communalism of interest between or among countries concerned, and treats the total stock of resources as of shared by these countries.
5. *The Doctrine of Correlative Rights.* Its emphasis is on the most efficient exploitation and utilization of joint resources, rather than on ownership rights.

As a matter of fact, the Doctrine of Absolute Sovereignty has never been a generally recognized principle of international law. The idea of 'sovereignty' is a major obstacle to achieving integrated development of international and cross-border resources. The typical example is for an uppermost riparian country to over-exploit the waters flowing through its territory, which could affect its neighboring countries. The result is that international agreements often refer only to certain aspects of planning of developments (like data collection, or individual water projects), or create organizations that have a coordinative role, rather than an overall planning and management role.

The Doctrine of Absolute Integrity is too restrictive, which is not very practical and, therefore, has been rarely used. In fact, the Doctrine of Limited Territorial Sovereignty has been the most widely accepted in various international treaties. It conforms to the general legal obligation to use one's property in a manner that will not cause injury to others. According to Dellapenna (1999, p. 1314), restricted sovereignty goes by the name of "equitable utilization" of the shared resources. The Doctrine of the Community of International Resources stipulates that the entire cross-border area constitutes a single geographic and economic unit that transcends national boundaries, and therefore the cross-border resources are either invested in the whole community or shared among the countries concerned.

### 3.1.1 *Equity and Justice*

The principle has been applied by international courts and also by national courts of various federal countries. It is also endorsed by most writers (see for example, Dellapenna 1999, p. 1315; McCarrey 1996), as well as by the Helsinki Rules and by the UN's 1997 Convention. The International Court of Justice's opinion referred twice to the rule of equitable utilization and did not mention the 'no harm' rule (Green Cross 2000, p. 52). Wouters (1992) also concluded that the principle of equitable utilization emerged as the central concept in reconciling the various interests of watercourse states in the development of their trans-border waters.

The Beibu Gulf Demarcation Agreement and the Beibu Gulf Fishery Cooperation Agreement (both were signed by China and Vietnam on December 25, 2000 in Beijing and entered into force on July 30, 2004) follows the 'equitable' principle (this case will be further discussed in Sect. 8.2 of Chap. 8). The Iraq–Saudi Arabia boundary is based on the Treaty of Muhammarah (Khorramshahr) signed on May 5, 1922, and the subsequent Protocol of Uqayr, on December 2, 1922. This delimitation of a boundary was the first in this desert area. With regard to the equitable use of the boundary resources, the Protocol of Uqayr (Article 1) states:<sup>2</sup>

- a. The frontier from the East begins at the junction of the Wadi al Aujah (W. el Audja) with Al Batin and from this point the Najd frontier passes in a straight line to the well called Al Wuqubah (El Ukabba) leaving Al Dulaimiyah (Dulaimiya) and Al Wuqubah (El Ukabba) north of the line and from Al Wuqubah (El Ukabba) it continues N.W. to Bir Ansab (Bir Unsab).
- b. Starting from the point mentioned above, i.e., from the point of the junction of the Wadi al Aujah (W. el Audja) with Al Batin (El Batin) the Iraq boundary continues in a straight line N.W. to Al Amghar (El Amghar) leaving this place to the south of the line and from thence proceeds S.W. in a straight line until it joins the Najd frontier at Bir Ansab (Bir Unsab).

<sup>2</sup> Cited from Office of the Geographer (1971).

- c. The area delimited by the points enumerated above which includes all these points will remain neutral and common to the two Governments of Iraq and Najd who will enjoy equal rights in it for all purposes.

The principle of equity and justice requires the interests of all countries concerned to be taken into account when exploiting and allocating their shared resources. India and Pakistan are facing severe water problems. Although India is not among the world's most severely water stressed countries, there are significant areas of scarcity with one third of its 570,000 villages declared water deficient (Chaudhary et al. 2004, p. 175). Its continuing population growth demands careful management of the nation's water resources. The Himalayan rivers are snow fed and perennial while the peninsular rivers are seasonal and dependent on the monsoons. The north and east are water rich while the west and south are water short. There are arid, drought prone regions (e.g. Gujarat, Karnataka, Andhra Pradesh, Tamil Nadu) and in the east areas which periodically experience devastating floods. Primarily arid and semi-arid, Pakistan depends upon the Indus River basin, the headwaters for which are in India. As a result, Pakistan is in a water crisis and faces nearly insurmountable challenges in meeting the demands of its growing population (140 million in 2000; projected to double by 2025). Rapidly declining storage capacity further complicates the problem. Pakistan's two main reservoirs on the Indus, the Mangla and Terbala, are losing storage capacity due to sedimentation (and have already lost 20 and 43%, respectively).<sup>3</sup>

The Indus Treaty of 1960, which was signed between the governments of India and Pakistan, was mediated by the World Bank, while the latter also assisted in funding the massive construction connected to the Partition of the Indus (Baxter 1967). The Treaty assigned the waters of the eastern tributaries of the Indus River to India and the western tributaries to Pakistan. However, other upper riparians were not included in this agreement. Article XI of the Indus Water Treaty states expressively that the parties did not intend to establish any general principle of law or any precedent but the practice and implementation of the Treaty, which points to some important principles of international laws. India gave up its upper stream sovereignty and believed that it could utilize the resources of the upper tributaries whenever it wishes. The second principle of international law that was applied by the Indus Treaty is the principle of equitable apportionment of the water (Kliot et al. 2001, p. 242).

Note that the principle of equitable use of shared resources sometimes may not mean a 50:50 division of shared resources among claimants. Under the United Nations Convention on Laws of the Sea (UNCLOS), China has the right to claim a continental shelf as far as 350 nautical miles. However, Japan also has the right to an exclusive economic zone (EEZ) extending 200 nautical miles from its shore. Since China's coast is within 400 nautical miles of the nearest undisputed Japanese island, China and Japan's claimed EEZs overlap in the East China Sea. With regard to the southern portion of the East China Sea, which is claimed by both China and

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<sup>3</sup> Data source: Economic Review (2002, p. 18), cited from Brannon and Hanson (2004).

Japan, Valencia (2007, p. 160) suggests that the boundary could be the equidistance line, ignoring the Diaoyu/Senkaku features; or perhaps that line adjusted by the length of the coastline ratio of 64:36 (the mainland China and Taiwan) versus Japan (the Ryukyus).<sup>4</sup>

### 3.1.2 *The Obligation not to Cause Harm*

This obligation includes the duty of preventive and cooperative actions. The 1988 Report to the International Law Commission suggests that appreciable harm resulting from water pollution is a violation of the principle. The World Bank statement for projects in international waterways requires the assessment of potential significant harm before approving projects on international waterways (Solanes 1992; Caponera 1995; McCarrey 1996).

After the Partition of Indus, which was based on the Indus Water Treaty signed in September 1960, India disrupted water flows to Pakistan. The treaty gives Pakistan access to the flows of the Western tributaries of the Indus River while allowing India use of the Eastern tributaries. Under this treaty, India provides water flows to Pakistan and advises them of potential drought or flood events. The treaty has remained effective even during each India–Pakistan war (Alam 2002). Negotiation over water issues has been conducted periodically between the two nations. Talks addressing Pakistani concerns over the Indian Baglihar Dam project on the Chenab River in Kashmir have had no conclusive results, as Pakistan believes this project may affect irrigation flows in the Eastern Punjab and India believes it consistent with the treaty (Jan 2004).

The “Agreement between the United States of America and Canada Relating to the Exchange of Information on Weather Modification Activities”, signed by the Government of the United States of America and the Government of Canada, is much more clearly defined.<sup>5</sup> For example, in Article I(b) of the Agreement, the term ‘weather modification activities of mutual interest’ is defined as

...carried out in or over the territory of a Party within 200 miles of the international boundary; or such activities wherever conducted, which, in the judgment of a Party, may significantly affect the composition, behaviour, or dynamics of the atmosphere over the territory of the other Party.

In Article IV, ‘each Party agrees to notify and to fully inform the other concerning any weather modification activities of mutual interest conducted by it prior to the commencement of such activities. Every effort shall be made to provide such notice

<sup>4</sup> See Case 6 at the end of Chap. 6 for a more detailed account of the fair division of the East China Sea.

<sup>5</sup> See “Agreement between the United States of America and Canada relating to the exchange of information on weather modification activities,” Washington, DC: Government of the United States of America; and Ottawa: Government of Canada, available at: <http://www.americansovereign.com/articles/weather.htm>. Accessed on 11 Oct 2011.



as far in advance of such activities as may be possible....' Furthermore, the agreement states:

The Parties agree to consult, at the request of either Party, regarding particular weather modification activities of mutual interest. Such consultations shall be initiated promptly on the request of a Party, and in cases of urgency may be undertaken through telephonic or other rapid means of communication.

## 3.2 Cross-Border Management: Categories

The world is increasingly smaller and its people more interlinked and mobile. With these developments, cross-border planning issues have become more prevalent and significant.

There are three requisites for a cross-border regime to be established: (i) active support and long-term commitment on the part of top-level political representatives, (ii) mobilization of the available geological, meteorological, legal, social, engineering and other expertise, and (iii) a domestic government structure capable of effective international cooperation and collaboration (Housen-Couriel 1994, p. 2).<sup>6</sup> Specifically, an international treaty or agreement on cross-border resources should include the following items:

- Objects (rivers, lakes, seas, forestry, oil, coal, or minerals);
- Subjects (data collection, planning of allocation, or exploitation);
- Parties involved in the agreement (bilateral or multilateral);
- Territorial scope (the whole area or parts of it); and
- Intensity of cooperation (consultation, joint management, or integrated planning).

The various institutional arrangements and mechanisms as reflected in existing treaties, conventions and agreements relating to cross-border resource management can be divided into three categories: (i) resource allocation, (ii) resource management, and (iii) integrated planning.

### 3.2.1 Resource Allocation

A large number of treaties and agreements belong to this category, which include, *inter alia*, the "International Commission of the Elbe" (1919–1936, based on the Treaty of Versailles), the "Internationalization of the Danube Basin Treaty of Versailles" (1919–1939), the "Environmental Program for the Danube River Basin" (conceived in Sofia in September 1991 and started in 1992), and the "La Plata Treaty 1973" of Rio de la Plata. One of the shortcomings of these narrowly defined legal

<sup>6</sup> Cited from Kliot et al. (2001, p. 235).

regimes is their inability to extend their operation beyond their mandate (Kliot et al. 2001, p. 239). Other examples of cross-border resource allocation would include the “Indus Treaty 1960,” the “Treaty between Bangladesh and India on Sharing the Gangs Waters at Farakka 1996,” and the “Tonkin Gulf Demarcation Agreement and the Tonkin Gulf Fishery Cooperation Agreement signed by China and Vietnam, 2000.”

Agreements and treaties on how to allocate shared resources have become a common expression of neighboring sovereign states. The Nile’s water resources were divided between Egypt and Sudan first in 1929 when the two countries were under British administration, and in a second agreement in 1959 when both countries became independent states. The 1929 Agreement allocated 48 billion m<sup>3</sup> of Nile water to Egypt and only 4 billion m<sup>3</sup> to the Sudan. The 1959 Treaty improved Sudan’s allocation from 4 to 18.5 billion m<sup>3</sup> whereas Egypt increased its allocation to 55.5 m<sup>3</sup> (Waterbury 1979; Kliot 1994).

The Treaty of Peace for Jordan River, which was signed by the governments of Israel and Jordan on October 26, 1994, put an end to the state of war which had lasted for almost 50 years between Jordan and Israel. Some specific articles (such as Article 6a of Annex II) of the Treaty deal with the Jordan River. Israel and Jordan have agreed to share the river. Both countries will create storage facilities to hold excess water from rain floods as well as build dams for river flow management. The parties agreed to provide water to one another. In terms of environmental conservation, Jordan and Israel are obligated to protect the river from pollution, contamination, or industrial disposal. Furthermore, according to the Treaty, the countries will establish a joint water committee to oversee issues regarding the quality of the water (Hof 1995, p. 53).

### ***3.2.2 Resource Management***

The joint management of natural and environmental resources in cross-border areas, which follows the doctrine of communality of property, is embraced by non-governmental organizations (NGOs) and academics (see, for example, Green Cross 2000; Savenije and van der Zaag 2000). It has also been endorsed by the “Helsinki Rules on the Uses of the Waters of International Rivers” (which is an international guideline regulating how rivers and their connected groundwaters that cross national boundaries may be used, adopted by the International Law Association (ILA) in Helsinki, Finland in August 1966) and by the “Convention on the Law of Non-Navigational Uses of International Watercourses” (which is a document adopted by the United Nations on May 21, 1997 pertaining to the uses and conservation of all waters that cross international boundaries, including both surface and groundwater). Notwithstanding the lack of the formal status of the Rules and of the ratification of the Convention, these documents are regarded as an important step toward arriving at the international law governing water (Raj and Salman 1999, pp. 171–173).

In many cases, the socioeconomic bases of cross-border resources are just as compelling as the physical bases. Efforts to exploit natural and environmental resources frequently generate important dependencies or inter-dependencies among geographically adjacent regimes. A few examples will make this proposition clear. It is common for fishermen from two or more states to be interested in harvesting the same fish stocks. Also situations frequently arise in which the nationals of one state wish to exploit resources under the complete or partial jurisdiction of another state (Young 1977, p. 24). All this suggests that there are often substantial gains to be achieved by transcending international borders in efforts to manage natural resources and to maintain environmental quality. Furthermore, it seems reasonable to suppose that there will be cases in which transaction costs will not be prohibitive when coordinated management arrangements are limited to a relatively small number of stakeholders. At the same time, transaction costs ordinarily rise steeply with an increasing number of stakeholders participating in a cross-border resource management.

It is difficult to define the property rights of public goods, such as meadow, forest, fishery, atmosphere, groundwater, lakes and oceans. It is more difficult to administer the commonly owned goods, for instance, forest resources in mountainous areas. Declining environmental quality throughout the world has had an inevitable impact on production and on the daily life of human beings. Environmental pollution is caused by its externalities. A negative externality exists whenever private economic actions have adversely affected the general public, and these effects increase the cost of economic actions. External effects can be either positive or negative. The positive effect is termed the external economy, whereas the negative effect is called the external diseconomy. For people with a desire to pursue the lowest cost of production, the private economic activity, the externality may be described as the "external diseconomy." People always endeavor to transfer externalities from private cost to social cost by imposing a detached cost. The inappropriate use of natural and environmental resources represents a negative externality. The externality of environmental pollution illustrates one such example. Pollution produced by the private industry or even emanating from domestic point sources imposes an external cost on the public goods.

There has been an emerging interest in the management of transboundary natural and environmental resources. Previous studies pertain to either pollution control or specific natural resources such as fisheries.<sup>7</sup> Since the 1990s, there has been a growing body of literature on the joint development of common offshore oil and gas deposits.<sup>8</sup> The concept "joint management" is based on resource sharing, environmental protection, promotion of dispute settlement, and cross-border cooperation.

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<sup>7</sup> See, for example, Young (1977), Pinkerton (1989), SUNCE (1994), Dubbink and van Vliet (1996), Pomeroy (1996), Symes (1997), Klooster (2000), Castro and Nielsen (2001), and Guo and Yang (2003).

<sup>8</sup> Major studies in this regard would include, among others, Park (1993, pp. 3–14, 2005), Denoon and Brams (1997), Harrison (2005), Jiang (2006), Koo (2010), Lee (2006), Masahiro (2005), Ong (1999), Buszynski and Sazlan (2007), Valencia (2007), and Guo (2010).

The context of joint management relates to the characteristics of natural and environmental resources, claims of property rights, and political regimes. The rationale for the joint management scheme is apparent, even though the fair division scheme (see Chap. 6 for details) is the best approach by which to settle existing boundary and territorial disputes.

The establishment of the joint management mechanism is an important vehicle for efficient territorial and resource management in disputed areas. In addition to the benefits of providing resource and environmental security, cross-border collaboration also enhances sovereignty in areas where borders have been contested or ill defined. In southern Africa, for instance, the establishment of cross-border conservation areas has increased control over border areas through joint border patrols, stricter monitoring of human movements and collaboration on controlling illegal activities, leading to higher political cooperation (Singh 2000). The idea of joint management incorporates various components, including importance attached to biodiversity conservation and ecosystem-based management, as well as philosophical concepts of environmental law and sustainable development such as inclusion of all stakeholders and conservation of natural and environmental resources for future generations.

### ***3.2.3 Integrated Spatial Planning***

This concept is interpreted as that a cross-border area should be treated as a single unit for development planning and management. Given the geographical and geological characteristics of the natural and environmental resources, only an integrated planning of the cross-border area as a whole may be effective. Although the integrated cross-border planning is the ideal form (in terms of both the economic and environmental benefits) of institution for the management of cross-border resources, it still remains rare in practice. One of the legal regimes which started with the fundamental role of water allocation and became a multipurpose organization which practiced joint management is the International Boundary and Water Commission of the USA and Mexico which jointly manages the Colorado and Rio Grande/Rio Bravo.

In 1992, an integrated environmental plan was approved by the US and Mexican governments for their border area. This plan, as an outgrowth of talks between the presidents of the two nations, is known as the Integrated Border Environmental Plan (IBEP). Goals include strengthening enforcement of environmental laws; reducing pollution; increasing cooperative planning, training, and education; and improving mutual understanding of border environmental challenges. The first agreement, the North American Agreement on Environmental Cooperation (NAAEC), took effect on January 1, 1994. Intended to promote sustainable development through joint environmental and economic policies, the NAAEC brought together environmental officials from Mexico, Canada, and the US in the Commission for Environmental Cooperation (CEC) and charged them with protecting, conserving, and improving

the environment in each country through increased cooperation and public participation. By 1996, the commission had launched nearly 40 projects focused on four major themes—conservation, protecting human health and the environment, enforcement, and public information and outreach (EPA 2001).

The significance of monitoring cross-border groundwater was stressed by the Economic Commission for Europe, which established a Task Force on Monitoring and Assessment of Transboundary Waters in 1994 (Buzas 2000). The joint Polish–Lithuanian program of environmental geological research entitled “Belt of Yotvings—fragment of Green Lungs of Europe” was launched in 1992 to deal with the collection of all information significant for assessment of geological environment, resources, and possible hazards in order to ensure sustainable use of the subsurface and better living conditions for the population (Slowanska 1997). The name of the program comes from the idea of creating the “Green Lungs of Europe,” covering the most valuable natural areas of Eastern and Central Europe. The “Belt of Yotvings” refers to the ancient people who lived in the present Polish–Lithuanian–Belarusian border-region until the fourteenth–fifteenth centuries. The Polish–Lithuanian border area is characterized by rich biodiversity, forests, valuable geomorphologic features formed by continental glaciation, and picturesque landscapes that are subject to protection and that occur in several protected areas on both sides of the border (Giedraitiene et al. 2002).

Other examples which follow principles of integrated river basin management come from Asia and Africa. In 1996 India and Nepal signed a treaty for the integrated development of the Mahakali River. The Mahakali Treaty incorporated former agreements and provided for a new project—The Pancheshwar Multipurpose Project. The Treaty has provisions for water sharing projects for power generation, irrigation use, and flood control. The Agreement stipulates that the two countries will share equally the energy generated and share the cost in proportion to the benefits accruing to each. The Protocol on Shared Watercourse Systems of Southern Africa Development Community (SADC) which was signed in 1995 and ratified in 1998 refers to three international river basins: Zambezi, Limpopo and the Okavango. It calls for the establishment of River Basin Commissions in each basin, to collect and exchange data, monitor and research, and settle disputes. There is the intention to bring the Protocol in line with the UN 1997 Convention (Green Cross 2000; Kliot et al. 2001, p. 251).

### 3.3 Cross-Border Management: Regimes

The idea of cross-border management incorporates various components, including the philosophical concepts of environmental law and sustainable development such as inclusion of all stakeholders and conservation of natural and environmental resources for future generations. There are three mechanisms to implement international protocols of transnational public resources: the first mechanism is to transform the protocols into contracts and set up the authority to bring contracts

into effect; the second is to cultivate the habits that everyone complies with the protocols; the third is that even though there are no trusts between people and there are no more powerful authority to implement the protocols, the protocols can still be stood by. There is hope that international protocols relating to environmental problems can come true through the last two mechanisms, especially the second one (Dasgupta 1996).

The establishment of cross-border management mechanism is an important vehicle for resource and environmental security. In addition to the benefits from providing resource and environmental security, cross-border cooperation mechanism also enhances sovereignty in areas where borders have been contested or ill-defined. For instance, in southern Africa, Singh (2000) demonstrated that establishing cross-border conservation areas would increase control over border areas through the establishment of joint border patrols, stricter monitoring of human movements and collaborating on controlling illegal activities leading to higher political cooperation.

### 3.3.1 *Cooperative Management*

The management of cross-border resources is based on resource sharing principles, cooperation, of environmental protection and promotion of dispute settlement. It is embraced by the international law (1997 Convention, Helsinki Rules) and by academics (Green Cross 2000; Savenije and van der Zaag 2000). Cooperative management follows the doctrine of communality of property. Its major facets are as follows: management of the whole cross-border area as a unit regardless of the borders; management according to some agreed-upon formula; investigation and resolution of the inevitable cross-border disputes according to peaceful and friendly manners.

Cross-border cooperation, in terms of the intensity it is conducted, can be classified as different levels of forms. Specifically, they range from “no cooperation” (here, it is defined as “Level 1”) to “full cooperation” (here, it is defined as “Level 5”), as follows:<sup>9</sup>

- Level 1. No Cooperation
  - (1.1) Hostility and armed conflict
  - (1.2) Possible actions with negative cross-border impacts
  - (1.3) No communication between staff of adjoining areas
- Level 2. Communication
  - (2.1) Information sharing
  - (2.2) Irregular low-level meetings
  - (2.3) Notification about actions with negative cross-border impacts
- Level 3. Consultation
  - (3.1) Willingness to consult on specific items of common interest

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<sup>9</sup> Note that some functions mentioned in Level 5 (full cooperation) may also be defined as those of the “joint management regime” (this will be discussed later in Sect. 3.3.2).

- (3.2) Regular notification about actions that may have cross-border impacts
- (3.3) Joint cross-border research program
- Level 4. Coordination
  - (4.1) Regular high-level meetings
  - (4.2) Coordinated protection and management of cross-border resources
  - (4.3) Cross-border planning
- Level 5. Full cooperation
  - (5.1) Sustained peace and friendship
  - (5.2) Joint protection of natural and environmental resources
  - (5.3) Integrated long-range planning

During the past decades, multipurpose projects have been constructed in transnational and cross-border areas for water supply, flood control, irrigation, navigation and hydropower generation. Large dams are sometimes justified because of hydro-power, which provides a high return and subsidizes other project purposes. Some of the best basin-wide multipurpose organizations can be found in developing regions. Most of these institutions also incorporate mechanisms for sharing the benefits and costs of the various projects and mechanisms for dispute resolution.

The Mekong committee, which was established in 1957 by Cambodia, Laos, Thailand and Vietnam, had a wide range of activities including collection of basic data, flood control, assistance and planning of dams, fishing, navigation, and pollution control (Chomchai 1986; Kirmani 1990). The Mekong River Commission (MRC), founded in 1995, has a more complex structure in which a political layer was superimposed on the MRC. The MRC's contributions include a flood forecasting and warning system, a network of hundreds of hydrological and meteorological stations, water balance studies, water quality monitoring, and salinity control structure for the Mekong delta (Jacobs 1999). The 1995 Agreement provides for the extension of the MRC to include China and Myanmar—the uppermost riparians, but does not include any mutually binding clauses concerning the use of the river's resources. The new commission has a dam building agenda which could potentially threaten the lower rice-growing regions, particularly in Vietnam and Cambodia. Besides, the fact that China's water requirements are growing as well as the fact that it is not a member in the MRC, are all serious impediments to achieving sustainable cooperation in the Mekong Basin (Green Cross 2000, p. 92).

### ***3.3.2 Joint Management***

The context of joint management is given definition through resource characteristics, claims of property rights, and potential regimes. Joint management is almost solely associated with common pool resources. Because of the seeming vastness of these resources, it is difficult to stop users from deriving benefits from them (Ostrom 1990, p. 280). The nonexclusive or common nature of these cross-border resources manifests in multiple claims to property rights. These claims serve as a basis in challenging the dominant property rights regimes, and also become the

impetus into the spectrum of potential institutional arrangements at the nexus of bureaucracy, community, and market-based approaches (Yandle 2003)

As a type of management system or rights regime, the joint management system can be further classified into the following three categories:

- Claims-based joint management
- Crisis-based joint management
- Community-based resource management

Once enacted, claims-based joint management regimes are constitutionally protected. They have a broad range of environmental and resource matters. These include power sharing and cooperation as concerns fish and wildlife harvesting, the management of parks and conservation areas, environmental screening and review procedures, land use planning and water, etc. Crisis-based models, which have multiple boards for different mandates, are in contrast to the claims-based joint management agreements. However, crisis-based arrangements are in practice much closer to true co-jurisdiction than any of the claims-based agreements. There are many models for community-based agreements. General features of community-based resource management include enhanced relationship with the concerned government department, final government decisions, etc. Ontario's community forestry initiative, which consists of four pilot projects, is one type of provincial response, such as the Elk Lake Community Forest Project. Another type is the system of controlled exploitation zones for fish and wildlife in Quebec (Abbott 2001).

Joint management as a political process could be useful for the cross-border management of natural and environmental resources. Successful institutional arrangements for joint management can improve the cross-border management and decision-making process through encouraging participatory democracy, flexibility, multiple accountability and strategic planning at local and regional scales (Noble 2000). While local communities and organizations may not be capable of accepting full responsibility for resource and environment management, they can actively participate in planning and management initiatives related to resource access, allocation and decision-making through effective institutionalized joint management arrangements. In marginal and border areas, organizations that remain in constant contact with the social field of the domain are best suited for dealing with such issues. This may range from ultimate decision-making authority to simply serving as an energy center to present local concerns to a higher authority.

Since the late 1980s, the emerging interest in the co-management—or the joint management of the commons—of natural and environmental resources covers both theoretical and empirical researches. Co-management may be referred to under several names, such as joint or shared stewardship, joint management, or partnerships. The term co-management has been used loosely to describe a variety of institutional arrangements encompassing consultation with members of the public on matters of environmental and resource allocation and management; the devolution of administrative, if not legislative, authority; and multi-party decision making. Co-management is thus essentially a form of power sharing, although the relative balance among parties, and the specifics of the implementing structures, can vary a



great deal (Abbott 2001). The existing case studies in co-management have offered many documented descriptive examples, most of which pertain to specific natural resources such as of fisheries (Pinkerton 1989; Dubbink and van Vliet 1996; Pomeroy 1996; Symes 1997; Klooster 2000; Castro and Nielsen 2001).

### 3.3.3 *Third-Party Trusteeship*

According to Black's Law Dictionary, trusteeship is a legal term which can refer to any person who holds property, authority, or a position of trust or responsibility for the benefit of another (Black 1979, p. 1357). UK legislation relating to trusteeship includes: (i) trustee Delegation Act 1999 specifically covers matters to do with land, (ii) trustee Act 1925, (iii) trusts of Land and Appointment of Trustees Act 1996, (iv) trustee Act 2000, and (v) Charities Act 1993. In the United States, when a consumer or business files for bankruptcy all property belonging to the filer becomes property of a newly created entity. For all bankruptcies (consumer or business) filed under Chap. 7, 12 or 13 of Title 11 of the United States Bankruptcy Code, a trustee (the "trustee in bankruptcy" or TIB) is appointed by the United States Trustee, an officer of the Department of Justice that is charged with ensuring the integrity of the bankruptcy system and with representatives in each court, to manage the property of the bankruptcy estate, including bringing actions to avoid pre-bankruptcy transfers of property. In bankruptcies filed under Chap. 11, the debtor continues to manage the property of the bankruptcy estate, as "debtor in possession," subject to replacement for cause with a trustee.

In this third-party trusteeship regime, all stake-holders will surrender their rights of governing a certain area or property to a third party. In exchange, they each will receive an allowance (in cash or by kind) —the amount of which depends on an agreement—from the third party. The third party should have sufficient economic and technological capacities to "take care" of the disputed area. Frankly, the advantage of the "third-party trusteeship model" is that, after implementation, which is based on a package of agreements signed between all stake-holding states and with an appropriate third party, it can resolve cross-border problems or disputes definitively, thus making it easier for the follow-on cross-border management.<sup>10</sup>

## 3.4 Toward a Borderless World

### 3.4.1 *About the Internet*

The Internet is consistently ranked as one of the top inventions of the twentieth century. The Internet has grown to become a vast information and communications

<sup>10</sup> See Sect. 8.5 of Chap. 8 for a more detailed account of the third-party trusteeship regime.

network, used as much by the state as businesses and individuals and all manner of groups and organizations. It has a global reach growing steadily day by day. Events have moved as fast as the Internet itself. In 1995, there were just 16 million users, or 0.4% of the global population. By the end of 2013, according to a UN report, some 2.7 billion people (that is 40% of the world's population) have been able to connect with each other via the Internet (Jazeera 2013).

The Internet has become an integral part of information infrastructure facilities around the world. The information technology (IT) would not be able to be so popular today without the rapid development of the Internet. The stunning growth and vigorous exploration of the Internet have greatly accelerated and promoted the technological development of the communication and information industries, and new ideas and technological innovations have made businesses more diversified and integrated, providing an information platform open to the whole society, which in turn arouses people's passion for further innovation. The new businesses derived from the usage of the Internet have benefited the whole world today.

But access to the Internet has been far from universal. Over the past years, the average cost of Internet access has dropped dramatically. But the price of the Internet is still a major obstacle for the popularity of the Internet application around the world. And, till present, the cost of connectivity varies greatly throughout the world (see Box 3.1).

### **Box 3.1 How the Cost of Connectivity Varies Throughout the World**

As of 2013, Chattanooga (Tennessee, USA), Hong Kong, Seoul, Lafayette (Louisiana, USA), along with two Kansas cities (in Kansas and Missouri states, USA) offered world-leading gigabit speeds. Meanwhile, there were larger cities that had higher prices for slower speeds. In the US, for example, the best deal for a 150 Mbps home broadband connection from cable and phone companies is \$ 130/month, offered by Verizon FiOS. By contrast, the international cities surveyed offered comparable speeds for less than \$ 80/month, with most coming in at about \$ 50/month. When it comes to mobile broadband, the cheapest price for around 2 GB of data in the US (\$ 30/month from T-Mobile) is twice as much as what users in London pay (\$ 15/month from T-Mobile). It costs more to purchase 2 GB of data in a US city than it does in any of the cities surveyed in Europe (see a case study at the end of this chapter for more details).

### **3.4.2 Internet Censorship**

In as early as the 1990s, governments around the world began to address the problems of material on the Internet that is illegal under their laws, and also that considered harmful or otherwise unsuitable. The nature of material of principal concern has varied substantially. For example: political speech; promotion of or incitement

to racial hatred; pornographic material. Few governments have attempted to ban or otherwise legislatively restrict access to “matter unsuitable for minors” as distinct from material illegal to distribute to adults.

In brief, government policies concerning censorship of the Internet may be broadly grouped into four categories:<sup>11</sup>

- a. Government policy to encourage Internet industry self-regulation and end-user voluntary use of filtering/blocking technologies.
- b. Criminal law penalties (fines or jail terms) applicable to content providers who make content “unsuitable for minors” available online.
- c. Government mandated blocking of access to content deemed unsuitable for adults.
- d. Government prohibition of public access to the Internet.

In April 1999, the Australian government introduced an Internet censorship Bill into Parliament. The proposed law was amended to include provision for an additional access prevention method. In addition, State and Territory criminal laws apply to content providers/creators. These laws enable prosecution of Internet users who make available material that is deemed “objectionable” or “unsuitable for minors”. The detail of the criminal offence provisions is different in each jurisdiction that has enacted or proposed laws of this nature.

At present, Canada, Denmark, New Zealand, Norway, and the United Kingdom have no law making it a criminal offence to make material that is unsuitable for minors available on the Internet, nor were there any proposals to create such a law. Discussion related to protection of minors was primarily unfolding around the issue of filtering at public libraries.

Regulatory activity in Germany and France concerning illegal material on the Internet has been focused on enforcing their domestic laws prohibiting race hate material. Germany has some of the world’s toughest laws banning race hate propaganda, conceding defeat to the cross-border reach of the Internet and given up trying to bar access to foreign-based neo-Nazi sites.

In Saudi Arabia, public access to and from the Internet has been funneled through a single government controlled center since the Internet access was first made available in the late 1990s. From this center, the government blocks access to Internet content deemed unsuitable for the country’s citizens, such as information considered sensitive for political or religious reasons, pornographic sites, etc.

The Singapore Broadcasting Authority (SBA) has regulated Internet content as a broadcasting service since 1996. The SBA has the power to impose sanctions, including fines, on licensees who contravene the Code of Practice. “Prohibited Material” is defined in the Code of Practice and appears to involve material deemed unsuitable for adults by the Singaporean Government.

In July 2001, the “Internet Content Filtering Ordinance” became effective in South Korea. Websites required to be blocked are those that meet the criteria as determined by the Information and Communications Ethics Committee (ICEC). The

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<sup>11</sup> Source: <http://www.efa.org.au/Issues/Censor/cens3.html>. Accessed on 18 Feb 2014.

ICEC is a Seoul-based non-governmental organization that is mandated by the 1995 Law for Electronics and Communications Businesses to suppress harmful information and communication, and to foster a healthy information culture by “filtering national illegal and harmful information” and prevent “cyber sexual violence”.

According to the Swedish law, in computer areas where illegal messages often occur, the service providers must check what is stored, but in other areas, it is enough compliance for service providers to check when someone complains that something illegal has been stored.

Since 1996, four US states, New York, New Mexico, Michigan and Virginia have passed Internet censorship legislation restricting/banning online distribution of material deemed “harmful to minors”. These laws have been struck down on Constitutional grounds.

### 3.4.3 *Bypassing the Great Firewall*

In 1997, the Ministry of Public Security took initial steps to control Internet use in China. In 1998, the Golden Shield project was started. It has a nickname “Great Firewall” (GFW) in reference to its role as a network firewall and to the ancient Great Wall of China. A major part of the project includes the ability to block content by preventing IP addresses from being routed through and consists of standard firewalls and proxy servers. China has censored Web sites that include (among others): Web sites belonging to “outlawed” or suppressed groups, such as pro-democracy activists and the Falun Gong; News sources that often cover topics that are considered defamatory against China, such as the Tiananmen Square protests of 1989 and sites related to the Taiwanese government or linked with the Dalai Lama or the Tibet Independence Movement.

Technically, the censorship of the Internet consists of standard firewalls and proxy servers at the Internet gateways. The system also selectively engages in DNS (domain name system) poisoning when particular sites are requested. Some commonly used technical methods for censoring are:<sup>12</sup>

- i. IP (internet protocol) blocking: Since the access to a certain IP address is denied, if the target Web site is hosted in a shared hosting server, all Web sites on the same server will be blocked.
- ii. DNS filtering and redirection: Since the DNS doesn’t resolve domain names or returns incorrect IP addresses, this affects all IP protocols such as HTTP (hypertext transfer protocol), FTP (file transfer protocol) or POP (post office protocol).
- iii. URL (uniform resource locator) filtering: Scan the requested URL string for target keywords regardless of the domain name specified in the URL. This affects the Hypertext Transfer Protocol.

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<sup>12</sup> Based on Arthur (14 December 2012) and Wilde (7 January 2012) as well as two Websites: (i) <http://cyber.law.harvard.edu/filtering/china/appendix-tech.html> and (ii) <http://www.percy.in/2012/05/how-to-unblock-websites-in-china-for.html>. Accessed on 18 Feb 2014.

- iv. Packet filtering: Terminate TCP (transmission control protocol) packet transmissions when a certain number of controversial keywords are detected. This can be effective with many TCP protocols such as HTTP, FTP or POP, but search engine pages are more likely to be censored.
- v. Man-in-the-middle attack: A firewall can use a root certificate, which is found in most operating systems and browsers, to make attacks. If a previous TCP connection is blocked by the filter, future connection attempts from both sides will also be blocked for a period of time.
- vi. VPN (virtual private network) blocking: Some unknown entities may initiate unsolicited TCP/IP connections to computers within other countries for the purported purpose of network enumeration of services with the aim of facilitating IP blocking.

China's GFW has been implemented to block destination IP addresses and domain names and to inspect the data being sent or received. Thus, the basic censorship circumvention strategy is to use proxy nodes and encrypt the data. The following are common circumvention tools (Anderson 2012; Clayton et al. 2006):

- Proxy servers outside China can be used, even though using just a simple open proxy (such as HTTP (hypertext transfer protocol) or SOCKS (socket secure)—without also using an encrypted tunnel (such as HTTPS) does little to circumvent the sophisticated censors.
- Companies can establish regional Web sites within China. This prevents their content from going through the GFW.
- Onion routing, such as I2P (Invisible Internet Project) or Tor (the onion router), can be used.
- Freegate, Ultrasurf, and Psiphon are free programs that circumvent the GFW using multiple open proxies in China.
- VPNs (virtual private networks) and SSH (secure shell) are the powerful and stable tools for bypassing surveillance technologies.
- Reconfiguration at the end points of communication, encryption, discarding reset packets according to the TTL (time to live) value by distinguishing those resets generated by the GFW and those made by end user, not routing any further packets to sites that have triggered blocking behavior.

In addition, in order to avoid their politically-sensitive articles published in websites to be blocked, netizens in China have invented many special terms. For example, the Chinese terms such as “human rights,” “Tiananmen,” “Cultural Revolution,” and “1989” sometimes were written as “ren·quan,” “tianan·door,” “wen·ge,” and “198·9,” respectively. Even though articles including such terms are considered to include false elements, they may not be easily identified by the GFW to include the politically-sensitive content.

### 3.5 Case 3. Internet Speed and Prices Around the World<sup>13</sup>

Since 2012, the Open Technology Institute of the New America Foundation has published a study of the cost of consumer broadband services in 22 cities around the world. The data release includes: (A) a comparison of “triple play” (which generally refers to a bundle of services that includes high-speed Internet, telephone and television for a single monthly rate) offerings that bundle Internet, phone, and television services; and (B) a comparison of the fastest Internet package available in each city. More detailed results of these surveys are reported as follows.

(A) Triple play rankings by price (Internet service providers and price in USD/PPP are given in parentheses):

1. Seoul (C&M, \$ 14.52)
2. Seoul (HelloVision, \$ 15.73)
3. Riga (Balti-Com, \$ 21.75)
4. Zurich (VTX, \$ 29.96)
5. Zurich (Sunrise, \$ 32.37)
6. Berlin (TeleColumbus, \$ 33.52)
7. Paris (Free; SFR, \$ 34.87)
8. Bucharest (Romtelcom, \$ 34.93)
9. Seoul (LG Uplus, \$ 34.98)
10. Seoul (SK broadband, \$ 36.31)
11. Berlin (Kabel Deutschland, \$ 36.46)
12. Paris (Bouygues Telecom; Darty, \$ 37.09)
13. London (Sky, \$ 38.26)
14. Bristol, VA (BVU, \$ 54.79)
15. Lafayette, LA (LUS, \$ 65.39)
16. Washington, DC (RCN, \$ 68.30)
17. Los Angeles, CA; New York, NY (Verizon, \$ 69.99)
18. New York, NY (Time Warner Cable, \$ 74.97)
19. Lafayette, LA (AT&T, \$ 79.00)
20. Los Angeles, CA (Time Warner Cable, \$ 79.96)
21. Washington, DC (Verizon, \$ 79.99)
22. Chattanooga, TN (EPB, \$ 81.82)
23. New York, NY (RCN, \$ 89.99)
24. San Francisco, CA (Comcast, \$ 99.00)
25. Bristol, VA (Charter, \$ 99.97)
26. Kansas City, KS (Time Warner Cable, \$ 99.99)
27. Los Angeles, CA (AT&T U-Verse, \$ 109.00)
28. Kansas City, MO (Time Warner Cable, \$ 112.49)
29. Washington, DC (Comcast, \$ 112.50)
30. Lafayette, LA (Cox, \$ 121.22)

<sup>13</sup> All data cited in this case study are based on Hussain et al. (2013).

31. Chattanooga, TN (AT&T, \$ 133.00)
32. San Francisco, CA (Astound, \$ 134.00)
33. Chattanooga, TN (Comcast, \$ 150.85)

(B) Wired speed leaders (Internet service providers and download speed are given in parentheses):

1. Seoul (HelloVision); Tokyo (KDDI); Hong Kong (Hong Kong Broadband Network Limited); Chattanooga, TN (EPB); Kansas City, MO (Google Fiber); Kansas City, KS (Google Fiber); Lafayette, LA (LUS); Bristol, VA (BVU) (all with 1000 Mbps)
2. Riga (Baltcom); Amsterdam (KPN); New York, NY (Verizon, 500 Mbps)
3. Paris (SFR); Washington, DC (Verizon); Los Angeles, CA (Verizon) (all with 300 Mbps)
4. Toronto (Rogers, 250 Mbps)
5. Mexico City (Totalplay (Iusacell), 200 Mbps)
6. Berlin (Deutsche Telekom, 200 Mbps)
7. Copenhagen (Stofa, 150 Mbps)
8. Zurich (UPC, 150 Mbps)
9. Bucharest (UPC, 150 Mbps)
10. Prague (UPC, 120 Mbps)
11. San Francisco, CA (Comcast, 105 Mbps)
12. London (Virgin, 100 Mbps)
13. Dublin (Magnet, 100 Mbps)

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## Chapter 4

# Crossing Borders and/of Cultures

In his famous essay *The Protestant Ethic and the Sprit of Capitalism*, Weber (1904) argued that the profit-maximizing behavior so characteristic of the bourgeoisie, which could be explained under fully developed capitalist conditions by its sheer necessity to survival in the face of competition, could not be so explained under the earlier phases of capitalist development. It was the product of an autonomous impulse to accumulate far beyond the needs of personal consumption, an impulse which was historically unique. Weber traced its source to the ‘worldly asceticism’ of reformed Christianity, with its twin imperatives to methodical work as the chief duty of life, and to the limited enjoyment of its product. The unintended consequence of this ethic, which was enforced by the social and psychological pressures on the believer to prove (but not earn) his salvation, was the accumulation of capital for investment. The larger participation of Protestants (compared with that of Catholics) in modern business life was also more striking, as Weber (1904, p. 7) observed:

Among journeymen, for example, the Catholics show a stronger propensity to remain in their crafts, that is they more often become master of craftsmen, whereas the Protestants are attracted to a larger extent into the factories in order to fill the upper ranks of skilled labor and administrative positions.

### 4.1 A World of Cultures

The modern technical definition of culture, as socially patterned human thought and behavior, was originally proposed by a nineteenth-century British anthropologist, Edward Tylor. In his charter definition of the anthropological concept of culture, for example, Tylor (1871, p. 1) states “Culture or civilization, taken in its wide ethnographic sense, is that complex whole which includes knowledge, belief, art, morals, law, customs, and any other capabilities and habits acquired by man as a member of society.” There has been considerable theoretical debate by anthropologists since

Tylor. In 1952, for example, Alfred Kroeber and Clyde Kluckhohn, American anthropologists, published a list of 160 different definitions of culture (Bodley 1994). Although simplified, their list indicates the diversity of the anthropological concept of culture. Indeed, culture is too complex to define in simple terms and it can seem that each sociologist has a preferred definition. Certain agreed fundamentals, however, appear in the definition by Hoebel (1960, p. 168): “Culture is the integrated sum total of learned behavioral traits that are shared by members of a society.”

Although many more complicated compositions for a culture have been suggested, we have mainly discussed below three elements—ethnicity, language and religion. Of course, our discussion of these cultural elements is not definitive and perhaps would not satisfy anthropologists. Nevertheless, our consideration is due to the concerns that (a) ‘ethnicity’ provides a genetic basis in which socioeconomic behaviors between groups of people can be easily differentiated; (b) ‘language’ is an effective tool of communication; and (c) ‘religion’ can provide the insights into the characteristics of culture.

### ***4.1.1 Ethnicity***

Before dealing with the concept ‘ethnicity’, it is necessary to know some facts about ‘race’. Genetically, race is defined as a group with genes frequently differing from those of other groups in human species. However the genes responsible for the hereditary differences between humans are few when compared with the vast number of genes common to all human beings regardless of the race to which they belong. All human groups belong to the same species and are mutually fertile. In practice, race usually refers to any of several subdivisions of mankind sharing certain physical characteristics, such as skin pigmentation, skin complexion, color and type of hair, shape of head, stature, form of eyes and nose, and so on. The differences among races are essentially biological and are marked by the hereditary transmission of physical characteristics.

General agreement is inadequate as to the classification of such people as the aborigines of Australia, the Dravidian people of Southern India, the Polynesians, the Ainu of Northern Japan and so on. Most anthropologists have agreed on the existence of three relatively distinct groups: Caucasoid, Mongoloid and Negroid.

- The Caucasoid group, found in Europe, North Africa, and from the Middle East to North India, is characterized as having skin of pale reddish white to olive brown. The hair is light blond to dark brown. The color of the eyes varies from light blue to dark brown.
- The Mongoloid group, which includes most peoples of East Asia and the American Indians, has been described as having skin of saffron to yellow or reddish brown. The hair is dark, straight. The eyes are from black to dark brown.
- The Negroid group, which includes the African peoples of Southern Sahara, the Pygmy groups of Indonesia, and the inhabitants of New Guinea and Melanesia, is characterized by a brown to brown–black complexion. The hair is dark and coarse, usually curly. The eyes are dark.

Unlike race, ethnicity is a social entity formed in the historical process. In practice, ethnicity is usually determined according to language rather than religion, because whereas in most cases an ethnic group uses the same or at least similar linguistic systems, it does not necessarily share religious beliefs. In brief, more than 2000 ethnic groups have been identified in the world. The ethnic distribution of the world population, however, is rather uneven. For example, the largest ethnic group (Han Chinese) has a population of more than one billion people, whereas the smallest (Andmanese in India) has a population of between dozens to a few hundreds.

The identification of ethnic groups may be a political issue. For the United States the Census Bureau provides a classification of racial groups as five categories: (i) white, (ii) black, (iii) American Indian, Eskimo, Aleutian, (iv) Asian, Pacific islander, and (v) other (including Hispanic). Some studies also look at 'ancestry' or ethnic origin, most often defined in this context as the country of birth of the American individual (for instance, Western European, Eastern European and Indian).

It has been generally believed that colonial authorities were largely responsible for creating tribal identities among the Tutsis and the Hutus in Rwanda. Much has been written about the artificial birth of the Hutu–Tutsi split as part of the divide-and-conquer strategy of Belgium, the colonial power. For us, what is notable is the rich anecdotal evidence that physical attributes play a critical role in the conflict. On average, 'Tutsis' are taller and more slender; they have somewhat lighter skin and thinner noses. Before colonization the terms 'Hutu' and 'Tutsi' did not bear the same political meaning as they do today. In order to affirm their authority, colonial rulers redistributed power and privilege between the two groups. Belgian governed the region through Tutsis who, with more European features, were considered to be born to rule (Lee 2002, p. 83).

Ethnic groups are not restricted to single countries. For example the Han Chinese can be found in (besides the mainland of China) almost all major countries (especially those in Southeastern Asia) and the Anglo-Saxons are distributed in the United Kingdom, the United States, Canada, Australia, New Zealand and so on. On the other hand, there is a great range of ethnic diversities in the world, and while there is only one single ethnic group in Japan, Korea, Hungary and Romania, in most places, a nation is not a homogeneous unit but rather a collection of areas fragmented along ethnic lines. Nigeria, for example, is divided into Hausa, Ibo and Yoruba tribes and areas, as Sri Lanka is divided into Sinhalese and Tamil areas.

It is necessary to be very cautious in trying to identify the role of such cultural elements as race and ethnicity in socioeconomic affairs. According to the biological tenet which sees cooperation among animals as mainly influenced by genetic similarity, socioeconomic behaviors between various groups of people can be easily differentiated. But the term 'race' is not appropriate when applied to national, religious, geographic, linguistic or cultural groups, nor can the biological criteria of race be equated with any mental characteristics such as intelligence, personality, or character. In the nineteenth and early twentieth centuries spurious theories, mainly expressed by those who were interested in emphasizing the supposed superiority of their own kind of culture or nationality, were developed about race, culture and nationality.

### 4.1.2 Language

Ethnicity is usually represented by linguistic identities, giving rise to the term ‘ethnolinguistics’. Though complex in terms of lexicon, grammar, syntax, phonetics and so on, languages may be classified either genetically or typologically. The genetic classification assumes that certain languages are related and that they have evolved from a common ancestral language; while typological classification is based on similarities in the language structure. Before classifying the world of languages, a few points on linguistic terminology should be explained.

Family is a label often used for a conservative genetic classification of language, one that can be proved only when an abundance of cognates (related words) is available. Phylum is a label for a liberal genetic classification that is proved with fewer cognates; it encompasses language families. A given phylum always has a greater extension than any of the families included in it, even though the term ‘family’ is in practical usage often employed to refer to a phylum.

The number of languages on earth is roughly between 4000 and 6000 (Pinker 1994). Although the classification of these language groups may differ, they can be roughly distinguished through the following phylums:<sup>1</sup>

- Indo-European Phylum
- Sino-Tibetan Phylum
- Hamio-Semitic Phylum
- Caucasian Phylum
- Ural-Altaiic Phylum
- Finno-Ugric Phylum
- Dravidian Phylum
- Nilo-Saharan Phylum
- Niger-Congo Phylum
- Khoisan Phylum
- Paleo-Siberian Phylum
- Austro-Asiatic Phylum
- Austronesian Phylum
- Other Phylums

There is very uneven distribution of population among languages. The nine largest linguistic groups, which account for more than half of the world population, are Chinese (19.7%), English (9.2%), Hindi (7.3%), Spanish (5.6%), Arabic (3.8%), Portuguese (2.9%), Russian (2.7%), Japanese (2.1%) and Bengali (2.1%). The other linguistic groups, each accounting for more than one percent of the world population, are French (1.9%), German (1.5%), Korean (1.2%), Vietnamese (1.1%) and Turkish (1.0%). Other languages may have very few speakers.<sup>2</sup>

<sup>1</sup> A detailed classification of existing languages is shown in Appendix at the end of this chapter.

<sup>2</sup> Calculated by the author based on *Britannica Book of the Year 2001*. Notice that according to these statistics several other languages (such as Phoenician, Akkadian, Moabite, and Ugaritic of Semitic family, and Kott, Assan, and Arin of Paleo-Siberian phylum) have already become extinct.

Altogether, the five major Western languages (English, French, German, Portuguese and Spanish) are spoken by approximately one-fifth of the world population, of which the native English-speakers possess the largest part.<sup>3</sup> Even though the number of people with English as a first language has declined slightly during the past decades, English is still the primary language of intercultural communication, since it serves as a lingua franca for the largest group of people whose native languages are not English. The English used by different ethnic groups throughout the world is also diversified. English is indigenized and takes on local colorations which distinguish it from British or American English and which, in extreme cases, make these 'Englishes' almost unintelligible one to another. Nigerian Pidgin English, Indian English and other forms of English are being incorporated with their respective host cultures and perhaps will continue to differentiate themselves so as to become related but distinct languages.

A glance at the history reveals that the distribution of language speakers has reflected the distribution of economic power in the world. Latin, for example, was a universal language in Europe during the Middle Age and the Renaissance. French was once known as the universal language of diplomacy, and English today is often said to fill such a role in world commerce. During the heyday of the Soviet Union, Russian was the lingua franca from Prague to Hanoi. The decline of Russian power is accompanied by a parallel decline in the use of Russian as a second language. Since the late twentieth century China's economic power has stimulated the learning of Chinese in other countries.

### 4.1.3 Religion

Religion is a major determinant of societal attitudes and behavior. According to the *Oxford Advanced Learner's Dictionary*, 'religion' is defined as 'belief in the existence of a supernatural ruling power, the creator and controller of the universe, who has given to man a spiritual nature which continues to exist after the death of the body' (1974, p. 712). In addition, according to *The New Columbia Encyclopedia*, religion comprises at least three aspects: (1) a system of thought, and action that is shared by a group and that gives the members of that group an object of devotion; (2) a code of behavior by which an individual may judge the personal and social consequences of his action; and (3) a framework of reference by which an individual may relate to a group and their universe (1975, p. 2299).

The development of human civilization has been accompanied by increasing number of religions. The religions that are particularly important to our contemporary society include: Hinduism, Buddhism, Christianity, Confucianism, Taoism, Islam, Shinto, Shamanism, and Animism.

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<sup>3</sup> According to Huntington (1996, p. 60), the share of English-speakers in world population was 9.8% in 1958, and it declined gradually to 9.1% in 1970, 8.8% in 1980 and 7.6% in 1992.

Dating from 1500 BC, Hinduism is a non-creedal religion. It is a combination of ancient philosophies and customs, animistic beliefs and legends. Since Hindu is born, not made, Hinduism is an ethnic religion and, therefore, many of its doctrines only apply to the Indian society. One important characteristics of Hinduism is the caste system. Each member of a particular caste has a specific occupational and social role, which is hereditary. Marriage is forbidden outside of the caste. Although efforts were made to weaken this system, it still has a strong hold in the Indian society. Another element is *baradari*, or the 'joint family'. After marriage, the bride goes to the groom's home. After several marriages in the family, there is a large joint family. All generations of the family live together and pool their income with little distinct between brothers and cousins. Women are completely subordinate to men, adult men are expected to do what their fathers tell them. Veneration of the cow is perhaps the best-known Hindu custom. Another element of traditional Hinduism is the restriction of freedom for women, following the belief that to be born a woman is a sign of sin in a former life.

Founded by Siddhartha Gautama (563–485 BC), Buddhism is one of the most influential religions in Asia. As a reformulation of Hinduism, it did not abolish caste but declare that Buddhists were released from caste restriction. At the heart of Buddhism there are the Four Noble Truths: (1) existence is suffering; (2) suffering has a cause, namely craving and attachment; (3) there is a cessation of suffering, which is Nirvana; and (4) there is a path to the cessation of suffering, which includes the Noble Eightfold Path—that is, right view, right intention, right speech, right action, right livelihood, right effort, right mindfulness, and right concentration. Nirvana is the ultimate goal of the Buddhism. It represents the extinction of all cravings and the final release from suffering. To the extent that such ideal reflects the thinking of the mass of people, the society's values would be considered antithetical to such goals as acquisitions, achievement, or affluence. From another early school of Buddhism there developed the lines of thought that led toward the positions advocated by Mahayana Buddhism. The Mahayana (greater vehicle) gave itself from this name in polemical writings to distinguish itself from what it called the Hinayana (lesser vehicle), Theravada, and related schools. The main philosophical tenet of the Mahayana is that all things are empty, or devoid of self-nature. Geographically, the Hinayana Buddhism has followers in Southeast Asia (especially in Cambodia, Myanmar and Thailand) and in East Asia, while the Mahayana Buddhism only concentrates on Southwest and Northwest China.

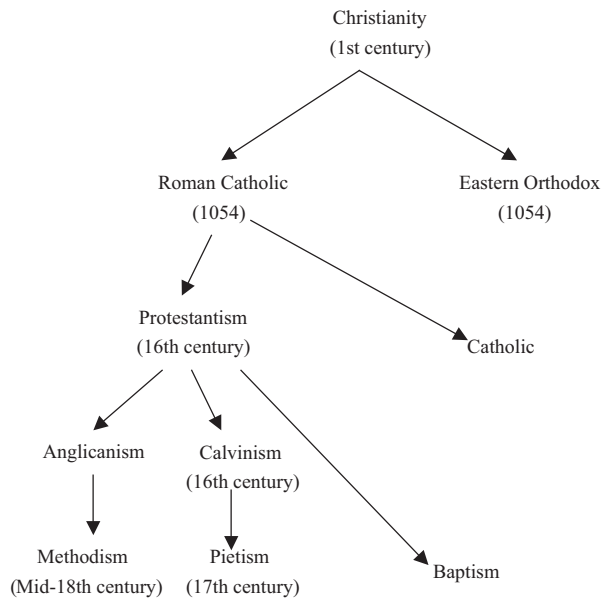
Founded in Palestine by the followers of Jesus Christ in the first century, Christianity is now the most influential religion in the Western society. The central teachings of traditional Christianity are that Jesus is the Son of God, the second person of the Trinity of God and Father, the Son, and the Holy Spirit; and that his life on earth, his crucifixion, resurrection, and ascension into heaven are the proofs of God's love and forgiveness of man's sins. In 1054 Christianity was split into two churches: Roman Catholicism and Orthodox (or Eastern Orthodox)<sup>4</sup>. The major differences

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<sup>4</sup> In what follows, the terms 'Orthodox Christianity' and 'Eastern Orthodox' will be used interchangeably.



**Fig. 4.1** Christianity and its major sects



between the two churches are that the doctrine of Orthodox Church accepts the first seven councils while Roman Catholics recognizes 21 general councils, and in rejection by the Orthodox Church of the jurisdiction of the Bishop of Rome (the pope). Eastern Orthodox Christianity has been mainly adopted in Russia and Central Europe, Roman Catholicism traditionally emphasized the Church and the sacraments as the principal elements of religion and the way to God. Since the sixteenth century there has been a further division of Christianity (see Fig. 4.1).

The Protestant Reformation made some critical changes in emphasis but retained agreement with Catholicism on most traditional Christian doctrine. The Protestants, however, stressed that the Church, its sacraments, and its clergy were not essential to salvation; rather, ‘salvation is by faith alone’. Protestantism minimized the distinction between the secular and the religious life. In history there have been four principal forms of ascetic Protestantism: (i) Calvinism, (ii) Pietism, (iii) Methodism, and (iv) Baptism. None of these movements was completely separated from the others, and even the distinction from the non-ascetic Churches of the Reformation is never perfectly clear.

Founded by Confucius (551–479 BC), Confucianism was reputed to have served as the basis of the traditional Chinese culture. *Lunyu* (Analects of Confucius), which covers a wide scope of subjects, ranging from politics, philosophy, literature and art to education and moral cultivation, has influenced Chinese society for over two thousand years. Its ideas have taken such firm root in China that both the Han and many non-Han Chinese have been influenced by it. Since the Han dynasty, every ruler has had to pay at least some heed to this, and people also expected their ruler to act accordingly in China. Confucian philosophy concerning the relationship be-

tween politics and morality serves as the basis of the Confucian school's emphasis on moral education, becoming one of the major characteristics of Confucianism. This idea also represents the distinguishing feature of the Oriental culture realm under the influence of Confucianism.

Taoism originated from sorcery, pursuit of immortality and other supernatural beliefs found in ancient China. Taoists look to the philosopher Laozi (or named Lao Tzu, born in about 600 BC) as their great leader, and take his work *The Classic of the Way and Its Power* ('Daode Jing' or 'Tao Te Ching') as their canon. As an escape from Confucianism, Taoism has been promoted by a group of scholars working against the overnice ritualism and detailed prescriptions of the classics. It has also denoted the common people's belief in certain traditional super-institutions. Applying the idea of balance in all things, Taoism argues that human moral ideas are the reflection of human depravity, that the idea of filial piety springs from the fact of impiety, that the Confucian statement of the rules of propriety is really a reflection of the world's moral disorder.

Founded by Muhammad (also spelled Muhammed or Mohammed) (AD 570–632), Islam dates back from about AD 610. Islamic adherents can be found from the Atlantic across the northern half of Africa, the Middle East, and across the most part of Asia. 'Islam' is the infinitive of the Arabic verb 'to submit'. Muslim is the present participle of the same verb, thus a Muslim is one submitting to the will of Allah—the only God of the universe—of which Mohammed is the Prophet. Muslim theology, *Tawhid*, defines the Islamic creed, whereas the law, *Shariah*, prescribes the actions of adherents. The Koran (*Qur'an*) is accepted as the ultimate guide and anything not mentioned in the Koran is quite likely to be rejected. The Five Pillars of Islam, or the duties of a Muslim, are (1) the recital of the creed, (2) prayer, (3) fasting, (4) almsgiving and (5) the pilgrimage. There are two major groups in Islam—namely, *Sunni* and *Shia*. While they are similar in many ways, Sunni Muslims adhere to both the Koran and *Sharia*, while Shia Muslims only believe in the Koran.

The *Shinto* means in Japanese the way of the gods. Shintoism is a Japanese religion that came from the indigenous people of the country. Members of the Shinto belief worship the *kami*, who include native deities (including emperors and heroes), spirits of nature, and mythical objects. A perfect understanding of Shinto will enable one to have proper understanding of the Japanese nation and their culture. Among the most important aspects of modern Shinto are (1) reverence for the special or divine origin of Japanese people and (2) reverence for the Japanese nation and the imperial family as head of that nation. The impact of modern Shinto on Japanese life is reflected in an aggressive patriotism. The mobilization of the Japanese and their behavior during the Second World War are examples of that patriotism.

Shamanism originated from the Evinki people of Siberia, derived from the verb *scha-*, 'to know', so shaman literally means 'the one who knows', is wise, a sage. Further ethnologic investigation shows that the true origin for the word shaman can be traced from the Sanskrit initially, then through Chinese–Buddhist mediation to the Manchu in northeast China. Shamans believe that there exists a medium, or 'witch', between the God and themselves. The witch, according to the shamanism, can convey the God's decrees.

As a primeval religion, the followers of animism tend to be found in remote and mountainous areas. Animists believe that hills, valleys, waterways and rocks are spiritual beings, as are the plants and animals. Furthermore, they believe that there are other, less obvious spiritual beings not commonly associated with the phenomena of everyday experience. Animists worship the natural bodies (most of which are animals) with which they have special causal relations.

Weber (1904) argued that religious practices and beliefs had important consequences for economic development. Nevertheless, neither mainstream nor heterodox economists paid much attention to measures of culture as determinants of economic growth during the Cold War era. Since the 1990s, there has been a growing tendency for researchers such as Huntington (1996), Landes (1999) and Inglehart and Baker (2000) to use a nation's culture to explain economic growth. Recently, Barro and McCleary (2003) analyzed the influences of religious participation and beliefs on a country's rate of economic progress. They found that economic growth responds positively to the extent of religious beliefs, but negatively to church attendance. That is, growth depends on the extent of believing relative to belonging. These results accord with a perspective in which religious beliefs influence individual traits that enhance economic performance.

Some empirical research works, however, cast serious doubt on the importance of religion. For example, after examining a large cross-section of conflicts, Fox (1997) finds that in only a small minority do religious issues play more than a marginal role. Similarly, Alesina et al. (2002) find that religious fractionalization does not significantly predict the rent-seeking policy distortions usually associated to other types of ethnic fractionalization. Nevertheless, it is more convincing to say that some religions' social and economic impacts may vary from time to time, as witnessed by Catholic and Protestantism. Though Catholics and Protestants have now become friendly and inclusive, this had not been so before the nineteenth century (see Fig. 1.2 of Chap. 1).

## 4.2 Defining Boundaries for Cultures

### 4.2.1 *Culture Area Concept*

The culture area concept is a means of organizing a vast amount of variegated ethnographic data into comprehensive units within a classificatory system. It depends on a number of criteria or determinants in the isolation of units. In theory, major considerations in recognizing these areas and sub-areas are ecological zones, patterns of cultural integration and correlations between the independently diffused traits, among others. In practice, however, since the factors by which a culture is determined or influenced are so numerous, the cultural classification of diversified economies in the world is an extremely difficult task. Therefore, it seems necessary to simplify the multicultural division of the world.

While scholars have generally agreed in their identification of the major cultures in history and on those that exist in the world, there have also been differences of opinions. For example, Spengler (1928) specified eight major cultures and McNeil (1963) discussed nine civilizations in the whole history. Bagby (1958, pp. 165–174) saw seven major civilizations or nine if Japan is distinguished from China and the Eastern Orthodox from the West. Rostovanyi (1993) identified seven and Braudel (1994) nine major contemporary civilizations. Quigley (1979, pp. 77 and 88) argued for 16 clear historical cases and very probably eight others, while Toynbee (1961, pp. 546–547) raised the number to 21 or 23.

Such divergent opinions depend in part, as noted by Huntington (1996, p. 44), on whether cultural groups such as the Chinese and Indians are thought to have had a single civilization throughout history or two or more closely related civilizations, one being the offspring of the other. Despite these differences, the identity of the major civilizations is not contested. As Melko (1969, p. 133) argued, there exist at least 12 major cultures in the world, seven of which no longer exist (Mesopotamian, Egyptian, Cretan, Classical, Byzantine, Middle American, and Andean) and five of which still do (Chinese, Japanese, Indian, Islamic, and Western).

#### 4.2.2 *Culture Areas of the World*

From the perspective of intercultural politics, Galtung (1992, pp. 23–24) and Huntington (1996, pp. 45–47) developed a similar multicultural structure of seven or eight culture areas, including:

- Sinic
- Japanese
- Hindu
- Islamic
- Western
- Orthodox
- Latin American and, possibly,
- African<sup>5</sup>

Both Galtung and Huntington defined the Orthodox culture as distinct from its parent Byzantine culture and from Western Christian culture, and maintained that the Japanese culture was also distinct. According to Quigley (1979, p. 83), Japan was, to a large extent, the offspring of the Sinic culture. Alternatively, both should be classified as parts of a larger East Asian culture area.

After taking account of the influences of anthropological differences, Sapper (1968) classified the world into 11 cultural divisions, including

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<sup>5</sup> Other authors who advanced similar arguments include Lind (1990), Buzan (1991), Gilpin (1993), Lind (1992, 1994), Rostovanyi (1993), Vlahos (1991), Puchala (1994), Elmandjra (1994) and *The Economist* (1994, pp. 21–23).

- Germanic
- Latin
- Slavic
- West Asian
- Indian
- East Asian
- the inland
- African
- Malayan
- Australian and
- the North Pole

However, this classification satisfies the anthropologists only. Political economists have usually treated Australia as part of the Western culture area and Malaysia as part of the East (or Southeast) Asian culture area. Other authors have defined a relatively small number of culture areas. For example, Kendall (1976) classified the world into six distinct culture areas, including

- Western
- Islamic
- Indian
- East Asian
- Southeast Asian and
- African

In Kendall's study, the Western culture area, which is composed of four sub-culture areas (Northwest Europe, Canada, USA, South Africa, Australia, and New Zealand; the Mediterranean; Central Asia; and the former USSR), is very heterogeneous in terms of geography, political economy, and culture. Quite independently, Aono (1979, pp. 48–51) developed a framework that closely parallels Kendall's (1976) on the salience to a world of six culture areas, including

- East Asian
- Malayan
- South Asian
- Islamic
- African and
- European

Again, the European area is assumed to include at least three economically and geographically heterogeneous cultures (or sub-cultures)—Germanic, Latin, and Slavic.

The cultural division of the world economy may vary, depending on different purposes or criteria selected by researchers.

### 4.3 Intercultural (Dis)similarity

#### 4.3.1 (Dis)similarity Index

In the real world, most culture areas, including nations and super-national and sub-national areas, are more or less linked to each other in terms of ethnicity, language or religion. Intercultural (dis)similarity is defined here as the degree to which two culture areas are similar or dissimilar. Intercultural (dis)similarity index can be constructed in different ways. The simplest method is to use a dummy index; i.e., using '1' for economies to be culturally linked with each other, and using '0' otherwise. Although it has been applied in a number of studies (see, for example, Havrylyshyn and Pritchett 1991; Foroutan and Pritchett 1993; Frankel and Wei 1995; Frankel et al. 1997b), this method cannot precisely measure the extent to which economies are culturally linked each other, particularly when the economies are culturally diversified.

A comprehensive method can be used to construct cultural similarity indexes. Suppose that the population shares of  $N$  cultural (ethnic, linguistic, religious) groups are expressed by  $(x_1, x_2, \dots, x_N)$  and  $(y_1, y_2, \dots, y_N)$  for economies  $X$  and  $Y$ , respectively.  $x_i$  and  $y_i$  (where,  $x_i \geq 0$  and  $y_i \geq 0$ ) belong to the same cultural group. Mathematically, the cultural similarity indexes between the economies  $X$  and  $Y$  can be measured according to the following formula:

$$SIMILARITY = \sum_{i=1}^N \min(x_i, y_i) \quad (4.1)$$

In Eq. 4.1,  $\min(\bullet)$  denotes the minimization of the variables within parentheses. The values of  $SIMILARITY$  range between 0 and 1. In the extreme cases, when  $SIMILARITY = 1$ , the two economies have a common cultural (linguistic, religious or ethnic) structure (i.e., for all  $i$ ,  $x_i = y_i$ ); when  $SIMILARITY = 0$ , the two economies do not have any cultural (linguistic, religious or ethnic) links with each other (i.e., for all  $i$ ,  $x_i$  (or  $y_i$ ) = 0 and  $x_i \neq y_i$ ). In the other words, greater values of  $SIMILARITY$  indicate greater cultural similarity between two economies. This formula has been used in Guo (2004, 2006) and Noland (2005).<sup>6</sup>

#### 4.3.2 Dissimilarity and Trade

Trade and economic cooperation are based on cultural commonality, as it is easier and more efficient for people with the same cultural identity (language, religion, or any other cultural element) to trust and communicate with each other than for

<sup>6</sup> Several other methods can also be used to comprehensively measure cultural similarity indexes. Boisso and Ferrantino (1997), for example, use  $\sum x_i y_i$  as the construct of similarity index. However, using Eq. 4.1 can prevent the index from further reduction when the values of  $x_i$  and  $y_i$  are small.

those with different cultural identities. Although it is not the only tool with which to build trusting relationships, businessmen usually make deals with whom they can understand. By contrast, minority faces disadvantages in conducting intercultural economic activities. Since the adoption of a common standard between different cultural groups of people is not likely, given that they have markedly differing attitudes as well as different cultural values, the greater the cultural difference involved in a multicultural society, the higher the managerial risks and costs resulting from it. The problems inherent in intracultural and intercultural behaviors can be summarized as follows (Huntington 1996, p. 129):

- feelings of superiority (and occasionally inferiority) toward people who are perceived as being very different;
- fear of and lack of trust in such people;
- communication difficulties resulting from differences in language and accepted civil behavior;
- lack of familiarity with the assumptions, motivations, relationships and social practices of other people.

For a long time since World War II, the influences of various cultural factors on economic activities had been ignored by the mainstream development thinkers and practitioners. It seems probably that these conclusions could be correct under certain circumstances. During the Cold War, ideological preferences might have been of greatest significance in decision-making (Huntington 1996, p. 125). Consequently, the cultural determinants of the international trade of the Cold War might be different from that of the post-Cold War period. Since the end of the Cold War, there has been a growing concern that cultural links exhibit a trend towards increasing trade between countries that are similar to each other culturally (see Rauch and Trindade (2002), among others). Trade within the European Community constituted less than 50 % of the community's total trade before the 1980s; by the 1990s this has grown to more than 60 %. Trade among the ASEAN, Taiwan, Hong Kong, South Korea and the mainland of China—most of which either fall within or are closely related to the Chinese cultural circle—increased from less than 10 % to over 30 % of total trade from the 1950s to the 1990s.

Precisely, each culture possesses a common system of signifying and normative values, some shared basis (such as common history, language, race or ethnicity, religion) through which people identify themselves as members of a single group, and the will or decision to be primarily self-identified as a member of a given community. Ultimately, this may to some extent be traceable to a biological basis, since, in human societies, ascriptive ties are said to dampen coalition building and to inhibit compromise across groups (that cross-cutting cleavages promote), thus increasing chances for social conflict (Bollen and Jackman 1985). Cultural differences underlie many conflicts, both international and domestic. Intercultural conflict is usually attributed to cultural dissimilarity, since the latter implies a degree of difficulty that the disparate groups concerned have in communicating or cooperating with one another.

### 4.3.3 *Nonlinear Effects of Dissimilarity*

By way of contrast, there is a quite different viewpoint, showing that the direction of the correlation between cultural dissimilarity and international trade may change under different conditions. As a matter of fact, in addition to the fact that intercultural differences generate some managing risks and extra costs for bilateral trade, intercultural trade is important not only for the realization of economies of scale but also for the utilization of the culturally based complementary conditions. Although every cultural group runs the risk of being stereotyped because of shared commonalities, no group, culture, or person remains static or lives in isolation. Instead, all societies have interacted. History reveals similarities in societal structures, and differences in behavior and stages of development. The diversity and plurality of cultures can and do benefit from each other, as cultures discover their own peculiarities and idiosyncrasies. For example, on this basis of the panel data from the USA and China, cultural influences on foreign trade are found to have two different directions during the 1990s: cultural dissimilarity tends to retard trade with poor countries and regions and to encourage trade with richer economies (Guo 2004).

To conclude, it is reasonable to believe that culture plays differing roles in the formation of intercultural relations. On the one hand, cultural dissimilarity brings about political distrust or instability. On the other hand, it generates ‘differentiation of production’ or complementarity in economic terms, which in turn induces cooperation among distinctive groups of people. From the perspective of economics, ‘differentiation of production’ implies ‘comparative advantages’, while the latter influences to some extent the potential benefit of trade and cooperation between the cultures concerned.<sup>7</sup> As a result cultural dissimilarity is not only a determining source for intercultural conflicts, but also the source for intercultural dependence and intercultural cooperation.

## 4.4 Cultural Diversity

### 4.4.1 *Diversity Index*

In Webster’s Dictionary, ‘diverse’ is defined as ‘the state or quality of being different or varied; a point of difference; property of being numerically different; condition capable of having various traits composed of unlike or distinct elements’. The term ‘cultural diversity’ used here describes a wide range of ethnic, linguistic, religious and other cultural groupings. It is generally assumed that while all persons

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<sup>7</sup> The term ‘cultural monopolization of trade’ is used here to denote that, since there are usually some culturally unique—both traditional and modern—commodities in each culture, intercultural exporters of these products can, at least in theory, realize a monopolized profit for each of their own. As a result, one culture’s gross benefit of exporting its products to the other culture grows with greater cultural dissimilarity of them.



share some traits with all others, all persons also share other traits with only some others, and all persons have still other traits which they share with no one else. Following this assumption, each person may be described in three ways: via the universal characteristics of the species; the sets of characteristics that define that person as a member of a group; and the person's idiosyncratic characteristics. Diversity also sometimes implies clashes of values, goals and interests, which can lead to highly conflictual debates, anger, frustration, mistrust and hostility. When attempting dialogue in a conflict situation, the experience might be negative, discourage people from further interaction, and increase mistrust.

In addition, conversion of religious groups is a widespread phenomenon. In the Middle Ages entire Central European populations switched back and forth between Catholicism and Protestantism as the political alliances of their princes switched between the Pope and the Emperor. In Fascist Italy many Jews converted to Catholicism to escape discrimination. In modern-day India it is extremely common for lower-caste Hindus to convert to the Muslim or Catholic faiths, in which they meet with relatively less discrimination. For most people, and for most religions, the material costs of conversion are relatively modest, amounting in many cases to geographical relocation to a locality where one can easily establish a new religious identity (Caselli and Coleman 2013).

There have been various quantitative methods to measure cultural diversity. The simplest method is derived from the number of cultural groups: thus, the cultural diversity of a society is positively related to the number of cultural groups involved. As shown in Table 4.1, India, the United States, China, the Philippines, Mexico and Russia are the most diversified in terms of number of linguistic groups; while South Africa, the United States, Taiwan, Canada, India, the United Kingdom and New Zealand are the most diversified in terms of number of religious groups. However, this method ignores the influence of population composition among all cultural groups. For example, given two societies having the same number of cultural groups, but that in which population is equally distributed among all cultural groups

**Table 4.1** Economies with largest numbers of languages/religions. (Source: Author based on Britannica Book of the Year 1996)

No.	Economy	By language	Economy	By religion
1	India	72	South Africa	30
2	United States	50	United States	15
3	China	49	Taiwan	13
4	Philippines	44	Canada	11
5	Mexico	38	India	10
6	Russia	36	United Kingdom	10
7	Togo	35	New Zealand	9
8	Kenya	31	Australia	8
9	Zambia	31	Ukraine	8
10	Uganda	30	Lebanon	8

**Table 4.2** Economies with least population shares of linguistic/religious majority (%). (Source: Author based on Britannica Book of the Year 1996)

No.	Economy	By language	Economy	By religion
1	India	10.70	New Zealand	21.64
2	Cameroon	14.86	Malawi	23.77
3	Togo	19.80	Samoa	26.04
4	Zambia	20.22	Australia	27.34
5	South Africa	22.41	Suriname	27.36
6	Uganda	24.06	Ghana	29.34
7	Nigeria	25.06	Trinidad and Tobago	29.39
8	Côte d'Ivoire	25.77	Kenya	29.53
9	Gabon	26.41	South Africa	29.71
10	Chad	27.01	Ukraine	30.73

might be more culturally diverse than one in which population is unevenly distributed among a cultural *majority* and much smaller cultural minorities. To demonstrate this point, let us consider an extreme case in which the cultural majority accounts for almost 100% of the total population, while each of the minorities retains a tiny share. Such a society can only be defined as a culturally homogeneous, no matter how many minority groups exist (Table 4.2).

The second method defines cultural diversity in relation to the population ratio of the largest cultural group. In many cases, the lower the ratio of the largest cultural group, the greater the cultural diversity it implies. However, as it only takes account of one (that is, the largest) cultural group, this method may miscalculate the cultural diversity when two or more large cultural groups exist simultaneously in the country (or region). Furthermore, depending on criteria used, these methods may result in conflicting measurement on cultural diversity. As shown in Table 4.2, India, Cameroon, Togo, Zambia, France, South Africa and Uganda are defined as the most diversified in terms of population ratio of the largest linguistic group; while New Zealand, Malawi, Samoa, Australia, Suriname and Ghana are defined as the most diversified in terms of population ratio of the largest religious group.

In a case study, at the end of this chapter, more complicated methods for the measurement of cultural diversity are provided for different research purposes.

#### 4.4.2 Diversity and Growth

A long line of assumptions have been made about the performances of cultural diversity. Much of it, as stated by Hagen (1986) and Cullen (1993), is attributed to the variety of competing demands on political and economic capital that must be met or on the difficulty that disparate groups have in communicating or cooperating. This hypothesis may trace back to a biological basis in which cooperation among animals is importantly influenced by genetic similarity (Wilson 1980, pp. 34–35). There is strong empirical evidence that supports the above view. While there may

be several reasons for high illiteracy (which is a clear obstacle to economic growth), it is likely that the imposition of different languages may be one of the reasons why literacy rates remain low in multicultural places. For example, In Andhra Pradesh, India's biggest state, the official language is Hindi; however, Urdu-speaking Muslims make up of at least 15% of the population, and constitute more than 50% of the population in some large western cities such as Meeruta. Literacy rates in Andhra Pradesh rose from 21.2% to only 45.11% between 1961 and 1993, whereas in Kerala, where there is relatively little language conflict, the rise was from 46.8 to 90.59% (Saville 2002, p. 203).

It is very easy to understand that culturally diverse societies are associated with political instability, which, as indicated in Nordlinger (1972) and Lijphart (1990), adversely affects economic growth. The detrimental influence of cultural diversity on economic growth may be transmitted by a proliferation of political parties which interjects elements of political instability or political fragmentation into society. For example, Hannan and Carroll (1981) consider that the effectiveness of democratic institutions may be reduced if different groups in a society articulate their demands by creating separate political parties or by polarizing existing ones. However, there are quite different views, suggesting that a multiparty system may lead to moderation and political flexibility by allowing centrist factions to intervene as neutral arbiters (Horowitz 1971).<sup>8</sup>

By way of contrast to the above hypotheses, there are also views on the positive effects of cultural diversity on economic growth. The potential benefits of heterogeneity come from variety in production (Alesina and Ferrara 2005). Cultural diversities exist spatially and temporally, between and within nations in terms of economic availability, opportunities, access to power, resources and human existence. Although every cultural group runs the risk of being stereotyped because of shared commonalities, no group, culture, or person remains static or lives in isolation. Instead, all societies have interacted. History reveals similarities in societal structures, and differences in behavior and stages of development. Societies can and do benefit from the diversity and plurality of cultures that are discovering their own peculiarities and idiosyncrasies.

A number of scholars have empirically assessed the influence of cultural diversity on economic growth.<sup>9</sup> The primary argument suggests that diverse states are more susceptible to development-inhibiting internal strife than their homogeneous counterparts are (Lijphart 1977; Lemco 1991). Following Tocqueville (1873), Duetsch (1953) and Banks and Textor (1963), Adelman and Morris (1967) gather the data for 74 less developed countries from 1957 to 1962 and rank each country on a 10-point ordinal scale of diversity. Their results, based on factor analysis, support their hypothesis: homogeneous countries typically had higher growth rates. Haug (1967) finds a negative correlation between per capita GNP and cultural diversity based on the data of 114 countries in 1963. Reynolds (1985) compares 37 less de-

<sup>8</sup> Cited from Lian and Oneal (1997).

<sup>9</sup> See, for example, Easterly and Levine (1997), Bluedorn (2001), Montalvo and Reynal-Querol (2005), and Alesina and Ferrara (2005).

veloped countries from 1950 to 1980 and, again, indicates that cultural diversity results in lower growth rates. He suggests that this may be due to a sense of alienation among peoples. In other words, reaching a consensus on policies favorable to economic development, especially for the long run, may be difficult when groups have different interpretations of the past and different goals for the future.

### 4.4.3 *Nonlinear Effects of Diversity*

Among the existing studies on the correlation between cultural diversity and economic development, Lian and Oneal (1997) demonstrate quite a different scenario. They use the data of 98 countries from 1960 to 1985 and find that the growth rates in per capita GDP is not significantly related to ethnic, religious and linguistic differences. They then try to investigate whether the influence of cultural diversity on economic development might be indirect through the intervening factors of political instability or political fragmentation, which also shows no correlation. Obviously, their result could support an assumption that political instability and social conflict—with which economic development is closely associated—are not related to cultural difference. This assumption might be confirmed by the fact that the proliferation of political groups can actually be stabilizing because it allows centrist parties to become arbiters in coalition governments (Horowitz 1971).<sup>10</sup>

There are methodological reasons for the different results of the existing studies. In theory, each cultural element (ethnicity, language, or religion) may play a different role in the synthesized measure of cultural diversity. For example, religion may contribute a large portion to cultural diversity in the nations of Balkan and the Middle East, while ethnicity as a key factor in cultural make-up differs within South Asia and between China, Japan and Korea. Nevertheless, language is the most important index when the cultural differences within the western European nations are analyzed (see Box 4.1). There is also an argument that religion per se should be a relatively weak source of cultural diversity. For most people, and for most religions, the material costs of conversion are relatively modest, amounting in many cases to geographical relocation to a locality where one can easily establish a new religious identity (see, for example, Horowitz 1985, p. 43).

#### **Box 4.1 A Story About the Birth of Euro**

On 12 December 1995, leaders from the European Union were meeting in Madrid, Spain, to discuss whether or not ‘ECU’ was to be used as the name of the forthcoming single currency. When the meeting reached midway, German

<sup>10</sup> Similarly, Eckstein (1966) and Schattschneider (1960) propose that a two-party system is less stable than systems with more parties because decisions may appear to be zero-sum, straining the unity and peace of the society.

chancellor Helmut Kohl suddenly stated: “ECU as the name of the single currency is not acceptable to Germans. Its pronunciation is very similar to that of the German word ‘cow’.”

In December 1978, when the leaders of the European Community decided in Brussels to start the European monetary system, the European currency unit was set up in order to stabilize the exchange rates of its member states. Interestingly, the abbreviation of the European Currency Unit, or ECU, is exactly the same in both pronunciation and spelling, as the French word *ecu* (an ancient French coin). In French, ‘*ecu*’ refers to a shield used by French cavaliers in ancient times. A currency named after a shield will give people a feeling of strength. The start of the European single monetary system and the establishment of the ECU were proposed by the then French president and, therefore, worked to the particular satisfaction of France.

When the meeting came close to launch time, the Spanish premier, González said: “I have consulted with some fellows that ‘EURO’ is relatively acceptable.” This time, the Greeks complained that the pronunciation of ‘Euro’ is very similar to that of ‘urine’ in Greek, a word that is even worse than ‘Ecu’ in German. But they were not able to provide better proposals. At last, with the support from Chirac, a compromise was reached: EURO was decided for the name of the EU’s single currency.

Alesina and Ferrara (2005) highlight three ‘microfoundations’ underlying the non-linear relationship between cultural (ethnic) diversity and economic performance.

- First, diversity can affect economic choices by directly entering individual preferences.
- Second, diversity can affect economic outcomes by influencing the strategies of individuals. Even when individuals have no taste for or against homogeneity, it may be optimal from an efficiency point of view to transact preferentially with members of one’s own type if there are market imperfections.
- Finally, diversity may enter the production function. People differ in their productive skills and, more fundamentally, in the way they interpret problems and use their cognitive abilities to solve them. This can be considered the origin of the relationship between individual heterogeneity and innovation or productivity.

An elegant formalization of the third microfoundation is provided by Hong and Page (1998), who prove two key results on this point. First, a group of ‘cognitively diverse’ problem solvers can find optimal solutions to difficult problems; second, under certain conditions a more diverse group of people with limited abilities can outperform a more homogeneous group of high-ability problem solvers. The intuition is that an individual’s likelihood of improving decisions depends more on her having a different perspective from other group members than on her own high expected score. In a more recent case study, Parrotta et al. (2014), using data on patent applications filed by firms at the European Patent Office and a linked

employer–employee database from Denmark, estimate the contribution of workers’ diversity in cultural background, education and demographic characteristics to valuable firm’s innovation activity. Specifically, they find that ethnic diversity may facilitate firms’ patenting activity in several ways by (a) increasing the propensity to (apply for a) patent, (b) increasing the overall number of patent applications, and (c) by enlarging the breadth of patenting technological fields, conditional on patenting.

Many theories exist for assessing the macroeconomic effects of cultural diversity—both negative and positive. The potential benefits of heterogeneity come from variety in production, and the costs come from the inability to agree on common public goods and public policies. This is an empirically plausible implication: the benefits of skill differentiation are likely to be more relevant in more advanced and complex societies. The problem is that most of these theories tend to have offsetting effects and that the net effects on growth, which depend entirely on all the internal and external conditions and environment concerned, are ambiguous. For example, while cultural diversity raises risks and costs for economic transactions between different groups of people, including the rich and poor or those with different cultural values and religious beliefs, they may also become incentives and even productive factors contributing to technological innovations and economic development.

#### 4.5 Case 4. How to Measure Cultural Diversity Scores

Although the understanding of cultural diversity may vary according to the perspective taken, the number of cultural groups and their populations should be taken into account simultaneously. To this end, the measurement of cultural diversity index (DIV) can be simplified as follows:

$$\text{DIV} = N^{(1-\rho_l)} - 1 \quad (4.2)$$

where  $N$  denotes number of cultural groups;  $\rho_l$  is population ratio of the largest cultural group (that is, the majority) to the total population. In Eq. 4.2, DIV is positively related to  $N$  but negatively related to  $\rho_l$ . Specifically, when  $N=1$  (or  $\rho_l=1$ ),  $\text{DIV}=0$ .

There are a number of papers in the literature that proxy for diversity using the ethnolinguistic fractionalization index, which measures the probability that two individuals who meet at random will be from different ethnolinguistic groups (Mauro 1995; Easterly and Levine 1997; La Porta et al. 1999; Bluedorn 2001; Ottaviano and Peri 2004; Alesina and Ferrara 2005; Montalvo and Reynal-Querol 2005). Specifically, the ethno-linguistic fractionalization (ELF) measure is defined as follows:

$$\text{ELF} = 1 - \sum_{i=1}^N s_i^2 \quad (4.3)$$

where  $s_i$  is the share of group  $i$  over the total of the population. This index represents the probability that two randomly drawn individuals from the population belong to different ethnic groups. This index reaches a theoretical maximum of 1 when every

individual belongs to a different group. This measure implies that a country composed of, say, 100 equally sized groups is more fractionalized than a country with two equally sized groups.

But many hypotheses and arguments in the literature refer not just to measures of ethnic diversity like the above-mentioned one, but to more fine-grained conceptualizations of ethnic structure. For example, Horowitz (1985) finds that ethnic conflicts are more likely to occur in countries with an ethnic majority and a large ethnic minority, as opposed to those in homogenous or highly heterogeneous countries. Based upon the theoretical results of Esteban and Ray (1994), Montalvo and Reynal-Querol (2002) propose the following polarization index (PI):

$$PI = 1 - \sum_{i=1}^N \left( \frac{1/2 - s_i}{1/2} \right)^2 s_i \quad (4.4)$$

where  $s_i$  is the share of group  $i$  in the population. The index PI reaches maximum when two equally sized groups face each other and declines as the configuration of groups differs more and more from this half and half split.

Lian and Oneal (1997) use a comprehensive diversity score (CDS) based on the formula developed by Molinar (1991):

$$CDS = \frac{(\sum_{i=1}^N \rho_i^2) - \rho_l^2}{(\sum_{i=1}^N \rho_i^2)^2} \quad (4.5)$$

where  $\rho_i$  is the percentage of the  $i$ th group and  $\rho_l$  is the percentage of the largest cultural group;  $N$  is the total number of ethnic groups. Obviously, the larger the value of  $\rho_l$ , the smaller is the CDS.

Several other methods can also be used to measure cultural diversity. For example, a larger population is likely to be less homogeneous, since the average preference distance between individuals is likely to be positively correlated with the size of a country (Dahl and Tufle 1973; Alesina and Spolaore 1997). But it is not effective when universally used as an index of cultural diversity.

Table 4.3 gives a few examples (labeled A—K) of how these measures work in a set of economies with differing cultural structures.

Montalvo and Reynal-Querol (2002) show that the PI index is highly correlated with the ELF at low levels of the ELF, uncorrelated at intermediate levels, and negatively correlated at high levels. In a cross-country regression analysis, they find that ethnic polarization has a positive impact on the likelihood that a civil war occurs, and a negative effect on a country's growth rate. They do not find an independent effect of ethnic fractionalization. Using a different data set, Alesina et al. (2003) compare the results of the polarization index PI and the fractionalization index ELF, and find that fractionalization works slightly better as a determinant of policies and economic outcomes. While the apparent inconsistency between the two sets of results may be due partly to different parameterization and partly to different data sources, it is difficult to gauge the statistical significance of the difference due to the

**Table 4.3** Diversity examples

Type	Population structure	Eq. (4.2)	Eq. (4.3)	Eq. (4.4)	Eq. (4.5)
A	Perfectly homogeneous <sup>a</sup>	0	0	0	0
B	(0.95, 0.05)	0.10	0.19	0.00	0.04
C	(0.8, 0.2)	0.32	0.64	0.09	0.15
D	(1/2, 1/2)	0.50	1.00	1.00	0.41
E	(0.75, 0.20, 0.05)	0.40	0.70	0.12	0.32
F	(0.55, 0.30, 0.15)	0.59	0.87	0.65	0.64
G	(1/3, 1/3, 1/3)	0.67	0.89	2.00	1.08
H	(0.49, 0.17, 0.17, 0.17)	0.67	0.78	0.81	1.03
I	(1/4, 1/4, 1/4, 1/4)	0.75	0.75	3.00	1.83
J	(0.48, 0.01, 0.01, 0.01, ...)	0.76	0.50	0.09	6.88
K	Perfectly heterogeneous <sup>b</sup>	$\approx 1^c$	$\approx 0^c$	$N-1$	$\approx N-1^c$

<sup>a</sup> There is only one cultural group

<sup>b</sup> There are  $N$  cultural groups, each of which has a share of  $1/N$  in population

<sup>c</sup> Only when  $N$  is enough large

high correlation between the two measures at low levels of fragmentation (Alesina and Ferrara 2005).

There are arguments that the CDS is superior to the ELF because it better reflects the distance between the two largest groups without overstating the influence of the largest (Rae 1967, p. 120; Taagepera and Shugart 1989, p. 210; Molinar 1991; Lian and Oneal 1997). However, most problematic is that the CDS formula (Eq. 5.8) is not sensitive for the measures of cultural diversity in countries in which there is only one major cultural group. For example, the cases C (0.8, 0.2) and J (0.48, 0.01, 0.01, 0.01, ...) in Table 4.3 have different cultural structures, but they have the same diversity score (0.09). In addition, Table 4.3 shows that the CDS index is not correlated with the other indexes.

Even though each formula has its own advantage, Eq. 4.2 is the easiest in application since it does not need the data on population shares for all cultural groups. By contrast, Eqs. 4.3, 4.4 and 4.5 will meet difficulties in application, especially when a large number of countries are selected.

## 4.6 Appendix

A brief overview of existing families of languages in the world<sup>11</sup>

Indo-European Phylum. This phylum is composed of Slavic languages (including Bulgarian, Macedonian, Russian, Slovene, Serbo-Croatian, Ukrainian and so on), Germanic languages (including English, Frisian, Netherlandic-German, Insular

<sup>11</sup> Based on Britannica Book (1996) and other sources.



Scandinavian, and Continental Scandinavian), Latin languages (including Spanish, Portuguese, French, Italian, Romanian and so on), Albanian language, Celtic languages (including Irish, Wales, Scottish), Greek languages (including Greek and Cyprian) languages, Baltic languages (including Lithuanian and Latvian), and Indo-Iranian (including Hindi, Urdu, Bengali, Romany, Tajik, Persian and so on).

**Sino-Tibetan Phylum.** This phylum is composed of Sino-Tai languages (including Chinese, Thai, Lao and so on), Tibetan-Burman languages (including Tibetan and Burman), Miao-Yao languages (including Miao and Yao), Zhuang-Dong languages (including Zhuang and Dong), and Karen.

**Hamio-Semitic Phylum.** This phylum is composed of Semitic languages (including Arabic, Hebrew, dialects of East and West Aramenian and Modern South Arabic), Berber languages (including Guanche, Tamashek, Tamazight and so on), Cushitic languages (including Gallinya, Somali and so on), and Chadic languages (consisting of over 100 languages).

**Caucasian Phylum.** This phylum is composed of South Caucasian languages (including Georgian, Laz, and Svan), and Northwest Caucasian languages (including, Kabardian, Abaza, Adyghian, Ubykh, Chechen, Ingush and so on).

**Ural-Altaiic Phylum.** This phylum is composed of Uralic languages (including Mansi, Khanti and so on), Turkic languages (including Azerbaijani, Kazakh, Uighur, Uzbek, Kirgiz, Turkmen, Turkish and so on), Mongolian languages (including Mongolian and so on), and Manchu-Tungus languages (including Manchu).

**Finno-Ugric Phylum.** This phylum is composed of Hungarian, Norwegian, Swedish, Finnish, Russian Lapp and so on.

**Dravidian Phylum.** This phylum is composed of Brahui, Telugu, Tamil, Malayalam, Kannada, Gondi, Tulu, Kurukh, Kui and so on.

**Nilo-Saharan Phylum.** This phylum is composed of Eastern Sudanic languages (including more than 60 languages), Central Sudanic languages (including about 30 languages of which Sara, Lugbara and Mangbetu are the largest), Saharan languages (including Kanuri, Masalit, Songhai, Fur and so on).

**Niger-Congo Phylum.** This phylum is composed of Bantu languages (including Rwanda, Shona, Kongo, Luba-Lulua, Xhosa and so on), Mande (including Bambara, Menda, Vai and so on), Gur (Voltaic) languages (including Mossi and so on), West Atlantic languages (including Fulani, Wolof, Temne, and so on), Adamawa-Eastern languages (including Sango and so on), and Kwa languages (including Twi, Yoruba, Igbo and so on).

**Khoisan Phylum.** This phylum includes about four dozen languages spoken in southern Africa and two click languages (Sandawe and Haza) spoken in Tanzania.

**Paleo-Siberian Phylum.** This phylum is composed of Luorawetlan languages (including Chukchi, Kamchadal and Koryad) Yukaghir languages (including Yukaghir, Chuvantsy, and Gilyak), and Yeniseian language (including Ket, Kott, Assan and Arin).

**Austro-Asiatic Phylum.** This phylum is composed of more than 50 languages (including Khmer, Mon, Vietnamese, Muong, Jahaic or Semang, Senoic or Sakai, Semelaic and so on) and sometimes 16 or so Munda languages (including Santali, Mundari, Ho, Sora, Kharia, Korku and so on).

Austronesian Phylum. This phylum is composed of two families of approximately 500 languages, including: Western Austronesian (or Indonesian) and Eastern Austronesian (or Oceanic).

Other Phylums. These languages include Japanese, Korean<sup>12</sup>, Papuan, and so on.

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<sup>12</sup> Sometimes, Korean is also classified as a member of the Ural-Altaic phylum.

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# Chapter 5

## Doing Cross-Border Research

One day about sunset, Zhuangzi dozed off and dreamed that he turned into a butterfly. He flapped his wings and sure enough he was a butterfly. What a joyful feeling as he fluttered about, he completely forgot that he was Zhuangzi. Suddenly, he woke up and there he was, solid and unmistakable Zhuangzi. But for a while he couldn't even identify whether he was Zhuangzi who had dreamt he was a butterfly, or he was a butterfly dreaming he was Zhuangzi. Maybe Zhuangzi was the butterfly, or maybe the butterfly was Zhuangzi. Between Zhuangzi and a butterfly there must be some distinction! This is what is meant by the 'transformation of things'.

–Zhuangzi<sup>1</sup>

### 5.1 Definitions of the Disciplinary

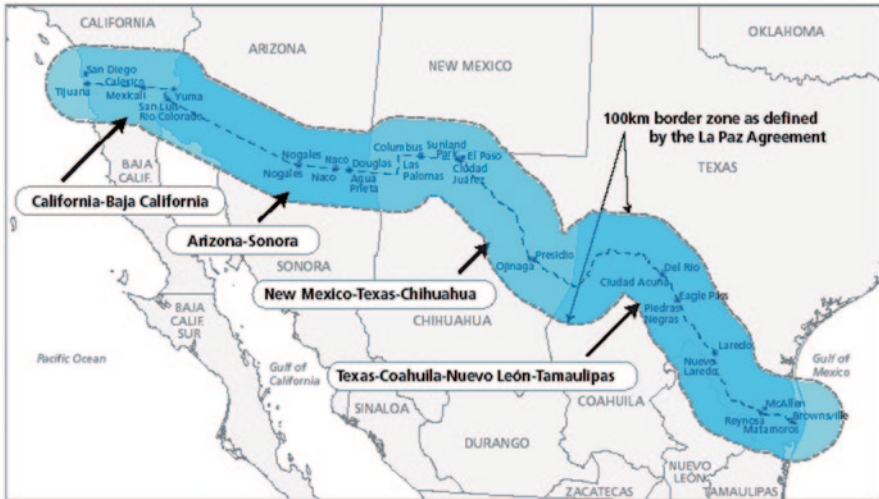
#### 5.1.1 *Disciplinary Boundary 1*

First of all, cross-border research includes but still is different from the research on cross-border areas.

With regard to cross-border areas, we have only a very restricted geographical scope – that is, each border area must be defined as of a certain geographical area. For example, in China, international border trade covers an area 15 km from the border (Cihai 1988, p. 1035; 1999, p. 1250). This is a narrow definition. Peach (1985, pp. 57–80) includes 23 counties of the four states of California, Arizona, New Mexico, and Texas, all of which share a border with Mexico in a broad definition of a border-area. This area also includes Culberson and Dimmit counties of Texas, which are proximate to the border. Other research tasks have defined the US side border-area in an even wider geographical scope. Hansen (1981), for example, used functional economic areas, defined by the Bureau of Economic Analysis, to

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<sup>1</sup> Excerpted from “On Arranging Things” (or “Setting Things Right”) written by Zhuangzi (or Chuang Tzu, 369–286 BC) – translated by author based on the original Chinese text.



**Fig. 5.1** The officially defined scope of the US–Mexico border region. (Source: US Environmental Protection Agency, Washington, DC)

include cities as far from the border as San Antonio, Texas, and Palm Springs, California.

According to the “Agreement between the United States of America and the United Mexican States on Cooperation for the Protection and Improvement of the Environment in the Border Area,” signed by President De la Madrid and President Reagan in La Paz, Mexico, in 1983, the size of the US–Mexico border area extends 100 km from the border. In March 2002, President Bush and President Fox directed their respective administrations to work with their legislatures to make changes to the Border Environmental Cooperation Commission (BECC) and the North American Development Bank (NADB). These changes include expanding the geographic scope for BECC/NADB operations in Mexico from 100 to 300 km and concentrating grants and low-interest rate loans for projects in the poorest communities located within the current border region of 100 km (see Fig. 5.1).

In this book, we would rather exclude the restrictions of geographical scope; instead, we stipulate that cross-border research includes not only issues relating to cross-border areas but also all those that are related to borders – spatial, political, economic, and cultural.

### 5.1.2 *Disciplinary Boundary 2*

Second, cross-border research includes but still is different from transnational or trans-regional research.

International management is the practice of managing business operations in more than one country. International management requires knowledge and skills

above and beyond normal business expertise, such as familiarity with the business regulations of the nations in which the organization operates, understanding of language, culture, economic, local customs, laws and political environment. International management provides the conceptual and analytical skills needed to formulate effective management strategies and policies to benefit all the firms' constituents in today's globally competitive environment.

However, cross-border management includes far more professional topics than international management. Specifically, it will deal with not only international issues but also other issues as long as the latter are related to borders at international, interregional or even lower political levels. In addition, cross-border management – not international management – treats border areas as one of its key research areas. This will enable “cross-border management” become a useful sourcebook for specialists and practitioners when issues such as natural resource exploitation, environmental and ecological protection, and territorial-related international relations – to list but three – are addressed.

## 5.2 Natural Sciences

The natural sciences are the sciences that seek to elucidate the rules that govern the natural world through scientific methods, the cornerstone of which is measured by quantitative data (Ledoux 2002, p. 34). Based on formal sciences, they also attempt to provide mathematical (either deterministic or stochastic) models of natural processes. There are five branches of natural science: astronomy, biology, chemistry, the Earth sciences and physics (Barr 2006, p. 1; Simhony 2006, p. 49). Over the course of the past five centuries or so, the natural sciences have been changing our living and thinking ways at a much greater pace than they did in the earlier period of the human civilizations (see Box 5.1). The term “natural science” is used to distinguish the subject from the social sciences, such as economics and sociology, which apply the scientific method to the study of human behavior and social patterns; the humanities, which use a critical or analytical approach to study the human condition; and the formal sciences such as mathematics and logic, which use an a priori, as opposed to empirical methodology to study formal systems.

### **Box 5.1 On the Nature of Things**

Nearly six hundred years ago, Poggio Bracciolini (AD 1380–1459) – an Italian humanist and calligrapher – found a very old manuscript off a library shelf. That was the last surviving manuscript of Titus Lucretius Carus – a Roman poet and philosopher (c. 99–c. 55 BC). The book (*De rerum natura*), translated into English as “On the Nature of Things,” is a beautiful poem but was the one of the most dangerous ideas: that the universe functioned without the aid of gods, that religious fear was damaging to human life, and that matter was made up of very small particles in eternal motion, colliding and swerving in new directions. The circulation of this ancient book – the greatest discov-

ery of the greatest book-hunter of his age – fueled the Renaissance, inspiring artists such as Botticelli and thinkers such as Giordano Bruno; shaped the thought of Galileo and Freud, Darwin and Einstein; and had a revolutionary influence on writers such as Montaigne and Shakespeare and – in the hands of Thomas Jefferson – left its trace on the Declaration of Independence (see, for example, Greenblatt 2012, pp. 8 f., 183, and 262 f.).

### 5.2.1 *All Nature is Ruled by Laws*

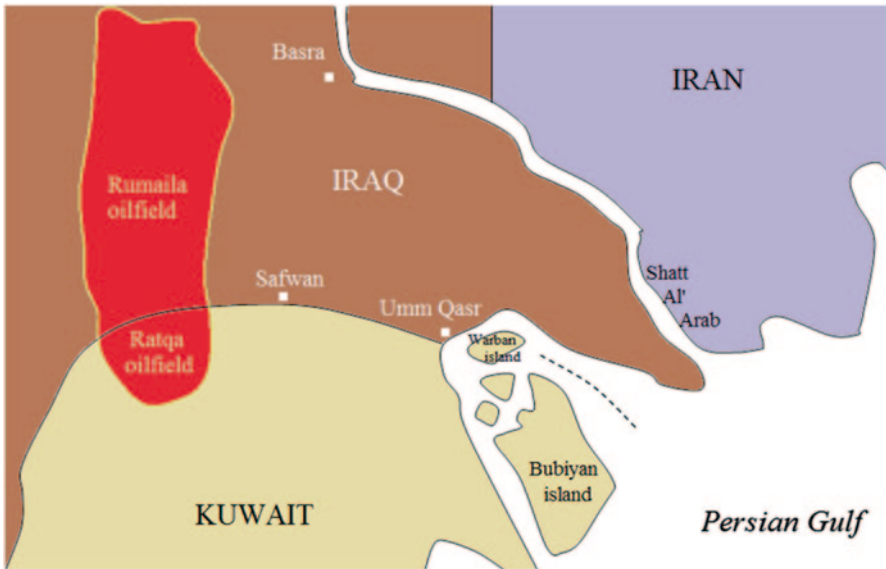
Very often, the geological formation of and/or the geographical distribution of natural and environmental resources (such as waters, minerals, and energy) are not consistent with those of political boundaries. This is true not only for cross-border rivers, lakes, and shorelines but also for underground and undersea resources that are shared by several nations. In many circumstances, the nonexclusive or common nature of cross-border resources is manifests in multiple claims to property rights, which reduces, to a large extent, the popularity of the fair division scheme. In the case of the common petroleum deposits that straddle the boundary of states, Lagoni (1979, p. 217) describes the problems as follows:

These deposits are characterized by a complicated ‘equilibrium of rock pressure, gas pressure and underlying water pressure’ (Ely 1938, p. 1219), so that extracting natural gas or petroleum at one point unavoidably changes conditions in the whole deposit. One possible result is that other states cannot extract the minerals from their part of the deposit, even if the first state has extracted only that portion originally situated in its territory or continental shelf.

Oil deposits may also span international borders, contributing to regional tensions. For example, Rumaila (in Iraq) and Ratqa (in Kuwait) are among the most productive oil fields in the world. Tectonically, these two oil fields are located within a single geological block (like a footprint), straddling both sides of the Iraq–Kuwait boundary; and Iraq possesses a much larger share of the total oil reserves than Kuwait (see Fig. 5.2). In reality, however, Iraq and Kuwait have not yet negotiated an agreement – technically, never an easy task – by which to appropriately divide the oil reserves. This is totally determined by the very fact that the oil flows beneath the earth without regard to the political boundaries of the surface. Consequently, there has been a long lasting concern in Iraq that Kuwaiti companies are stealing their oil resources. For example, in 1989, Iraq began to allege that it would lose oil from its wells in the Rumaila oil fields, located near the Iraq–Kuwait border area. Iraq believed that the Kuwaitis had installed a slant drilling operation on the border, enabling them to drill under the boundary and steal Iraqi oil.<sup>2</sup> This, together with other boundary and territorial disputes, eventually led to the Iraqi invasion of Kuwait in 1990 and the US-led war against the Iraqi army that followed.

<sup>2</sup> At that time, the Iraqi government assessed the oil losses at \$ 2.7 billion, but after discovering the enormity of the operation, losses were re-assessed to about \$ 14 billion (Lagauche 2009).





**Fig. 5.2** The Rumaila–Ratqa oil fields and the Iraq–Kuwait boundary. (Copyright © 2012 by Rongxing Guo)

### 5.2.2 *Nature Doesn't Recognize Borders*

The region spanning the United States–Mexico border is heavily dependent on the natural resources in the region being available to open access by the two nations. The Colorado River, for example, flows over a distance of 1442 miles, and forms a drainage basin of 244,016 miles<sup>2</sup>. For a 17-mile long section, the river serves as the border between the state of Arizona in the US and Mexico; it then flows 80 miles through Mexico to the Gulf of California. Issues, particularly those concerning groundwater quantity and quality, take on even more complex dimensions along the US–Mexico border. Waters in underground basins located partly in the United States and partly in Mexico have never been apportioned between the two countries. At least twelve US border municipalities are completely dependent on groundwater, and another four partially so. Agricultural production in Arizona and New Mexico and along the upper Rio Grande in Texas is also heavily dependent on groundwater. With the exception of the lower Rio Grande valley, Mexican agriculture relies just as much on this resource. The Mexican cities of Nogales, San Luis Rio Colorado, Agua Prieta, Ciudad Juarez, Presido, and Ciudad Acuna are nearly totally dependent on groundwater, while Mexicali, Tijuana, Reynosa, and Matamoros are variously dependent on it for up to half of their water. Along the entire border area there are many other locations where groundwater is at present or may become a source of bilateral conflict.

Air pollution in transboundary regions has also posed many challenges to policy-makers. With the help of a strong wind, air pollutants can be easily carried from one

place to another, regardless of their origins. The city of Mexicali, the state capital of Baja California in Mexico, lies 189 km inland from the Pacific Coast. However, it is also on the Mexico/California border at the lower end of California's Imperial Valley. Mexicali is adjacent to the Californian city of Calexico and 20 km south of Imperial county's seat, El Centro. Airflow to Mexicali is channeled through the Imperial valley and is usually from the northwest or southeast, with northwesterly winds being most frequent. During the period from March 1992 through August 1993, for example, hourly  $PM_{10}$  concentrations were higher in the border area during southerly than northerly flow.<sup>3</sup> For wind flow patterns in both directions,  $PM_{10}$  initially decreased with wind speed due to improved ventilation, then increased at high wind speeds due to increased suspension of soil particles. On average, when the wind was blowing from Mexico (i.e., southerly flow), the  $PM_{10}$  flux at Calexico was three times greater than when the wind was blowing from the United States (i.e., northerly flow). However, because winds from the north were about twice as frequent as winds from the south, the total flux from Mexico was only about 1.5 times the total flux from the United States (Chow et al. 2000).

## 5.3 Social Sciences

### 5.3.1 *Political Economy*

The traditional meaning of the term political economy is that branch of the art of government concerned with the systematic inquiry into the nature and causes of the wealth of nations, although it is now often used loosely to describe political aspects of economic policy-making. In its contemporary meaning, *political economy* refers to different, but related, approaches to studying economic and related behaviors, ranging from the combination of economics with other fields to the use of different, fundamental assumptions.

Political economy commonly refers to studies drawing upon economics, law, and political science in explaining how political institutions and the economic system – capitalist, socialist, or mixed – influence each other. The *Journal of Economic Literature* (JEL) classification codes associate political economy with three subareas: the role of government and/or power relationships in resource allocation for each type of economic system, international political economy, which studies the economic impacts of international relations, and economic models of political processes.

As a unified (or interdisciplinary) subject of political science and economics, political economy is the interplay between economics, law and politics, and how institutions develop in different social and economic systems, such as capitalism, socialism and communism. Economists and political scientists, when they come

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<sup>3</sup>  $PM_{10}$  denotes particles with aerodynamic diameter being less than 10  $\mu\text{m}$ .

together to address political economy problems, often examine phenomena beyond economics' standard remit, such as government failure and complex decision-making. Other "traditional" topics include analysis of such public policy issues as economic regulation, monopoly, rent-seeking, market protection, institutional corruption, and distributional politics.<sup>4</sup> From the mid-1990s, the field has expanded, in part aided by new cross-national data sets that allow tests of hypotheses on comparative economic systems and institutions.

International political economy (IPE) is an academic discipline within political science that analyzes economics and international relations. As an interdisciplinary field, the IPE draws heavily on many distinct academic schools, most notably political science and economics, also sociology, history, and international studies. Areas of study within this topic include differences in legal systems, political systems, economic policy, language, accounting standards, labor standards, living standards, environmental standards, local culture, corporate culture, foreign exchange market, tariffs, import and export regulations, investment and trade agreements, and many more topics. Each of these factors requires significant changes in how individual economic units operate from one country to the next.

### 5.3.2 *International Relations Theory*

International relations as a discipline is believed to have emerged after the First World War with the establishment of a Chair of International Relations at the University of Wales, Aberystwyth. Early international relations scholarship in the Inter-war years focused on the need for the balance of power system to be replaced with a system of collective security. These thinkers were later described as "Idealists" (Burchill et al. 2005, pp. 1–7). The early works of international relations (IR) as theory include Edward H. Carr's *The Twenty Years' Crisis* which was published in 1939 (Carr 2001) and to Hans Morgenthau's *Politics Among Nations* which was first published in 1948 (Morgenthau and Thompson 1985).

IR theory can be divided into "positivist/rationalist" theories which focus on a principally state-level analysis, and "post-positivist/reflectivist" ones which incorporate expanded meanings of security, ranging from class, to gender, to postcolonial security. Many often conflicting ways of thinking exist in IR theory, including constructivism, institutionalism, Marxism, neo-Gramscianism, and others. However, two positivist schools of thought are most prevalent: realism and liberalism; though increasingly, constructivism is becoming mainstream (Burchill et al. 2005, pp. 209 and 216).

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<sup>4</sup> See, for example, Krueger (1974), Becker (1983), Weingast et al. (1981), Breyer (1994), and Williamson (1996).

The following list illustrates most of the theories that have been included in current IR textbooks:

- Classical realism – which is a state level theory that argues that all states seek power.
- Neo-realism – which is a system level theory that is an offshoot of classical realism.
- Neo-classical realism – which is a sort of revival of classical realism.
- Liberalism – which is often called idealism.
- Neo-liberalism – which is an offshoot of liberalism.
- Cognitive theories – which are those mentioned above which examine the role of psychological processes – perception, misperception, belief systems – on the foreign policy behavior of states.
- Constructivism – which is a theory that examines state behavior in the context of state characteristics.

## 5.4 Operations Research

### 5.4.1 *What is Operations Research?*

Operations research (OR), or operational research in British usage, is a discipline that applies various analytical methods to help make better decisions. It is often considered to be a sub-field of mathematics. Operations research is often concerned with determining the maximum (of profit, performance, or yield) or minimum (of loss, risk, or cost) of some real-world objective.

OR is known by different names in different organizations: Systems Analysis and Management Science among them. Related fields include Operations Management, Industrial Engineering, and Systems Engineering (however, OR tends to have a broader and more mathematical scope than these fields). Information lies at the core of what OR analysts do: they collect, synthesize, and work with information, and use information systems as a source of data and a means of implementing solutions. Operations Research (OR) applies scientific method to the management of organized systems in business, industry, government and other enterprises. According to Cornell University School of Operations Research and Information Engineering, OR is regularly applied in areas such as:<sup>5</sup>

- supply chain management
- marketing and revenue management systems
- manufacturing plants
- financial engineering
- telecommunication networks

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<sup>5</sup> Cited from <http://www.orie.cornell.edu/about/whatis.cfm>. Accessed 28 May 2014.

- healthcare management
- transportation networks
- energy and the environment
- service systems
- web commerce
- military defense

Originating in the efforts of military planners during World War II, OR's techniques have grown to concern problems in a variety of industries. Since that time, OR has expanded into a field widely used in industries ranging from petrochemicals to airlines, finance, logistics, and government, moving to a focus on the development of mathematical models that can be used to analyze and optimize complex systems, and has become an area of active academic and industrial research. Employing techniques from mathematical optimization and modeling, and statistical analysis, operations research arrives at optimal or near-optimal solutions to complex decision-making problems.

### 5.4.2 *Problem-Solving Methods*

Analytical methods used in OR include a wide range of problem-solving techniques and methods applied in the pursuit of improved decision-making and efficiency, such as simulation, mathematical optimization, econometric methods, network analysis, queuing theory and other stochastic-process models, Markov decision processes, data envelopment analysis, expert systems, and game theory (to be discussed in Sect. 5.5). The whole process that OR undertakes can be broadly broken down into the following steps: (i) A set of potential solutions to a specific problem is developed. (ii) The alternatives derived in the first step are analyzed and reduced to a small set of solutions most likely to prove workable. (iii) The alternatives derived in the second step are subjected to simulated implementation and, if possible, tested out in real-world situations.<sup>6</sup>

Because of its emphasis on human-technology interaction and because of its focus on practical applications, operations research has overlap with other disciplines, notably industrial engineering and operations management, and draws on psychology and organization science. Because of the computational and statistical nature of most of these fields, OR also has strong ties to computer science and analytics. In general, the major sub-disciplines in modern operational research, as identified by the journal *Operations Research*, include:<sup>7</sup>

- Computing and Information Technologies
- Decision Analysis

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<sup>6</sup> Cited from <http://whatis.techtarget.com/definition/operations-research-OR>. Accessed 28 May 2014.

<sup>7</sup> Cited from <http://pubsonline.informs.org/journal/opre#>. Accessed 23 Feb 2014.

- Optimization
- Policy Modeling
- Simulation and Stochastic Models
- Supply Chain
- Telecommunications and Networking
- Transportation

## 5.5 Game Theory

### 5.5.1 *Historical Evolution*

Game theory did not really exist as a unique field until John von Neumann published a paper in 1928 (Neumann 1928). Von Neumann's original proof used Brouwer's fixed-point theorem on continuous mappings into compact convex sets, which became a standard method in game theory and mathematical economics. His paper was followed by his 1944 book *Theory of Games and Economic Behavior*. The second edition of this book provided an axiomatic theory of utility, which reincarnated Daniel Bernoulli's old theory of utility (of the money) as an independent discipline (von Neumann and Morgenstern 1944). During the following time period, work on game theory was primarily focused on cooperative game theory, which analyzes optimal strategies for groups of individuals, presuming that they can enforce agreements between them about proper strategies (Leonard 2010).

In the beginning of the 1950s, the first mathematical discussion of non-cooperative games appeared, and an experiment was undertaken by mathematicians, as part of their investigations into game theory. Around this same time, John Nash developed a criterion for mutual consistency of players' strategies, known as the Nash equilibrium, applicable to a wider variety of games than the criterion proposed by von Neumann and Morgenstern. This equilibrium is sufficiently general to allow for the analysis of non-cooperative games in addition to cooperative ones.<sup>8</sup> Game theory experienced a flurry of activity in the 1950s. And the first applications of game theory to philosophy and political science occurred during this time.

In 1965, Reinhard Selten introduced his solution concept of subgame perfect equilibria, which further refined the Nash equilibrium (later he would introduce trembling hand perfection as well). In 1967, John Harsanyi developed the concepts of complete information and Bayesian games. Nash, Selten and Harsanyi became Economics Nobel Laureates in 1994 for their contributions to economic game theory.

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<sup>8</sup> Cited from "Game theory". Available at <http://www.academicroom.com/topics/what-is-game-theory>. Accessed 5 Feb 2014.

### **5.5.2 Rational Choice of Strategies**

Conversely, games in which the participants can make commitments to coordinate their strategies are “cooperative games.” In a cooperative game, the rational person’s problem is to answer the question, “What strategy choice will lead to the best outcome for all of us in this game?” If that seems excessively idealistic, we should keep in mind that cooperative games typically allow for “side payments,” that is, bribes and quid pro quo arrangements so that everyone is (might be?) better off. Thus the rational person’s problem in the cooperative game is actually a little more complicated than that. The rational person must ask not only “What strategy choice will lead to the best outcome for all of us in this game?” but also “How large a bribe may I reasonably expect for choosing it?”

There is, in general, no unique answer to the question “what is the rational choice of strategies?” Instead there are at least two possible answers, two possible kinds of “rational” strategies, in non-constant sum games. Often there are more than two “rational solutions,” based on different definitions of a “rational solution” to the game. But there are at least two: a “non-cooperative” solution in which each person maximizes his or her own rewards regardless of the results for others, and a “cooperative” solution in which the strategies of the participants are coordinated so as to attain the best result for the whole group (see Chap. 7 for more detailed analyses). Of course, “best for the whole group” is a tricky concept – that’s one reason why there can be more than two solutions, corresponding to more than concept of “best for the whole group.”

## **5.6 Interdiscipline**

### **5.6.1 Interdisciplinary Studies**

Due to the spatial and institutional complexities of cross-border management, many traditional theories and methods cannot be successfully applied. Cross-border management needs new and interdisciplinary approaches. An interdisciplinary approach involves drawing appropriately from several disciplines (or separate branches of learning or fields of expertise) to redefine problems outside of normal boundaries and reach solutions based on a new understanding of complex situations. The use of the term ‘multidisciplinary’ has in recent years been overtaken by the term ‘interdisciplinary’ (a Google ratio of 36,800,000: 62,600,000 in mid-January 2014) for what is essentially holistic working by another name.

The term interdiscipline or cross-discipline means an organizational unit that involves two or more academic disciplines. It is related to interdisciplinarity, but it is a noun used for a certain kind of unit (academic discipline). A field may be both a discipline and an interdiscipline at the same time. The example of information sci-

ence demonstrates that a field may be regarded as a discipline in some countries but an interdiscipline in other countries.<sup>9</sup>

Interdisciplinary programs sometimes arise from the viewpoint that the traditional disciplines are unable to address an important problem. For example, social science disciplines such as anthropology and sociology paid little attention to the social effects of technology throughout most of the twentieth century. As a result, many social scientists with interests in technology have joined science and technology studies programs, which are typically staffed by scholars drawn from numerous disciplines. They may also arise from new research developments, such as nanotechnology, which cannot be addressed without combining the approaches of two or more disciplines. Examples include quantum information processing, an amalgamation of quantum physics and computer science, and bioinformatics, combining molecular biology with computer science.

Cross-border research needs multi- and interdisciplinary approaches. As a matter of fact, interdiscipline (or cross-discipline) per se is also special kind of cross-border research.

### 5.6.2 *Study of Interdisciplinarity*

An initial distinction should be made between interdisciplinary studies, which can be found spread across the academy today, and the study of interdisciplinarity, which involves a much smaller group of researchers. The former is instantiated in thousands of research centers across the world. The latter includes one US organization, the Association for Interdisciplinary Studies (founded in 1979), two international organizations, the International Network of Inter- and Transdisciplinarity (founded in 2010) and the Philosophy of/as Interdisciplinarity Network (founded in 2009), and one research institute devoted to the theory and practice of interdisciplinarity, the Center for the Study of Interdisciplinarity at the University of North Texas (founded in 2008).<sup>10</sup>

In contrast to an interdisciplinary study, which seeks to synthesize broad perspectives, knowledge, skills, interconnections, and epistemology in an educational setting, studies of interdisciplinarity raise to questions about how interdisciplinarity works, as well as the nature and history of disciplinarity, and its future. Researchers at the Center for the Study of Interdisciplinarity have made the distinction between philosophy ‘of’ and ‘as’ interdisciplinarity, the former identifying a new, discrete area within philosophy that raises epistemological and metaphysical questions about the status of interdisciplinary thinking, with the latter pointing toward a philosophical practice that is sometimes called ‘field philosophy’ (Frodeman et al. 2012).

<sup>9</sup> For example, in America information science and communication studies are considered as two academic disciplines; in France, however, they are considered one interdiscipline (Newell 1983).

<sup>10</sup> Cited from an article available at <http://en.wikipedia.org/wiki/Interdisciplinarity>. Accessed 28 Feb 2014.



## 5.7 Case 5. How the Measurement Standards and Units Differ in the World

There are many different standards and units used all over the world. The metric system is a system of measurement used in most of the world. Formerly called the meter–kilogram–second (MKS) system, the International System of Units (SI, which is abbreviated from *systeme internationale*, the French version of the name) is a scientific method of expressing the magnitudes or quantities of important natural phenomena.

There are several base units in the metric system, from which other units are derived. For example, the units of length or linear size are based on the meter. They include the kilometer which is 1000 m, the centimeter, and the millimeter which is 1/1000th of a meter. The unit of volume is the liter. It is used for measuring an amount of liquid. A milliliter (abbreviated as ml) is the amount of liquid that would fill up a cube that measures 1 cm on each side. 1 l of liquid would fill up a cube that is 10 cm on each side. The unit of mass is the kilogram. A kilogram weighs the same as a liter of water (at normal temperature, and pressure). 1 g is the weight of 1 ml of water at 0°C. The metric ton is 1000 kg or a million grams.

Since 1795 when France officially adopted the SI, more and more countries have been willing to adopt this system. Till present, however, many countries, including industrialized countries, have yet to adopt the SI as their official system. For example, although use of the metric system was already sanctioned by law in the United States in as early as 1866, it has been slow in displacing the American adaptation of the British Imperial System known as the US Customary System.

Imperial units were defined in the United Kingdom in 1825. These units were based on similar units that were in use before 1825. British imperial units were used in countries that were part of the British empire. While many of these countries, including the United Kingdom, have officially adopted SI, the older system of units is still used.

Many American units of weights and measures are based on units in use in the United Kingdom before 1825, when the British Imperial System was established. Since the Mendenhall Order of 1893, the US yard and pound and all other units derived from them have been defined in terms of the metric units of length and mass, the meter and the kilogram; thus, there is no longer any direct relationship between American units and British units of the same name. In 1959 an international agreement was reached among English-speaking nations to use the same metric equivalents for the yard and pound for purposes of science and technology. These values are  $1 \text{ yd} = 0.9144 \text{ m}$  and  $1 \text{ lb} = 0.45359237 \text{ kg}$ . In the United States, the older definition of the yard as  $3600/3937 \text{ m}$  is still used for surveying, the corresponding foot ( $1200/3937 \text{ m}$ ) being known as the survey foot.

The English units of measurement have many drawbacks: the complexity of converting from one unit to another, the differences between American and British units, the use of the same name for different units (e.g., ounce for both weight and liquid capacity, quart and pint for both liquid and dry capacity), and the existence of three different systems of weights (avoirdupois, troy, and apothecaries'). Because of

these disadvantages and because of the wide use of the much simpler metric system in most other parts of the world, there have been proposals to do away with the US Customary System and replace it with the metric system.

Source: Chisholm (1967), Nelson (2000) and Bureau International des Poids et Mesures (2012).

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# **Part II**

## **Method**

# Chapter 6

## Solving Fair Division Problems

There is a story about seven monks who lived in a temple. They led a poor life and could only share one bowl of porridge a day. At the beginning, one monk was specially designated to divide the porridge and he always took the largest share. Then, another monk took the position and he did the same. In order to divide porridge justly, the seven monks elected an honest and morally lofty monk to take the position. At the beginning, the monk could do his work justly. But soon, he began to be partial to those who fawned on him. Then, someone suggested every monk take the job of dividing porridge in turn every day. But they found a monk could only have enough to eat one day a week and had to stay hungry in the remaining six days. Finally, the seven monks discussed the measures of porridge sharing. They established a porridge-distribution commission and a supervision committee, and formulated detailed rules for porridge distribution and supervision mechanisms. This way, the porridge could be divided justly. However, the supervision committee and porridge-sharing commission had endless argument on porridge sharing. When porridge was shared, it had long turned cold. Finally, the seven monks agreed on rotating division system and stipulated that the monk who divided the porridge should be the last one to select porridge. Hence, they found the porridge is very justly shared.

Cited from National Bureau of Corruption Prevention (2010)

### 6.1 Divider–Chooser Method

A fair division method is a systematic procedure for solving fair division problems. A block of land or a deposit of natural or environmental resources may be internationally claimed, if it is physically linked with two or more sovereign states. From the legal point of view, the former's ownership is in dispute if one single state does not have complete power to exercise exclusive control over it. The advantage of the "fair division method" is that, through the establishment of an agreed boundary or boundaries dividing the disputed land and other natural resources therein into two or more sectors that are under the jurisdictions of different sovereign states, it can help resolve sovereignty disputes definitively.

A fair division problem refers to the division of a resource in such a way that all recipients believe that they have received a fair amount. Divide and choose's origins are undocumented. The related activities of bargaining and barter are also ancient. Negotiations involving more than two people are also quite common.

### 6.1.1 *Criteria and Principles*

There are a number of widely used criteria for the above methods to be successfully applied. Some of these conflict with each other but often they can be combined. The criteria described below are only for when each player is entitled to the same amount (Mandal 2009, pp. 110–111):

- A proportional or simple fair division guarantees each player gets his fair share. For instance if three people divide up a cake each gets at least a third by their own valuation.
- An envy-free division guarantees no-one will want somebody else's share more than their own.
- An exact division is one where every player thinks everyone received exactly their fair share, no more and no less.
- An efficient or Pareto optimal division ensures no other allocation would make someone better off without making someone else worse off. The term efficiency comes from the economics idea of the efficient market. A division where one player gets everything is optimal by this definition so on its own this does not guarantee even a fair share.
- An equitable division is one where the proportion of the cake a player receives by their own valuation is the same for every player. This is a difficult aim as players need not be truthful if asked their valuation.

Suppose that a fair division problem has a set of  $N$  players ( $P_1, P_2, \dots$ , and  $P_N$ ) and a set of goods ( $S$ ). All the  $N$  players wish to divide  $S$  into  $N$  shares ( $S_1, S_2, \dots$ , and  $S_N$ ) so that each player can get a fair share of  $S$ . A fair share is a share that, in the opinion of the player receiving it, is worth  $1/N$  of the total value of  $S$ . We will assume that any player is capable of deciding whether his share is fair; that is, we assume that any player is capable of assigning unambiguous values to  $S$  and to various parts of  $S$ .

For two people there is a simple solution which is commonly employed. This is the so-called "divide and choose" method. One person divides the resource into what they believe are equal halves, and the other person chooses the "half" they prefer. Thus, the person making the division has an incentive to divide as fairly as possible: for if they do not, they will likely receive an undesirable portion. This solution gives a proportional and envy-free division (Brams and Taylor 1995).<sup>1</sup>

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<sup>1</sup> See Box 6.1 for a brief account of Brams and Taylor and of their mathematical contributions to the solutions to the cake-cutting problem.

**Box 6.1 Brams, Taylor and the Cake-Cutting Problem**

The cake-cutting problem had been one of the most important open problems in twentieth century mathematics, when the most important variant of the problem was finally solved with the Brams–Taylor procedure by Steven Brams and Alan Taylor in 1995 (Brams and Taylor 1995). The theory of fair division provides explicit criteria for various different types of fairness. Its aim is to provide procedures (algorithms) to achieve a fair division, or prove their impossibility, and study the properties of such divisions both in theory and in real life.

Steven J. Brams was born on November 28, 1940, in Concord, New Hampshire. He is a game theorist and political scientist at the Department of Politics of New York University. Brams is best known for using the techniques of game theory, public choice theory, and social choice theory to analyze voting systems and fair division. Brams has applied game theory to a wide variety of strategic analyses on international relations (see, for example, Brams and Taylor 1996; Hill 2000; Robertson and Webb 1998).

Alan Dana Taylor is a mathematician. He received his PhD in 1975 from Dartmouth College. He currently is the Marie Louise Bailey professor of mathematics at Union College, in Schenectady, New York. Taylor was a co-discoverer, with Brams, of the first envy-free solution to the  $n$ -person cake-cutting problem. Previous to the Brams–Taylor procedure, the cake-cutting problem had been one of the most important open problems in contemporary mathematics.

The stylized steps of this and the following methods discussed in this chapter are designed to meet the immediate needs of the reader. For mathematical details about these methods, the reader is advised to consult more extensive treatments.

**6.1.2 A 2-Player Case**

A moving-knife procedure is a type of solution to the fair division problem. The simplest example is a moving-knife equivalent of the “I cut, you choose” scheme, sometimes known as Austin’s moving-knife procedure (Austin 1982). One player moves the knife across the cake, conventionally from left to right. The cake is cut when either player calls “stop”. If each player calls stop when he or she perceives the knife to be at the 50–50 point, then the first player to call stop will produce an envy-free division if the caller gets the left piece and the other player gets the right piece.

Sometimes, a fair division does not mean a 50–50 division. Suppose that there are two players: Alice and Bob who win a pizza with a half pepperoni half anchovies. Bob likes both anchovies and pepperoni equally well; Alice, on the other hand,

cannot stand anchovies (she considers the anchovie-pizza worth nothing to her). Notice here that in order to comply with the rules for solving this problem by a fair division method, Alice and Bob must be unaware each other's preference. Bob is randomly picked to become the divider and Alice the chooser. Bob then (behaving rationally) cuts the pizza exactly in half. (He knows that he only has to make sure that each piece is the same size.) Now Alice has an easy choice—she picks the half that she thinks is larger in value than the other piece. Bob gets the remaining piece of the pizza.

Notice that in the above example, the divider came out with a fair share while the chooser came out with more than a fair share. Therefore, in order to get a fair share, the divider (Bob) must cut the pizza as equal as possible. Last but not least, to be really fair, we need to pick our divider randomly.

### 6.1.3 Example

The resolution of the dispute over the Iceland—Jan Mayen continental shelf is a successful application of fair division. The continental-shelf questions on the extension of the exclusive economic zones (EEZs) of Iceland and Norway to 200 nautical miles had existed in those areas between Iceland and Jan Mayen where the distance between the baselines is less than 400 nautical miles. The “Agreement between Iceland and Norway on the Continental Shelf in the area between Iceland and Jan Mayen” was signed by the Governments of Iceland and Norway on October 22, 1981.

According to the Agreement, the delimitation line between the two Parties' parts of the continental shelf in the area between Iceland and Jan Mayen shall coincide with the delimitation line for the economic zones (Article 1), and that cooperation between the two Parties be established in connection with the exploration for and exploitation of hydrocarbon resources in an area between Iceland and Jan Mayen on both sides of the delimitation line—that is, from lat. 70°35'N to 68°00'N and from long. 10°30'W to 6°30'W (Article 2).

Specifically, according to the Agreement, the fair division of the disputed water area is agreed as the following:<sup>2</sup>

- A. In the part of the area north of the delimitation line between the two Parties' economic zones (approximately 32,750 km<sup>2</sup>), Iceland shall be entitled to participate with a share of 25% in such petroleum exploitation activities. In negotiations with outside governmental or non-governmental petroleum companies, Norway shall seek to arrive at an arrangement whereby both the Norwegian and the Icelandic percentage of the costs of such petroleum activities are carried by the company (or companies) concerned up to the stage where commercial finds have been declared.

<sup>2</sup> Source: [http://eng.idnadarraduneyti.is/media/Acrobat/Jan\\_Mayen\\_Agreement.pdf](http://eng.idnadarraduneyti.is/media/Acrobat/Jan_Mayen_Agreement.pdf). Accessed 23 July 2014.



B. In the area south of the delimitation line between the two Parties' economic zones (approximately 12,720 km<sup>2</sup>), Norway shall be entitled to participate with a share of 25% in petroleum exploitation activities. In negotiations with outside governmental or non-governmental petroleum companies, Iceland shall not be bound to seek to arrive at an arrangement whereby the Norwegian percentage of the costs of such petroleum activities are carried by the company (or companies) concerned.

## 6.2 Lone Divider Method

### 6.2.1 A 3-Player Case

This is just an extension of the divider–chooser method. Using the above pizza example: three players are now involved in the game. The lone divider method requires three steps:

- Step 1 (Division): One player is randomly picked to become the divider. The divider (rationally) slices the pizza into three pieces.
- Step 2 (Declarations): Each chooser declares which piece(s) he or she considers acceptable (a fair share, in other words).
- Step 3 (Distribution): The distribution here depends on the declarations made by the choosers. There are three cases:
  - Case 1: Both choosers declare just one piece, and they are different. Then each chooser gets his or her declared piece. The divider gets the remaining (undeclared) piece.
  - Case 2: Both choosers declare one or two pieces acceptable, and they are different. Then the chooser declaring just one piece gets her or his chosen piece, and the chooser of two pieces gets her or his choice. The divider gets what was left.
  - Case 3: Both choosers declare one or two pieces acceptable, and they are the same piece(s). Then, the divider gets the undeclared piece (if both choosers declare the same two pieces) or selects one of the two undeclared pieces (if both choosers declare the same single piece). Next, the two choosers put the remaining two pieces back together to apply the divider-chooser method (again, the new divider is randomly selected).

Finally, everyone gets a fair share in all the three cases. Although the above process is described for three players, we can easily extend it to more players if needed. This division is rational only if each piece has equal value to the divider.

## 6.3 Lone Chooser Method

### 6.3.1 A 3-Player Case

Suppose that there are three players. Again, using the pizza as an example, the lone chooser method goes through three steps, as follows:

- Step 1 (First Division): After a chooser and two dividers are chosen at random, the two dividers split the pizza by the divider-chooser method.
- Step 2 (Second Division): Each divider now (rationally) divides his part into three parts he considers equal.
- Step 3 (Selection): The chooser picks one piece from each divider, and each divider keeps whatever he has left.

Again, this method has a fair share for everybody. Although the above process is described for three players, we can easily extend it to more players if needed.

## 6.4 Last Diminisher Method

The theory of fair division dates back only to the end of the Second World War. A proportional (fair division) division for any number of players called ‘last-diminisher’ was devised in 1944. This was attributed to Banach and Knaster by Steinhaus when he made the problem public for the first time at a meeting of the Econometric Society held in Washington DC on September 17, 1947.<sup>3</sup>

In this method everybody is both a divider and a chooser. The method makes sense only for division problems in which there are at least three players. We start by randomly assigning an order to the  $N$  players. Player  $P_1$  claims a certain piece of the object. If  $P_2$  thinks  $P_1$  was too greedy, it can “trim”  $P_1$ ’s share smaller and take it from  $P_1$  (the trimmed part goes back with the rest of the unclaimed goods); or  $P_2$  can pass, if he/she agrees that what  $P_1$  has done is a fair share. During the round, the turns go in order down the ranks of the players, with each subsequent player either “passing” or trimming the claim and taking it for his own. After everyone has played or passed, whoever was the “last diminisher” takes his claim and leaves the game.

The next step is just to repeat what we just finished but with one less player. If we continue this process, we will eventually have only two players left who can finish the process by the divider–chooser method.

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<sup>3</sup> Cited from [http://en.wikipedia.org/wiki/Fair\\_division](http://en.wikipedia.org/wiki/Fair_division). Accessed 19 Feb 2014.

### 6.4.1 *A N-Player Case*

The last diminisher method can be treated as a generalization of the divider–chooser method. The whole procedure of the method is described as follows:

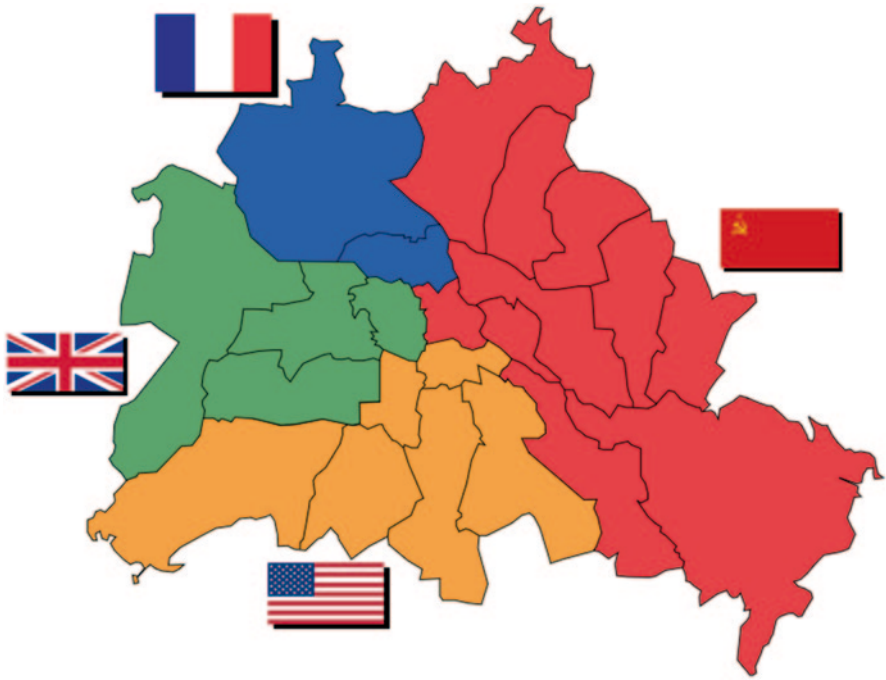
1. Step 1 (First Round: Division): Randomly set the order of the  $N$  players as  $P_1, P_2, \dots,$  and  $P_N$ , and let  $P_1$  cut a piece.
2. Step 2 (First Round: First Selection):  $P_2$  either claims a subpiece of  $P_1$ 's piece (becomes a diminisher) or passes to stay in contention for a piece of the rest. There are two cases:
  - Case 1: If  $P_2$  becomes a diminisher, the trimmed part is put back with the rest and  $P_1$  becomes a contender.
  - Case 2: If  $P_2$  passes, play passes to  $P_3$ .
3. Step 3 (First Round: Further Selections): Each remaining player, in turn, diminishes or passes. When all players have played, the last diminisher gets his/her piece and departs.
4. Step 4 (Second Round: Division and Selections): The process begins again with one less player. When only two players remain in the game, use the divider–chooser method.

So why does this method produce fair shares? If  $P_1$ 's claim is agreed by the rest of the players, then he gets what he was identifying as a fair share. Nobody else can take it away from him without “diminishing” it.  $P_2$ 's diminishing it should make it less than a fair share to  $P_1$  (unless he was being too greedy initially), which would make the remainder appear to contain potentially more than a fair share, a situation  $P_1$  should be happy with. The same argument applies to everybody else as well. Note that the pieces removed by a diminisher can be arbitrarily small, a situation that immediately penalizes even the slightest bit of greed.

### 6.4.2 *Example*

It is interesting to recall that in 1944 when the allies (the Great Britain, France, the Soviet Union, and the United States) agreed to partition Germany into zones after World War II. Of course, it is difficult to classify which of the above four fair-division methods was applied in that complicated process.

After agreement was reached by the Great Britain, the United States and the Soviet Union on partitioning Germany into three zones (France was later given part of both the Great British and American zones), the United States and Great Britain discussed exchanging the two zones that they were scheduled to control. This did not happen in the end, but the United States received transit rights through the British zone to allay US fears of lack of access to the sea (Smith 1963, pp. 16–17 and 28–29).



**Fig. 6.1** Berlin divided by the Potsdam Conference. (Source: Historicair 11 September 2007)

With regard to the problem of what to do with Berlin, the allies did not reach any agreement at the first stage. Subsequently, they decided to partition it into zones, even though this city fell 177 km within the Soviet zone. Berlin was simply too valuable a “piece” for the Western allies to cede to the Soviets, which is at least suggestive of how, after a piece is trimmed off, it can be subsequently divided under the trimming procedure (Brams and Taylor 1996, p. 144). Eventually, at the Potsdam Conference, held in Potsdam, occupied Germany, from July 17 to August 2, 1945, the problem of what to do with Berlin was solved by dividing it into four connected zones like the rest of Germany (see Fig. 6.1).

## 6.5 Method of Sealed Bids

### 6.5.1 *Criteria and Procedure*

Next we consider discrete fair division problems. Indivisible parts make the theory much more complex. An example of this would be where a car and a motorcycle have to be shared. This is also an example of where the values may not add up nicely, as either can be used as transport. The use of money can make such problems much easier.

The criteria of a fair division are stated in terms of a player's valuations, their level of entitlement, and the results of a fair division procedure. The valuations of the other players are not involved in the criteria. Differing entitlements can normally be represented by having a different number of proxy players for each player but sometimes the criteria specify something different.

Suppose that there are  $N$  players and that the object include a variety of items, each of which cannot be physically divided (such as cars and valuable paintings). This method can be described as a three step process:

- Step 1 (Bidding): Each player produces a sealed bid in which he or she attaches a monetized value to each item in the object. A player's fair share is  $1/N$  of his total assessment of all the items.
- Step 2 (Allocation): Each item goes to the highest bidder for that item. If her/his assessed value of the items received exceeds her/his fair share, she/he must pay the difference. If the assessed value of the items received falls short of a fair share, then she/he is paid out of money that others have had to pay.
- Step 3 (Dividing the Surplus): There is almost always a surplus of cash that is divided equally among the players.

### 6.5.2 *Example*

Let us illustrate the method of sealed bids with an example. Suppose a rich lady has two houses, two cars, and three apartments and wants to fairly allocate them between her five children (named A, B, C, D, and E). After long negotiations, the five children have reached a friendly agreement: to divide fairly in equal shares among themselves. They also agree beforehand that any ties for high bid will be resolved with a coin toss. Table 6.1 shows the results of the bidding step.

Next, we continue to Step 2, the allocation. Each item goes to the highest bidder, so A gets Cars #1 and #2, and Apartment #2. These items total \$ 144.0 thousand, which is \$ 11.2 thousand more than A's assessment of a fair share, \$ 132.8 thousand, so A has to pay \$ 11.2 thousand (in cash) back to the estate. We can allocate to the others in the same way. It is noticeable that since C gets House #2, whose value (\$ 62.0 thousand) is \$ 58.5 thousand lower than C's fair share (\$ 120.5 thousand), he will receive an extra amount of \$ 58.5 thousand in cash. Table 6.2 shows the whole

**Table 6.1** The bidding results of the five children (in thousand dollars)

Item	A	B	C	D	E
House #1	\$ 190.0	\$ <i>210.0</i>	\$ 195.0	\$ 190.0	\$ 205.0
House #2	\$ 60.0	\$ 59.0	\$ <i>62.0</i>	\$ 59.5	\$ 58.0
Car #1	\$ <i>29.0</i>	\$ 24.5	\$ 25.0	\$ 27.5	\$ 27.5
Car #2	\$ <i>25.0</i>	\$ 19.0	\$ 22.5	\$ 24.5	\$ 19.5
Apartment #1	\$ 120.0	\$ 125.0	\$ 119.0	\$ 125.0	\$ <i>133.0</i>
Apartment #2	\$ <i>90.0</i>	\$ 89.0	\$ 80.0	\$ 75.0	\$ 65.0
Apartment #3	\$ 150.0	\$ 135.0	\$ 99.0	\$ <i>170.0</i>	\$ 149.0
Total value	\$ 664.0	\$ 661.5	\$ 602.5	\$ 671.5	\$ 657.0
Fair share <sup>a</sup>	\$ 132.8	\$ 132.3	\$ 120.5	\$ 134.3	\$ 131.4

*Note:* The figures in italic denote the highest bidding results for seven items

<sup>a</sup> The fair share is 1/5 of the “total share”

**Table 6.2** The allocation results of the five children

Child	Items received	Value received (in thousand dollars)	Surplus value (+/-) (in thousand dollars) <sup>a</sup>
A	Cars #1 and #2, Apartment #2	\$ 144.0	+\$ 11.2
B	House #1	\$ 210.0	+\$ 77.7
C	House #2	\$ 62.0	-\$ 58.5
D	Apartment #3	\$ 170.0	+\$ 35.7
E	Apartment #1	\$ 133.0	+\$ 1.6
Total surplus			+\$ 67.7

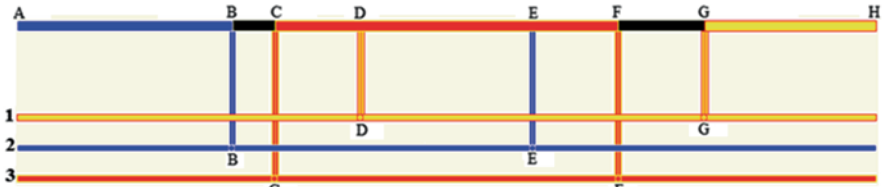
<sup>a</sup> The “surplus value” equals the “value received” (shown in the third column of Table 6.2) minus the “fair share” (shown in the last row of Table 6.1)

allocation results of the five children (shown in the second column) and how much each should pay back to (or receive from) the estate (shown in the last column).

The allocation has not ended yet. After everybody gets its fair share, there is still \$ 67.7 thousand left over. What is amazing! So, if there is not any fee for an executor, everybody gets an extra benefit (\$ 13.54 thousand)—it is over and above what each one considers a fair share!

## 6.6 Method of Markers

The method of markers applies to problems of discrete fair division in which the goods could be arranged in a linear fashion. This may be the case of a large number of small items to be shared among  $N$  players, or a continuous item, like a gold chain, to be cut into  $N$  pieces. In this method, each of the  $N$  players indicates his or her opinion with regard to a fair division by placing  $N-1$  markers and agrees to



Notes: (1) The top bar represents the goods to be shared in the required linear arrangement. (2) 1, 2, and 3 denote Players 1, 2, and 3, respectively. (3) The horizontal bars are rails on which the vertical bars – the markers – slide. (4) The marks D and G are made by Player 1; B and E by Player 2; and C and F by Player 3.

Fig. 6.2 The method of markers—an example of three players

accept any segment of the goods that lies between any pair of his or her consecutive markers.

Suppose that all of the  $N$  players have different views on the values of the goods to be divided among these players. Thus each player could have different segments of goods. Specifically, this method comprises three steps:

- Step 1 (Bidding): Each player secretly divides the line of items into  $N$  segments, each of which she or he considers a fair share. This is easily done by positioning  $N - 1$  markers.
- Step 2 (Allocation): Consider all the first markers—one from each player, and find the leftmost among them. The owner of the marker receives the first segment (i.e., the one from the left end and up to the marker itself) and all the remaining markers of that player are removed from further consideration. Continue the process until everybody has her fair share.
- Step 3 (Dividing the Surplus): There will usually be some leftovers, and these can be distributed by chance. If there are many leftovers, we can even use the method of markers again.

If two or more players have the same leftmost markers in Step 2, we can randomly let one player receive the first segment and include the other player(s) in further consideration.

### 6.6.1 Example

Below is an example in which there are three players, named 1, 2, and 3. As shown in Fig. 6.2, the top bar represents the goods to be shared in the required linear arrangement. Each player secretly divides the line of items into three segments, each of which she or he considers a fair share: AD, DG, and GH for Player 1; AB, BE, and EH for Player 2; and AC, CF, and FH for Player 3.

Consider all the first markers (B, C, and D)—one from each player, and find the leftmost among them. Player 2 (the owner of the marker B) receives the first segment (i.e., AB). After the remaining marker of Player 2 (i.e., E) is removed from further consideration, the leftmost marker among all the second markers (F and G)

is F. Thus, Player 3 (the owner of the marker F) receives the second segment (i.e., CF). At last, Player 1 receives the last (third) segment (i.e., GH).

Chances are that after each of the players received what in his or her view is necessarily a fair share, some items will remain undivided (these are portions marked as BC and FG of the top bar in Fig. 6.2). These leftovers can either used as bonus for an external executor or be shared by all the three players by using the method of markers again.

## 6.7 Summary

Mathematicians have invented six different fair division methods in all, four of which are methods for solving continuous fair division problems (i.e., the divider-chooser method, the lone divider method, the lone chooser method, and the last diminisher method) and two of which are methods for solving discrete fair division problems (i.e., the method of sealed bids, and the method of markers). Note that in all the fair division methods that have just been discussed, the “fair” share delivered to a recipient does not mean the “best” share; neither does it mean the “same” share to all the other recipients. This is because in most circumstances (especially when the object to be divided is heterogeneously or discretely characterized) the “best” division method does not exist or cannot be achieved under existing techniques available to players.

The methods discussed in this chapter can be used to solve more complicated problems, such as those in which the sovereignty or ownership over the territories is disputable or unclearly defined. According to their geometric characteristics, objects (such as territories or any other natural resources therein) to be divided by disputant states can be classified into two groups:

- i. continuous objects (i.e., those that can be divided infinitely in many ways, such as land, lakes, seas, waters, etc.); and
- ii. discrete objects (i.e., those that comprises indivisible objects or those that are not easily divisible, such as bridges, dams of rivers, sites of valuable natural heritages and of cultural relics, etc.).

It must be noted that a fair division method is required only to give a fair division and not the *best* division. In addition, things would have come out different (but still fair) had the initial coin tosses come out different. However, as illustrated in their methodological characteristics, the fair division methods can make all players better off, if the players are determined to behave rationally (see Table 6.3 for a comparison of these fair division methods).

For example, disputant states can apply the “method of sealed bids” to solve the fair division of disputed islands and the “method of markers” to solve the fair division of seabed hydrocarbon deposits in disputed seas (lakes). In the first case, disputant states can bid for what they desire, and, after the bidding results are announced, they could (or could invite a neutral umpire to) calculate how to fairly divide the



**Table 6.3** How to achieve the fair division scheme: six methods and their characteristics. (Source: Defined by author)

	Divider–chooser method	Lone divider method	Lone chooser method	Last diminisher method	Method of sealed bids	Method of markers
Number of recipients	2	3 or more	3 or more	3 or more	2 or more	2 or more
Is an external executor needed?	Not necessary	Not necessary	Not necessary	Not necessary	Yes	Yes
Characteristics of object(s) <sup>a</sup>	Continuous object	Continuous object	Continuous object	Continuous object	Discrete objects	Continuous/discrete objects <sup>b</sup>
Do the objects need to be monetized?	No	No	No	No	Yes	No

<sup>a</sup> A “continuous object” is one that can be divided infinitely (such as a piece of land, a lake, a sea area, etc.); and “discrete objects” are indivisible or are not easily divisible (such as bridges, dams of rivers, sites of valuable natural heritages and of cultural relics, etc.)

<sup>b</sup> These may be defined as a continuous object or a large number of discrete objects, or as a mix of both of them

assets. At last, all the disputant states can also divide the total surplus in a way that gives each disputant state a fair share.

In the real world, of course, people sometimes have a very accurate idea of how the other players value the goods and they may care very much about it. The case where they have complete knowledge of each other’s valuations can be modeled by the theory of games—including both cooperative and non-cooperative games (see Sects. 7.1 and 7.2 of Chap. 7 for details).

## 6.8 Case 6. How to Divide the East China Sea: An American View

The East China Sea contains large amounts of seabed resources including sand and gravel, shell and carbonate sand, heavy-metal sand, phosphorus, precious coral, rock salt, as well as varying amounts of titanium, gold, platinum, zircon, and other heavy metals. Under the United Nations Convention on Laws of the Sea (UNCLOS), China has the right to claim a continental shelf as far as 350 nautical miles. However, Japan also has the right to an exclusive economic zone (EEZ) extending 200 nautical miles from its shore. Since China’s coast is within 400 nautical miles of the nearest undisputed Japanese island, China and Japan’s claimed EEZs overlap in the East China Sea.

From 2004 to 2008, China and Japan had held a series of high-level meetings to address their growing maritime boundary disputes and joint/cooperative development of the hydrocarbon resources in the disputed area. On June 18, 2008, after 12 rounds of talks, China and Japan reached an agreement concerning (i) the joint development of a zone straddling both sides of the median line claimed by Japan, including the oil/gas field called “Longjing” by China and “Asunaro” by Japan, and (ii) Japan’s participation in China’s Chunxiao (“Shirakaba” to Japan) gas field. However, little progress toward the joint/cooperative development has been achieved since then.

Mark J. Valencia, an American scholar, proposed five specific options for a Chinese–Japanese agreement. In most of these options, the area would be divided into different portions based on the degree of difficulty or complexity in resolving the boundary. The joint development concept could then be applied to the more jurisdictionally complex portions of the area. In all options, the first step would be to agree to a 12-nautical mile territorial sea enclave around the Senkaku/Diaoyu islands and to leave that area either as a “no-go” zone or for joint use and future settlement. These options also assume that China’s claim to the Japan/South Korea joint development zone (JDZ) will be quietly dropped as part of this settlement. The five specific options are reported as the following (Valencia 2007, pp. 159–161):<sup>4</sup>

- Option 1 is an agreed continental shelf and exclusive economic zone (EEZ) boundary for the whole area. The region could be divided at approximately 27°N latitude into North and South Zones. The equidistance principle could be applied in the North Zone. Although the existence of the Japan–Korea JDZ might complicate matters, the boundary could initially run along the JDZ’s southwestern edge which is an approximate equidistance line between China and South Korea. In the South Zone, the boundary could be the equidistance line, ignoring the Diaoyu/Senkaku features (A); or perhaps that line adjusted by the length of the coastline ratio of 64:36 (the mainland and Taiwan) versus Japan (the Ryukyus) (B). Alternatively, the adjusted equidistant line ignoring the features could be the boundary in both the North and South Zones (C). These lines could then be connected to the axis of the Okinawa Trough to define the southern portion of the boundary.
- Option 2 is a boundary in the North Zone and a JDZ in the South Zone. The region could be divided into North and South Zones, as above, with the equidistance line designated as the boundary in the North Zone. The boundary could then extend along the equidistance line or an adjusted equidistance line southwest from the Japan/Korea JDZ to approximately 125°E and 28°15’N. The difference between this option and Option 1 is that joint development could be undertaken in the area bounded by the equidistance line with the Japanese Senkakus as base points, the equidistance line with the Chinese Diaoyutais as the base points and the axis of the Okinawa Trough.

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<sup>4</sup> Copyright by the *Asian Perspective*—cited with permission by this journal.

- Option 3 is a JDZ in the North Zone. The boundary in the South Zone could be an equidistance line modified by coastline proportionality, and a China/Japan JDZ could be established for the North Zone.
- Option 4 is a JDZ for the entire area in dispute. China and Japan could agree to joint development of the entire disputed area bounded by Japan's claim and China's claim (A), or that bounded by the equidistance line between the Chinese mainland and the nearest undisputed Japanese territory ignoring the Senkakus/Daoyutais, the axis of the Okinawa Trough, and the southwestern edge of the Japan/Korea JDZ (B).
- Option 5 is a boundary and joint development. Any of the joint development options could be employed without or with a boundary. In the latter case, the formula for establishing each party's share in the joint ventures on either side of the boundary line could be negotiated. For example, for Option 1, if the unified boundary is the "median line" ignoring the Diaoyu/Senkaku islets, the resources in the area between the EEZ boundary originally claimed by Japan from the Senkakus and the median line could be allocated to China. Those situated between the median line and a line halfway to the Okinawa Trough would be shared equally and those between the line halfway to the Trough and the Trough itself could be split 25/75 in favor of Japan. Alternatively, if the boundary is located two-thirds of the way to the Trough—because of China's greater length of coastline on the East China Sea—the joint development split would be: Japan's original EEZ claim from the Senkakus to the median line—75/25 for China; median line to the boundary—50/50 split; and all resources to the east of the boundary allocated to Japan.

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# Chapter 7

## Cross-Border Behaviors as Games

One day, a man passed away. When he met God, he asked: “God, I would like to know what Heaven and Hell look like.” God showed the man two doors. Inside the first one, in the middle of the room, was a large round table with a large pot of stew. It smelled delicious and made the man’s mouth water. But the people sitting around the table were thin and weak, appearing to be famished. All of them were holding spoons with very long handles; however, because the handles were so long that the people there could reach the food on those platters but could not get the food back to their mouths. The man shuddered at the sight of their misery and suffering. God said, “What you have seen here is Hell.” Then the man entered the other door inside which he thought there must be heaven. The room appeared exactly the same as the one he just visited—long tables, hungry people, strapped arms, unable to bend their hands to their mouths to eat. But there was a profound difference. The people in heaven sat across from each other, not trying to feed themselves, but trying to feed the person sitting across from them. The man said, “I don’t understand.” God smiled. “It is simple,” he said: “Love only requires one skill. The people in Heaven have learned how to share and feed each other, while the people in Hell only think of themselves...”

—A Jewish folk tale

### 7.1 A Lose-Lose Game

A cross-border system, which is governed by two or more independent players, is divided by various man-made boundaries—either physically visible or invisible. In this system, all players interact with each other. The elements of each sub-system, which include various political, economic and cultural factors, are correlated with each other in sequence. The whole system provides a very complicated function with respect to the locations. The interactions between the various elements are complex. In addition, the cross-border system is sometimes integrated and dynamic. The former emphasizes that all players are interdependent, whereas the latter describes the relationship between the state and time of system. In short, the spatial and institutional features of cross-border issues require specialized analytical tools.

### 7.1.1 *An Old Story*

In the middle of the Warring States Period (475–221 BC), seven Chinese states were being locked in battle. Duke Hui of the state of Zhao was going to conquer the state of Yan until one of his political advisers, named Su Dai from the Yan, told him a story which has now become a very popular Chinese idiom “yubang xiangzheng, yuweng deli” (snipe and clam fight, fisherman gets both):<sup>1</sup>

On my way here I was crossing the Yishui river when I saw a clam just swimming to the bank and opened its shell in the sun, enjoying the sunshine. A snipe (a kind of bird with a long bill—author) flew over and saw a piece of red meat on the ground, so it dived to the ground and pecked at the clam. Before the snipe drew back its beak, it was gripped tightly inside because the clam suddenly felt a sharp pain and closed its shell quickly. The snipe shook its head violently to cast off the clam, but it failed no matter how hard it tried.

The snipe said angrily: “Listen, you clam, if it does not rain today and tomorrow, you will die from thirst.”

“You lesson. If you cannot feed yourself today and tomorrow, you will die of hunger! Do you still dare to eat me?” replied the clam.

The snipe and clam were locked in fight and quarreled. Neither of them wanted to give up in first. Just at that moment, an old fisherman came. He picked them up and took both of them home for dinner.

Su Dai then addressed the Duke of Zhao: “Now that the Zhao is ready to attack the Yan. But, if both states were locked in a long stalemate with neither side ready to yield, then both states will be equally worn out. I’m afraid then the powerful state of Qin will turn up as the fisherman. Therefore, I do hope that Your Majesty will give this matter careful consideration before you act.”

“Well said,” nodded the Duke of Zhao. And sure, he gave up his military plan.

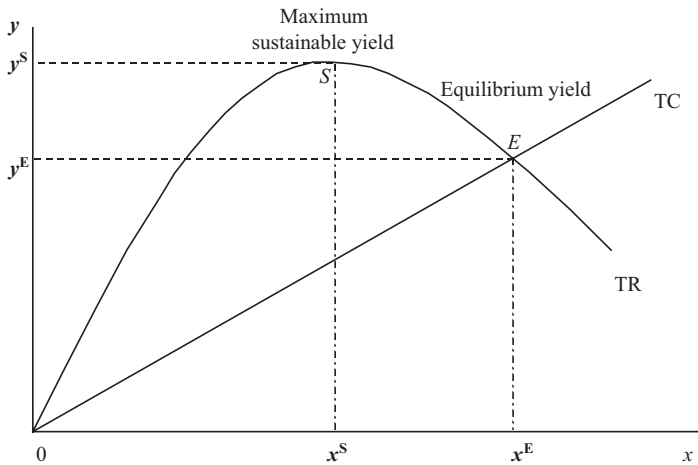
### 7.1.2 *Avoiding Lose-Lose Situations*

In theory, cross-border cooperation is mutually beneficial to all sides concerned, given the complementarity in natural resource endowments as well as other economic attributes. However, the costs arising from cross-border transactions and discoordination cannot be underestimated. Thus, the extent of progress in cross-border cooperation must depend upon the extent to which the related sides reorganize and respond pragmatically to the economic and non-economic benefits and costs involved.

Can cross-border natural and environmental resources be optimally managed? To answer these questions, let us first consider a traditional example.

Figure 7.1 illustrates a highly simplified graphical form for a given fishery. Axis  $x$  of this figure represents different levels of effort, and axis  $y$  is a measure of total

<sup>1</sup> This story was included in Zhangguoce (Records of the Warring States), an ancient Chinese book compiled by Liu Xiang (77–6 BC).



**Fig. 7.1** The equilibrium and maximum sustainable yields of fishery

yield (in revenue) of fishery. The curve TC is an aggregate cost curve (based on the simplifying assumption of linear costs with respect to the level of effort. And TR is a sustainable yield curve reflecting the fact that harvest per unit of effort will eventually decline due to both stock depletion and crowding in the fishery. The concept of ‘maximum sustainable yield’ (that is, point  $S$ ) suggests harvesting any given stock at the level that permits the greatest annual harvest over long run. It is, therefore, essentially a biological standard. In the absence of controls, the equilibrium will occur at the intersection of the curves where the total revenue of the fleet is just sufficient to cover the total costs and there is no true profit (see point  $E$ ).

This analysis induces several important implications. Common property arrangements without controls will tend to produce stock depletions in the sense that the equilibrium point will typically occur at a level of yield distinctly below the level of ‘maximum sustainable yield’ for the stock in question. They will also be economically inefficient in the sense that they generate situations in which total benefit and costs, rather than marginal benefits and costs, are equal. Under these circumstances, a reduction in effort would actually lead to an increase in yield from the fishery as well as creating some economic profit (Young 1977, p. 63). If the fishery falls within the jurisdiction of a single regime, the maximum sustainable yield derived from the above analysis could be easily adopted by the regime as its long-term fishing policy.

However, if the fishery falls under the jurisdictions of two or more regimes, the problem could not be solved easily. This can be described by an interesting dilemma faced by fishermen:

If a fishery is subject to open access, every fisherman will harvest too many fish because each has little to gain from conservation. If the current rate of harvest is reduced, growth in the total stock of the fishery is likely to be greater and hence the stock should support a

greater rate of harvest in the future. But if one fisherman reduces his harvest, and this fisherman is only one among many, he could only hope to recover (at best) only a small portion of the extra future harvest, most (if not all) of it will be garbled by the other fishermen. Every other fisherman faces exactly the same incentive. Although every fisherman could be better off if use of the resource were reduced by all, each has a private incentive to overexploit the fish population.<sup>2</sup>

Obviously, under the shadowy influence of the incentives, the most possible consequence of the above fishery example would be the overexploitation of the scarce fishery resource until it is exhausted. The fishery example illustrates a phenomenon that is common to many social and economic problems in which the private incentives of independent agents (like the slippery fishermen as above) prevent the agents from reaching an outcome which makes all the agents better off. If the resource is under the jurisdiction of a single government, the exploitation of it can be easily coordinated by the government itself. But if the resource is located at cross-border areas and subject to open access to more than one regime, the problem cannot be solved so easily by one side of the border alone but need consistent cross-border cooperation between all parties concerned.

## 7.2 Non-Cooperative Games

### 7.2.1 *A Lose-Win Dilemma*

Arms races, environmental pollution, the overexploitation of fisheries, inflation, and many other social problems seem to be accurately described by the “non-cooperative solutions” of rather simple non-constant sum games. How can all this irrationality exist in a world of absolutely rational decision makers? A game is cooperative if players are able to form binding commitments. For instance the legal system requires them to adhere to their promises. In non-cooperative games, however, this is not possible. In most circumstances, communication among players is allowed in cooperative games, but not in non-cooperative ones.

Games in which the participants cannot make commitments to coordinate their strategies are “non-cooperative games.” The solution to a “non-cooperative game” is a “non-cooperative solution.” In a non-cooperative game, the rational person’s problem is to answer the question “What is the rational choice of a strategy when other players will try to choose their best responses to my strategy?”

Consider a famous example of inefficiency, the so-called “Prisoner’s Dilemma”. Mugsy and Spike have just been nabbed for a crime. They have promised each other not to rat on the other if caught. The attorney offers them the following prison-expectations (in years) if they stay silent or rat on the other:

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<sup>2</sup> Cited from Barrett (1992, p. 11).

**Table 7.1** The prisoner’s dilemma

<b>SPIKE</b>	<b>MUGSY</b>	<u>Silent</u>	<u>Rat</u>
<u>Silent</u>		2	10
<u>Rat</u>		0	7

What should they do? Here each of them is trying to minimize his time in jail. A little thinking shows that each can always do better by Rattng on the other. From Spike’s point of view, if Mugsy is Silent, he should Rat, because 0 year is better than 2. But if Mugsy rats he should also rat, because 7 years is better than 10. Whereas if they could both really keep their promise to stay silent, they would only get 2 years each. So the equilibrium here is inefficient from the criminals’ point of view. It is easy to see why many kinds of human organizations (not just criminal) go to great lengths to try to get people to keep promises!

The lower-right cell is not only a Nash equilibrium (see Box 7.1), it also has another interesting property with which it should not be confused—it is also a “dominant strategy.” In a “Prisoner’s Dilemma” game, non-cooperation with your partner is always your best move. The idea of a dominant strategy is that it is always your best move regardless of what the other guys do. Note that this is a stronger requirement than the idea of Nash equilibrium, which only says that you have made your best move given what the other guys have done.

**Box 7.1 The Nash Equilibrium**

John Forbes Nash, Jr. (born on June 13, 1928) is an American mathematician whose works in game theory, differential geometry, and partial differential equations have provided insight into the forces that govern chance and events inside complex systems in daily life. Nash earned a doctorate in 1950 with a 28-page dissertation on non-cooperative games (Nash 1950). The thesis contains the definition and properties of what would later be called the “Nash equilibrium”. Nash’s theories have been applied in various fields, including market economics, computing, evolutionary biology, artificial intelligence, accounting, politics and military theory. In 1994, He won the Nobel prize in economics.

Game theorists have applied the Nash equilibrium concept to the analysis of the strategic interaction of several decision makers. For example, the Nash



equilibrium is a solution concept of a non-cooperative game involving two or more players, in which each player is assumed to know the equilibrium strategies of the other players, and no player has anything to gain by changing only their own strategy. If each player has chosen a strategy and no player can benefit by changing strategies while the other players keep theirs unchanged, then the current set of strategy choices and the corresponding payoffs constitute a Nash equilibrium.

John Forbes Nash, Jr. is the subject of the 2001 Hollywood movie “A Beautiful Mind.” The film, which is loosely based on the biography of the same name, tells stories about Nash’s mathematical genius and also his schizophrenia.

### 7.2.2 *Subgame Perfect Equilibrium*

In game theory, a subgame perfect equilibrium (or subgame perfect Nash equilibrium) is a refinement of a Nash equilibrium used in dynamic games. A strategy profile is a subgame perfect equilibrium if it represents a Nash equilibrium of every subgame of the original game. A common method for determining subgame perfect equilibria in the case of a finite game is backward induction.

Here one first considers the last actions of the game and determines which actions the final mover should take in each possible circumstance to maximize his/her utility. One then supposes that the last actor will do these actions, and considers the second to last actions, again choosing those that maximize that actor’s utility. This process continues until one reaches the first move of the game. The strategies which remain are the set of all subgame perfect equilibria for finite-horizon extensive games of perfect information. However, backward induction cannot be applied to games of imperfect or incomplete information because this entails cutting through non-singleton information sets.

Reinhard Selten has proved that any game which can be broken into “subgames” containing a sub-set of all the available choices in the main game will have a subgame perfect Nash equilibrium strategy (possibly as a mixed strategy giving non-deterministic sub-game decisions). The subgame-perfect Nash equilibrium is normally deduced by “backward induction” from the various ultimate outcomes of the game, eliminating branches which would involve any player making a move that is not credible (because it is not optimal) from that node. One game in which the backward induction solution is well known is tic-tac-toe, but in theory even Go has such an optimum strategy for all players.<sup>3</sup>

<sup>3</sup> Cited from <http://www.nationmaster.com/encyclopedia/Subgame-perfect-equilibrium>. Accessed on 25 Feb 2014.

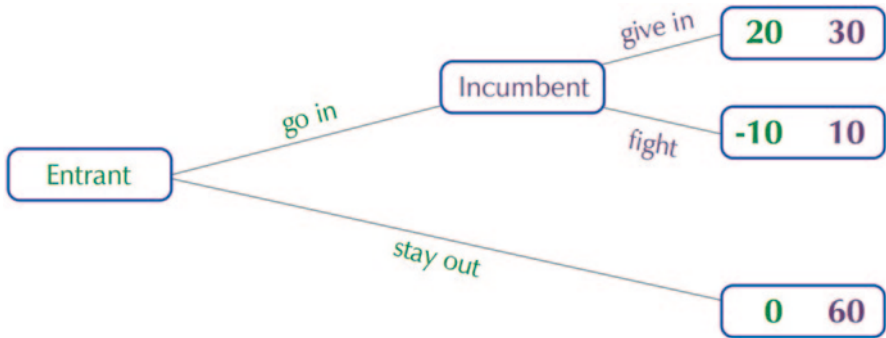


Fig. 7.2 The ‘chain store’ paradox

Table 7.2 The ‘chain store’ paradox

<b>Entrant</b>	<b>Incumbent</b> <u>Fight</u>	<u>Given in</u>
<u>Fight</u>	-10      10	20      30
<u>Given in</u>	0      60	0      60

The simplest example of this is the “Chain Store” paradox (see Fig. 7.2). The established store (“incumbent”) threatens to fight a price war if the newcomer (“entrant”) comes in. There is no reason not to believe this threat. And if the entrant does, he will stay out. There are two Nash equilibria in this matrix, lower left and upper right. But in fact the upper-right is stronger than just a static Nash equilibrium. It is what Selten called a “subgame perfect” equilibrium, because just looking at the last part of the game where the incumbent finds himself one the entrant has entered (the “sub-game”), it would obviously be irrational for him to follow through on this threat.

Specifically, for the incumbent, by fighting, he gets 10 points, and by giving in, he gets 30 (see Table 7.2). The sequential or “extended form” of the game makes this clearer. Of course the incumbent would like his threat to be believed, and with less than full information (about motivations, future games, etc.), it may well be. But if both players have the full information, and it is “common knowledge” that each is fully informed and rational—then such a threat is absurd, and will probably never be made.

### 7.2.3 ‘Fog of War’

Once a battle begins, information that is tactically relevant can become confusing and even distorted. Because of the difficulty of seeing patterns in the midst of the fog—separating the signal from the noise, for example—tactical leaders must be allowed to act independently of operational plans. This idea builds on the forgoing idea of thinking forward and reasoning backward, but now makes it conditional—not on the assumption of perfect rationality on the part of all players—but on one’s Perceptions of what the other player is likely to do. One way to think about this is by considering what a famous nineteenth century German General—Carl von Clausewitz (July 1, 1780–November 16, 1831)—called the “Fog of War.”

Clausewitz was a German general and military theorist who stressed the “moral” (in modern terms, psychological) and political aspects of war. In his most notable work, *Vom Kriege* (On War), which was unfinished at his death, he stressed the dialectical interaction of diverse factors, noting how unexpected developments unfolding under the “fog of war” (i.e., in the face of incomplete, dubious, and often completely erroneous information and high levels of fear, doubt, and excitement) call for rapid decisions by alert commanders. Clausewitz had many aphorisms, of which the most famous is that “War is the continuation of Politik by other means,”<sup>4</sup> a description that has won wide acceptance (Clausewitz 1984, p. 87).

The Cuban Missile Crisis was a 13-day confrontation in October 1962 between the former Soviet Union and Cuba on one side and the United States on the other side. The crisis is generally regarded as the moment in which the Cold War came closest to turning into a nuclear conflict (Marfleet 2000). After the US had placed nuclear missiles in Turkey and Italy, aimed at Moscow, and the failed US attempt to overthrow the Cuban regime, in May 1962 Nikita Khrushchev proposed the idea of placing Soviet nuclear missiles in Cuba to deter any future invasion attempt. The crisis was finally resolved peacefully, as follows:

- Soviet Union withdrew nuclear missiles from Cuba
- United States withdrew nuclear missiles from Turkey and Italy
- The United States agreed not to invade Cuba without direct provocation
- A nuclear hotline was created between the United States and the Soviet Union

By so-called “backward induction” (thinking forward and then reasoning backward), one can show that the Nash equilibrium of mutual Backdown leads to the Soviets deciding to build the missiles, while the equilibrium of mutual Doomsday leads the Soviets to do nothing; i.e., to not build the missiles. With a convincing enough show that the Americans were willing to go Doomsday, the Soviets changed their course in midstream, and backed down.

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<sup>4</sup> Note that the German word ‘Politik’ may be translated as “policy” or “politics”; but both of the two have very different implications.

## 7.3 Cooperative Games

Without going into technical details, let us first have is simple question: if people want to yield a cooperative solution, and any non-constant sum game can in principle be converted to a win-win game, how, then, can a non-cooperative outcome of a non-constant sum game be rational? The obvious answer seems to be that it cannot be rational. Yes, the cooperative solution is the only truly rational outcome in a non-constant sum game.

In game theory, a cooperative game is a game where groups of players (“coalitions”) may enforce cooperative behavior, hence the game is a competition between coalitions of players, rather than between individual players. An example is a coordination game, when players choose the strategies by a consensus decision-making process.

### 7.3.1 *A Win-Win Game*

Cooperative games are particularly important in daily life. Suppose that Joey has a bicycle. But Joey would rather have a game machine than a bicycle, and he could buy a game machine for \$ 80, but Joey doesn’t have any money. We may say that Joey values his bicycle at \$ 80. Mikey has \$ 100 and no bicycle, and would rather have a bicycle than anything else he can buy for \$ 100. We may say that Mikey values a bicycle at \$ 100. The strategies available to Joey and Mikey are to give or to keep. That is, Joey can give his bicycle to Mikey or keep it, and Mikey can give some of this money to Joey or keep it all. It is suggested that Mikey give Joey \$ 90 and that Joey give Mikey the bicycle. And this seems to be a win-win game. Next, let us explain the payoffs in more details:

At the upper left of the above table, Mikey has a bicycle he values at \$ 100, plus \$ 10 extra, while Joey has a game machine he values at \$ 80, plus an extra \$ 10. At the lower left, Mikey has the bicycle he values at \$ 100, plus \$ 100 extra. At the upper right, Joey has a game machine and a bike, each of which he values at \$ 80, plus \$ 10 extra, and Mikey is left with only \$ 10. At the lower right, they simply have what they begin with—Mikey \$ 100 and Joey a bike (with a value of \$ 80).

To “keep” is a dominant strategy equilibrium in this game. If we think of this as a non-cooperative game, it is much like a Prisoners’ Dilemma (as discussed in Sect. 7.2). However, “give” makes both sides better off. Thus, we would expect a cooperative solution, and we suspect that it would be the one in the upper left.

### 7.3.2 *Seeking Pareto optimality*

We can say that one outcome is better than another (for example, upper left better than lower right) if at least one person is better off and no-one is worse off.

**Table 7.3** A win-win game

	Joey		
Mikey		Give	Keep
Give		90	170
Keep	110	0	80
	200		100

This is called the Pareto criterion.<sup>5</sup> The standard definition of efficient allocation in economics is “Pareto optimality.” In defining an efficient allocation, it is best to proceed by a double-negative. An allocation is *inefficient* if there is at least one person who can do better, while no other person is worse off. (That makes sense—if somebody can do better without anyone else being made worse off, then there is an unrealized potential for benefits in the game). Conversely, the allocation is *efficient* in the Paretian sense if no-one can be made better off without making someone else worse off.

We have found in Table 7.3 that both Joey and Mikey in the bike-selling game are better off if they make the transaction. This is the basis in cooperative games. More specifically, every cell in the table except the lower right is Pareto-optimal, and in fact any price between \$ 80 and \$ 100 would give yet another of an infinite number of the Pareto-optimal outcomes to this game.

Next, in order to better illustrate the mechanisms of the cooperative games, let us assume that there are just two goods: “widgets” and “money.”<sup>6</sup> We will also use hypothesis that utility is proportional to money. In other words, we can use equivalent amounts of “money” as a measure of the utility of widgets. Let us further assume that there are just two persons, Jeff and Adam. At the beginning of the game, Jeff has 5 widgets but no money, and Adam has \$ 22 but no widgets. The “strategies” that Jeff and Adam can choose are unilateral transfers—Jeff can give up 0, 1, 2, 3, 4, or 5 widgets, and Adam can give up from 0 to 22 dollars. Presumably both would choose “zero” in a non-cooperative game. The benefits functions are roughly defined in Table 7.4.

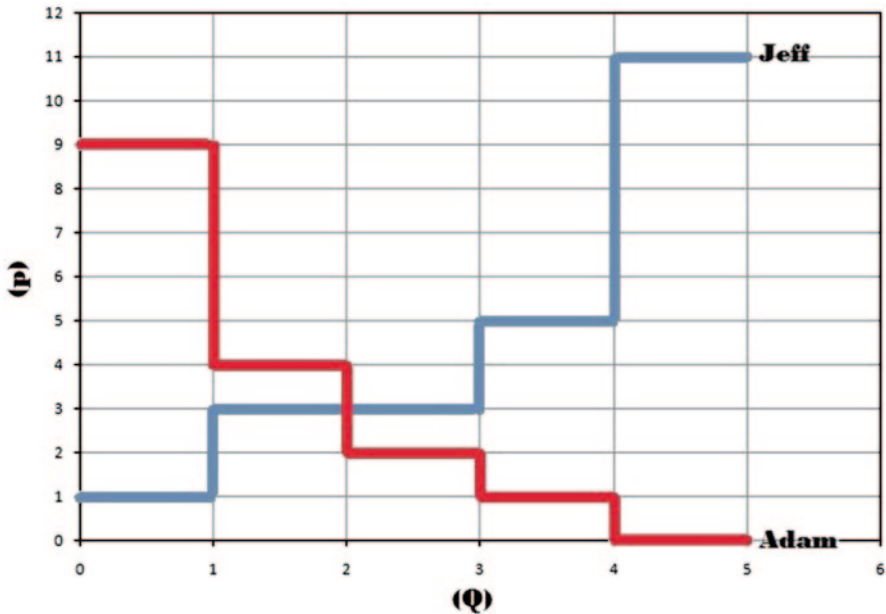
Adam’s marginal benefit curve for widgets will be his demand curve, while Jeff’s marginal benefit curve will be the reverse of his supply curve (shown in Fig. 7.3). The rationale of these two curves is that (i) since Jeff has too many (at least com-

<sup>5</sup> It is after Vilfredo Federico Damaso Pareto (AD 1848–1923)—an Italian engineer, sociologist, economist, political scientist, and philosopher.

<sup>6</sup> This example is based on McCain (2010, pp. 444–446).

**Table 7.4** The “widgets” for “money” game

Jeff			Adam		
Widgets	Benefits		Widgets	Benefits	
	Total	Marginal		Total	Marginal
1	10	10	1	9	9
2	15	5	2	13	4
3	18	3	3	15	2
4	21	3	4	16	1
5	22	1	5	16	0



**Fig. 7.3** Adam’s demand and Jeff’s supply of widgets

pared with Adam) widgets, he will not care too much when giving out his first widget but would expect more value on his last widget; (ii) since Adam has no widget at all, he is thus willing to pay more money for the first one, but, along with the number of widgets he get increases, he would expect a less value on the widgets he get.

Market equilibrium comes where  $p=3$ ,  $Q=2$  in Fig. 7.3, i.e. Jeff sells Adam 2 widgets for a total payment of \$ 6. Under these transactions, Jeff will have \$ 18 of widgets and \$ 6 of money; while Adam will have \$ 13 of widgets and \$ 16 of money. The total benefit divided between the two persons is \$ 24+\$ 29=\$ 53.

We need to talk about cooperative games with more than two persons. A group of players who commit themselves to coordinate their strategies is called a “coalition.”

What the members of the coalition get, after all the bribes, side payments, is called an “allocation” or “imputation.” With three or more players, some of the players may profit by “ganging up” on the rest.

For example, in poker, two or more players may cooperate to cheat a third, dividing the pelf between themselves. This is cheating, in poker, because the rules of poker forbid cooperation among the players. For the members of a coalition of this kind, the game becomes a non-zero sum game—both of the cheaters can win, if they cheat efficiently.

## 7.4 Optimizing Multilateral Cooperation

### 7.4.1 Linear Programming

Before starting the discussion of multilateral optimal plans, let us first look at a simple issue. Suppose that a farmer has a 500 ac farm on which he plants two crops: corn and soybeans. For each acre of corn planted, 15 kg fertilizer is needed and for each acre of soybeans planted, 25 kg fertilizer is needed. Each acre of corn requires 100 bushels of storage; each acre of soybeans requires 40 bushels of storage. Finally, each acre of corn yields a profit of \$ 600 and each acre of soybeans yields a profit of \$ 900.

Suppose that the farmer has only 10,000 kg fertilizer and the total amount of storage space available is 35,000 bushels. Then, how many acres of each crop should be planted in order to maximize the total profit? What will his profit be if he follows this strategy?

In mathematical terms, the above planting example can be illustrated as the following:

Let  $x$  be acres of corn to be planted and  $y$  be acres of soybeans to be planted, then the total profit ( $P$ ) function is written as

$$\text{Maximize } P = 600x + 900y$$

Subject to:

$$x + y \leq 500 \text{ (land constraint)}$$

$$15x + 25y \leq 10,000 \text{ (fertilizer constraint)}$$

$$100x + 40y \leq 35,000 \text{ (storage constraint)}$$

$$x \geq 0, y \geq 0 \text{ (non-negative constraints)}$$

With the help of computer software, we may obtain the optimal solution for the farmer:  $x = 250$ ;  $y = 250$ ; and  $P = 375,000$ . Believing it or not, other planting strategies you set for the farmer cannot yield a profit larger than \$ 375,000.

The above example is a special case of mathematical programming or mathematical optimization. Linear programming (LP, or linear optimization) is a method by which to achieve the best outcome (such as maximum profit or minimum cost) in a mathematical model whose requirements are represented by linear relationships. More formally, linear programming is a technique for the optimization of a linear objective function, subject to various linear constraints.

The LP method was first developed by Leonid Kantorovich who developed the earliest linear programming problems in 1939 for use during World War II to plan expenditures and returns in order to reduce costs to the army and increase losses to the enemy (Kantorovich 1940). The method was kept secret when George B. Dantzig published the method later in 1947 (Dantzig 1947, pp. 339–347). Since the end of World War II, many industries have found its use in their daily planning. The linear-programming problem was first shown to be solvable in polynomial time by Leonid Khachiyan in 1979, but a larger major theoretical and practical breakthrough in the field came in 1984 when Narendra Karmarkar introduced a new interior-point method for solving linear-programming problems (NationMaster 2014).

Linear programming is a considerable field of optimization for several reasons. Many practical problems in operations research can be expressed as linear programming problems. Although the modern management issues are ever-changing, most policymakers and practitioners working in the fields of planning, production, transportation, technological development, and others want to maximize profits or minimize costs with limited resources. Therefore, many issues can be characterized as linear programming problems.

### 7.4.2 *Cross-Border Optimization*

Next, let us extend the resource-allocation problem stated at the beginning of this section into a more complicated scenario.

Suppose that there are  $m$  farmers (which can also be administrative or political regions that can decide independent production strategies). Each has a piece of farm land to be planted with  $n$  categories of corn. Assume that  $c$  denotes the profit of each unit of corn planted and  $a$  denotes amounts of resources (land, material, labor, etc.) needed for each unit of corn planted and  $b$  denotes total amounts of these resources.

Let  $x_j$  be acres of land to be planted for the  $j$ th corn ( $j=1, 2, \dots$ , and  $n$ ) and  $c_j$  be the profit yielded for each unit of land to be planted for the  $j$ th corn ( $j=1, 2, \dots$ , and  $n$ ). Then the total profit ( $P$ ) function of each farmer is:

$$\max P = c_1x_1 + c_2x_2 + \dots + c_nx_n$$



Subject to

$$\begin{aligned} a_{11}x_1 + a_{12}x_2 + \cdots + a_{1n}x_n &\leq b_1 \\ a_{21}x_1 + a_{22}x_2 + \cdots + a_{2n}x_n &\leq b_2 \\ a_{31}x_1 + a_{32}x_2 + \cdots + a_{3n}x_n &\leq b_3 \\ \cdots \\ x_1 \geq 0, x_2 \geq 0, \dots, x_n &\geq 0. \end{aligned}$$

The above LP model can be written in a standard form, as the following:

$$\begin{aligned} \max: P &= cx \\ \text{Subject to: } Ax &\leq b; x \geq 0. \end{aligned}$$

$$\text{Where } c = (c_1, c_2, \dots, c_n); A = \begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ a_{31} & a_{32} & \cdots & a_{3n} \\ \cdots & & & \end{bmatrix}; \text{ and } x = \begin{bmatrix} x_1 \\ x_2 \\ \cdots \\ x_n \end{bmatrix}$$

Using the above model, we may help each farmer of the  $m$  farmers to find an optimal solution for his planting strategy (the profit is represented by  $P_1, P_2, \dots$  or  $P_m$ ).

Now, suppose that all the  $m$  farmers agree to invite a planning board to decide a joint/cooperative strategy in order to maximize their total profit (not that of each farmer). Then, how will you help them to do so?

Since each of the  $m$  farmers' linear programming models can be written as the one mentioned above, we may build a linear programming model for the  $m$  farmers, as the following:

$$\begin{aligned} \text{Max: } P &= \sum_{i=1}^m c^i x^i \\ \text{Subject to: } \sum_{i=1}^m A^i x^i &\leq \sum_{i=1}^n b^i \quad \text{and } x^i \geq 0. \end{aligned}$$

Where  $x^i$  is the policy variable vector of the  $i$ th farmer ( $i=1, 2, \dots, m$ );  $c^i$  denotes the  $i$ th farmer's profit vector; and  $A^i$  denotes the  $i$ th farmer's matrix of amounts of resources (land, material, labor, etc.) needed for planting.

After all the farmers form a production union, there is also an optimal solution for their planting strategy (the profit is represented by  $P$ ). Borrowing the mathematical proofs of Guo (2012a, pp. 71–74), we derive:

$$P \geq P_1 + P_2 + \cdots + P_m.$$

In other words, after the administrative or political borders (barriers) are removed, more economic benefits will be yielded.

## 7.5 Making Rational and Optimal Decisions

### 7.5.1 *Avoiding Lose-Lose Outcomes*

In this chapter, several decision-making methods have been discussed, which provide a way of predicting what will happen if decisions are made by one side of a border, given that, at the same time, the outcome depends on the decisions of the others. The simple insight underlying the cross-border behaviors is that one cannot predict the result of the choices of multiple decision-makers if one analyzes those decisions in isolation. Instead, one must ask what each player would do, taking into account the decision-making of the others.

Of the two types of games that have been discussed in Sects. 7.2 and 7.3, non-cooperative games are able to model situations to the finest details, producing accurate results. Cooperative games focus on the game at large. Considerable efforts have been made to link the two approaches. The so-called Nash-program<sup>7</sup> has already established many of the cooperative solutions as non-cooperative equilibria. Zero-sum games are a special case of constant-sum games, in which choices by players can neither increase nor decrease the available resources. In zero-sum games a player benefits only at the equal expense of others. More formally, the total benefit to all players in the game, for every combination of strategies, always adds to zero.

Games may also be divided into two classes, i.e., zero-sum and non-zero-sum games. The class where the sum of the winnings of all the players is the same in all outcomes may be called ‘constant-sum’. But as pay-offs can always be mathematically rescaled, it is convenient and normal to call them ‘zero-sum’. Chess and football are zero-sum, and remain so even if an outside body awards a fixed prize for winning. ‘Non-zero-sum’ is preferable to ‘positive-sum’ and ‘negative-sum’. Although these labels are commonly used, they are usually misleading and sometimes wrong, as they fail to specify what the positive sum is being compared with.

The importance of zero-sum games in politics is more informal. In a zero-sum game there is no scope, in the long run, for cooperation among the players. Thus coalition games are zero-sum. Some political games including, for example arms races or cross-border conflicts, are zero-sum. Non-zero-sum games offer scope for cooperation among the players to achieve one of the outcomes that is best in aggregate. This is true whether the game is regarded as cooperative or non-cooperative. Even in a non-cooperative game such as Prisoners’ dilemma, players may reason about each other’s reasoning. In repeated plays of non-cooperative games, they may send each other signals by their actions which enable the players to coordinate their actions on a cooperative equilibrium.

A lose-lose game is the one in which each party involved will end up being worse off. The intractable budget-cutting negotiation in the US Congress from 2012 to 2013 is an example of the lose-lose situations. Cuts are essential—the question

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<sup>7</sup> The Nash program is the research agenda for investigating on the one hand axiomatic bargaining solutions and on the other hand the equilibrium outcomes of strategic bargaining procedures (Bolt and Houba 2002, pp. 81–114).

is where they will be made and who will be hurt. In some lose-lose situations, all parties understand that losses are unavoidable and that they will be evenly distributed. In such situations, lose-lose outcomes can be preferable to win-lose outcomes because the distribution is at least considered to be fair (Spangler 2003). However, a lose-lose game sometimes also implies disastrous situations to all the parties involved. This immediately reminds me of the popular Chinese fable mentioned at the beginning of Sect. 7.1.

Where there is patience, there is hope. And the hope usually emerges when there are changes in favor of the creation of a fairly relaxed atmosphere under which each and all stakeholders can benefit from compromise and cooperation. At the very least, the lose-lose situation will not occur if the policymakers from all sides involved are well aware of the “snipe-clam” story told by Su Dai 2000 years ago.

### 7.5.2 *Cooperation Through Compromise*

If cross-border economies fall under the jurisdiction of a single administrative authority, their economic policies may be easily coordinated and optimized, and the inefficiencies of allocation of production factors can be therefore eliminated. But since these economies are spatially and institutionally separated by their interprovincial borders, the problem cannot be solved easily.

In a case study, to be shown at the end of this chapter, we will use the LP method to estimate the economic impact of the interprovincial border on regional economic development in China. The result shows that, through cross-border cooperation, the multiregional complementarities can be better utilized and therefore the cross-border region’s economies can be more optimized than those that are under cross-border separation.

However, there is still a problem in relation to cross-border economic cooperation. As will be shown in the case study below, even though an integrated economic strategy will benefit the border areas as a whole, the gain from cross-border cooperation varies in different areas. For example, as shown in Table 7.8 in the case study (below), after cross-border cooperation, Shanxi’s agricultural production will increase by 440.6 million yuan (which is about 58.7% of its previous total agricultural production). In Hebei’s side, however, there will be a loss of 32.0 million yuan (which is about 0.8% of its previous total agricultural production).

If a redistribution agreement (again, this still need negotiating, bargaining, and compromise—we call this as the second-round cross-border cooperation) is established among all partners involved, the previous (or called the first-round) cross-border cooperation can be still be sustained. Specifically, in the redistribution agreement, partners who have gained the largest shares of net benefits in the first-round cross-border cooperation may transfer part of their benefits to those who have either gained the smallest shares of benefits or not gained at all.

Specifically, there are many ways for the redistribution of net benefits. The first one can be called “absolute-mean approach,” which enables each partner to obtain an equal share of net benefit. With regard to the case study to be shown below, since

the net benefit is 1443.1 million yuan (see Table 7.8), each of the four provinces will obtain about 360.8 million yuan. As a result, the optimized agricultural production of the four provinces will be revised as the following:

- Shanxi: 1111.9 million yuan
- Hebei: 4629.4 million yuan
- Shandong: 4531.5 million yuan
- Henan: 3603.3 million yuan

Since the above figures are 48.0, 8.5, 8.6 and 11.1 % higher than those shown in the second column of Table 7.8, respectively, large provinces (such as Hebei, Shandong and Henan) may insist that they unfairly treated.

The second way for the redistribution of net benefits can be called “relative-mean approach,” which enables each partner’s share of net benefit to be a fixed (mean) ratio to its size. Since the total net benefit is about 11.6 % of the total agricultural production (see Table 7.8), each province can obtain the same rate of benefit growth. As a result, the optimized agricultural production of the four provinces will be revised as the following:

- Shanxi: 838.2 million yuan
- Hebei: 4763.8 million yuan
- Shandong: 4654.5 million yuan
- Henan: 3618.6 million yuan

The above figures are 87.1 million yuan, 495.2 million yuan, 483.8 million yuan, 376.1 million yuan higher than those shown in the second column of Table 7.8, respectively. This enables larger provinces (such as Hebei, Shandong and Henan) to obtain larger shares of net benefits.

## 7.6 Case 7. Estimating the Economic Impacts of Borders<sup>8</sup>

The Shanxi–Hebei–Shandong–Henan provincial border-region, located in central China, has a long history of political and economic evolutions. It was the political, economic, and cultural center of China in the late Shang dynasty (c. sixteenth century to 1046 BC). During Warring States (771–221 BC) period, the three states of Han, Zhao, and Wei were located in this area. From 1949 to 1952, most of this area was established as a new province (Pingyuan province). It is now under the separate administrations of Shanxi, Hebei, Shandong, and Henan provinces. Stemming from the heterogeneity of physical conditions, this region demonstrates many cross-border comparative advantages and complementarities. The agricultural production is taken here as an example. Table 7.5 shows the regional differences in agricultural production. For example, Liucheng of Shandong province produces 7204.9 kg of grains per ha, while Jiaozhuo of Henan province produces only 1818.8 kg/ha; the

<sup>8</sup> This case study is revised version of my research (Guo 2013a, pp. 106–115).

**Table 7.5** Agricultural productivity in the Shanxi–Hebei–Shandong–Henan border region

Sub-region	(1) Grains (kg/ha)	(2) Cotton (kg/ha)	(3) Vegeta- bles (kg/ha)	(4) Fruits (kg/ha)	Total land (thousand ha)
Shanxi					
Changzi	3274.2	387.0	20400.6	4182.6	299,400
Jincheng	2236.2	221.0	16279.1	3521.1	221,900
Hebei					
Xingtai	2646.0	789.5	20828.7	3447.9	901,400
Handan	4973.4	654.9	36145.8	2906.3	1,029,800
Shandong					
Liucheng	7204.9	884.5	67367.8	2115.5	533,500
Hezhe	6358.4	789.5	67387.8	5906.3	734,700
Henan					
Anyang	3113.6	469.9	29225.6	4154.8	450,000
Xinxiang	3646.5	947.9	40076.0	4135.7	416,100
Jiaozhuo	1818.8	755.1	50740.2	4145.7	384,700
Hebi	2286.2	343.7	40209.5	4540.4	60,400
Puyang	3013.7	682.5	17150.6	587.1	763,300

cotton productivity in Xinxiang of Henan province is 947.9 kg/ha which is more than four times that of Jincheng of Shanxi province. The output of vegetables per ha in Jincheng reaches 16279.1 kg, which is less than one-fourth that in Shandong province as a whole. The production of fruits in Hezhe of Shandong province is 5906.6 kg/ha which is more than ten times that in Puyang of Henan province.

Obviously, according to the principles of comparative advantage and mutual complementarity, the cross-border cooperation could be greatly benefited by all participants in the area. However, the administrative borders had seriously cut off the cross-border economic relations and rigidly formed a self-reliant agricultural system for each side before an association for economic and technological coordination was established by the 14 municipalities and prefectures of the border-region.

For the sake of computational ease, we consider only one production constraint—cultivable land—and apply the methodology developed in Sect. 8.2 of Chap. 8 to analyze the optimal agricultural production plans for the area under different border conditions.

Let policy variable  $X_{ijk}$  stand for the cultivable land input of the  $k$ th agricultural production in the  $j$ th sub-region (prefecture or municipality) of the  $i$ th province. The 4-p linear programming model for the border-region is built as below.

1. The cultivable land use for the agricultural production in the  $j$ th sub-region of the  $i$ th province should not in any case exceed the total cultivable land area, i.e.,

$$\sum_{k=1}^4 X_{ijk} \leq CLA_{ij} \quad (8.1)$$

**Table 7.6** Output targets by product and by region (unit: million/kg)

Sub-region	(1) Grains	(2) Cotton	(3) Vegetables	(4) Fruits
Shanxi	1334.3	1.1	433.2	92.5
Hebei	2937.2	219.1	1590.5	219.9
Shandong	4849.4	383.8	1226.4	129.5
Henan	5622.0	137.6	1295.0	86.3
Total	15742.9	741.6	4545.1	528.2

where  $CLA_i$  is the total cultivable land area of the  $j$ th sub-region of the  $i$ th province ( $i=1, 2, 3, 4$ ), the data of which are given in the last column of Table 7.5. Formula (8.1) generates 11 cultivable land constraints.

- In the 4-p spatial system, we suppose that each side (province) in this area expects a larger agricultural production so as to sustain its increasing demand. So the output constraint for the  $k$ th agricultural production of the  $i$ th province is constructed as

$$\sum_j C_{ijk} X_{ijk} \geq PYO_{ik} \quad (8.2)$$

where  $C_{ijk}$  (shown in Table 7.5) is the output per ha of the  $k$ th agricultural product ( $k=1, 2, 3$ , and 4) of the  $j$ th sub-region in the  $i$ th province ( $i=1, 2, 3$ , and 4); and  $PYO_{ik}$  is the output targets set for the  $k$ th agricultural product ( $k=1, 2, 3, 4$ ) of the  $i$ th province ( $i=1, 2, 3$ , and 4) which is given in Table 7.6.

- The objective function of each province is to maximize its agricultural output, i.e.,

$$\max F_{4i} = f_{4i}(X^{4i}) = \sum_j \sum_{k=1}^4 p_k C_{ijk} X_{ijk} \quad (8.3)$$

where  $i=1, 2, 3$ , and 4 and  $C_{ijk}$  is given in Table 7.6,  $p_k$  is the price of the  $k$ th product ( $k=1, 2, 3, 4$ ). For simplicity of computation, the price of the  $k$ th product in the border-region is supposed to be a constant at all circumstances in the case study:  $p_1=0.488$  yuan/kg,  $p_2=2.442$  yuan/kg,  $p_3=0.068$  yuan/kg, and  $p_4=0.058$  yuan/kg.

By combing the objective functions of all the four provinces—each of which is shown in Formula (8.3)—we can establish an objective function for a border-less system:

$$\max F_1 = \sum_{i=1}^4 \sum_j \sum_{k=1}^4 p_k C_{ijk} X_{ijk} \quad (8.4)$$

**Table 7.7** Optimal solutions to the production plans (unit: 1000 ha)

No.	(1) Grains		(2) Cotton		(3) Vegetables		(4) Fruits	
	4-p	1-p	4-p	1-p	4-p	1-p	4-p	1-p
1.1	296.5	0.0	2.8	0.0	0.0	0.0	0.0	299.4
1.2	162.5	0.0	0.0	0.0	26.6	0.0	32.9	215.3
2.1	0.0	0.0	241.0	901.4	0.0	0.0	660.4	0.0
2.2	791.6	1029.8	44.0	0.0	194.1	0.0	0.0	0.0
3.1	392.7	533.5	140.8	0.0	0.0	0.0	0.0	0.0
3.2	0.0	241.6	328.5	0.0	391.6	493.2	14.6	0.0
4.1	450.1	450.1	0.0	0.0	0.0	0.0	0.0	0.0
4.2	461.1	384.7	0.0	31.6	0.0	0.0	0.0	0.0
4.3	144.6	0.0	182.2	0.0	25.5	0.0	31.2	383.6
4.4	61.1	61.1	0.0	0.0	0.0	0.0	0.0	0.0
4.5	763.3	763.3	0.0	0.0	0.0	0.0	0.0	0.0

(1) 4-p=the optimal solution if the 11 areas are under four provinces (or planning boards); and 1-p=the optimal solution if the 11 areas are united as one single province. (2) Errors may exist due to rounding off

**Table 7.8** Maximized outputs under different production plans (unit: million yuan)

Province	(1) 4-p	(2) 1-p	(3)=(2)-(1)	(4)=(3)/(1)×100(%)
Shanxi	751.1	1191.7	440.6	58.7
Hebei	4268.6	4236.6	-32.0	-0.8
Shandong	4170.7	4884.8	714.1	17.1
Henan	3242.5	3562.9	320.4	9.9
TOTAL	12432.9	13876.0	1443.1	11.6

(1) Shanxi includes Jincheng and Changzhi; Hebei includes Handan and Xingtai; Shandong includes Liucheng and Hezhe; and Henan includes Anyang, Hebi, Jiaozhuo, Puyang, and Xinxiang. (2) 4-p=the optimal solution if the four provinces' 11 areas are under four provinces (or planning boards); and 1-p=the optimal solution if the four provinces' 11 areas are united as one single province. (3) Errors may exist due to rounding off

The linear programming model includes 44 policy variables and 31 production constraints. The optimal solution of the model is shown in Table 7.7; and the total output value of the border-region is 12433.0 million yuan (see Table 7.8).

To make a comparison, let us analyze the optimal solution for the border-region's agricultural production under the borderless condition (one may simply assume that the 4-p border-region has been merged as a new province now). The elimination of the 4-p border means the cross-border comparative advantages can be fully utilized. Therefore, under the borderless condition, Formula (8.2) now becomes

$$\sum_{i=1}^4 \sum_j C_{ijk} X_{ijk} \geq \sum_{i=1}^4 PYO_{ik} \tag{8.5}$$

where  $PYO_k$  is the previous year's total output of the  $k$ th agricultural product ( $k=1, 2, 3, 4$ ) of the border-region. Therefore, compared to Formula (8.2) under 4-p border condition, Formula (8.5) generates now only four production constraints for the grains, cotton, vegetables and fruits. Other production constraints and objective functions are as same as that of the case under the 4-p border condition. The new linear programming model includes 44 policy variables and 19 production constraints, which produces an optimal solution (see Table 7.7). The total optimal output value of the whole region, now, becomes 13876.0 million yuan (see Table 7.8).

We now are able to compare the two spatial systems using their optimal solutions. The difference between the two systems' total output values may be treated as the economic loss of the 4-p border, i.e., 1443.1 (million yuan). This means that, after the removal of the 4-p provincial border, the border-region may increase its annual agricultural production by 1443.1 million yuan (about 10.4% of that in the 4-p border case). This also simply means that agricultural production in the border-region has been decreased by the same amount per year due to the existing 4-p border-related barriers.

From Table 7.8, we may also find that each provincial side obtains a different return from the cross-border cooperation in our case study. For example, after cross-border cooperation, Shanxi's agricultural production will increase by 440.6 million yuan (about 58.7% of that in the 4-p border case). In Hebei's side, however, there will be a loss of 32.0 million yuan (about 0.8% of that in the 4-p border case). The net benefit from cross-border cooperation is also different between Shandong (714.1 million yuan or about 17.1% of its previous output) and Henan (320.4 million yuan or about 9.9% of its previous output), respectively.

Summarizing up, due to the cross-border separation, the border-region cannot be economically optimized. In this section, we have estimated the economic impacts of the "sub-political borders" and apply it to analyze the border-region of Shanxi, Hebei, Shandong, and Henan provinces in Central China. The result shows that the economic potentials in the border-region have not been fully utilized and that the annual agricultural production has been decreased by about 10.4% due to the cross-border separations between the four provinces.

If the area falls under the jurisdiction of a single political authority, the economic relationship between its internal locations and sectors may be easily regulated by the single authority by means of unified economic policies, and the inefficiencies of allocation of production factors can be therefore eliminated. But the resources in the border-region have been administered by four provincial authorities, the problem cannot be solved easily.

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## Chapter 8

# Advancing Cross-Border Development

Cross-border development is the only feasible mechanism by which policy-makers can better cope with the challenges and problems resulting from the increasingly interacted world. And this does work as long as certain bilateral or multilateral agreements are arranged. Over the course of the past decades, various bilateral and multilateral agreements and treaties have been arranged for the joint and cooperative development throughout the world. And, so far many of these agreements and treaties have been successfully implemented. Considered in terms of the sophistication of institutional arrangements from the simplest to the most complex, these cross-border development models can be divided into:

- i. solo-development model
- ii. parallel-development model
- iii. joint venture model
- iv. joint authority model, and
- v. third-party trusteeship model

These models vary in terms of institutional complexity, participatory status, easiness in implementation, as well as in terms of the features of the targets designated for development and of the states involved. However, it is certain that, comparing those who do not take any actions at all, policymakers and practitioners can apply any of these models to achieve more efficient cross-border cooperation and management.

## 8.1 Solo-Development Model

### 8.1.1 *Definition*

Under the solo-development model only one partner, acting on behalf of all stakeholders, is selected to manage the whole business operations. The other stakeholders receive a share in the proceeds from the operations after the costs stemming from the business activities are deducted.

Examples of the solo-development model include the 1958 Saudi Arabia–Bahrain Agreement and the 1969 Abu Dhabi–Qatar Agreement. In the 1958 Agreement a disputed area of continental shelf in the Persian Gulf is divided between Saudi Arabia and Bahrain. Even though the Agreement provided for the equal sharing of net income derived from the exploitation of the Fashtu bu Saafa Hexagon, an area lying on the Saudi side of the delimited continental shelf boundary, it did not provide for, or even acknowledge, the rights of Bahrain (Ong 1999, p. 789). The 1969 Agreement provides that both Abu Dhabi and Qatar shall have equal rights of ownership over a single oil field (called “Hagl El Bundug”), even though the delimitation places most of the field within the maritime jurisdiction of Qatar. The field is developed by the Abu Dhabi Marine Areas Company alone, in accordance with the terms of the concession granted to it by the ruler of Abu Dhabi, with all revenues, profits and benefits divided equally between the two states.

### 8.1.2 *Example I*

The 1989 Australia–Indonesia Timor Gap Treaty affords another example of this type of petroleum exploitation of two zones at the Sea of Timor: each state unilaterally administered the zone adjacent to its territory and paid 10% of any revenues to the other.

The Sea of Timor is located in the eastern part of the Timor island in the Indonesian archipelago that lies between the South China Sea and the Indian Ocean. East Timor declared independence in November 1975, after four centuries under Portuguese colonial rule. Indonesia invaded immediately thereafter, and purported to annex East Timor as its 27th province. Substantial oil and natural gas deposits lie under the Timor Sea. The oil and gas fields lie much closer to the island of Timor (the eastern part of which is now called Timor-Leste) than to Australia, but the International Court of Justice (ICJ) and the 1982 UNCLOS left Indonesia (on behalf of East Timor) with no legal recourse in the absence of cooperative negotiations with Australia. The problem was that East Timor’s claims to these resources overlap with those advanced by Australia. Without a boundary apportioning their respective entitlements, or some other mutual arrangement, the resources cannot be exploited.

In instances where claims overlap, international law requires that states delimit their respective entitlements by a maritime boundary. Timor-Leste is in the unique position of having to set not only a frontal boundary with Australia, but also lat-

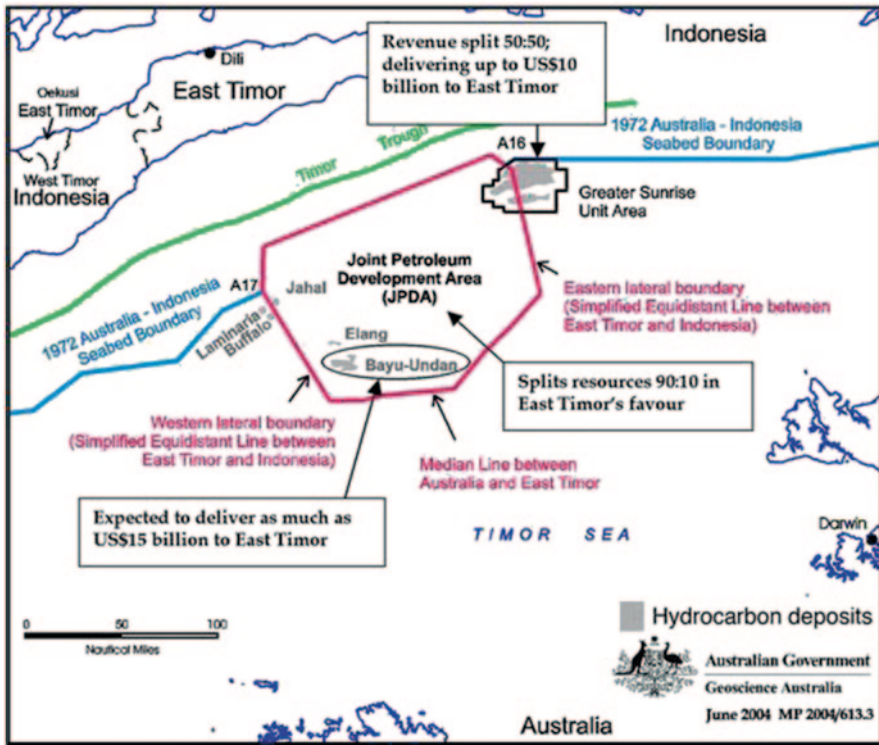


Fig. 8.1 The joint petroleum development area, Australia and East Timor. Copyright © 2004 Commonwealth of Australia (Geoscience Australia, Canberra)

eral boundaries. This is because Australia and Indonesia have delimited seabed and water column boundaries in the Timor Sea that do not coincide. The 1972 Seabed Agreement between Australia and Indonesia set the seabed boundary between the two countries between the median line and the Timor Trough.

In 1989, Australia and Indonesia signed the Timor Gap Treaty, which gives Australia control of 85% of the sea and most of the oil.<sup>1</sup> The Greater Sunrise oil and gas field is located in the Timor Gap where Australia and East Timor have overlapping claims over the continental shelf or seabed (see Fig. 8.1). After declaration of East Timor’s nationhood in 1999, the terms of the Timor Gap Treaty were not accepted by East Timor since according to the treaty, East Timor could only receive about 18% of the revenue from the field. Finally, in 2002, the “Timor Sea Treaty” signed by Australia and East Timor established a frontal seabed and water column boundary, as well as lateral seabed boundaries on the east and west between the median

<sup>1</sup> See “Treaty between Australia and the Republic of Indonesia on the Zone of Cooperation in an Area between the Indonesian Province of East Timor and Northern Australia,” signed on December 11, 1989. Available at <http://www.austlii.edu.au/au/other/dfat/treaties/1991/9.html#fn0>. Accessed 4 June 4 .

line and the 1972 Line. As a result, the new Treaty has transformed the solo development model into the one of joint authority.<sup>2</sup>

### **8.1.3 Example II**

During the early period of reform, China only allowed foreign investors to resort to using joint ventures companies involving a Chinese partner. China's accession to the World Trade Organization (WTO) in 2001 has helped enormously to level the playing field in China for foreign investors, by further opening previously closed sectors of industry to foreign investment. To implement its WTO commitments, from time to time China has promulgated an updated version of the 'Catalogue for the Guidance of Foreign Investment', by gradually lifting restrictions on foreign players and increasing the number of industries where wholly foreign owned enterprises (WFOEs) are now allowed. The Catalogue classifies foreign direct investment projects into three categories: encouraged, restricted and prohibited. All foreign investments that are not included in the Catalogue are permitted. The level of approval for the project and the availability of tax holidays are both derived from this all-important classification.

In China, the establishment of the WFOEs is regulated by the 'Law of the PRC Concerning Enterprises with Sole Foreign Investment'. China's entry into the WTO around 2001 has had profound effect on foreign investment. The WFOE is a Chinese legal person and has to obey all Chinese laws. As such, it is allowed to enter into contracts with appropriate government authorities to acquire land-use rights, rent buildings, and receive utility services. In this it is more similar to a cooperative joint venture (CJV) than an equity joint venture (EJV) (see a case study at the end of this chapter). Like EJVs, the WFOEs are typically limited liability enterprises, but the liability of the directors, managers, advisers, and suppliers depends on the rules which are established by the Chinese ministries and other relevant administrations to control product liability, worker safety or environmental protection. An advantage a WFOE enjoys over the other types of FDI is the protection to its know-how but its disadvantage is absence of an interested and influential Chinese party.

## **8.2 Parallel-Development Model**

### **8.2.1 Definition**

In this model each partner involved in a certain business area will conduct its own business activities independently. It seems that the development of the South China Sea has followed, at least partly, a "parallel model". At present, each of the coastal

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<sup>2</sup> We will discuss it in more detail later in the "joint authority model".

states (including Brunei, China, Indonesia, Malaysia, Philippines, Taiwan, and Vietnam) has its own seabed oil/gas operations and other fishing activities at an area that is also claimed—wholly or partially—by the other state(s). Despite the territorial disputes at and the uncertainty over the South China Sea, these coastal countries have involved energy companies in exploration and exploitation in their respective claims. Cooperation arrangements between national petroleum companies including Chinese state-owned oil companies have been negotiated which hold out the prospect of greater security, even in the absence of a settlement of the maritime claims (Buszynski and Sazlan 2007).

The primary advantage of the parallel development model is that sometimes it doesn't need any institutional arrangements and is therefore fairly user-friendly. However, the "parallel model" may induce irrational competition between all of the states involved the disputed area. This would affect the effectiveness of the "parallel development model". Even worse, when the stock of a disputed area's natural resources decreases, this model could even intensify—not resolve—existing boundary and territorial conflicts.

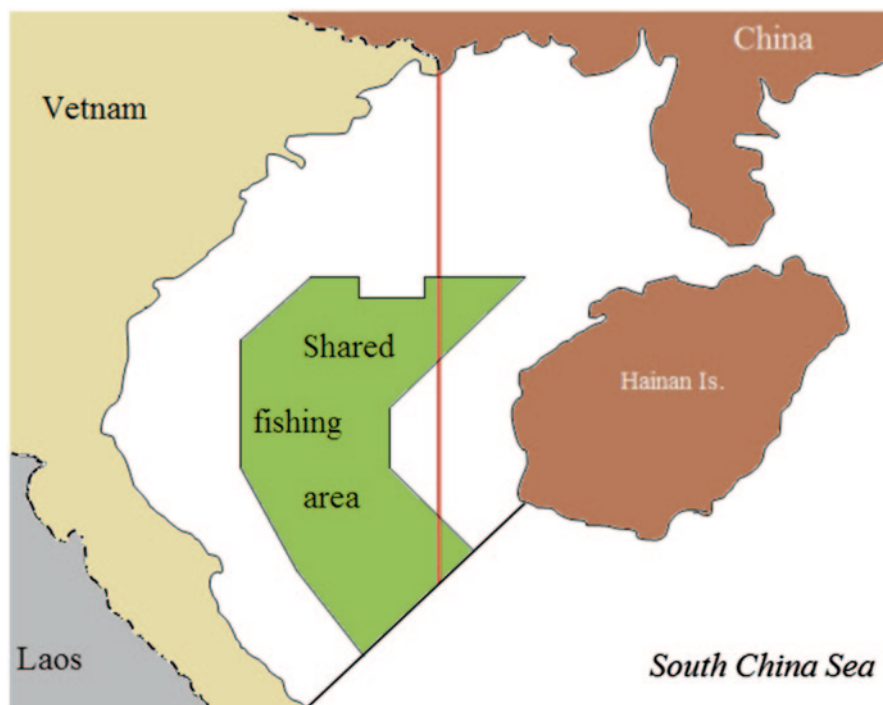
### 8.2.2 Example

The successful demarcation of the Beibu (Tonkin) Gulf between China and Vietnam is another example. The Beibu Gulf, with an area of 128,000 km<sup>2</sup>, is enclosed by the land of mainland China and Vietnam and China's Hainan island (see Fig. 8.2), and had never been demarcated. In spite of its richness, the fishery resource in the Beibu Gulf is not infinite and many years' of mass exploitation has influenced resource reproduction. It is estimated that the maximum sustainable yield is 600,000 t per year. However, during the past years, the fishermen from both sides have overexploited more than 1,000,000 t of fishery products annually.<sup>3</sup> If this situation continues, the fishery will become depleted eventually.

As a result of the Sino-French War in 1884 and 1885, the Sino-Vietnamese border was basically demarcated by the Sino-French Treaty of 1887 and was finalized in 1895. However, the maritime boundary within the Gulf of Tonkin, has never been accurately demarcated between China and Vietnam. The Vietnamese side suggested that the 1887 Treaty did yield a maritime boundary near the east longitude 108 line (see Fig. 8.2), while China insisted that there is no specific information about the boundary demarcation in the Treaty. The unclear situation of boundaries has caused problems when the two countries have had tensions or conflicts. China and Vietnam ratified the United Nations Convention on the Law of the Sea (UNCLOS) in 1994 and 1996, respectively. This means that both nations stipulate that, in addition to 12 nautical miles of territorial water, coastal countries are also entitled to 200 nautical miles of exclusive economic zone (EEZ) and continental shelf. But the Beibu Gulf, shared by the two countries, is only 180 nautical miles at the widest, meaning

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<sup>3</sup> Data source: <http://english.sina.com/news/china/6866068.shtml>. Accessed 1 Oct 2011



**Fig. 8.2** The shared fishing area of China and Vietnam at the Tonkin Gulf. Copyright © 2012 by Rongxing Guo

that China and Vietnam's claims overlap and a clear borderline needed to be defined through negotiations. The adoption of the EEZ system has had an impact on traditional fishing rights. As far as the Beibu Gulf is concerned, fishing disputes between China and Vietnam have been on the rise, undermining the interests of fishermen and affecting the smooth development of bilateral ties. Circumstances necessitate a speedy solution by both sides to the demarcation issue and the establishment of a new mechanism of cooperation in fishery.

The Beibu Gulf Demarcation Agreement and the Beibu Gulf Fishery Cooperation Agreement were signed by China and Vietnam on December 25, 2000 in Beijing, which took effect on July 30, 2004. China and Vietnam began talks on the demarcation of the Beibu Gulf in the mid-1970s. The Beibu Gulf demarcation agreement defines the borderlines of the territorial waters, the exclusive economic zones and the continental shelf for both China and Vietnam. The Chinese side held that both sides maintain balanced geopolitical ties in the Beibu Gulf area. Based on such a view, the two sides achieved a fair result by dividing roughly evenly the sea area between both sides (see Fig. 8.2) and fairly distributing the fishing resources in the Gulf. The agreement represents successful work by both sides in settling the maritime demarcation under a new order of maritime law.

As far as the Tonkin Gulf is concerned, fishing disputes between China and Vietnam have been on the rise, undermining the interests of fishermen and affecting the smooth development of bilateral ties. The adoption of the EEZ system has had an impact on traditional fishing rights. After several rounds of negotiations, China and Vietnam achieved a result by dividing roughly evenly the sea area between both sides and fairly distributing the fishing resources in the gulf. According to the Agreement signed in 2000, which took effect on July 30, 2004, China and Vietnam marked off a relatively large cross-border fishing area (more than 30,000 km<sup>2</sup>). This area covers most of the high and medium yield fishery ground in which both countries' fishing boats can enter for as long as 15 years.<sup>4</sup> Moreover, a cross-border water area, set as a transitional arrangement for four years, was marked off to the north of the shared fishing area to admit fishing boats from both sides. The agreement also stipulates that the two sides will carry out long-term fishery cooperation in the shared fishing area under the principle of mutual benefit.

## 8.3 Joint Venture Model

### 8.3.1 Definition

A joint venture (JV) is created by a business arrangement in which two or more parties agree to pool their resources for the purpose of accomplishing a specific task. This task can be a new project or any other business activity. In the JV, each of the participants is responsible for profits, losses and costs associated with it. However, the venture is its own entity, separate and apart from the participants' other business interests.

In general, joint ventures may take the form of either an equity joint venture (EJV) or a cooperative joint venture (CJV). In each EJV, all the partners involved share profits, losses and risk in equal proportion to their respective contributions to the EJV's registered capital. These escalate upwardly in the same proportion as the increase in registered capital. Profit and risk sharing in an EJV are proportionate to the equity of each partner in the joint venture, except in cases of a breach of the joint venture contract. CJVs and EJVs are similar in many respects including approval process, approval authorities, format of agreements, tax breaks, legal standing, and the means, laws, and authorities for dispute resolution. The general management structure and governance procedures are also virtually the same.

However, the CJVs are different from the EJVs in that there are no minimum limits on the foreign partner. Other differences are as follows. A CJV does not need to be a separate legal person.<sup>5</sup> The partners in a CJV are allowed to share profit on

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<sup>4</sup> See "The Tonkin Gulf Demarcation Agreement and the Tonkin Gulf Fishery Cooperation Agreement" signed by China and Vietnam, December 25, 2000, Beijing.

<sup>5</sup> Note that a CJV that is not a separate legal person may benefit from lower costs, but may also expose the parties to greater liability than if they were legal persons, because CJVs with legal



an agreed basis, not necessarily in proportion to capital contribution. (In contrast, an EJV's profit, control, and risk are divided in proportion to the equity shares invested by the parties.) This proportion also determines the control and the risks of the enterprise in the same proportion. A CJV could allow negotiated levels of management and financial control, as well as methods of recourse associated with equipment leases and service contracts. In an EJV management control is through allocation of board seats. During the term of the venture, the foreign participant can recover his investment, provided the contract prescribes that and all fixed assets will become the property of the domestic participant on termination of the joint venture.

It must be noted that the establishment of joint ventures in disputed areas is much more difficult than that in other types of cross-border areas. Therefore, its success should be based on a set of mutual understanding and of institutional arrangements between all parties concerned. Above all, the management of cross-border resources has major facets, which include, *inter alia*:

- the joint management of the whole area as a single unit regardless of the borders;
- the management according to some institutionally agreed-upon formula; and
- the joint investigation and conflict resolution of cross-border disputes according to peaceful and friendly manners.

### 8.3.2 Example I

Successful examples of the “joint venture model” include the 1965 Kuwait–Saudi Arabia Agreement, the 1974 Convention in the Bay of Biscay between France and Spain, the 1992 Memorandum of Understanding (MOU) between Malaysia and Vietnam, and the 1993 Colombia–Jamaica Treaty. In the 1965 Agreement each state, Kuwait and Saudi Arabia, enters into a separate and different concession agreement with the same company in respect of its undivided 50% interest in the resources of the zone, and each state has an equal number of representatives on the board of directors of the company. In the 1974 Convention, the delineated zone is divided into French and Spanish sectors and the nominated licenses of either party applying to explore the zone are encouraged to enter into joint ventures with the nominee of the other party on an equal basis, financing the operations in proportion to their shares. Under the 1992 MOU, Malaysia and Vietnam agree to undertake the exploration and exploitation of petroleum within the defined area of overlapping continental shelf claims. The 1993 Treaty establishes a zone in which Colombia and Jamaica exercise joint management and control over the exploration and exploitation of natural resources.<sup>6</sup>

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person status confer limited liability on parties to the joint venture.

<sup>6</sup> Based on Ong (1999, pp. 70–71).

### 8.3.3 *Example II*

In May 2003, China Petrochemical Corporation Group (Sinopec), China National Offshore Oil Corporation (CNOOC), Pecten Orient—a subsidiary of Royal Dutch/Shell), and Unocal East China Sea Limited (a subsidiary of Unocal Corporation) signed a contract on the joint development of natural gas at the Chunxiao/Shirakaba gas field in the Xihu Trough of the East China Sea, with shares of 30, 30, 20, and 20%, respectively (Guo 2010). One year later, on September 29, 2004, Royal Dutch/Shell and US-based Unocal Corporation announced that they decided to withdraw from the large-scale gas project for joint exploration, development, and marketing of natural gas resources citing “commercial reasons.” The decision that had been made by the two oil giants seemed quite unusual in the international experiences of setting up large joint ventures. But the real reason might be the opposition from the Japanese side: Japan considers the gas field extends beyond the Sino–Japanese maritime boundary (though China never recognizes this boundary).

## 8.4 Joint Authority Model

### 8.4.1 *Definition*

Institutionalized to the highest level, the joint authority model consists of a comprehensive agreement by all states concerned. This model “consists of an agreement by the interested states to establish an international joint authority or commission legal personality, licensing and regulatory powers, and a comprehensive mandate to manage the development of the designated zone on these states’ behalf” (Ong 1999, p. 791).

In sum, there are three requisites for an international regime to be established in a disputed cross-border territory (area): (i) active support and long-term commitment on the part of top-level political representatives, (ii) mobilization of the available geological, meteorological, legal, social, engineering and other expertise, and (iii) a domestic government structure capable of effective international cooperation and collaboration.<sup>7</sup> Usually, the joint authority model establishes a joint commission charged with rather more powers and functions than those of the “joint-venture model”, although in both models all stake-holding states follow the production-and/or profit-sharing principle.

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<sup>7</sup> See Housen-Couriel (1994, p. 2)—cited from Kliot et al. (2001, p. 235).

### **8.4.2 Example I**

The 1974 Sudan–Saudi Arabia Agreement is an early example of the joint authority model. Under this Agreement, the Joint Commission has legal personality as a body corporate in both Saudi Arabia and Sudan. In addition, the Commission is empowered to consider and decide on the application for licenses and concessions concerning the exploration and exploitation of the seabed resources in common zone. Other examples of this model include (i) the Malaysia–Thailand Joint Authority (which is based on the Malaysia–Thailand Joint Development Agreement of 1979–1990), and (ii) the Management and Cooperation Agency for Maritime Spaces, which was jointly established by Senegal and Guinea Bissau in 1995 to supervise the joint exploration and exploitation activities within the designated Joint Exploitation Zone in accordance with proportions agreed upon in relation to the living (50:50) and nonliving (85:15 in favor Senegal) continental shelf resources (Ong 1999, p. 792). In addition, the joint authorities are responsible for environmental protection in the designated joint exploitation zones in the disputed areas of respective states.

### **8.4.3 Example II**

On October 19, 1999, Indonesia renounced its claims to East Timorese territory, with the latter finally becoming an independent state on May 20, 2002. The Timorese leadership called for maritime boundary negotiations with Australia, arguing that the boundary at the Timor Sea should lie mid-way between the two countries, at what is referred to as the ‘median’ line. Australia was reluctant to engage in maritime boundary negotiations on these terms.

According to the UNCLOS, Timor-Leste and Australia each has sovereign rights to explore and exploit petroleum in defined maritime zones adjacent to its land territory. The UNCLOS allows every state to claim an exclusive economic zone (EEZ) extending up to 200 nautical miles from its coast, in which it has sovereign rights to explore and exploit natural resources in the seabed and superjacent waters. Australia and Timor-Leste have both claimed the full (i.e., the 200 nautical-mile) extent of their continental shelf and EEZ entitlements, respectively. Because these two countries are less than 400 nautical miles apart, their sovereign entitlements overlap significantly. Both in relation to the EEZ and the continental shelf, the UNCLOS requires that delimitation of overlapping entitlements be modified to take into account so-called “special circumstances” (such as significant disparity in coastal lengths, and islands or protruding points on a state’s coastline, among others). Timor-Leste argues that the frontal boundary should be set at the median line. Australia argues that the Timor Trough separates two distinct continental shelves in the Timor Sea.

Australia prefers a maritime boundary based on its continental shelf, which stretches north far past the median line, and maintains this is in accordance with standard international maritime law. Yet the East Timorese believe they are morally and legally in the right in arguing for a boundary equidistant from the two nations,

a boundary that would afford Timor-Leste a much bigger share of the oil and gas revenues. During the first years, Australia refused to exercise restraint in the disputed area. The lucrative Laminaria-Corallina and Buffalo fields were in the disputed area immediately west of the joint development zone agreed to by Timor-Leste and Australia. It was there that the lateral boundary dispute heated up, with Timor-Leste saying its maritime boundaries should be pushed out to the west and east into the wealth of the Greater Sunrise field (see Fig. 8.1).

On May 20, 2002, Australia and Timor-Leste signed the Timor Sea Treaty, an interim arrangement similar to the Timor Gap Treaty that allows for the joint exploitation of petroleum pending agreement on boundaries. It applies to an area of the Timor Sea defined as the Joint Petroleum Development Area (JPDA), from which petroleum is shared by 90:10 in favor of East Timor (see Fig. 8.1). The “2002 Timor Sea Treaty” (see Appendix at the end of this chapter) has led to the establishment a designated authority. This organization is responsible for the administration of all petroleum-related activities in part of the Timor Sea. The subsequent Treaty on Certain Maritime Arrangements in the Timor Sea (CMATS), which was signed in 2007, provides for the equal distribution of revenue derived from the disputed Greater Sunrise oil and gas field between Australia and East Timor.

#### **8.4.4 Example III**

A successful example of the joint authority model during armed conflict is in the Virungas, where montane forests in three adjacent protected areas in Rwanda, Uganda, and the Democratic Republic of Congo (DRC) are home to the endangered mountain gorilla. The gorilla population ranges freely across the borders of the three countries. In the 1980s, protected-area authorities started collaborating on gorilla conservation and tourism development on an ad hoc basis. As a joint authority, the International Gorilla Conservation Program (IGCP) was created in 1991, as conditions began to deteriorate. The IGCP still works very closely with the three protected-area authorities, aiming to strengthen their capacity to conserve the forests and gorillas in the face of ongoing threats (poaching, deforestation, and agricultural encroachment), and to promote a framework for regional collaboration.

During the past decade the forests have seen much fighting at various stages of the complex conflict. Several times, park authorities in Rwanda and the DRC were forced to withdraw from all or part of the parks. In 1994, refugee camps were established on the border of the Virunga National Park in the DRC, causing serious deforestation in the vicinity. More recently, when the DRC government forces were fighting against troops in the east backed by Rwanda and Uganda, its wildlife authority, was unable to support its staff in the Virungas in the east. The IGCP stepped in to provide this support, and helped to facilitate collaboration among the staff of the three protected areas. Remarkably, this collaboration continued, at the local level and the wildlife authority headquarters level, despite the worsening political situation (Lanjouw et al. 2001; Kalpers 2001).

The functions of the IGCP include control of illegal hunters moving across borders, control of fires and diseases in border areas, monitoring of cross-border wild-life movements, and joint effort on conflict resolutions. Under the IGCP, only the military forces were allowed to carry arms in the Virungas. At such times, unarmed park guards underwent training and conducted joint patrols with the military. In turn, the military received training from the park authorities on the ecological importance of the forest; health, behavior, and social structure of gorillas; and park regulations. This collaboration ensured that the military presence was not disruptive to the park and also sensitized an important interest group. The high conservation and economic value of the gorillas, the enormous dedication of the government protected-area staff, and the presence of the IGCP are the key factors that have ensured conservation of the gorilla population during this long-lasting and complex conflict (Shanbaugh et al. 2003, p. 73).

## 8.5 Third-Party Trusteeship Model

### 8.5.1 Definition

In this third-party trusteeship regime, a new relationship is created: (1) ‘entrustors’ who are the real owners of the cross-border properties or resources and (2) ‘fiduciaries’ who are now the nominal owners or managers of these resources. Fiduciary duties fall into two broad categories: the duty of loyalty and the duty of care. These duties vary with different types of relationships between fiduciaries and entrustors. The sole purpose of entrustment is to enable fiduciaries to serve their entrustors. Fiduciary relationships are service relationships, in which fiduciaries provide to entrustors services. Some fiduciaries may be both fiduciaries and entrustors of each other. To perform their services effectively, fiduciaries must be entrusted with power over the entrustors or their property (‘power’). The extent of entrusted power varies with the parties’ desires and terms of their arrangements.

According to this model, all stake-holding states will surrender their rights of governing a certain area or property to a third party. In exchange, they each will receive an allowance (in cash or by kind)—the amount of which depends on an agreement—from the third party. The third party should have sufficient economic and technological capacities to “take care” of the specific objects. As a matter of fact, the “third-party trusteeship model” can also be classified as a “cross-border management”, since the trustee per se is usually composed of several (sometimes with different interests) parties/members that bear joint responsibilities toward the objects. Frankly, the advantage of the “third-party trusteeship model” is that, after implementation, which is based on a package of agreements signed between all stake-holding states and with an appropriate third party, it can resolve border-related problems or disputes definitively, thus making it easier for the follow-on peace and development.

In the third-party trusteeship model, selecting a trusted third party (TTP) is of critical importance. The TTP is an entity which facilitates interactions between all parties who both trust it. The TTP reviews all critical transaction communications between the parties. The relying parties use this trust to secure their own interactions. TTPs are common in most cross-border transactions, given that the parties concerned have not any direct links or agreements. For example, when two sovereign states do not have diplomatic relations, a protecting power can be created by a third country that has diplomatic relations with both of these two states. As a result, the protecting power can protect either state, and/or represent the interests of the protected state's citizens living in the other state (see Box 8.1). For example, Cuba and the United States do not have formal diplomatic relations, but both maintain substantial diplomatic presences in each other's countries. Switzerland is the protecting power for the United States in Cuba.<sup>8</sup>

### **Box 8.1 Protecting Power Representation in a Third Country**

Diplomatically, “protecting power” refers to a special case of relationship that may occur when two sovereign states do not have diplomatic relations. Either country may request a third party (with which both do have diplomatic relations) to act as the protecting power. In the territory of the host country, the protecting power will be recognized by that state as empowered to represent the other and protect its interests. This may be extended by caring for the diplomatic property of its protectee or acting as consular officers on behalf of its citizens.

The relationship and the legal status of the protecting power created by a third party are recognized in international conventions on diplomatic and consular affairs. For example, according to Article 8 of the “Vienna Convention on Consular Relations” (which was done at Vienna on April 24, 1963 and entered into force on March 19, 1967), “[U]pon appropriate notification to the receiving State, a consular post of the sending State may, unless the receiving State objects, exercise consular functions in the receiving State on behalf of a third State.”

For more details about existing protecting power mandates throughout the world, please see a case study at the end of this chapter.

## **8.5.2 Example I**

Over the course of recent decades, international communities have set up various “third-party trusteeships” under which to exercise powers traditionally associ-

<sup>8</sup> Formally, the US representation in Cuba is now named as the “United States Interests Section in Havana of the Swiss Embassy to Cuba”.

ated with sovereignty for a limited period of time for the benefit of the population of some problematic territories. Examples can be found in Bosnia, Kosovo, East Timor, Afghanistan, and Iraq. Earlier examples also include the international administration of post-war Germany and Japan, both of the latter surrendered unconditionally to the allied forces led by the United States and the former USSR in the Second World War (1939–1945). The core of trusteeship consists of international intervention for the betterment of the host territory population. The legal structure of these trusteeships has varied widely; and only in East Timor has the political trustee made a relatively clean exit (Perritt 2003).

### 8.5.3 Example II

The political arrangement of Kosovo is the most recent and the best example of a political trusteeship in application. After the Second World War, Kosovo gradually changed its autonomous status within the Socialist Republic of Serbia. When the Constitution of the Socialist Federal Republic of Yugoslavia of 1974 was drafted, Kosovo gained the highest degree of autonomous status. However, the autonomous status of Kosovo was officially abrogated in June 1989. Through the whole 1990s, the Albanian-dominated Kosovo struggled to secure the right to self-determination including secession from the former Yugoslavia, which led to long-lasting serious guerrilla attacks and armed conflicts between the Kosovo Liberation Army (KLA) and the regular units of Yugoslavian army and police. In order to impose peace, in early 1999 the international community, led by the United States, decided to use the strategy of threatening force toward the former Yugoslavia through the North Atlantic Treaty Organization (NATO).

After a 78-day successful military air campaign targeting the former Yugoslavian military forces, launched by the NATO in May 1999, the United Nations Security Council (UNSC) approved a resolution on the political future of Kosovo (i.e., the UNSC Resolution 1244) on June 12, 1999. The UNSC Resolution aims to end the war and maintain peace, and the creation of a substantial self-government till the final solution for Kosovo. Based on the Resolution, the United Nations formed the United Nations Mission Interim in Kosovo (UNMIK) in post-war Kosovo. A special model of international governance with post conflict society, the UNMIK may also be treated as a moderate UN trustee model.<sup>9</sup> The main tasks of the UNMIK were, *inter alia*: (i) facilitating the safe return of refugees and displaced persons; (ii) the promotion of economic prosperity through the development of a market economy; (iii) support towards the reconstruction of key infrastructure; the maintaining of civil law and order, and promoting the respect for the rule of law; (iii) promoting

<sup>9</sup> See, for example, Indyk (2003). Regarding the nature of UNMIK, in the literature there are different opinions that describe UNMIK as a UN peacekeeping mission, as a peace enforcement operation, as a moderate UN trusteeship model, as a UN territorial administration or as an international governance with the whole society—cited from Reka (2003).

human rights; protection of the rights of all communities; and (iv) the creation of a safe ambient for the participation of all communities in the establishment of democratic institutions of self-government (Reka 2003).

## 8.6 Case 8. Managing Cross-Border Affairs for States that do not have Diplomatic Relations

There has been a long history for protecting power representation. In the First World War (1914–1918), Spain took protecting power representational mandates, and the Netherlands also took carriage of some duties. In the Second World War (1939–1945), Switzerland, thanks to its neutrality, became a protecting power. It represented the interests of 35 states, including the major combatant powers, with over 200 individual mandates (FDFA 2012).

A list of countries taking protecting power mandates is the following:<sup>10</sup>

- Belgium was the protecting power for the United States in Libya until 2006 when diplomatic relations were restored.
- Brazil was the protecting power for Argentina in the United Kingdom from the Falklands War in 1982 until 1989.
- Canada, since 1973, has been the protecting power for Israel in Cuba.
- Cyprus was the protecting power for Yugoslavia during the war in the 1990s.
- France was the protecting power for the United Kingdom in Uganda between 1976 and 1977 and for Senegal and China in each other's capitals between 1996 and 2005.
- Jordan was the protecting power for Saddam Hussein's Iraq in the United Kingdom after the first Gulf War.
- The Netherlands was the protecting power for Canada in Iran from 1980 to 1988.
- Oman is the protecting power for Iran in Canada following the 2012 suspension of diplomatic relations between Canada and Iran.
- Pakistan is the protecting power for Iran in the United States.
- Poland was the protecting power for the United States in Iraq after the first Gulf War. From 6th February, 2012, it was also the protecting power for the United States in Syria.
- Saudi Arabia represented Libya in the UK.
- Sweden has been the protecting power for the UK in Iran. As well as for the United States, Canada, Australia and other Western countries in North Korea for consular matters.
- Switzerland represents Cuba and the United States in each other's capitals, the United States in Iran, Iran in Egypt, and Georgia and Russia in each other's

<sup>10</sup> Sources: [http://en.wikipedia.org/wiki/Protecting\\_power](http://en.wikipedia.org/wiki/Protecting_power) and other miscellaneous news clip-pings.



capitals. During the Cold War the number of mandates fluctuated between four in 1948 and 24 in 1973.

- The United States was the protecting power for Canada in Nigeria from 1995 to 1999.

## 8.7 Appendix

Selected articles of the Timor Sea Treaty

(*Note:* The full text can found in <http://scaleplus.law.gov.au/html/comact/browse/TOCN.htm>.)

### 8.7.1 *Article 3: Joint Petroleum Development Area*

- The Joint Petroleum Development Area (JPDA) is established. It is the area in the Timor Sea contained within the lines described in Annex A.
- Australia and East Timor shall jointly control, manage and facilitate the exploration, development and exploitation of the petroleum resources of the JPDA for the benefit of the peoples of Australia and East Timor.
- Petroleum activities conducted in the JPDA shall be carried out pursuant to a contract between the Designated Authority and a limited liability corporation or entity with limited liability specifically established for the sole purpose of the contract. This provision shall also apply to the successors or assignees of such corporations.
- Australia and East Timor shall make it an offence for any person to conduct petroleum activities in the JPDA otherwise than in accordance with this Treaty.

### 8.7.2 *Article 4: Sharing of Petroleum Production*

- Australia and East Timor shall have title to all petroleum produced in the JPDA. Of the petroleum produced in the JPDA, 90% shall belong to East Timor and 10% shall belong to Australia.
- To the extent that fees referred to in Article 6(b)(vi) and other income are inadequate to cover the expenditure of the Designated Authority in relation to this Treaty, that expenditure shall be borne in the same proportion as set out in paragraph (a).

### **8.7.3 Article 5: Fiscal Arrangements and Taxes**

Fiscal arrangements and taxes shall be dealt with in the following manner:

- a. Unless a fiscal scheme is otherwise provided for in this Treaty:
  - i. Australia and East Timor shall make every possible effort to agree on a joint fiscal scheme for each petroleum project in the JPDA.
  - ii. If Australia and East Timor fail to reach agreement on a joint fiscal scheme referred to in sub-paragraph (i), they shall jointly appoint an independent expert to recommend an appropriate joint fiscal scheme to apply to the petroleum project concerned.
  - iii. If either Australia or East Timor does not agree to the joint fiscal scheme recommended by the independent expert, Australia and East Timor may each separately impose their own fiscal scheme on their proportion of the production of the project as calculated in accordance with the formula contained in Article 4 of this Treaty.
  - iv. If Australia and East Timor agree on a joint fiscal scheme pursuant to this Article, neither Australia nor East Timor may during the life of the project vary that scheme except by mutual agreement between Australia and East Timor.
- b. Consistent with the formula contained in Article 4 of this Treaty, Australia and East Timor may, in accordance with their respective laws and the taxation code, impose taxes on their share of the revenue from petroleum activities in the JPDA and relating to activities referred to in Article 13 of this Treaty.

### **8.7.4 Article 6: Regulatory Bodies**

- a. A three-tiered joint administrative structure consisting of a Designated Authority, a Joint Commission and a Ministerial Council is established.
- b. Designated Authority:
  - i. For the first three years after this Treaty enters into force, or for a different period of time if agreed to jointly by Australia and East Timor, the Joint Commission shall designate the Designated Authority.
  - ii. After the period specified in sub-paragraph (i), the Designated Authority shall be the East Timor Government Ministry responsible for petroleum activities or, if so decided by the Ministry, an East Timor statutory authority.
  - iii. For the period specified in sub-paragraph (i), the Designated Authority has juridical personality and such legal capacities under the law of both Australia and East Timor as are necessary for the exercise of its powers and the performance of its functions. In particular, the Designated Authority shall have the capacity to contract, to acquire and dispose of movable and immovable property and to institute and be party to legal proceedings.

- iv. The Designated Authority shall be responsible to the Joint Commission and shall carry out the day-to-day regulation and management of petroleum activities.
- v. A non-exclusive listing of more detailed powers and functions of the Designated Authority is set out in Annex C. The Annexes to this Treaty may identify other additional detailed powers and functions of the Designated Authority. The Designated Authority also has such other powers and functions as may be conferred upon it by the Joint Commission.
- vi. The Designated Authority shall be financed from fees collected under the Petroleum Mining Code.
- vii. For the period specified in sub-paragraph (i), the Designated Authority shall be exempt from the following existing taxes:
  1. in East Timor, the income tax imposed under the law of East Timor;
  2. in Australia, the income tax imposed under the federal law of Australia;

as well as any identical or substantially similar taxes which are imposed after the date of signature of this Treaty in addition to, or in place of, the existing taxes.
- viii. For the period specified in sub-paragraph (i), personnel of the Designated Authority:
  1. shall be exempt from taxation of salaries, allowances and other emoluments paid to them by the Designated Authority in connection with their service with the Designated Authority other than taxation under the law of Australia or East Timor in which they are deemed to be resident for taxation purposes; and
  2. shall, at the time of first taking up the post with the Designated Authority located in either Australia or East Timor in which they are not resident, be exempt from customs duties and other such charges (except payments for services) in respect of imports of furniture and other household and personal effects in their ownership or possession or already ordered by them and intended for their personal use or for their establishment; such goods shall be imported within six months of an officer's first entry but in exceptional circumstances an extension of time shall be granted by the Government of Australia or the Government of East Timor; goods which have been acquired or imported by officers and to which exemptions under this sub-paragraph apply shall not be given away, sold, lent or hired out, or otherwise disposed of except under conditions agreed in advance with the Government of Australia or the Government of East Timor depending on in which country the officer is located.
- c. Joint Commission:
  - i. The Joint Commission shall consist of commissioners appointed by Australia and East Timor. There shall be one more commissioner appointed by East Timor than by Australia. The Joint Commission shall establish policies and regulations relating to petroleum activities in the JPDA and shall oversee the work of the Designated Authority.

- ii. A non-exclusive listing of more detailed powers and functions of the Joint Commission is set out in Annex D. The Annexes to this Treaty may identify other additional detailed powers and functions of the Joint Commission.
  - iii. Except as provided for in Article 8(c), the commissioners of either Australia or East Timor may at any time refer a matter to the Ministerial Council for resolution.
  - iv. The Joint Commission shall meet annually or as may be required. Its meetings shall be chaired by a member nominated by Australia and East Timor on an alternate basis.
- d. Ministerial Council:
- i. The Ministerial Council shall consist of an equal number of Ministers from Australia and East Timor. It shall consider any matter relating to the operation of this Treaty that is referred to it by either Australia or East Timor. It shall also consider any matter referred to in sub-paragraph (c)(iii).
  - ii. In the event the Ministerial Council is unable to resolve a matter, either Australia or East Timor may invoke the dispute resolution procedure set out in Annex B.
  - iii. The Ministerial Council shall meet at the request of either Australia or East Timor or at the request of the Joint Commission.
  - iv. Unless otherwise agreed between Australia and East Timor, meetings of the Ministerial Council where at least one member representing Australia and one member representing East Timor are physically present shall be held alternately in Australia and East Timor. Its meetings shall be chaired by a representative of Australia or East Timor on an alternate basis.
  - v. The Ministerial Council may, if it so chooses, permit members to participate in a particular meeting, or all meetings, by telephone, closed-circuit television or any other means of electronic communication, and a member who so participates is to be regarded as being present at the meeting. A meeting may be held solely by means of electronic communication.
- e. Commissioners of the Joint Commission and personnel of the Designated Authority shall have no financial interest in any activity relating to exploration for and exploitation of petroleum resources in the JPDA.

### **8.7.5 Article 7: Petroleum Mining Code**

- a. Australia and East Timor shall negotiate an agreed Petroleum Mining Code which shall govern the exploration, development and exploitation of petroleum within the JPDA, as well as the export of petroleum from the JPDA.
- b. In the event Australia and East Timor are unable to conclude a Petroleum Mining Code by the date of entry into force of this Treaty, the Joint Commission shall in its inaugural meeting adopt an interim code to remain in effect until a Petroleum Mining Code is adopted in accordance with paragraph (a).

### **8.7.6 Article 8: Pipelines**

- a. The construction and operation of a pipeline within the JPDA for the purposes of exporting petroleum from the JPDA shall be subject to the approval of the Joint Commission. Australia and East Timor shall consult on the terms and conditions of pipelines exporting petroleum from the JPDA to the point of landing.
- b. A pipeline landing in East Timor shall be under the jurisdiction of East Timor. A pipeline landing in Australia shall be under the jurisdiction of Australia.
- c. In the event a pipeline is constructed from the JPDA to the territory of either Australia or East Timor, the country where the pipeline lands may not object to or impede decisions of the Joint Commission regarding a pipeline to the other country. Notwithstanding Article 6(c)(iii), the Ministerial Council may not review or change any such decisions.
- d. Paragraph (c) shall not apply where the effect of constructing a pipeline from the JPDA to the other country would cause the supply of gas to be withheld from a limited liability corporation or limited liability entity which has obtained consent under this Treaty to obtain gas from a project in the JPDA for contracts to supply gas for a specified period of time.
- e. Neither Australia nor East Timor may object to, nor in any way impede, a proposal to use floating gas to liquids processing and off-take in the JPDA on a commercial basis where such proposal shall produce higher revenues to Australia and East Timor from royalties and taxes earned from activities conducted within the JPDA than would be earned if gas were transported by pipeline.
- f. Paragraph (e) shall not apply where the effect of floating gas to liquids processing and off-take in the JPDA would cause the supply of gas to be withheld from a limited liability corporation or limited liability entity which has obtained consent under this Treaty to obtain gas from the JPDA for contracts to supply gas for a specified period of time.
- g. Petroleum from the JPDA and from fields which straddle the boundaries of the JPDA shall at all times have priority of carriage along any pipeline carrying petroleum from and within the JPDA.
- h. There shall be open access to pipelines for petroleum from the JPDA. The open access arrangements shall be in accordance with good international regulatory practice. If Australia has jurisdiction over the pipeline, it shall consult with East Timor over access to the pipeline. If East Timor has jurisdiction over the pipeline, it shall consult with Australia over access to the pipeline.

### **8.7.7 Article 9: Unitization**

- a. Any reservoir of petroleum that extends across the boundary of the JPDA shall be treated as a single entity for management and development purposes.

- b. Australia and East Timor shall work expeditiously and in good faith to reach agreement on the manner in which the deposit will be most effectively exploited and on the equitable sharing of the benefits arising from such exploitation.

### **8.7.8 Article 10: Marine Environment**

- a. Australia and East Timor shall cooperate to protect the marine environment of the JPDA so as to prevent and minimize pollution and other environmental harm from petroleum activities. Special efforts shall be made to protect marine animals including marine mammals, seabirds, fish and coral. Australia and East Timor shall consult as to the best means to protect the marine environment of the JPDA from the harmful consequences of petroleum activities.
- b. Where pollution of the marine environment occurring in the JPDA spreads beyond the JPDA, Australia and East Timor shall cooperate in taking action to prevent, mitigate and eliminate such pollution.
- c. The Designated Authority shall issue regulations to protect the marine environment in the JPDA. It shall establish a contingency plan for combating pollution from petroleum activities in the JPDA.
- d. Limited liability corporations or limited liability entities shall be liable for damage or expenses incurred as a result of pollution of the marine environment arising out of petroleum activities within the JPDA in accordance with:
  - i. their contract, licence or permit or other form of authority issued pursuant to this Treaty; and
  - ii. the law of the jurisdiction (Australia or East Timor) in which the claim is brought.

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## Chapter 9

# Alternative Strategies for Dispute Resolution

Regardless of various disagreements or disputes throughout the world, compromise may become possible because claims over disputed properties carry both benefits and costs. When these costs outweigh the value of contestation, compromise becomes more attractive than confrontation. The cost a stakeholder bears for pressing cross-border disputes opens a bargaining space in which concessions can be exchanged for other goals that a stakeholder may seek. When the bilateral (or multilateral) ties between the stakeholders become more important, cooperation in and delaying the settlement of their cross-border disputes will become more attractive than continuing to press claims. However, dispute resolution and cross-border cooperation cannot be achieved automatically. The style of settlement or negotiation also matters.

In this chapter, several settlement mechanisms or techniques are presented. Specifically, they include (i) negotiation, (ii) mediation, (iii) arbitration, (iv) litigation, and (v) shelving-disputes strategy. These settlement techniques can be used to seek a cessation of hostilities and to facilitate cooperative behavior as a peaceful means to end a conflict or, when a conflict is largely intractable, reduce cross-border tensions. Mediation and arbitration are similar in that they are alternatives to litigation. Sometimes they are used in conjunction with litigation to attempt to avoid litigating a dispute to its conclusion. Both mediation and arbitration employ a neutral third party. In many cases, mediation is employed as a non-binding procedure and arbitration as a binding procedure. Arbitrators generally act similar to a judge and make decisions about evidence and give written opinions. However, unlike litigation, arbitration can be either binding or non-binding.



## 9.1 Negotiation

### 9.1.1 Characteristics

For certain purposes, ‘negotiation’ can be defined as a process wherein two or more engaged and interacting parties that have a substantial and relevant difference in goals or interests try to make compromises and to achieve an agreement on their common interests. A negotiation process is put into place wherein people who disagreed strongly and had fought with one another came to some agreements that permitted them to live together and the social system in which they lived to continue to operate without warfare or schism. The eruption of violent conflict does not only affect internal stability but also that of other countries of the region leading to border controls, and the displacement of people and refugees resulting from wars.

The round-table negotiation has been the most common method used in various circumstances to settle disputes and conflicts throughout the world. Most of what we know about the formation, operation, and attributed outcomes of the negotiation fit well with widely held understandings in the conflict resolution field. The term ‘round table’ has come into being for a long time. Originally, it was King Arthur’s famed table in the Arthurian legend, around which he and his Knights congregate. As its name suggests, “round table negotiation” implies that everyone who sits there has equal status.

Generally, there is no head at the round table, and therefore no person has a privileged position. The negotiation itself covers an entire series of formal and informal meetings. In most circumstances, preparatory and informal meetings are the necessary and can play a key role in the success of a round table negotiation. The first things of the negotiation are to:

- Familiarize all the participants and stakeholders
- Identify issues related to, as well as the differences among, all the countries involved in the dispute
- Propose guidance for the formulation of strategies and policies that could influence action at the international level
- Form partnerships for follow-up

The “negotiation” is a decision-making process in which two or more entities meet together to discuss common and conflicting interests in order to reach an agreement of mutual benefit. Usually, there is no direct involvement by any third party (or person). In some instances, both parties may agree to have an expert render an opinion for inclusion in the discussions. This opinion is however non-binding and is usually treated only as a guide or aid in arriving at a decision. Before negotiations can be smoothly arranged, at least five key issues or questions must have been jointly dealt or settled by the sponsors:

- i. Who can (not) be involved in the negotiation?
- ii. What kind of issues can be negotiated?

- iii. What is required for negotiations to work well?
- iv. How do parties in conflict come to trust one another enough to negotiate?
- v. How can negotiations lead to compromises and/or agreements?

### ***9.1.2 Example***

The most recent and important example for the application of the negotiation in dispute-settlement has been the Polish Round Table Talks, held in Warsaw, Poland, from February 6 to April 4, 1989. The Polish Communists hoped to co-opt prominent opposition leaders into the ruling group without making major changes in the political power structure. In reality, the talks radically altered the shape of the Polish government and society. The events in Poland precipitated and gave momentum to the fall of the entire Communist bloc. Soon after the Polish Round Table events, in the early 1990s the Yalta Arrangement collapsed.<sup>1</sup>

In many round-table negotiations, participants or negotiators come from, or are related to, different ethnic, linguistic, and religious groups. In order to improve the efficiency of the round table negotiations, negotiators appearing at each round table should be familiar with each other's cultural background. In most, if not all circumstances, this requires that negotiators with differing cultural identities should apply different negotiating styles or approaches to problem solving, implicit assumptions and so on.<sup>2</sup> The major shortcoming of round table negotiation is its lack of efficient restraints to all sides joining the negotiation. Many negotiations may not be as efficient as expected; sometimes they may last for a long period of time before reaching, if any, a mutually accepted agreement. In some unlucky circumstances, negotiations may be ended fruitlessly.

Since negotiations are a volunteer process, their goals may not be achieved as expected by the participating side(s) involved. Sometimes, compromises or agreements that were once made at a negotiation may not be put into effect in the following years. From 2004 to 2008, China and Japan held various rounds of talks in order to address their growing maritime boundary disputes and the joint/cooperative development of the hydrocarbon resources in the disputed area of the East China Sea. On June 18, 2008, after 12 rounds of talks, China and Japan reached a principled consensus on the joint/cooperative development of the East China Sea. However, since the agreement is loosely restrained, little progress toward this end has been achieved since then.

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<sup>1</sup> More detailed analyses can be seen in Kennedy and Porter (2000).

<sup>2</sup> This will be discussed in detail in a case study of Chap. 18.

## 9.2 Mediation

### 9.2.1 *Characteristics*

In most cases third-party mediation provides communication and technical means for verifying complex negotiations. A third party is “an individual or a collective that is external to a dispute between two or more people and that tried to help them reach agreement” (Rubin et al. 1994, p. 197). Working out their troubles on their own or shake hands and get along may work occasionally, but most of the time the conflict will only be sent underground to resurface later in more destructive ways. A better approach is to allow both sides in conflicts to meet with a third party, or mediator, to assist them in their own resolution of the conflict. All things being equal, an outside mediator has a greater chance of succeeding. An insider may be part of the problem, may be perceived as favoring one of the stakeholders, and the stakeholders may be hesitant to share confidential information with an insider.<sup>3</sup>

Mediation is the process through which disputes are resolved by a neutral third party (called mediator) who makes no binding decisions. The mediator gets both or all parties involved in a dispute to arrive at workable, amicable or satisfactory resolution. The most important criterion for making mediation work is the willingness of all parties concerned to solve the problem through non-violent means. The utilization of third parties as mediators has to be carefully examined before being implemented. This includes who the mediators are, and what resources and skills they bring to the dispute settlement. More importantly, a person (or part) to be identified as mediator in a mediation must be impartial and a neutral, and, to be sure, be acceptable to both parties.

There are several draw backs to the mediation. These include:

- It can only work if all parties concerned agree to the process and its outcomes.
- Arbitral awards can be difficult, or almost impossible, to enforce because they have less authority than arbitration and litigation.

The third party’s roles may be formal or informal, advisory and facilitative or directive and coercive, and partial or impartial. Neutrality is a hallmark of formal mediation rhetoric, but in practice it is usually redefined as a sense of fairness that gains the trust of varied parties. Mediation helps stakeholders discuss issues, repair past injuries, and develop the tools needed to face disagreements effectively. Mediators may help participants glimpse at their blind spots, broaden their perspectives, and even muddle through the problem-solving process. Yet, successful mediators remember that the challenges are owned by the stakeholders and do not attempt to short-circuit the process by solving challenges for them. In most circumstances

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<sup>3</sup> A substantial portion of the literature on conflict resolution has addressed the utility of third-party intervention—see, for example, Forester and Stitzel (1989), Rubin et al. (1994), Moore (1996), and Billikopf (2005).

mediators facilitate the conflict-resolution process by the following aspects (Bil-likopf 2005):

- Understanding each participant’s perspective through a pre-caucus
- Increasing and evaluating participant interest in solving the challenge through mediation
- Setting ground rules for improved communication
- Coaching participants through the joint session
- Equalizing power (e.g., between persons in different organizational levels)
- Helping participants plan for future interaction

Mediation can aid disputants in putting aside strong social identity cleavages by providing an alternate bargaining context. When the disputants possess a shared identity aspect, mediation can enhance its salience, particularly when the mediator shares the same identity. Thus, negotiations tends to be more effective in the presence of either shared identity or of mediation, with the greatest efficacy observed when both are present and the third-party shares the same identity. For example, Block et al.’s (2009) estimates suggest that

- the marginal effects of shared identity on the likelihood of claimants using mediators are 0.16 (when claimants don’t share identity) and 0.403 (when claimants share identity);
- the marginal effects of shared identity on the likelihood of claimants using mediators are 0.225 (when mediator doesn’t share identity with claimants) and 0.395 (when mediator shares identity with claimants); and
- the marginal effects of mediation and shared identity on the likelihood of conflict resolution are 0.152 (when mediators are absent), 0.349 (when mediators are present), 0.16 (when claimants don’t share identity), and 0.249 when claimants share identity).<sup>4</sup>

### 9.2.2 Example

Successful cases for using mediation include the Indus Treaty between the governments of India and Pakistan in 1960 (which was mediated by the World Bank) and the peaceful resolution of the dispute between Argentina and Chile over the Beagle Channel in 1984 (which was mediated by the Vatican). Only after all the parties concerned invite international actors to join mediation, can the mediation approach become more effective and, therefore, more successful. For example, the peace settlement that followed the 1995 Ecuador–Peru war could not have been achieved without the active engagement of the governments of Argentina, Brazil, Chile, and the United States; the modest but essential financial, military, and techni-

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<sup>4</sup> In Block et al.’s (2009) quantitative analysis, “identity” is represented by linguistic or religious linkage; and the maximum number of cases used is 535.

cal resources provided by these governments, especially the United States; and the skill and dedication of US ambassador (Domínguez et al. 2003, p. 35).

The Beagle Channel is located in the extreme southern corner of South America. It separates the Tierra del Fuego archipelago's main island to the north from Navarino, Hoste, and other smaller islands to the south. The channel is named after the ship HMS Beagle which was involved in two surveys of the coasts of the southern part of South America in the early nineteenth century. Running from east to west, the Beagle Channel is about 240 km long and 5–13 m wide.<sup>5</sup> The main settlements on the channel are Puerto Williams, Chile and Ushuaia, Argentina, both located on Tierra del Fuego. While the western portion of the Channel lies entirely within Chile, the eastern portion forms part of the Argentina–Chile boundary.

Argentina and Chile attempted to definitively resolve their territorial disputes through a comprehensive agreement known as the Boundary Treaty of 1881. To the south of the Channel, the 1881 Treaty stipulated that the boundary would run to the south from Cape Espiritu Santo, on the northern shore of Tierra del Fuego, until it touches the Beagle Channel. Tierra del Fuego was thus to be divided into an eastern portion belonging to Argentina and a western portion belonging to Chile. With respect to the Beagle Channel, the key problem was the Treaty's failure to specify the eastern terminus of the Channel. The existing maps and documents have shown different interpretations of the 1881 Boundary Treaty. Since the Treaty granted Chile possession of all the islands south of the Beagle Channel, the Channel effectively defined the longitudinal scope of Chilean sovereignty to the south of Tierra del Fuego. It was therefore impossible to definitively separate Chilean and Argentine claims in this region without determining where the Channel ends. The Chilean view is that the Beagle Channel extended well to the east of Navarino island, and beyond the three smaller islands: Picton, Nueva, and Lennox, which were the focus of the dispute. Under this interpretation, all of the three islands are located south of the Channel, and thus belong to Chile. Argentina, on the other hand, argued that the Beagle Channel veered sharply to the south along the east side of Navarino island, making everything to the east of that island Atlantic, and thus, under the terms of the Boundary Treaty, Argentine.

In the course of attempting to resolve territorial disputes, however, Argentina and Chile confronted several collateral issues, including navigation rights, sovereignty over other islands in the Fuegian Archipelago, and maritime boundaries south to Cape Horn and beyond. The three islands at the channel's eastern end, Lennox Picton, and Nueva islands, were the subject of a territorial dispute between Argentina and Chile. The dispute began in the 1840s. On July 22, 1971, Chile and Argentina signed an arbitration agreement (the Arbitration Agreement of 1971). This agreement related to the dispute over the territorial and maritime boundaries between Chile and Argentina, and, in particular, over the title to the Picton, Nueva and Lennox islands near the extreme end of the American continent. The case was submitted to binding arbitration under the auspices of Queen Elizabeth II of the United Kingdom.

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<sup>5</sup> Cited from Merriam-Webster (2000, p. 156).

In the following years, the Beagle Channel Arbitration Court was set up to review the cartography of the disputed area. On May 2, 1977 the Court ruled that the islands belonged to Chile. In paragraph 163 of the Report and Decision of the Court of Arbitration, it stated that:

Finally, the Court wishes to stress again that its conclusion to the effect that the PNL [Picton, Nueva and Lennox islands] group is Chilean according to the 1881 Treaty has been reached on the basis of its interpretation of the Treaty, especially as set forth in paragraphs 55–111 above, and independently of the cartography of the case which has been taken account of only for purposes of confirmation or coronation. The same applies in respect of the particular maps discussed in, and from, paragraph 119 onwards.<sup>6</sup>

On January 25, 1978, Argentina repudiates the British arbitral award. On February 20, Argentina and Chile established a formal structure for further direct negotiations, all of which, however, became unsuccessful during the following months. In the meantime, military mobilization accelerated in Chile and Argentina. On January 8, 1979, the two countries agreed to allow the Vatican to mediate the dispute through the good offices of Antonio Cardinal Samoré, Pope's special envoy. On December 12, 1980, the Pope received the two delegations and presented to them his proposal for resolving the conflict. Under the papal proposal, Chile would retain all of the islands, but Argentina would be entitled to maintain certain limited facilities there and would receive important navigation rights.

The key element to this proposal was the creation of a vast ocean area known as the 'Sea of Peace'. In this area, extending to the east and southeast from the disputed chain of islands, Chile would be limited to a narrow territorial sea, in which it would be obliged to afford Argentina equal participation in resource exploitation, scientific investigation, and environmental management. Beyond the Chilean territorial waters would be a much broader band of ocean subject to Argentine jurisdiction, but also subject to the same sharing provisions that applied in Chilean waters.

The Pope's ruling resulted in the ratification of a treaty to settle the dispute in Rome. The Treaty of Peace and Friendship of 1984 between Chile and Argentina was signed into agreement at the Vatican on November 29, 1984.<sup>7</sup> It was ratified by the Argentine Chamber of Deputies on December 30, 1984, and the Argentine National Congress on March 15, 1985. After the Foreign Ministers of both countries exchanged original documents on May 2, 1985, the dispute officially ended. The 1984 Treaty contains a preamble, a maritime border definition, a comprehensive body of legislation on solving disputes, ship navigation rights and an exact definition of the border through the Straits of Magellan. The boundary between the

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<sup>6</sup> See "Reports on International Arbitral Awards" (Case concerning a dispute between Argentina and Chile concerning the Beagle Channel). Available at [http://untreaty.un.org/cod/riaa/cases/vol\\_XXI/53-264.pdf](http://untreaty.un.org/cod/riaa/cases/vol_XXI/53-264.pdf). Accessed on 15 June 2010.

<sup>7</sup> See "Treaty of Peace and Friendship between Chile and Argentina," signed on November 29, 1984. Available at [www.un.org/Depts/los/LEGISLATION-ANDTREATIES/PDFFILES/TREATIES/CHL-ARG1984PF.PDF](http://www.un.org/Depts/los/LEGISLATION-ANDTREATIES/PDFFILES/TREATIES/CHL-ARG1984PF.PDF). Accessed 14 May 2010.

respective sovereignties over the sea, seabed and subsoil of the Argentine Republic and the Republic of Chile in the sea of the southern zone from the end of the existing boundary in the Beagle Channel. On October 30, 2009, the 1984 Treaty was succeeded by the Maipú Treaty of Integration and Cooperation. The 2009 Treaty sets up a hierarchy of institutional mechanisms for binational integration ranging from annual presidential meetings to the Integration Committees and forums for collaboration between the formerly antagonistic states.<sup>8</sup>

International mediation is not automatically a good thing. For example, the Beagle Channel conflicts between Argentina and Chile from the 1970s to the 1980s show how varied the outcomes may be. The 1977 British mediation (arbitration) nearly brought the two countries to war. Also, despite its vast power and resources, the US government had very little leverage with either Argentina or Chile. The United States attempted to play an active role in resolving the conflict. Argentina and Chile, for their part, never seriously considered requesting US mediation (Laudy 2000, p. 307). In the 1981's successful resolution of the Beagle Channel conflict between Argentina and Chile, the mediator was the Vatican. Pope's supreme moral authority and influence over the large Catholic populations in each country made it a mediating body that the parties could not ignore.

## 9.3 Arbitration

### 9.3.1 *Characteristics*

Arbitration is designed for just such occasions as those that parties prefer to settle their disputes privately and informally, in that it can be designed for quick, practical and efficient resolution. Arbitration is a voluntary process of dispute resolution where a neutral third party renders a final and binding decision after each side has an opportunity to present its view. Unlike a judicial process, arbitration is conducted outside the court system by impartial arbitrators who are selected by the parties based on criteria that best fits the nature of their disputes. Arbitration is usually conducted by either one arbitrator or a panel of arbitrators.

In general, arbitration takes place within a six-part legal framework:

1. The Arbitration agreement. The formal (usually in written form) agreement of the parties to arbitrate is an essential element of any arbitration.
2. Statutes. Arbitration statutes typically provide the courts with certain powers to assist the arbitral process. Courts may be given a role, for example, in appointing arbitrators when the parties have not agreed on a method of appointment.
3. Courts. It is the courts at the place of arbitration that interpret the arbitration statutes that govern there.

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<sup>8</sup> The documents are available in Spanish at [www.mrecic.gov.ar/portal/prensa/comunicado.php?buscar=4053](http://www.mrecic.gov.ar/portal/prensa/comunicado.php?buscar=4053). Accessed 15 June 2010.

4. International treaties and conventions. They provide for the enforcement of arbitral awards.<sup>9</sup>
5. Arbitration rules. The parties are free to select the rules that will govern the arbitration, or to write their own rules.
6. Arbitral institutions.

Arbitration can be conducted either ad hoc or through an established arbitration institution. Ad hoc arbitration refers to a process by which the parties select the arbitration format and structure without using an existing arbitration institution. The ad hoc approach allows for greater specificity in the design of a mechanism for the particular contract. Parties concerned may jointly select ad hoc arbitration to reduce costs, to accelerate the process and/or to structure proceedings to suit their particular needs. When choosing ad hoc arbitration, the parties must specify in the arbitration clause all aspects of the arbitration, including applicable law, rules under which the arbitration will be carried out, the number of arbitrators, the method for selecting the arbitrator(s), the language in which the arbitration will be conducted and the place of arbitration. Parties may either develop their own rules or select established arbitration rules to govern the arbitration.

The established arbitration institution has formal procedures and rules. The institution chosen may administer the arbitration according to its own rules or, in some cases, according to other rules if requested. The list below shows some prominent international arbitration institutions available.

- a. American Arbitration Association (AAA), International Center for Dispute Resolution (New York, USA)
- b. Commercial Arbitration and Mediation Center for the Americas (CAMCA), International Center for Dispute Resolution (New York, USA)
- c. International Chamber of Commerce (ICC) Court of Arbitration (Paris, France)
- d. Inter-American Commercial Arbitration Commission (IACAC) (Washington, DC, USA)
- e. London Court of International Arbitration (LCIA), International Dispute Resolution Centre (London, UK)
- f. International Center for the Resolution of Intellectual Property Disputes (Geneva, Switzerland)

In addition, there are many other national and regional arbitration institutions located throughout the world. Several of the more prominent institutions are: (A) British Columbia International Commercial Arbitration Centre (BCICAC) (Vancouver, Canada); (B) Québec National and International Commercial Arbitration Centre (Québec, Canada); (C) Mexico City National Chamber of Commerce (Mexico city, Mexico); (D) Arbitration Institute of the Stockholm Chamber of Commerce (SCC) (Stockholm, Sweden); (E) Hong Kong International Arbitration Centre

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<sup>9</sup> The principal international convention to be applied in arbitration is the New York Convention on the Recognition and Enforcement of Foreign Arbitral Awards (1958), to which 137 nations have subscribed.



(Hong Kong S.A.R., China); (F) China International Economic and Trade Arbitration Commission (CIETAC) (Beijing, China); (G) Japan Commercial Arbitration Association (JCAA) (Tokyo, Japan); (H) Arbitral Centre of the Federal Economic Chamber, Vienna (Vienna, Austria); (I) Cairo Regional Centre for International Commercial Arbitration (Cairo, Egypt); (J) Regional Centre for Arbitration Kuala Lumpur (Kuala Lumpur, Malaysia); and (K) Singapore International Arbitration Centre (Singapore).<sup>10</sup>

In July 1899, the sovereign powers, meeting in The Hague, the Netherlands, at the first International Peace Conference, adopted a “Convention for the Pacific Settlement of International Disputes”. This conference established a global institution for international dispute resolution: the Permanent Court of Arbitration (PCA). The PCA and now has over 100 state parties. It provides facilities for the settlement of international disputes, including by arbitration, conciliation, fact-finding, and the administration of mass claims. Today, the PCA, housed with the International Court of Justice (ICJ) in the Peace Palace in The Hague, provides services for the resolution of disputes involving various combinations of states, state entities, intergovernmental organizations, and private parties. The PCA’s Secretariat, the International Bureau, headed by its Secretary-General, provides full registry services and legal and administrative support to tribunals and commissions.

The PCA has jurisdiction in relation to disputes involving individuals, companies and states. In subsequent years, however, following two world wars and the establishment of the Permanent Court of International Justice (PCIJ) and its successor, the ICJ (to be discussed later in Sect. 9.4 in detail), the PCA came to be underutilized by the international community. The PCA’s early cases involved exclusively state parties and issues of public international law. Several of these, however, were relevant to the fields of international trade, investment and intellectual property, in that they raised issues of state responsibility and involved various kinds of property claims on behalf of foreign nationals. The PCA has also settled the cases of international boundary and territorial disputes. Below is a selection of past and pending cases from 1909 to 2009:<sup>11</sup>

- Bangladesh/India (initiated in 2009)
- Eritrea-Ethiopia Claims Commission (awarded in 2009)
- The Government of Sudan/The Sudan People’s Liberation Movement/Army (Abyei Arbitration) (awarded in 2009)
- Eritrea-Ethiopia Boundary Commission (awarded in 2008)
- Ireland v. United Kingdom (MOX Plant Case) (awarded in 2008)

<sup>10</sup> A more extensive list of all international, regional and national arbitration associations is located on the internet at: <http://www.internationaladr.com/>.

<sup>11</sup> Source: [http://www.pca-cpa.org/showpage.asp?pag\\_id=1029](http://www.pca-cpa.org/showpage.asp?pag_id=1029) (Assessed 2 February 2011). Note that the abbreviation “v.” (for the Latin versus) represents that a case is submitted by an applicant state against a respondent state; if there is neither an “applicant” state nor a “respondent” state, their names are separated by an oblique stroke in the title.

- Guyana/Suriname (awarded in 2007)
- Barbados/Trinidad and Tobago (awarded in 2006)
- Malaysia/Singapore (initiated in 2003)
- Belgium/Netherlands (Iron Rhine Arbitration, awarded in 2005)
- Eritrea/Yemen (awarded in 1998 and 1999)
- island of Palmas (or Miangas) (United States/Netherlands, awarded in 1928)
- Norwegian Claims Case (United States/Norway, awarded in 1922)
- island of Timor (The Netherlands/Portugal, awarded in 1914)
- Canevaro Claim (Italy/Peru, awarded in 1912)
- North Atlantic Coast Fisheries (United States/Great Britain, awarded in 1910)
- The Grisbådarna Case (Norway/Sweden, awarded in 1909)

### 9.3.2 Example

The Abyei area is located between the north and the south parts of Sudan. The township of Abyei is located north of the river Bahr el Arab/Kir. The clay plains of the Abyei region are characterized by thick forest, bushes, and vegetation, which combined with the extreme wet and dry seasons support the many fruits and plants growing there. Using Abyei town as the center of their political and commercial affairs, the Ngok Dinka—one of the 25 tribes which comprise the Dinka people—are a highly cohesive tribal unit, with a well-defined, centralized political structure. They cultivate the land and, through tribal law and custom, grant individuals and families exclusive right to use certain lands. Living to the north of the Ngok Dinka are the Misseriya—Arab nomads who have their base in the region of Muglad. The Misseriya are cattle-herders whose nomadic existence takes them across a wide territory, ranging from the area around Muglad in the north, where they spend much of each year, to the Bahr river system of the Abyei region during parts of the dry season.

In 2005, under the mediation of the Intergovernmental Authority on Development (IGAD), the Comprehensive Peace Agreement (CPA), also known as the Naivasha Agreement, was signed in Naivasha, Kenya by the Sudanese government and the Sudan People Liberation Movement/Army (the latter represents the semi-autonomous region of southern Sudan, including three states of Abyei, Southern Kordofan, and Blue Nile). The CPA calls for a referendum on southern independence (in January 2011, the referendum was successfully done, which set the foundations for establishment of a new nation in southern Sudan) and, if the south secedes, a separate referendum in which the people of Abyei would decide whether to join northern Sudan or the newly independent south.

However, the deal included in the CPA left the borders of Abyei unsettled, raising questions about whether a major working oil field called Heglig was part of the region. In total, there are several major oilfields (including the Heglig) in the Abyei area, whose revenues were estimated to account for the major source of income in the region. On July 22, 2009, the Permanent Court of Arbitration (PCA) issued a

crucial ruling on a border dispute between the Sudanese government and the Sudan People Liberation Movement/Army. This stroke a tenuous compromise on one of the most explosive issues facing the nation of Sudan. The PCA's ruling adjusts the borders of Abyei (see Fig. 9.1), as the following:

- a. The northern boundary of the area of the nine Ngok Dinka chiefdoms transferred to Kordofan in 1905 runs along latitude  $10^{\circ}10'00''\text{N}$ , from longitude  $27^{\circ}50'00''\text{E}$  to longitude  $29^{\circ}00'00''\text{E}$ .
- b. The southern boundary shall be the Kordofan—Bahr el-Ghazal—Upper Nile boundary as it was defined on January 1, 1956.
- c. The eastern boundary of the area of the nine Ngok Dinka chiefdoms transferred to Kordofan in 1905 runs in a straight line along longitude  $29^{\circ}00'00''\text{E}$ , from latitude  $10^{\circ}10'00''\text{N}$  south to the Kordofan—Upper Nile boundary as it was defined on January 1, 1956.
- d. The western boundary of the area of the nine Ngok Dinka chiefdoms transferred to Kordofan in 1905 runs in a straight line along longitude  $27^{\circ}50'00''\text{E}$ , from latitude  $10^{\circ}10'00''\text{N}$  south to the Kordofan—Darfur boundary as it was defined on January 1, 1956, and continuing on the Kordofan—Darfur boundary until it meets the southern boundary confirmed in paragraph (b) above.<sup>12</sup>

At the same time, the ruling by the PCA awards control of a working (currently Chinese-run) oilfield in the region of Abyei to the Sudanese government but defines the region's boundaries in a way that is politically beneficial to the new nation in southern Sudan. That territory is populated mainly by the Ngok Dinka—a politically powerful nomadic tribe that considers itself southern. The exercise of established traditional rights within or in the vicinity of the Abyei area, particularly the right of the Misseriya and other nomadic peoples to graze cattle and move across the so-called "Shared Rights Area" (as defined in Fig. 9.1) surrounding the northern boundary of the Abyei area, remains unaffected. Although it seems that there is still a long way toward the peace and stability in Sudan, the PCA's ruling has provided a relatively concrete foundation for the complex process of state-building and peace-keeping in one of the most fragile nations in Africa.

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<sup>12</sup> See "Arbitration Agreement between the Government of Sudan and the Sudan People's Liberation Movement/Army on Delimiting Abyei Area" (available at <http://www.pca-cpa.org/upload/files/Abyei%20Final%20Award.pdf>, accessed 4 February 2011).

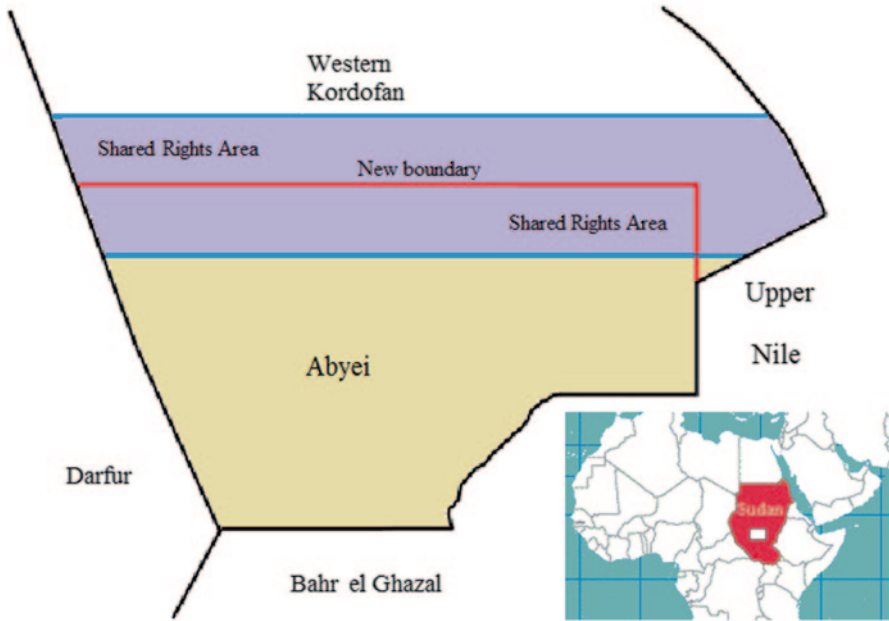


Fig. 9.1 The delimitation of the Abyei area (central Sudan). Note: More detailed data on the reference points of the boundaries of the Abyei area are available at [http://www.pca-cpa.org/showfile.asp?fil\\_id=1335](http://www.pca-cpa.org/showfile.asp?fil_id=1335). Accessed on 12 Feb 2011). Copyright © 2010 by Rongxing Guo

## 9.4 Litigation

### 9.4.1 Characteristics

International laws and conventions provide the normative framework and procedures by which to coordinate behaviors, to control conflicts, to facilitate cooperation and to achieve common values among independent countries concerned. If a negotiated settlement cannot be reached, all states concerned could demonstrate their commitment to the rule of international law by agreeing to submit specified questions to an international tribunal. The stated commitment of all states to “resort to the rule of law rather than to confrontation and intimidation would offer hope that the region can move beyond the geopolitical rhetoric that has informed public discourse to date and would serve as a model of accommodation and cooperation between former competitors” (Dutton 2007, p. 63).

At present, the major international courts include the International Court of Justice (ICJ) and the International Criminal Court (ICC), both of which are located in The Hague, the Netherlands.

The International Criminal Court (ICC) is the first permanent, treaty based, international criminal court established to help end impunity for the perpetrators of the most serious crimes of concern to the international community.<sup>13</sup> As two typical examples of the ICC, the Nuremberg and Tokyo trials addressed the war crimes, the crimes against peace, and the crimes against humanity committed during the Second World War. In the 1990s after the end of the Cold War, tribunals like the International Criminal Tribunal for the former Yugoslavia and for Rwanda were also established in The Hague, the Netherlands. Since the ICC does not deal with international boundary and territorial issues, it will not be analyzed here in detail.

The International Court of Justice (ICJ) is the principal international judicial organ of today (see Box 9.1). It was established in June 1945 by the Charter of the United Nations and began work in April 1946. The seat of the ICJ is in The Hague, the Netherlands. The predecessor of the ICJ is called the Permanent Court of International Justice (PCIJ). The PCIJ held its inaugural sitting in the Covenant of the League of Nations in 1922 and was dissolved in 1946. The work of the PCIJ, the first permanent international tribunal with general jurisdiction, made possible the clarification of a number of aspects of international law, and contributed to its development. Between 1922 and 1940 the PCIJ dealt with 29 contentious cases between states, and delivered 27 advisory opinions.<sup>14</sup>

### **Box 9.1 About the International Court of Justice**

The International Court of Justice (ICJ) is the principal judicial organ of the United Nations. It was established by the United Nations Charter, signed in 1945 at San Francisco, United States, and began work in 1946 in the Peace Palace, The Hague, the Netherlands. The official languages of the ICJ include English and French. The ICJ is composed of 15 judges, with a dual role: (i) settling legal disputes between states submitted to it by them and (ii) giving advisory opinions on legal matters referred to it by duly authorized United Nations organs and specialized agencies.

The ICJ can only hear a dispute when requested to do so by one or more states. The states concerned must also have access to the ICJ and have accepted its jurisdiction, in other words they must consent to the ICJ's considering the dispute in question. A state may manifest its consent in three ways:

<sup>13</sup> A more detailed description of International Criminal Court (ICC) can be found in <http://www.icc-cpi.int/Menus/ICC/About+the+Court/> (Assessed 4 February 2011).

<sup>14</sup> Cited from the website of the ICJ (available at <http://www.icj-cij.org/pcij/index.php?p1=9>. Accessed 3 May 2010).

- A special agreement: two or more states in a dispute on a specific issue may agree to submit it jointly to the ICJ and conclude an agreement for this purpose;
- A clause in a treaty: over 300 treaties contain clauses (known as compromissory clauses) by which a state party undertakes in advance to accept the jurisdiction of the ICJ should a dispute arise on the interpretation or application of the treaty with another state party;
- A unilateral declaration: the states parties to the Statute of the ICJ may opt to make a unilateral declaration recognizing the jurisdiction of the ICJ as binding with respect to any other state also accepting it as binding.

(Source: <http://www.icj-cij.org/information/en/ibleubook.pdf>. Accessed 3 March 3 2014)

The ICJ's role is to settle, in accordance with international law, legal disputes submitted to it by states and to give advisory opinions on legal questions referred to it by authorized United Nations organs and specialized agencies. The ICJ is vested with the power to make its own rules. The ICJ formed its first chamber for dealing with a particular case in 1982, its second, in 1985, and, in 1987, its third and fourth *ad hoc* chambers (Schwebel 1987). The chamber's procedure is set out in the 1978's Rules of Court of the International Court of Justice (as amended on September 29, 2005). Once deliberation has taken place, the ICJ will issue a majority opinion. Individual judges may issue separate opinions (if they agree with the outcome reached in the judgment of the court but differ in their reasoning) or dissenting opinions (if they disagree with the majority). No appeal is possible, though any party may ask for the ICJ to clarify if there is a dispute as to the meaning or scope of the court's judgment.<sup>15</sup>

The ICJ has been criticized with respect to its rulings, its procedures, and its authority. Many of these criticisms refer more to the general authority assigned to the body by member states through its charter than to specific problems with the composition of judges or their rulings (Orozco 2001). As shown in the case of land boundary demarcation between Honduras and El Salvador, submitted to the ICJ in 1986. Although both governments, Honduras and El Salvador, accepted the ICJ's judgment of September 11, 1992, the ICJ's judgment raised the salience and the stakes of the bilateral dispute, injuring other aspects of bilateral and even trilateral relations. In 2002, the two states, together with Nicaragua, submitted an application revision of the 1992's judgment. The ICJ made a second judgment in 2007, though the definitive delimitation on the ground is still pending.

Even though the "litigation" is more effective than both "negotiation" and "mediation", it is not available in cases in which one or more parties don't welcome this

<sup>15</sup> See Article 60 of the "Statute of the International Court of Justice". Available at <http://www.icj-cij.org/documents/index.php?p1=4&p2=2&p3=0>. Accessed 12 June 2010.

kind of authority or are (partially) free of the jurisdiction of the ICJ. The “compulsory” jurisdiction is only limited to cases where both parties have agreed to submit to its decision, and, as such, instances of aggression tend to be automatically escalated to and adjudicated by the UNSC. Till the year 2010, the ICJ jurisdiction has been accepted by 13 countries, including: Austria, Bulgaria, Cameroon, Costa Rica, Dominican Republic, Gabon, Georgia, Guinea-Bissau, Guyana, Haiti, Luxembourg, Paraguay, and Uruguay; and those that have accepted the ICJ jurisdictions with reservations include: Australia, Barbados, Belgium, Botswana, Cambodia, Canada, Congo (Democratic Republic), Cote d’Ivoire, Cyprus, Denmark, Egypt, Estonia, Finland, the Gambia, Greece, Guinea, Honduras, Hungary, India, Japan, Kenya, Lesotho, Liberia, Liechtenstein, Madagascar, Malawi, Malta, Mauritius, Mexico, Nauru, Netherlands, New Zealand, Nigeria, Norway, Pakistan, Panama, Peru, Philippines, Poland, Portugal, Senegal, Somalia, Spain, Sudan, Suriname, Swaziland, Sweden, Switzerland, Togo, Uganda, and the United Kingdom.<sup>16</sup>

It should be noted that as of the year 2010, four of the five UNSC members (i.e., China, France, Russia, and the United States) and many other major states have not officially accepted the ICJ jurisdictions. Nevertheless, France, and the United States have sometimes chosen to apply the ICJ mechanism to settle the international boundary and territorial disputes of their own. However, China and Russia have never officially considered applying the ICJ mechanism in their international affairs.

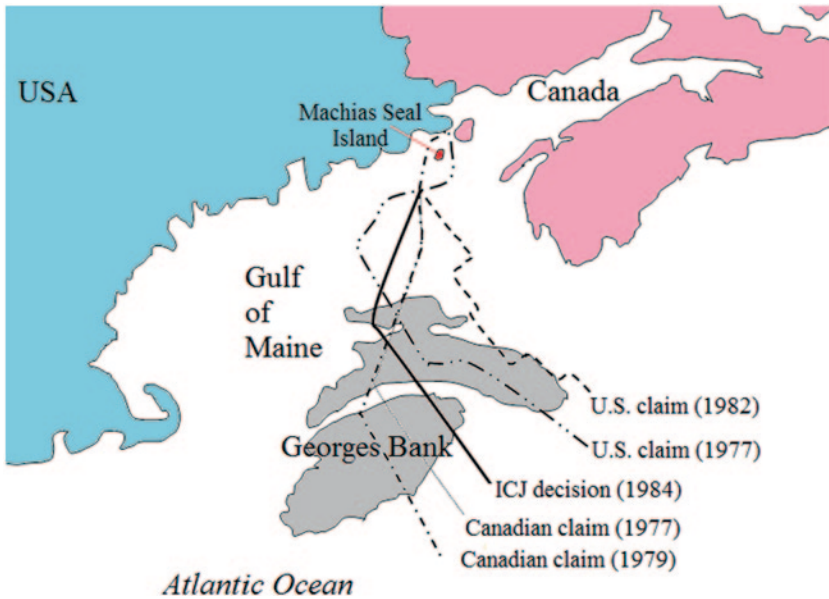
Finally, there is still a principal shortcoming for existing international judicial system. International courts or tribunals may have not been tasked with addressing the long-term, practical border management issues such as the use of natural trans-boundary resources, security and access problems, or environmental regulatory inconsistencies that often underlie a boundary or territorial dispute (IBRU 2011, p. 1). International arbitration of a boundary or territorial dispute is often the first step in what must be viewed by states as long-term peace-building in disputed border areas. Without a binding decision made by the arbitration or without any effective external involvement, questions submitted by disputant parties sometimes cannot be easily resolved.

### 9.4.2 Example

From the 1960s till the early 1980s there was a dispute between Canada and the United States over fishing and other resource rights in the Georges Bank at the Gulf of Maine. Under their respective 200-nautical mile limit laws the United States claimed most of Georges Bank and Canada claimed a certain portion of it (see Fig. 9.2). In addition, the two countries have also been disputed over the ownership of Machias Seal island. This island has an area of approximately 0.08. km<sup>2</sup>

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<sup>16</sup> Based on CIA (2010). The statuses of the ICJ jurisdictions for the remaining countries are either “unacceptable” or “not known”.



**Fig. 9.2** The US–Canada maritime boundary dispute in the Gulf of Maine. Copyright © 2010 by Rongxing Guo

and is located in the Gulf of Maine, around lat.  $44^{\circ}30'10''\text{N}$  and long.  $67^{\circ}06'10''\text{W}$ . It is approximately 16 km southeast from Cutler, Maine and approximately 19 km southwest of Southwest Head, New Brunswick on Grand Manan island. North Rock (lat.  $44^{\circ}32'15''\text{N}$  and long.  $67^{\circ}05'10''\text{W}$ ) is an exposed rock outcropping located approximately 4 km, north-northeast of Machias Seal island. It has also been claimed by both Canada and the United States as part of the Machias Seal island boundary dispute.

In order to resolve the maritime boundary dispute, Canada and the United States agreed to international arbitration in 1981. The delimitation of the maritime boundary dividing the EEZs and fisheries zones in the Georges Bank at the Gulf of Maine was constituted by the ICJ in an Order of January 20, 1982. The ICJ delivered its Judgment on October 12, 1984. The ICJ applied criteria of a primarily geographical nature, and used geometrical methods appropriate both for the delimitation of the sea-bed and for that of the superjacent waters. As for the plotting of the delimitation line, the ICJ divided the rich fishing grounds of Georges Bank almost equally between the United States and Canada. Thereafter, United States fishermen have to stay on their side of the boundary, and Canadian fishermen are not allowed to cross into the United States zone.



## 9.5 Shelving Disputes

### 9.5.1 *Characteristics*

Cross-border disputes may also emerge as a result of fundamental geopolitical changes as well as historical and cultural claims. In certain circumstances, boundary and territorial disputes may even evolve into a vicious circle of rivalry and competitions. Therefore, it seems unlikely that some, if not all, boundary and territorial disputes can be easily resolved. However, provocative actions, which are aimed at the seizing of part or all of the disputed territories or any benefits thereof, sometimes are very costly. When the costs of a provocative action exceed its benefits, the disputant parties may find that “shelving disputes strategy” is the most logical solution to cross-border conflicts.

The negotiating techniques discussed in the previous sections have concrete procedures in application and are designed to target a final resolution scheme. By contrast, the “shelving disputes strategy” has no mandatory design; instead, it simply allows all the disputant parties concerned to indefinitely postpone their final decision on how to settle their dispute or, more specifically, how to draw a boundary line dividing their respective territories. As a result, this strategy provides an opportunity and time for the disputant parties concerned to find a solution at a later stage. One of the most noticeable examples applying the “shelving disputes strategy” would be the temporary resolution of the territorial disputes between China and Japan in the late 1970s. It paved the way for the friendship relations between China and Japan during the following two decades or so. In 1978, when the Sino–Japanese Treaty of Peace and Friendship was signed, then Chinese Vice-Premier Deng Xiaoping (1904–1997) made a very famous remark:

It is true that the two sides maintain different views on this [Diaoyu/Senkaku] question... It does not matter if this question is shelved for some time, say, ten years. Our generation is not wise enough to find common language on this question. Our next generation will certainly be wiser. They will certainly find a solution acceptable to all.<sup>17</sup>

The rationale for “shelving disputes” is based on an understanding that some or all participants will have to pay more additional costs than what they can benefit from finding an immediate solution to a territorial dispute. Claiming a piece of territory controlled or claimed by other state(s) always carries some price. By challenging another state’s sovereignty, territorial claims foster uncertainty about the security of the most vital of national interests, territorial integrity, and mistrust about the intentions of the opposing state more broadly. Uncertainty and mistrust, in turn, “sustain poor and tense diplomatic relations that limit the willingness of states to engage in or deepen cooperation with each other, creating security, diplomatic, or economic opportunity costs for contesting land” (Fravel 2008, p. 16). Given an active dispute,

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<sup>17</sup> Cited from Lo (1989, pp. 171–172).

delaying (i.e., shelving the dispute and doing nothing to compromise or escalate) is in many circumstances the least costly strategy for policymakers to adopt.

The main purpose of the dispute-shelving strategy is to shift attention from sovereignty dispute to more essential concerns which countries involved could try to tackle together, and which do not necessarily depend on a resolution of the sovereignty dispute. Regular meetings or workshops can be held, with participation of the officials and expert groups from the countries involved in the dispute. The idea is to build confidence, initiate cooperative projects, lay the foundation for joint management of shared resources, and ensure cross-border environmental protection. Sovereignty issues have been banned from the agenda at all meetings.

Even though the term “shelving disputes” is defined here as a dispute-settlement strategy, it is only considered an approach to conflict *prevention* (instead of conflict *resolution*). Nevertheless, in most circumstance it can be applied by policymakers and practitioners to reduce or delay—not to remove—existing cross-border tensions in certain areas.

### 9.5.2 Example

The ICJ’s 1984 delimitation decision highlights a gap of several dozens of km between the end of the US–Canada land boundary and the 1984 maritime boundary at the Gulf of Maine.<sup>18</sup> This has left the sovereignty of Machias Seal island—which lies in the middle of this “grey zone” (a term coined by fishermen from both countries)—unresolved. It would not have been in question today if Canada and the United States had decided to include this issue in their 1981 application to the ICJ in The Hague. However, in order to avoid a zero-sum game for their own, both Canada and the United States decided to shelve the dispute over the sovereignty of the Machias Seal island by agreeing to have a common starting point for the offshore boundary southwest of the island at lat. 44°11’12”N and long. 67°16’46”W. Recognizing the importance of the Gulf of Maine to marine habitat, both Canada and the United States currently maintain complementary embargos against offshore oil and gas exploration activities on the Georges Bank in the southern part of the gulf. Dispute actually could have been settled in the ICJ’s 1984 delimitation decision that divided up the rich fishing grounds on Georges Bank. However, the Machias Seal island was deliberately left out of consideration because neither side was willing to have its interests invalidated. Both states are rarely willing to simply relinquish terra firma, even when no economic, political, or strategic benefit can be derived. Such acquiescence could obviously be viewed as weak and contrary to national interests by either international community or constituents at home. While Canada and the United States continue to disagree on the sovereignty of the Machias Seal island

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<sup>18</sup> See “Delimitation of the Maritime Boundary in the Gulf of Maine Area,” signed by Canada and United States on October 12, 1984.



**Fig. 9.3** The Spratly islands showing occupied features. Notes: All occupied features are placed with flags, including those which are not labeled in the map. Some flags are not in the exact coordinates where they should actually lie.  Malaysia;  Philippines;  People's Republic of China  Republic of China (Taiwan);  Vietnam. (Source: Revised by author based on the map drawn by the U.S. Central Intelligence Agency, Washington, DC in 1995)

and the waters surrounding it, the major troubles to both nations' EEZs and fisheries zones at the Gulf of Maine have been resolved since the ICJ's judgment of 1984.

The South China Sea encompasses a portion of the Pacific Ocean stretching roughly from Singapore and the Strait of Malacca in the southwest, to the Strait of Taiwan (between Taiwan and mainland China) in the northeast (see Fig. 9.3). The area includes hundreds of small islands, rocks, and reefs, the majority of which are located within the Paracel and Spratly island chains. Many of these islands are partially submerged islets, rocks, and reefs that are little more than shipping hazards not suitable for habitation. Most of these islands are not arable, do not support permanent crops, and have no meadows, pastures or forests. But the surrounding water areas are abundant in oil, natural gas, minerals, and seafood.

The islands in the South China Sea are important for strategic and political reasons, because ownership claims to them can be used to bolster claims to the surrounding waters and seabed resources. The South China Sea and the islets and reefs

**Table 9.1** Competing maritime and territorial claims over the South China Sea, by country. (Sources: EIA (2008a) and author’s estimates)

Country	South China Sea	Spratly Islets	Paracel Islets
Brunei	UNCLOS	1 (0)	No
China	all*	all (9)	all (all)
Indonesia	UNCLOS	No	No
Malaysia	UNCLOS	3 (3)	No
Philippines	significant portions	8 (8)	No
Taiwan	all*	all (1)	all (0)
Thailand	n/a	no	No
Vietnam	all*	all (29)	all (0)

Notes: (1) UNCLOS denotes “claims to areas of the ocean to be made using a 200 nm exclusive economic zone (EEZ) and/ or the continental shelf principle; (2) “\*” excludes buffer zone along littoral states (calculations for buffer unknown); and (3) figures within parentheses are the numbers of islands that are actually occupied.

Sources: EIA (2008a) and author’s estimates.

therein have been claimed—either partly or wholly—by Brunei, China, Indonesia, Malaysia, Philippines, Taiwan, and Vietnam (see Table 9.1). At present, the overlapping sovereignty claims have resulted from economic considerations since the South China Sea is thought to possess substantial natural resources—chiefly oil, natural gas, and seafood. Each coastal state has its own oil/gas operations in the South China Sea that is also claimed—wholly or partially—by the other state(s). The current status of maritime and territorial disputes over the South China Sea is as follows.

Brunei does not physically occupy any of the Spratly islands, but claims part of the South China Sea nearest to it as part of its continental shelf and exclusive economic zone (EEZ). The boundary lines are drawn perpendicularly from two outermost points on the Brunei coastline. In 1984, Brunei declared an EEZ that includes Louisa Reef. Brunei had asserted a 200-nautical-mile EEZ off its coastline in 2000. But its EEZ and continental shelf overlap with Malaysia’s in the South China Sea and the final agreement on this issue has not been reached.

China claims almost all of the islands in, and the major portion of, the South China Sea for historical reasons. Chinese claims to the South China Sea are based on a number of historical events, including the naval expeditions to the Spratly islands by the Han dynasty in as early as AD 110 and the Ming dynasty from AD 1403 to 1433. In 1974, China seized the Paracel (called Xisha in Chinese) islands from Vietnam. Since the 1980s, China has implemented a shelving-disputes strategy toward the other islands in the South China Sea. And, sometimes, it has not voiced a specific objection to other states’ occupation and development of its claimed islets and water areas in the South China Sea.

Although not a claimant to any of the Spratly islands, Indonesia believes that Chinese and Taiwanese claims in the South China Sea may extend into Indonesia’s EEZ and continental shelf, including Indonesia’s Natuna gas field. Since the mid-1990s, Indonesia’s drilling in the natural gas fields has proceeded, and China has not voiced a specific objection to their development.

Malaysia’s Spratly claims to the South China Sea are based upon the continental shelf principle, and have clearly defined coordinates. Malaysia has occupied three

islands of the Spratlys that it considers to be within its continental shelf. Many of Malaysia's natural gas fields located offshore Sarawak also fall under the Chinese claim. But with regard to the gas fields, China has not specifically objected to their development. In addition, Malaysia and Vietnam signed a Joint development agreement in their disputed area.

The Philippines' Spratly claims are based both upon the proximity principle as well as on the explorations of a Philippine explorer in 1956. In 1968, the Philippines took control of three islands. In 1971, the Philippines officially claimed 8 islands, arguing that the islands had not belonged to anyone and were open to being claimed. In 1972, they were designated as part of Palawan Province. In 1978, the Philippines extended an official claim to islands east of the Spratlys, naming them the Freedom islands. The Philippines' Malampaya and Camago natural gas and condensate fields are in Chinese-claimed waters.

Taiwan's claims are similar to those of China, and are based upon the same principles. During the Second World War, Japan displaced the French and occupied the Spratly islands, using the islands as a submarine base. After the war, in 1946, Republic of China (ROC) took possession of the Pratas (Dongsha) island—the largest island in the Pratas group at the northeast part of the South China Sea. At present, Taiwan still controls and has built an airport in this island. China (PRC) has not challenged Taiwan's appearance at the South China Sea since it treats the latter as part of its own territory.

Vietnamese claims cover an extensive area of the South China Sea. In addition, Vietnam claims all of the Paracel islands (called "Hoang Sa" in Vietnamese). Vietnamese claims are based on history and the continental shelf principle. Vietnam claims the entire Spratly islands (called Truong Sa in Vietnamese) as an offshore district of the province of Khanh Hoa.

At present, most of the islands and reefs in the South China Sea have been occupied by China, the Philippines, Vietnam, Taiwan, and Malaysia (see Fig. 9.3). China's rising energy demands, decreasing ability to meet demand growth with domestic energy sources, and continued reliance on oil have propelled China to look to alternative energy sources. However, despite these territorial disputes and the uncertainty over the South China Sea, the above coastal countries have involved energy companies in exploration and exploitation in their respective claims. Co-operation arrangements between national petroleum companies including Chinese state-owned oil companies have been negotiated which hold out the prospect of greater security, even in the absence of a settlement of the maritime boundaries.

## **9.6 Case 9. Boundary/Territorial Disputes Submitted to the International Court**

Cases submitted to the International Court of Justice (ICJ) will follow a standard pattern. The cases can be lodged with the ICJ by either of the states parties to the proceedings or by both of them. They can also be submitted by the applicant who

files a written memorial setting out the basis of the ICJ's jurisdiction and the merits of its claim. The respondent may accept the ICJ's jurisdiction and file its own memorial on the merits of the case. If a case is submitted by an applicant state against a respondent state, the names of the two parties are separated by the abbreviation "v." (for the Latin versus) at the end of the official title of the case; if there is neither an "applicant" state nor a "respondent" state, their names are separated by an oblique stroke in the title.

The cases on boundary and territorial disputes submitted to the ICJ from 1947 to 2010 are reported below:

- 1947: Corfu Channel (The United Kingdom v. Albania)—the judgment was made in 1949.
- 1949: Fisheries (United Kingdom v. Norway)—the judgment was made in 1951.
- 1950: Haya de la Torre (Colombia/Peru)—the judgment was made in 1951.
- 1951: (1) Ambatielos (Greece v. The United Kingdom)—the judgment was made in 1953; (2) Minquiers and Ecrehos (France/The United Kingdom)—the judgment was made in 1953; and (3) Nottebohm (Liechtenstein v. Guatemala)—the judgment was made in 1955.
- 1955: (1) Antarctica (United Kingdom v. Argentina)—the judgment was made in 1956; and (2) Antarctica (United Kingdom v. Chile)—the judgment was made in 1956.
- 1957: Sovereignty over Certain Frontier Land (Belgium/The Netherlands)—the judgment was made in 1959.
- 1959: Temple of Preah Vihear (Cambodia v. Thailand)—the judgment was made in 1962.
- 1960: (1) South West Africa (Ethiopia v. South Africa)—the judgment was made in 1966; and (2) South West Africa (Liberia v. South Africa)—the judgment was made in 1966.
- 1967: North Sea Continental Shelf (Federal Republic of Germany/Netherlands)—the judgment was made in 1969.
- 1967: (1) North Sea Continental Shelf (Federal Republic of Germany/Denmark)—the judgment was made in 1969; and (2) Fisheries Jurisdiction (Federal Republic of Germany v. Iceland)—the judgment was made in 1974.
- 1972: Fisheries Jurisdiction (United Kingdom v. Iceland)—the judgment was made in 1974.
- 1976: Aegean Sea Continental Shelf (Greece v. Turkey)—the judgment was made in 1978.
- 1978: Continental Shelf (Tunisia/Libyan Arab Jamahiriya)—the judgment was made in 1982.
- 1981: Delimitation of the Maritime Boundary in the Gulf of Maine Area (Canada/United States of America)—the judgment was made in 1984.
- 1982: Continental Shelf (Libyan Arab Jamahiriya/Malta)—the judgment was made in 1985.
- 1983: Frontier Dispute (Burkina Faso/Republic of Mali)—the judgment was made in 1986.

- 1984: Application for Revision and Interpretation of the Judgment of 24 February 1982 in the Case concerning the Continental Shelf (Tunisia/Libyan Arab Jamahiriya) (Tunisia v. Libyan Arab Jamahiriya)—the judgment was made in 1985.
- 1986: (1) Border and Transborder Armed Actions (Nicaragua v. Costa Rica)—the case was removed from the ICJ's list in 1987; (2) Border and Transborder Armed Actions (Nicaragua v. Honduras)—the judgment was made in 1987; and (3) Land, Island and Maritime Frontier Dispute (El Salvador/Honduras: Nicaragua intervening)—the judgment was made in 1992.
- 1988: Maritime Delimitation in the Area between Greenland and Jan Mayen (Denmark v. Norway)—the judgment was made in 1993.
- 1989: (1) Arbitral Award of 31 July 1989 (Guinea-Bissau v. Senegal)—the judgment was made in 1991; and (2) Certain Phosphate Lands in Nauru (Nauru v. Australia)—the judgment was made in 1993.
- 1990: Territorial Dispute (Libyan Arab Jamahiriya/Chad)—the judgment was made in 1994.
- 1991: (1) Passage through the Great Belt (Finland v. Denmark)—the judgment was made in 1992; (2) Maritime Delimitation between Guinea-Bissau and Senegal (Guinea-Bissau v. Senegal)—the judgment was made in 1995; and (3) Maritime Delimitation and Territorial Questions between Qatar and Bahrain (Qatar v. Bahrain)—the judgment was made in 2001.
- 1993: Gabčíkovo-Nagymaros Project (Hungary v. Slovakia)—the judgment was not yet made.
- 1994: Land and Maritime Boundary between Cameroon and Nigeria (Cameroon v. Nigeria: Equatorial Guinea intervening)—the judgment was made in 2002.
- 1996: Kasikili/Sedudu island (Botswana/Namibia)—the judgment was made in 1999.
- 1998: (1) Request for Interpretation of the Judgment of 11 June 1998 in the Case concerning the Land and Maritime Boundary between Cameroon and Nigeria (Cameroon v. Nigeria), Preliminary Objections (Nigeria v. Cameroon)—the judgment was made in 1999; (2) Sovereignty over Pulau Ligitan and Pulau Sipadan (Indonesia/Malaysia)—the judgment was made in 2002.
- 1999: Territorial and Maritime Dispute between Nicaragua and Honduras in the Caribbean Sea (Nicaragua v. Honduras)—the judgment was made in 2007.
- 2001: Territorial and Maritime Dispute (Nicaragua v. Colombia)—the judgment was made in 2007.
- 2002: (1) Frontier Dispute (Benin/Niger)—the judgment was made in 2005; (2) Application for Revision of the Judgment of 11 September 1992 in the Case concerning the Land, Island and Maritime Frontier Dispute (El Salvador/Honduras: Nicaragua intervening) (El Salvador v. Honduras)—the judgment was made in 2007.
- 2003: Sovereignty over Pedra Branca/Pulau Batu Puteh, Middle Rocks and South Ledge (Malaysia/Singapore)—the judgment was made in 2008.
- 2004: Maritime Delimitation in the Black Sea (Romania v. Ukraine)—the judgment was made in 2009.

- 2006: (1) Dispute regarding Navigational and Related Rights (Costa Rica v. Nicaragua)—the judgment was made in 2009; (2) Pulp Mills on the River Uruguay (Argentina v. Uruguay)—the judgment was made in 2010.
- 2008: Maritime Dispute (Peru v. Chile).
- 2010: (1) Certain Activities carried out by Nicaragua in the Border Area (Costa Rica v. Nicaragua); (2) Frontier Dispute (Burkina Faso/Niger).<sup>19</sup>

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<sup>19</sup> Sorted by author based on ICJ (2010).



# Chapter 10

## Creating Special Functional Zones

In order for antagonistic and neighboring states to minimize or reduce the risk of cross-border conflicts and wars, this chapter provides some useful options for the effective settlement of cross-border disputes and resource management. There are various problems and obstacles to hindering the effective implementation of cross-border tasks. While some of these problems can be handled with methodological tools that are pretty standard, others are quite difficult to address. Furthermore, specific context matters to the evolution of boundary and territorial disputes.

The major obstacle to cross-border management is the institutional separations of the objects in focus. Thus, the creation of various special functional zones can help to improve the efficiency of conflict prevention and of cross-border resource management. In this chapter five functional zones – each of which has the special purposes of its own – will be discussed. They are (i) buffer zone, (ii) neutral zone, (iii) demilitarized zone, and (iv) international peace park.

### 10.1 Buffer Zone

#### 10.1.1 Function

A buffer zone is generally a zonal area that lies between two or more other areas (often, but not necessarily, countries), but depending on the type of buffer zone, the reason for it may be to segregate regions or to conjoin them. Common types of buffer zones are demilitarized zones (i.e., DMZ, see Sect. 10.3 for more details) and certain restrictive and green belts.

Different from the schemes that are either to seek a cessation of hostilities and to facilitate cross-border cooperation as a means to end a conflict, buffer zones is often used to reduce tensions when a boundary or territorial dispute is largely intractable. The term “buffer zone” refers to “a neutral area between hostile or belligerent forces

that serves to prevent conflict” (AHD 2009). In some intractable conflicts, buffer zones have been the conceptual basis for managing interactions among disputants. This concept that the relative proximity of disputants affects levels of anxiety and the potential for violence guides the development of buffer zones intended to de-escalate or avoid military conflict. That is, the time it takes to mount a military offensive is a function of the distance between the attacker and the victim.

Where a militarized conflict is inevitable, the parties involved in the conflict may still be able to prevent military activities from taking place in certain areas or zones. These demilitarized or buffer zones are often monitored by third parties. By widening the involvement of actors and providing extra – and hopefully unbiased – assurances that the opponents are upholding their share of obligations, “such monitoring may help legitimize, institutionalize, and reinforce the agreed-upon arrangements and facilitate cooperation toward resolving the larger dispute” (Smith 2003).<sup>1</sup>

Violations of the buffer-zone agreements, or endangering the peacekeepers by resuming hostilities, would likely result in international condemnation and pressure. These measures dissuade would-be aggressors, while holding the door open for potential negotiations toward resolving the larger conflict. Relocating troops to minimize the chance of conflict has two implications: (1) gradual reductions of forces in forward positions and (2) an incremental dismantlement of forward pickets and observation posts (Ahmed and Sahni 1998). In general, there are various reasons for establishing buffer zones:

- To provide sanctuary,
- To allow for supervision where contending claims exist,
- To simply reduce tensions through separation of disputants, and, if possible
- To facilitate cross-border cooperation.

During times of war, sanctuaries are often developed to provide refuge to non-combatants or to protect areas that may have environmental or social significance, where disputants agree that hostilities should not spread. The United Nations was originally organized to save succeeding generations from the scourge of war. To this end the United Nations established mechanisms for peacekeeping in the UN Charter. These traits determine the size, composition, and limits of the mission. For example, because the military personnel are lightly armed and require the consent of the parties involved, they are not capable of performing any peacemaking duties. At the same time, because peacekeeping forces are composed of military personnel, they are ill equipped to perform any state-building functions except in a support role. Given these constraints, peacekeeping operations usually perform the following missions (Ouellet 2003):

- preventive deployment to zones of conflict
- verification of cease-fire agreements, safe areas, and troop withdrawal

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<sup>1</sup> For instance, as will be discussed later, in the absence of a formal ceasefire, the United Nations is responsible for maintaining and overseeing a buffer zone between Greek and Turkish Cypriots, where military activities are monitored and reported and UN peacekeepers provide a tripwire that discourages aggression.

- disarmament and demobilization of combatants
- mine clearance, training, and awareness programs
- providing secure conditions for humanitarian aid and peace-building functions

Buffer zones also have other purposes, in addition to the political one. They can be set up to protect the environment, protect residential and commercial zones from industrial accidents or natural disasters, keep prisoners intent on escaping from rapidly acquiring hostages or a hiding place, and have uses in several other scenarios. Buffer zones often result in large uninhabited regions which are themselves noteworthy in many increasingly developed or crowded parts of the world.

An Air Defense Identification Zone (ADIZ) is airspace over land or water in which the identification, location, and control of civil aircraft is required in the interest of national security (Abeyratne 2012). An ADIZ extends beyond a country's airspace to give the country more time to respond to foreign and possibly hostile aircrafts. In addition, it can help reduce the risk of midair collisions, combat illicit drug flows, facilitate search-and-rescue missions, and reduce the need for fighter jet sorties for purposes of visual inspection. At present, dozens of countries have created their ADIZs (see Box 10.1).

#### **Box 10.1 Air Defense Identification Zones**

The first ADIZ was established by the United States after World War II. In the 1950s, the United States declared the world's first ADIZs to reduce the risk of a surprise attack from the Soviet Union. Today, the United States has five zones (East Coast, West Coast, Alaska, Hawaii, and Guam) and operates two more jointly with Canada. Other countries that maintain ADIZs include China, India, Japan, Norway, Pakistan, South Korea, and the United Kingdom. The ADIZs can increase transparency, predictability, and strategic stability by reducing uncertainty on both sides about when, where, and how aerial interceptions might take place. In 1960, for example, the Soviet Union had no clearly established air defense identification zones and procedures, and the resulting confusion led to a US reconnaissance aircraft being shot down over international waters (Welch 2013).

The ADIZs should not be confused with Flight Information Regions (FIRs), which are used to manage air traffic (Abeyratne 2012). Usually such zones only cover undisputed territory, do not apply to foreign aircraft not intending to enter territorial airspace, and do not overlap.

Japan has an ADIZ that was set up after World War II by the US military. On June 25, 2010 Japan extended its ADIZ. This led to an overlapping with Taiwan's ADIZ. Regarding the coast of mainland China, Japan's ADIZ has a distance of 130 km at its closest point, which also includes the Diaoyu/Senkaku islands which are claimed by China, Japan and Taiwan. South Korea operates a zone that covers most of its claimed airspace. It does not cover some remote spots. Its ADIZ was established in 1951, during the Korean War (1950–1953), by the United States Air Force. On November 23, 2013, China

established an ADIZ in the East China Sea, which covers the disputed islands with Japan and Korea in the East China Sea. On December 8, 2013, Defense Ministry of Republic of Korea announced the expansion of the Korean ADIZ, in response to the establishment of a Chinese zone that covers the disputed territory.

The buffer zone of a protected area may be situated around the periphery of the region or may be a connecting zone within it which links two or more protected areas, therefore increasing their dynamics and conservation productivity. A buffer zone can also be one of the protected area categories (e.g. category V or VI of IUCN Protected Area – shown in Sect. 16.5 of Chap. 16). A buffer zone is intended to avert the effect of negative environmental or human influences, whether or not it embodies great natural or cultural value itself. The importance and function of a buffer zone and the necessary protective measures derived thereof is a relatively new concept in conservation science and can differ greatly for each site.

There are various approaches in buffer zone management depending on the type and objectives of the conservation area for which it is created. The degree of legal protection to buffer zone varies. At present, only in a few countries do the protected area management authorities have the legal authority, jurisdiction and mandate to establish and manage buffer zones. In most cases where the buffer zones are outside the protected area, they fall under the institutional control and jurisdiction of authorities other than those responsible for management of the protected area.

### **10.1.2 Example**

The most interesting examples for the creation of buffer zones date from the Middle East hostilities of 1948 when three sanctuaries were established in Jerusalem as a result of an initiative by the International Committee of the Red Cross (ICRC) – they were modeled to some extent on the safety zones established in Madrid in 1936 and Shanghai in 1937. The United Nations and the ICRC fostered an agreement for, under the UN's or the ICRC's flag, establishing demilitarized zones within the city. This provided a buffer zone between combatants and non-combatants that helped protect certain areas and sectors of society. In the absence of agreement on wider demilitarization, the ICRC also proposed a more modest agreement for several separate zones under the ICRC's protection (Bailey 1980, pp. 502–503).

Cyprus is an island situated in the eastern Mediterranean Sea about 130 km west of Syria, 80 km south of Turkey and some 885 km southeast of the Greek mainland. Cyprus has been subject to colonization throughout its recorded history. It came under British administration in 1878. Britain annexed it in 1914, and it became a British Crown Colony in 1925. After the Second World War Greek Cypriots (the majority of the population) wanted unification with Greece. The Turkish-Cypriot minority protested and demanded that the island be divided. Later on, a compromised power-



**Fig. 10.1** The UN buffer zone in Cyprus. Notes: *ESBA* Eastern Sovereign Base Area of UK, and *WSBA* Western Sovereign Base Area of UK. (Copyright © 2010 by Rongxing Guo)

sharing government with majority Greek representation was approved, and Cyprus became an independent republic in 1960. According to the Zurich – London Treaty, signed in 1960, Britain retained control of its military and naval bases. However, the 1960 Constitution of the Cyprus Republic proves unworkable in many of its provisions, and this made its smooth implementation become impossible.<sup>2</sup>

The island of Cyprus is now divided into two de facto autonomous areas – a Greek Cypriot area controlled by the internationally recognized Cypriot government and a Turkish-Cypriot area. Between the two areas is the UN buffer zone (see Fig. 10.1). In addition, under the 1960 Treaty, the United Kingdom retains in the island two sovereign base areas – the Western Sovereign Base Area (WSBA) which is named Akrotiri and the Eastern Sovereign Base Area (ESBA) which is called Dhekelia. Officially, the Republic of Cyprus consists of the entire island, except the above two base areas. However, the Republic of Cyprus only controls the southern part of the island. Following an invasion by Turkish forces in 1974, the northern third of Cyprus came under Turkish control. The northern part of the Cyprus island then became the Turkish Republic of Northern Cyprus (TRNC) in 1983 – but Turkey alone recognizes this republic. The southern portion remains under the control of the internationally recognized Greek Cypriot government.

The Greek and Turkish Cyprus are separated by the 1974 ceasefire line, which is also called the “Attila Line” (named after the Turkish code-name for the military intervention in 1974: “Operation Atilla”) or “Green Line”. To keep the antagonistic

<sup>2</sup> Unless cited otherwise, the data and information on Cyprus, here and in what follows, draw on Guo (2007, pp. 90–92).

Turkish and Greek Cypriots apart, the United Nations has set up a buffer zone along the boundary. The UN buffer zone is divided into three sections. In the west the buffer zone lies around the Turkish Republic of Northern Cyprus (TRNC) controlled village of Kokkina. The main part goes from the north coast to through Nicosia until it reaches the western tripoint with the Dhekelia. The last section runs to the east coast. Parts of the buffer zone remain inaccessible. The UN Buffer Zone in Cyprus runs for more than 180 km along what is known as the 1974 Green Line between the self-proclaimed TRNC and the internationally recognized Republic of Cyprus. It has an area of 346 km<sup>2</sup>. The width of the zone ranges from 3.3 m in central Nicosia, to 7.4 km at the village of Athienou. The barrier itself consists of concrete walls, barbed wire fencing, watch-towers, anti-tank ditches, and minefields. There are several villages and farms located within the buffer zone. The village of Pyla is famous for being the only village on Cyprus where Greeks and Turks live side by side.

In April 2003, after the nearly 30 years of ban on crossings, the Turkish Cypriot de facto government significantly eased travel restrictions across the barrier, by opening four crossing points (two into the UK sovereign base of Dhekelia). UN peacekeepers have patrolled the buffer zone along the Attila Line since it was established; Turkey maintains troops in the north. Though tensions remain, there are shared aims: both sides want peace. Greek Cyprus has asked for the island to be demilitarized. Turkish Cypriots have proposed a loose federation of two essentially autonomous states. Tensions nearby the barrier rose several times in the past, with the latest being in 1996, when in a demonstration at Dherynia region, a Greek Cypriot was beaten to death by Turkish Cypriots while trying to cross the Green line, and the next day another was shot and killed trying to climb up on a Turkish flag-pole. Till present, large-scale, inter-ethnic fights have been successfully prevented by the buffer zone.

## 10.2 Neutral Zone

### 10.2.1 *Function*

The word ‘neutral’ is defined as “one who does not side with any party in a war or dispute.”<sup>3</sup> Neutralism or a “neutralist policy” is a position wherein a state intends to remain neutral in future foreign policies. A neutral power in a particular war is a sovereign state which declares itself to be neutral toward the belligerents. A non-belligerent state does not need to be neutral. Black et al. (1968, p. xi) define “neutralized state” as follows: “A neutralized state is one whose political independence and territorial integrity are guaranteed permanently by a collective agreement of great powers, subject to the conditions that the neutralized state will not take up arms against another state, except to defend itself, and will assume treaty obligations which may compromise its neutralized status... Neutralization is a special

<sup>3</sup> Source: <http://www.webdictionary.co.uk/definition.php?query=neutral>. Accessed on 23 April 2010.

international status designed to restrict the intrusion of specified state actions in a specified area.”

The concept of neutrality in war is narrowly defined and puts specific constraints on the neutral party in return for the internationally recognized right to remain neutral. In the “Convention Respecting the Rights and Duties of Neutral Powers and Persons in Case of War on Land” (signed on October 18, 1907 in The Hague), the rights and duties of a neutral power are defined:<sup>4</sup>

- Belligerents are forbidden to move troops or convoys of either munitions of war or supplies across the territory of a neutral Power. (Art. 2)
- Belligerents are likewise forbidden to: (a) Erect on the territory of a neutral Power a wireless telegraphy station or other apparatus for the purpose of communicating with belligerent forces on land or sea; (b) Use any installation of this kind established by them before the war on the territory of a neutral Power for purely military purposes, and which has not been opened for the service of public messages. (Art. 3)
- Corps of combatants cannot be formed nor recruiting agencies opened on the territory of a neutral Power to assist the belligerents. (Art. 4)
- The responsibility of a neutral Power is not engaged by the fact of persons crossing the frontier separately to offer their services to one of the belligerents. (Art. 6)
- A neutral Power is not called upon to prevent the export or transport, on behalf of one or other of the belligerents, of arms, munitions of war, or, in general, of anything which can be of use to an army or a fleet. (Art. 7)

A permanently neutral power usually refers to a sovereign state which is bound by international treaty to be neutral toward the belligerents of all future wars. Till present, 11 states have been recognized as neutral, though there are still states that have been claimed (but not recognized) and formerly recognized as neutral. Specifically, these neutral states are<sup>5</sup>

- Austria: It has been a neutral country since 1955, maintaining external independence and inviolability of borders (expressly modeled after the Swiss neutrality).
- Costa Rica: It has been a neutral country since 1949, after abolishing its military.
- Finland: It has a military doctrine of competent, “credible” independent defence, not depending on any outside support, and the desire to remain outside international conflicts.
- Ireland: It has been a traditional policy of military neutrality defined as non-membership of mutual defence alliances.
- Japan: It is constitutionally forbidden from participating in wars, but maintains heavily-armed “self-defense forces” and a military alliance.
- Liechtenstein: It has been a neutral country since its army was dissolved in 1868.
- Malta: It has implemented a policy of neutrality since 1980, guaranteed in a treaty with Italy concluded in 1983.

<sup>4</sup> The full text of the Convention can be found at [http://avalon.law.yale.edu/20th\\_century/hague05.asp](http://avalon.law.yale.edu/20th_century/hague05.asp). Accessed on 7 May 2010.

<sup>5</sup> Source: [http://en.wikipedia.org/wiki/Neutral\\_state#cite\\_note-0](http://en.wikipedia.org/wiki/Neutral_state#cite_note-0). Accessed on 7 May 2010.

- Sweden: It has not fought a war since ending its involvement in the Napoleonic Wars in 1814 with a short war with Norway, making it the oldest neutral country in the world.
- Switzerland: It is the second oldest neutral country in the world – it has not fought a foreign war since its neutrality was established by the Congress of Vienna in 1815.
- Turkmenistan: It declared its permanent neutrality and was formally recognized by the United Nations in 1995.
- Vatican City: The Lateran Treaty signed in 1929 with Italy imposed that “The Pope was pledged to perpetual neutrality in international relations and to abstention from mediation in a controversy unless specifically requested by all parties” thus making Vatican City neutral since then.

The establishment of neutral zones can help facilitate more cooperative behavior, and encourage less-provocative postures by providing a ‘buffer’ in the event that conciliatory gestures are exploited. Within a neutral zone, the larger the physical area between disputants, the greater the warning time each actor has before an impending military confrontation. As a result, increasing the area separating disputants can, *ceteris paribus*, reduce the probability of conflicts between the disputants.

### 10.2.2 Example I

Among all of these neutral states, Switzerland is noteworthy. A small country situated in the heart of Western Europe and with geographical proximity to Germany, France, Italy, and Austria, Switzerland has a multicultural identity of its own. For example, four languages – German (64%), French (20%), Italian (7%), and Romansch (0.5%) – are spoken in different regions, with the first three being adopted as official languages. The ethnic groups include German (65%), French (18%), Italian (10%), Romansch (1%) and others (6%). Major religions are Roman Catholic (42%), Protestant (35%), Muslim 4% and Orthodox (2%) (Guo 2009, p. 145). As a neutral state, Switzerland combines almost all aspects of the heterogeneous European societies and plays an important role as the headquarters of numerous international forums. In the twentieth century, strict neutrality policy enabled Switzerland to dodge two world wars. Thanks to its flexible policies toward ethnicity, language, and religion, Switzerland serves to promote the cause of moderation between different parts of the West Europe. Geneva was the seat of the League of Nations (later the European headquarters of the United Nations) and of a number of international organizations. In 2000, the Swiss voted against a plan to cut the number of foreigners in the country to 18% of the population.<sup>6</sup> Since 1970, four similar anti-immigration plans have failed. In 2002, the Swiss became the 190th member of the UN. But the country’s cherished neutrality long-held neutrality has never been abandoned.

<sup>6</sup> Foreigners have made up about 20% of the Swiss population in the early 2000s (Guo 2009, p. 146).



### 10.2.3 *Example II*

The boundaries between Iraq, Saudi Arabia and Kuwait, like many other boundaries in the Near East, reflect the historic difficulty of boundary drawing in the desert. There had been a number of disputes among the tribes of Iraq, Kuwait and Saudi Arabia. In addition to the geographical problems, there were substantial impediments to delimitation of a boundary on the ground, based on the way of life of the Nomad and Islamic tradition. In 1922, a British High Commissioner, exasperated at the disputes between Ibn Saud and the Amir of Kuwait, took a red pencil and drew the boundaries between them (Yergin, 2008, p. 268). He also roughly decided the locations of two ‘neutral zones’ along the borders between Saudi Arabia, Kuwait, and Iraq – both were called ‘neutral’ because the Bedouin would be able to pass back and forth to graze their flocks.

The Treaty of Muhammarah (Khorramshahr), signed on May 5, 1922, and the subsequent Protocol of Uqayr, signed on December 2, 1922, provided bases for the delimitation of the Iraq – Saudi Arabia boundary. According to the Treaty of Muhammarah (Article 1), “the tribes known as the Muntafiq, Dhafir and Amarat will belong to Iraq. Both Governments, that is to say the Government of Iraq and the Government of Najd, guarantee mutually that they will prevent aggression by their tribes on the tribes of the other, and will punish their tribes for any such aggression, and should the circumstances not permit of such punishment, the two Governments will discuss the question of taking combined action according to the good relations prevailing between them.”<sup>7</sup>

The present land boundary between Iraq and Saudi Arabia, which is the first international boundary that has ever been defined in this area, was eventually (thoroughly never clearly) fixed in 1975, with a length of 830 km. In earliest historic times, the boundary area was located across what is said to have been a traditional route where early nomadic man migrated across the desert in search of the more fertile lands of the Tigris – Euphrates. There empires rose and fell while in the Arabian Peninsula the barren desert sustained a relatively unchanged nomadic pattern of life until the recent discovery of oil. The additional “Neutral Zone,” which begins at the Kuwait boundary at the junction of the Wadi al Awja with the Wadi al Batin at lat. 29°06'05"N and long. 46°33'19"E is about 192 km long in the northern segment and about 201 km in length between the “Neutral Zone” and Saudi Arabia in the south (Office of the Geographer 1970). This desert boundary is essentially artificial and, historically, the first defined delimitation in the land between Mesopotamia and the Arabian Peninsula.

The Saudi – Iraqi neutral zone was located on the border between Saudi Arabia and Iraq. No military or permanent buildings were to be built in or near the neutral zone and the nomads of both countries were to have unimpeded access to its pastures and wells. Administrative division of the zone was achieved in 1975, and a border treaty concluded in 1981. As the Gulf War approached in early 1991, Iraq canceled all international agreements with Saudi Arabia since 1968. Saudi Arabia

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<sup>7</sup> Cited from Office of the Geographer (1971).

responded by registering all previous boundary agreements negotiated with Iraq at the United Nations in June 1991 (Schofield 1992). This ended the legal existence of the Saudi – Iraqi neutral zone. Kuwait’s desert plain slopes gradually from the west to the shores of the Persian Gulf. A number of discontinuities occur on the form of low depressions, sand dunes and escarpments. The Kuwait mainland, having no mountains or rivers or other natural features, was for a long time a transit area for nomadic tribes and caravans. Such freedom of movement made delineation of borders rather difficult and resulted in some border problems. The Treaty of Muhammarah also established the Kuwait – Saudi Arabia Neutral Zone, an area of about 5180 km<sup>2</sup> adjoining Kuwait’s southern border.<sup>8</sup> The northern part of this zone is administered by Kuwait, whilst the southern part is under the administration of Saudi Arabia. Both countries share the crude oil extracted from the partitioned zone equally.

Over the course of the past decades, there were serious international tensions in the Middle East. However, whatever potential for disputes exists between Iraq, Kuwait, and Saudi Arabia, this does not relate to the boundaries within the neutral zones. The neutral zones sometimes were still at the center of attention, especially when Iran began exploring in the area’s waters that are disputed with Kuwait and Saudi Arabia. However, within their neutral zone, there are no active disputes regarding the specific alignment of the boundary itself. Grazing and watering practice traditionally conducted by tribes crossing the boundary remain undisturbed.

## 10.3 Demilitarized Zone

### 10.3.1 *Function*

In most cases, a demilitarized zone (DMZ) is slightly different from the buffer zone although both of which have same or similar functions. A DMZ is an area, separated by a border between two or more groups, where military forces or operations or installations are prohibited, usually by treaty or other agreement. Often a DMZ lies upon a line of control – which demarcates the boundary between two militaries or political entities – and forms a de-facto international border. If two military forces are face to face, the time needed for one to attack the other is negligible. Both sides must, therefore, remain in a constant state of alert, which discourages cooperative behavior that may be misinterpreted as a sign of weakness and exploited by the other side. Moreover, it is reasonably to believe that the greater the distance between opposing armed forces, the less likely that they will come into physical contacts and that miscommunication will lead to violence.

The DMZ option is the last comprehensive solution for cross-border disputes. It would require, as essential preconditions, the prevention of any potential reoc-

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<sup>8</sup> Based on “History of Kuwait” – available at <http://www.historyofnations.net/asia/kuwait.html>. Accessed on 23 April 2010.

currence of armed conflict. In general, there have been four main reasons for the establishment of the DMZs: (i) to secure sanctuary for protected persons and other noncombatants in time of armed conflict; (ii) to provide a neutral base for the negotiation and/or supervision of a cessation of hostilities; (iii) to provide an interim solution where there are contending claims as to sovereignty; and (iv) to reduce tension along demarcation lines by a separation of forces (Bailey 1980, p. 502).

The creation of DMZs should be accompanied by the complete withdrawal of all military presence. Such a withdrawal would be accompanied by the removal of all military hardware from the disputed area, and a prohibition on aerial patrolling and reconnaissance by either side. The agreement should also include a commitment that both sides would refrain from reoccupying vacated positions. Another confidence building measure could be the use of hotlines between force commanders as well as senior personnel at military headquarters. A military disengagement agreement should incorporate many of the clauses of an agreement specifically aimed at de-escalating hostilities, including confidence-building measures such as prior notification of over-flights and flag meetings between all sides concerned. Such an accord would, however, move from conflict management to conflict prevention since it would demonstrate the willingness for both parties to waive an instant, comprehensive solution to the boundary and territorial disputes. It could also serve as a continuum from cease-fire to demilitarization should the political will exist.

When the truce is finally concluded on board, the demilitarization agreements should be proposed. In general, there are four provisions for the design of a DMZ:

- The size of the DMZ may change as a result of the political atmosphere: specifically it may be reduced (when there is a related situation) or expanded (when there is a tightened situation);
- The “average width” of the DMZ should be approximately the same on each side of the status quo line or the military demarcation line (MDL);
- All residents (except those who get permissions from either/both sides) should be removed from the DMZ; and
- The military personnel may be temporarily deployed within the DMZ for police purposes, but they are never allowed to infiltrate beyond the MDL.

### ***10.3.2 Example I***

The establishment of the DMZs is normally accomplished on the basis of agreements between the parties concerned. The DMZ may also come about following a recommendation of the UN Security Council (UNSC), as happened in Yemen in 1963, and in the Golan Heights and Sinai in 1974 and 1975. In the case of Jammu and Kashmir, the UNSC helped bring about demilitarization, although a complete DMZ was never achieved. DMZs, of course, can exist *de facto* and without the express agreement of their interested parties, as in Sinai where Egypt kept substantially demilitarized from 1957–1967 (Bailey 1980, pp. 501–502). Since the end of

the Second World War, numerous DMZ mechanisms have been established. They include:<sup>9</sup>

- The Netherlands and Indonesia negotiated DMZs for Indonesia in 1948;
- The International Committee of the Red Cross (ICRC) proposed for three civilian sanctuaries in Jerusalem in 1948;
- Israel and Jordan negotiated for a no-man's land in Jerusalem and for the demilitarization of Mount Scopus in 1948;
- Egypt and Israel agreed to the demilitarization of El-Auja in 1949 and parts of Sinai from 1974 to 1979;
- India and Pakistan negotiated for demilitarization along the cease-fire line in Kashmir in 1949;
- Israel and Syria negotiated the demilitarization of the Hula area in 1949 and a buffer strip on the Golan Heights in 1974;
- The US-led Unite Command negotiated with North Korea and China for neutral conference zone in the village of Panmunjom in 1951, and a DMZ on both sides of the Military Demarcation Line (MDL) in 1953; and
- Egypt and Saudi Arabia and Yemen agreed to a deep DMZ in Yemen in 1963.

See a case study at the end of this chapter for more details about the Korean DMZ.

### 10.3.3 Example II

In computer security, a DMZ (demilitarized zone) is a conceptual network design where publicly accessible servers are placed on a separate, isolated network segment.<sup>10</sup> The purpose of a DMZ is to ensure that publicly accessible servers cannot contact other internal network segments. A Firewall is particularly relevant in DMZ implementation, since it is responsible for ensuring that proper policies are in place to protect local networks from the DMZ, while maintaining accessibility to the DMZ.

Any Internet service that is being provided to users on the external network can be placed in the DMZ. The most common of these services are: (i) Web servers; (ii) Mail servers; (iii) FTP (File Transfer Protocol) servers; and iv) VoIP (Voice over Internet Protocol) servers. For security, some enterprises install a proxy server within the DMZ. This has the following benefits:

- Obliges internal users to use the proxy server for Internet access.
- Reduced Internet access bandwidth requirements since some web content may be cached by the proxy server.
- Simplifies recording and monitoring of user activities.
- Centralized web content filtering.

<sup>9</sup> Based on Bailey (1980).

<sup>10</sup> Cited from <http://www.tp-link.us/article/?faqid=28>. Accessed on 8 March 2014.

## 10.4 International Peace Park

### 10.4.1 *Function*

As a special type of cross-border areas, disputed areas tend to be remote and, due to the lack of cross-border coordination, to be particularly vulnerable to environmental damages. Sometimes they are also the location of armed conflicts, including both conflicts between neighboring countries and civil conflicts, since groups opposing the government often establish bases and hold territory in remote border areas (Shanbaugh et al. 2003, p. 71). By way of contrast, there are also incentives for hostile nations to cooperate on transnational resources, because of the latter's nature as of commonality, even if disputes rage over other issues.<sup>11</sup>

The creation of international peace park in disputed areas is a pragmatic way to cement harmonious relations between neighboring, antagonistic nations, while providing a model for peace for nations around the world. The past decades brought times of war and peace, prosperity and poverty around the world. But through the international peace park all the idea of international peace proved a powerful symbol for mankind's capacity for friendship. The reasons for the creation of the peace parks are twofold. First, people have named the parks 'peace parks' because they believe the parks can help countries learn to work together. Second, they will help enhance cross-border resource management.

The application of peace-park mechanism ensures the demilitarization of uncertain areas besides suggesting a unique way of promoting ecological protection of the fragile natural environment. Although small in number, these conservation successes serve notice that cross-border conservation can assist in creating opportunities not only for peace but also for conservation benefit in areas of high military activity.<sup>12</sup> Specifically, the objectives (tasks) of the international peace parks are threefold (Shine 1997):

- to confirm, strengthen cross-border cooperation or re-establish good relations with a neighboring state(s);
- to prevent escalation of border disputes such as demilitarized zones; and
- to safeguard important areas of biodiversity, which are or were in military zones.

In 1932, the United States and Canada established the world's first international peace park on their joint land boundary – namely, Waterton-Glacier International Peace Park. The Waterton-Glacier International Peace Park celebrates the longest unguarded boundary on the earth. Since the Second World War, there have been dozens of international peace parks on the five continents. Given the political and socioeconomic complexities associated with border areas, international peace parks can offer an innovative method to mitigate these political problems and to protect and maintain the biological health of the fragile environment. According to a case

<sup>11</sup> See, for example, Wolf (1999), and Blatter et al. (2001, pp. 31–56).

<sup>12</sup> See, for example, Westing (1992, 1998), Weed (1994), and Sethi (2000).

study conducted by Singh and Jackson (1999), the snow leopard habitat in Central Asia lies along various international border areas. Most of these areas are either hotly contested or arenas of conflict and refugee movements. As a result, the establishment of the cross-border conservation areas can not only protect the snow leopard as a keystone species to maintain the region's rich biodiversity, it can but also defuse tensions along international borders.

### **10.4.2 Example I**

The peace-park concept, as a vehicle for the resolution of political and military conflicts, has gained importance over the last decades. The Ecuador – Peru boundary is one of the most problematic boundaries in the world. Land squabbles have surrounded bilateral relations between Ecuador and Peru. The Aguarana and Shuar groups of the Jibara peoples live on both sides of the Ecuador – Peru boundary. Ecuadorian claims over territories that historically and legally belong to Peru date back to Ecuador's independence in 1830, nine years after the independence of Peru in 1821. Ecuador claimed it had legal rights based on colonial titles over three Peruvian provinces: Tumbes in the coast, Jaen in the Andean mountains, and Maynas in the Amazonian region. However, with time, Ecuador's pretensions were reduced to the Amazonian province called Maynas in the Spanish colonial documents.

The Cordillera del Condor is a mountain range on the boundary between Ecuador and Peru. It is a key element in the hydrological cycle that links the Andes with the Amazon and is also considered a region of global biological significance. It is remote, largely road-less, and completely uninhabited at highland. Culturally the Jivaroan people have lived in this area for centuries along the rivers and at the base of the mountain range. The Rio de Janeiro Protocol – which was signed following a major conflict in 1941 when Peru invaded Ecuador – defined the border between the two countries. After congresses of both Peru and Ecuador ratified the treaty, the Peruvian – Ecuadorian boundary demarcation commission was formed on June 2, 1942. In 1943 technical divergences of interpretation on the exact borderline that should follow along some specific boundary areas arose.

The Peruvian – Ecuadorian boundary demarcation commission continued working until 1950 placing boundary markers. Mapping the Ecuadorian – Peruvian border was completed in early 1947; but in the Condor Cordillera stretch, east of the city Zamora, the boundary remained unmarked. The disputed area is a 78 km-long strip of mostly unpopulated, and little explored territory, deep in the Amazonian rainforest and almost inaccessible by land. However, during the following years, the situation came to a deadlock. While Peru held to the view that the border in the undemarcated area ran along the heights of the Condor range, Ecuador insisted that there was no technical basis for considering that mountain range as the border between the two nations. Ecuador hinted at the idea that the spirit of the 1941 Protocol, which had never mentioned the Condor range by name, would require the location of the border markers along the Cenepa river, immediately to the east of the range.

The Cordillera del Condor was once again at the center of the Ecuador – Peru border conflict from the early 1990s onwards. In 1995 a war occurred in the border area. The war had a serious impact on the local communities, and a reported 28 people were killed during the conflict. Of the 350 Indian communities on the Ecuadorian side of the border, 20,000 people were directly affected by the fighting, 8000 of them were permanently displaced, their habitats destroyed (Franco 1997). The peace plan was signed on February 17, 1995 and committed both countries to withdraw their forces ‘far’ from the disputed zone. Normalization of relations was a slow process. The two countries refused to engage in face-to-face talks over the border negotiations. After the undeclared war, tensions still remained between the two countries and the border, as it had for over 150 years, a source and potential for conflict.

During the mid-1990s, political leaders of the two countries conducted various negotiations in order to fix their joint boundary. Official discussions between the foreign affairs ministers of Peru and Ecuador began in January 1996. However, nothing much came out all through the year except an agreement to provide a framework for a definitive solution on the border issue. In August 1997, the two nations signed an agreement aimed at ensuring transparent mechanisms in arms procurements. Following further negotiations, several commissions were established in order to examine the frontier markers on the ground of the Cordillera del Condor. Talks continued through 1998 and, thanks to the mediation efforts of Argentina, Brazil, Chile, and the United States, the Peace Agreement was eventually signed in Brasilia on October 26, 1998. This put an end to one of the long-lasting territorial disputes in the Western Hemisphere.

Peru and Ecuador have eventually ended their border dispute by establishing a cross-border peace park, where only “ecological police” and not the military would be allowed to patrol. The Ecuadorean park comprises an area of 25.4 km<sup>2</sup> while the Peruvian park runs over 54.4 km<sup>2</sup> (Sethi 2000). The peace accord was accompanied by other bilateral treaties and agreements as well. Among the most important was the trade and navigation treaty under which Ecuador was granted navigation rights for conducting trade and commerce on the upper reaches of the Amazon River and its tributaries within Peru. Ecuador would also have the right to set up two trading centers and to build its own industries, warehouses or import-export centers. Also, with tensions dissipating, the two formerly antagonistic states would have less need to purchase military equipments. For example, until 1997–1998, Peru had been the largest importer of arms in South America at US\$ 1 billion a year (Finnegan 1999). With the peace agreement in place, the two countries can better allocate their scarce resources to develop their beleaguered economies. The Rand Corporation estimated that the annual defence spending of the two nations would decrease from between 0.5 to 4% in the very first years after the implementation of the peace accord.<sup>13</sup>

The peace-park mechanism can also be applied to the management of territories that are claimed by multilateral parties. The management of Antarctica as “a continent of peace” has proved to be successful. Situated in the southern hemisphere,

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<sup>13</sup> Based on Sethi (2000).

overlying the South Pole, Antarctica is the southernmost continent and is surrounded by the Southern Ocean, which in turn borders on southern Pacific, Atlantic and Indian Oceans. According to the *New World Encyclopedia*, the name Antarctica comes from the Greek *antarktikos*, meaning “opposite to the Arctic”. The first confirmed sighting of the continent is commonly accepted to have occurred in 1820 by the Russian expedition of Mikhail Lazarev and Fabian Gottlieb von Bellingshausen.<sup>14</sup> Antarctica is the coldest and windiest continent, and has the highest average elevation of all the continents. Currently, there is no permanent human resident in the Antarctica. Only cold-adapted plants and animals – including penguins, fur seals, mosses, lichen, and many types of algae – are able to survive there.

### 10.4.3 Example II

As the only uninhabited continent in the world, Antarctica has no government and belongs to no country. Various countries have claimed specific areas of Antarctica, although, as a rule, no other countries recognize such claims. Argentina, Australia, Chile, France, New Zealand, Norway, and UK claim land and maritime sectors for a large portion of the continent. In addition, the Argentine, British and Chilean claims all overlap (see Fig. 10.2 for details). The following gives details of territorial claims in Antarctica:

- a. Adelaide island (claimed by Argentina, Chile and United Kingdom)
- b. Adélie Land (claimed by France)
- c. Peter I island (claimed by Norway)
- d. Queen Maud Land (claimed by Norway)
- e. Ross Sea (claimed by New Zealand)
- f. South Orkneys (claimed by Argentine and United Kingdom)
- g. South Shetlands (claimed by Argentina, Chile and United Kingdom)
- h. Victoria Land (claimed by Australia)
- i. Weddell Sea (claimed by Argentina and United Kingdom)
- j. Wilkes Land (claimed by Australia)

However, these territorial claims have not been recognized by international community. The area between long. 90°W and 150°W (except the Peter I island) has been the only part of Antarctica (indeed the only solid land on Earth) that is not claimed by any country.

The Antarctic Treaty was signed in 1959 by 12 countries. As of 2010, 47 countries have signed the treaty. The treaty prohibits any military activity in Antarctica, such as the establishment of military bases and fortifications, the carrying out of military maneuvers, or the testing of any type of weapon. Military personnel or equipment are permitted only for scientific research or for other peaceful purposes. Remote, isolated, and frozen all year, Antarctica is the most untouched and undisturbed region on the planet. Scientific research in Antarctica offers many advantages over anywhere else on earth, including: (1) Antarctica has the cleanest air in

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<sup>14</sup> Source: <http://www.newworldencyclopedia.org/entry/Antarctica>. Accessed on 15 August 2010.





Fig. 10.2 The existing territorial claims in Antarctica. (Source: Revised by author based a map drawn by the US Central Intelligence Agency, Washington, DC)

the world allowing air quality monitoring with a reliable baseline; (2) Antarctica is the darkest place on earth, an ideal setting for astronomical research; (3) Studying the bottom of the food chain allows scientists to better understand environmental impacts on humans; and (4) Antarctica has no borders, allowing research findings to be freely available to everyone. Also many projects are internationally coordinated and supported without any ‘home turf’ issues.<sup>15</sup>

<sup>15</sup> Cited from <http://www.antarcticconnection.com/antarctic/stations/index.shtml>. Accessed on 17 May 2010.

The Antarctic has been recognized as one of the most successful cases of international cooperation on disputed territories. The 1991 Protocol on Environmental Protection to the Antarctic Treaty restricts a struggle for resources. One of the finest testimonials to the spirit of international cooperation perpetuated by the Antarctic Treaty has been the abiding cooperative research by scientists, even those whose home nations were involved in strong tensions and military confrontations. Under the Antarctic Treaty, activities on the continent have truly proclaimed this “a continent of peace.” For example, during the Cuba missile crisis (a confrontation between the former Soviet Union, Cuba and the United States) in the early 1960s and the wars in Vietnam from the 1960s to the 1970s and in the Falkland islands in the early 1980s, all those in the Antarctic scientific community continued an unbroken and peaceful exchange of information (Antarctic Connection 2010).

## 10.5 Case 10. The Korean Demilitarized Zone

Korean peninsula extends southwards for about 1100 km from the Asian mainland into the Pacific Ocean. It is surrounded by the Sea of Japan to the east, East China Sea to the south, and the Yellow Sea to the west. After Japan’s surrender at the conclusion of the Second World War, the Korean peninsula was partitioned into two occupation zones, approximately divided at the 38th parallel. The USSR controlled the north, with the United States taking charge of the south. In 1948, the division was made permanent with the establishment of two separate regimes – the People’s Democratic Republic of Korea (DPRK) in the North and the Republic of Korea (ROK) in the South. On June 25, 1950, hoping to unify the Korean peninsula under a single Communist government, the DPRK launched a surprise invasion of South Korea. North Korea swiftly seized Seoul and surrounded the allied forces in the peninsula’s southeast corner near Pusan. In a desperate bid to reverse the military situation, UN Commander Gen. Douglas MacArthur ordered an amphibious landing at Incheon on September 15, 1950 and routed the North Korean army. The UN’s forces pushed north across the 38th parallel, approaching the Yalu River. Prompted by a successful counteroffensive, China entered the war, forcing the UN troops into a headlong retreat.

Ultimately, the Korean War stabilized near the 38th parallel but dragged on for two years while negotiations took place. An armistice was agreed on July 27, 1953, resulting in a demilitarized zone (DMZ) across the middle of the Korean peninsula.

The Korean DMZ is one of the most phenomenal military edifices left on this planet after the end of the Cold War. Established with the armistice that ended the Korean War in 1953, the DMZ runs along a line 213 km long and extends 2 km on either side of the North–South Korean boundary along the 38th Parallel. Fences with 3 m high were erected at each boundary of the DMZ and all civilian homes, with the exception of two villages (Taesong-dong in South Korea and Kichong-dong in North Korea), were removed. There is only one crossing point in the DMZ: the village of Panmunjon, which also lies on an old high road that linked north to

south in the days before the Korean War. North and South Korea have sporadically exchanged delegations and officials through Panmunjon.

The DMZ is patrolled by nearly 1 million North Korean soldiers, while South Korea has fielded over half million troops on its side, coupled with a US force of some one-third million military personnel stationed under the auspices of the United Nations Command.<sup>16</sup> The armistice established the DMZ on both sides of the line as a buffer for the two countries to prevent further military confrontation. Known as the world's most heavily fortified boundary, the DMZ, that spans the boundary between North and South Korea, is dotted with landmines and bunkers and crisscrossed by barbed wire. The strip of land serves at times as a tourist destination, a site for negotiations and one of the most noted potential military flash-points on the globe. Except in the area around the truce village of Panmunjeom and on the Donghae Bukbu Line at the east coast, humans normally are not allowed to enter the DMZ.

Throughout its existence, the DMZ has witnessed various tensions between the North and South Korea. Since the 1960s, there have been serious (bloody) incidents and hostile events within the DMZ, especially along the military demarcation line (DML). Some of them are worth particularly of attention:<sup>17</sup>

- On January 17, 1968, 31 North Korean commandos crossed the border disguised as South Korean soldiers in an attempt to assassinate President Park Chung Hee at the Blue House. The failed mission resulted in 29 commandos killed, one committed suicide, and the last captured. 68 South Koreans killed and 66 wounded, including about 24 civilians. Three Americans were killed and another three wounded in an attempt to prevent the commandos from escaping back via the DMZ. In October, 130 North Korean commandos entered the Ulchin and Samcheok areas in Gangwon-do. Eventually 110 of them were killed, 7 were captured and 13 escaped.
- In March 1969, six North Korean infiltrators crossed the border near Chumunjin, Gangwon-do and killed a South Korean policeman on guard duty. In October, North Korean infiltrators killed four United States soldiers near the southern boundary of the DMZ.
- In April 1970, three North Korean infiltrators were killed and five South Korean soldiers wounded at an encounter in Kumchon, Gyeonggi-do.
- In November 1974, the first of what would be a series of North Korean infiltration tunnels under the DMZ was discovered.
- In March 1975, the second North Korean infiltration tunnel was discovered.
- In June 1976, three North Korean infiltrators and six South Korean soldiers were killed in the eastern sector south of the DMZ, with another six South Korean soldiers being injured. On August 18, the Axe Murder Incident results in the death of two US soldiers and injuries to another four US soldiers and five South Korean soldiers.

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<sup>16</sup> See Kim (2014) and Hwang (2010, pp. 47–59) for more details about the DMZ.

<sup>17</sup> Sources: Nanto (2003) and Global Security (2005) for the pre-2004 period, and collected by author for the period from 2005 and 2013.

- In October 1978, third North Korean infiltration tunnel was discovered.
- In October 1979, three North Korean agents attempting to infiltrate the eastern sector of the DMZ were intercepted, killing one of the agents.
- In March 1980, three North Korean infiltrators were killed attempting to enter the south across the estuary of the Han River.
- In March 1981, three North Korean infiltrators spotted at Kumhwa, Gangwon-do, one was killed. In July, three North Korean infiltrators were killed in the upper stream of the Imjin River.
- In March 1990, the fourth North Korean infiltration tunnel was discovered, in what may be a total of 17 tunnels in all.
- In May 1992, three North Korean infiltrators dressed in South Korean uniforms were killed at Cheorwon, Gangwon-do. Three South Koreans also were wounded.
- In October 1995, two North Korean infiltrators were intercepted at the Imjin River. One was killed, the other escaped.
- In April 1996, several hundred North Korean armed troops entered the Joint Security Area and elsewhere on three occasions in violation of the Korean armistice agreement. In May, seven North Korean soldiers crossed the DMZ but withdrew when fired upon by South Korean troops.
- In April 1997, five North Korean soldiers crossed the MDL's Cheorwon sector and fired at South Korean positions. In July, 14 North Korean soldiers crossed the MDL, causing a 23-min exchange of heavy gunfire.
- On November 1, 2004, the United States withdrew its troops from the border, ending patrols there that date back to 1953, when the Korean War ended with an armistice.
- On May 26, 2006, two North Korean soldiers entered the DMZ and crossed into South Korea. They returned after South Korean soldiers fired warning shots.
- On October 27, 2009, one South Korean pig farmer cut a hole in the DMZ fence and defected to North Korea.
- On October 29, 2010, two shots were fired from North Korea toward a South Korean post near Hwacheon and South Korean troops fired three shots in return.
- On October 6, 2012, an 18 year old North Korean Army private defected to South Korea. He was apparently not detected as he crossed the DMZ and had to knock on a South Korean barracks door to draw attention to himself. The soldier later told investigators that he had defected after killing two of his superiors.
- On September 16, 2013, a 47 year old man was shot dead by South Korean soldiers while trying to swim across the Tanpocheon Stream near Paju to North Korea.

Even though the MDL has occasionally bristled with tensions and the North and South Korean armies more often exchanged gunfire and ultimatums, the DMZ did prevent large-scale military attacks from (on) each side of the boundary. On September 26, 2013, the South Korean government set aside 40.2 billion won (US\$ 37.3 million) in 2014's budget proposal for a project calling for the establishment of a peace park in the DMZ on the border with North Korea. The DMZ peace park project is one of President Park Geun-hye's outreach projects to North Korea.

The project was first unveiled during her visit to the United States in May 2013 and formally proposed the on August. Of the proposed budget set aside for the peace park project, 24 billion won was designated for use in removing landmines strewn throughout the DMZ, while the rest was allocated for research and other purposes (Yonhap 2013).

At present, inside the DMZ, six decades of “forced inaccessibility” have created a natural sanctuary. No humans have set foot in the core zone. As a result, numerous previously unreported species have been recorded and many that were thought to have been lost, along with a number of unique habitats, have been “re-discovered.” The biota of the DMZ corridor represents the last vestige of natural heritage of the Korean peninsula.

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# Chapter 11

## The Art of (Avoiding) War

The art of war is of vital importance to the State. It is a matter of life and death, a road either to safety or to ruin. Hence it is a subject of inquiry which can on no account be neglected. The art of war, then, is governed by five constant factors, to be taken into account in one's deliberations, when seeking to determine the conditions obtaining in the field. These are: (1) the moral law, (2) heaven, (3) earth, (4) the commander, and (5) method and discipline.

—Sun Tzu

### 11.1 The Art of War

#### 11.1.1 In Search of Sun Tzu

In the late Spring and Autumn period (770–476 BC) in ancient China, Sun Tzu (544–496 BC) wrote a book entitled *The Art of War* (sunzi bingfa). While the book “The Art of War” mainly refers to the work of Sun Tzu, the “Art of War of Sun Bin” (sunbin bingfa) has also been a well-known classic work on military strategy during the Warring States period (475–221 BC). Sun Bin’s Art of War is an ancient Chinese classic work on military strategy written by Sun Bin (c. 377–316 BC)—a descendant of Sun Tzu. The following is a famous story about Sun Bin:<sup>1</sup>

Sun Bin was circumvented in the state of Wei by his fellow student Pang Juan because of the latter’s jealousy over his military talent. In 340 BC, Sun Bin arrived in the state of Qi as a refugee from the state of Wei. Tian Ji—a military general by King Wei of Qi—met Sun Bin and was so impressed with Sun’s expertise in military strategy that he kept Sun at his residence as a retainer.

At that time horse racing was a favorite pastime between the King and the aristocrats. Each time Tian Ji lost to the King. Sun Bin learned that both Tian and the King have three horses in different classes: regular, plus, and super. The rule is to have three rounds in a match; each of the horses must be used in one round. Being the most powerful man in the

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<sup>1</sup> Excerpted from and translated by author based on Sima (104 BC, 1997, pp. 616–17).

country, the King has such great horses that in each class his horse is better than Tian's. Sun Bin also noticed that each time the speed difference between the King and Tian Ji's horses were rather little. Following Sun Bin's suggestion, Tian Ji used his regular class horse race against the super class from the King, they lost that round. But then his plus beat the King's regular, and his super beat the King's plus. Eventually, Sun Bin helped Tian Ji win the race over the King for the first time.

The King was impressed by Tian Ji's victory and Tian told the King that he won the race after following Sun Bin's suggestion. Tian recommended Sun Bin to the King as a talent and the King appointed Sun as a military adviser to General Tian Ji. Afterwards the Qi's force won many battles with the help of Sun Bin.

According to historical records from the Han dynasty, Sun Bin's Art of War contained an extensive 89 chapters, with four volumes of pictures attached, but was lost by the end of the Eastern Han dynasty (AD 25–220) till April 1972. As a consequence, Sun Bin's Art of War was sometimes conflated with Sun Tzu's The Art of War.

### ***11.1.2 Learning the Art of War***

In April 1972, bamboo slips of both Sun Tzu's and Sun Bin's works were unearthed in the Yinque-hill area (Linyi city, Shandong province). Due to natural erosion, some of the bamboo slips were damaged and difficult to reinterpret. After a decade of textual research, Sun Bin's Art of War has been identified to contain 16 chapters from 222 bamboo slips, with a total of 4891 words. Selected contents of Sun Bin's Art of War include:<sup>2</sup>

- Capturing Pang Juan: It describes the four stratagems that Sun Bin employed in the Battle of Guiling.
- Meeting King Wei: Sun Bin discusses with King Wei of Qi about war and states: "Only victory in war can bring about authority and prosperity". Sun believes that the historically progressive unification accomplished in war had been an important means of facilitating the submission of feudal lords. To start a war, one must have "a storage of materials, a just cause for war" and must "be well-prepared before launching an attack". Sun also pointed out that "Warmongers will inevitably lose and those who expect to make a fortune out of war will also suffer defeat and disgrace".
- King Wei asks for advice: It focuses on resolute attacks on weakly defended key enemy positions and on the military philosophy of using Tao and flexible principles to attain victory.
- Tian Ji asks how to construct a defense: It discusses the problems of battlefield positions in field operations.
- Selection of the best soldiers: It comments on the basic principles of building and training an army, and on the factors of field command that will determine victory or defeat.

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<sup>2</sup> Cited from Low and Associates (1997).



- Eight formations: It discusses the methods of a commander and the principles of battle formation.
- Organization of military posts.

As the oldest military treatise in the world, *Sun Tzu on the Art of War* has long been revered as the definitive guide to strategy and tactics on the battlefield, and its timeless wisdom has been applied everywhere challenges must be faced. This book is divided into 13 chapters, which are:<sup>3</sup>

1. Laying plans (or titled “the calculations”): It explores the fundamental factors and elements that determine the outcomes of military engagements.
2. Waging war: It advises that successful military campaigns require limiting the cost of competition and conflict.
3. Attack by stratagem (or titled “planning offensives”): It defines the source of strength as unity, not size, and discusses the factors that are needed to succeed in any war.
4. Tactical dispositions (or titled “positioning”): It teaches commanders the importance of recognizing strategic opportunities, and teaches not to create opportunities for the enemy.
5. Energy (directing): It explains the use of creativity and timing in building an army’s momentum.
6. Illusion and reality (or titled “weak points and strong points”): It explains how to respond to changes in the fluid battlefield over a given area.
7. Maneuvering (titled “armed contest”): it explains how to win those confrontations when they are forced upon the commander.
8. Variation in tactics (or titled “adapting to the nine contingencies”): It explains how to respond to shifting circumstances successfully.
9. Deploying the army (or titled “the army on the march”): It describes the different situations in which an army finds itself as it moves through new enemy territories, and how to respond to these situations.
10. The terrain (or titled “situational positioning”): It looks at the three general areas of resistance (distance, dangers and barriers) and the six types of ground positions that arise from them.
11. The nine terrains (situations): It describes how a commander will need to successfully navigate the common situations (or stages) in a campaign.
12. The attack by fire: It explains how to use the environment as a weapon.
13. The use of spies (intelligence): It specifies five types of intelligence sources and how to best manage each of them.

Both Sun Tzu and Sun Bin emphasized the importance of positioning in military strategy. The decision to position an army must be based on both objective conditions in the physical environment and the subjective beliefs of other, competitive actors in that environment. They thought that strategy was not planning in the sense of

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<sup>3</sup> The English translations of *Sun Tzu on the Art of War* include Giles (1910), Wing (1988), Ames (1993), Sawyer (1994), Kaufman (2001), and Wee (2003). For a comparison of some of these translations, see the case study at the end of this chapter.

working through an established list, but rather that it requires quick and appropriate responses to changing conditions. Planning works in a controlled environment; but in a changing environment, competing plans collide, creating unexpected situations.

In many countries, *Sun Tzu on the Art of War* has been part of the syllabus for potential candidates of military service examinations. In the United States, for example, *The Art of War* is listed on the Marine Corps Professional Reading Program (formerly known as the Commandant's Reading List). It is recommended reading for all United States Military Intelligence personnel and is required reading for all CIA officers.

*The Art of War* has been applied to many fields well outside of the military. It has been applied in many business and strategic management books in which the art of war has turned to the one for inspiration and advice on how to succeed in competitive business situations (see, for example, Krause 2007; McNeilly 1996; Michaelson 2001). In addition, *The Art of War* has been the subject of negotiation tactics and trial strategy.

## 11.2 Evils of War

### 11.2.1 From Disputes to Wars

In the real world, various disputes can eventually be ended with wars. They may include either a dispute over a physical property (a piece of land or a water area) or may be ideological-, institutional- or functional-related. In what follows in this section, we only discuss the disputes across physical borders.

The term “territorial dispute” refers to the disagreement over a piece of territory that is claimed by two or more independent countries. More specifically, a territorial dispute exists between two or more states when “at least one government does not accept the definition of where the boundary line of its border with another country is currently located, whereas the neighboring government takes the position that the existing boundary line is the legal border between the two countries based on a previously signed treaty or document” (Huth 1998, p. 19). Literally, “boundary disputes” (conflicts over how to draw border lines) and “territorial disputes” (conflicts over larger tracts of land or water) are different terms. In practice, however, they do not have so many differences from each other, as all territorial-related disputes have resulted—directly or indirectly—from the disputes over various political boundaries—land, water, or even air.

Boundary and territorial disputes may evolve from historical claims, or they may be brought on by competition of resource exploitation. Ethnic clashes continue to be responsible for much of the territorial fragmentation around the world. Disputes over islands at sea or in rivers frequently form the source of territorial and boundary conflicts. Other sources of contention include access to water and mineral (especial-

ly petroleum) resources, fisheries, and arable land. Issues pertaining to the territorial control of seawaters have long been the subject of international law.

Boundary and territorial disputes can be easily found throughout the world. This is simply due to the very fact that most, if not all of existing political boundaries are either inappropriately or imprecisely defined. Except those that are either defined by latitudes and longitudes (the major portion of the US–Canadian land boundary is an example) or by other quantitatively identified coordinates, most of existing land boundaries around the world are not defined with completely accurate details.<sup>4</sup> Also, many exclusive economic zones (EEZs) claimed by neighboring coastal states are overlapped. Fortunately, most of existing territorial disputes stemming from the inappropriate or imprecise definitions of international boundaries have been of dormancy.

Under certain conditions and circumstances, dormant boundary and territorial disputes may be activated and evolve into more serious cross-border conflicts and wars. Specifically, various factors (such as resource scarcity, locational feature, domestic politics, geopolitical competition, and cultural difference) have decisively influenced the cross-border tensions in the disputed territories throughout the world.

Sometimes, it is very difficult to clarify the real causes behind a specific case of territorial dispute. In most (if not all) circumstances, different factors can be simultaneously found to activate an individual case of cross-border conflict or war. For example, geopolitical competition is not the only factor resulting in the brief border war between China and India in 1962. Neither is it the only one impeding the current Sino-Japanese cooperation on the East China Sea. Japan has a tradition of uncompromised territorial negotiations with its neighbors.<sup>5</sup> Also, especially since the 1990s, China's position on the disputes over the East China Sea has become increasingly tougher.<sup>6</sup> In addition, with regard to the on-going negotiations on oil/gas exploitation in the East China Sea, locational and domestic factors also are responsible to the current difficulties. Tactically, without cooperation with Japan, China still can unilaterally exploit the hydrocarbon deposits on its (i.e., the western) part of the East China Sea—though the exploitation cannot be economically maximized. But this is not the case for Japan—all of Japan's claims of the seabed resources have been located at the disputed area.

Unlike “domestic politics” (including variables such as “inter-party struggle” and “nationalism”, all of which are always the positive factors contributing to cross-border conflicts and wars), “geopolitical competition” can both intensify existing boundary and territorial disputes and suddenly put them to a dormant status. For example, as a result of the Cold War in the late 1990s, China and Russia found that, compared to the United States and its political allies in Asia and Europe, they

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<sup>4</sup> As a matter of fact, without using the Geographic Information System (GIS) technique and the remote-sensing images and the high-resolution aerial photographs, it is almost impossible to accurately define the existing irregular border lines.

<sup>5</sup> Examples in this regard can be found in Japan's fruitless negotiation with Russia on the Northern Territories/South Kurils—see, for example, deVillafranca (1993) and Kimura (2008).

<sup>6</sup> See, for example, Ishii and Chugoku (2006, pp. 137–59), Ishii et al. (2003), and Drifte (2008).

would have been politically or militarily lonelier had they not decided to resolve the obstacles hindering them from establishing a friendlier political (if not economic) relationship. Therefore, it is quite easy to understand that the quick settlement of the disputed border area (which was a Chinese territory but was occupied by Russia in the 1920s) in the early 2000s was to a large extent the joint (cooperative) response to the potential external threats to both China and Russia (see Sect. 12.4 of Chap. 12 for details).

### ***11.2.2 Evils of War***

The loss of human life is not the only evil consequence of war. Armed conflicts and wars are always destructive of the living conditions of human-beings. They have negative impacts on the quality of life, the capabilities of people to live the kinds of lives they value, and the real choices the human-beings have. Wars result in the loss of livelihoods and opportunity, as well as of human dignity and of fundamental human rights. Livelihoods are directly affected through decreased access to land, and inadequate access to natural resources, as a result of exclusion, displacement and the loss of biodiversity. Armed conflicts and wars can set in motion a cycle of degradation and human vulnerability. Human vulnerability refers not only to the exposure to negative environmental change, but also to the ability to cope with such change through either adaptation or mitigation (UNEP 2008).

The Strategic Foresight Group—a political think tank based in Mumbai, India—has calculated the peace dividend for the Middle East and consequently the economic cost of conflict in the region by country. According to its report, the opportunity cost of conflict for the region from 1991 to 2010 has been US\$ 12 trillion. Iraq suffered the largest loss. Had it have peace, Iraq's gross domestic product (GDP) could have been more than 30 times its present size. If we measure Iraq's opportunity loss since 1980, before the Iran-Iraq War and the Persian Gulf War with Kuwait, the losses are even greater—Iraq's GDP could have been more than 50 times its projected GDP in 2010. In other words, had there been peace in Iraq, every Iraqi citizen would be earning over US\$ 9600 instead of the US\$ 2300 in 2010 (Strategic Foresight Group 2009).

During and following an armed conflict, an armed and lawless society can have both direct and indirect impacts on the environment, which include at least three aspects—environmental damage, resource destruction and over-exploitation, and institutional threats to environmental protection. The negative impacts of armed conflict on the environment have become well documented in a growing body of literature.<sup>7</sup> The most serious environmental impact of armed conflict is pollution. Pollution can take many forms, and it can result directly from actions by military or

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<sup>7</sup> See, for example, Austin and Bruch (2000), Blom et al. (2000), Blom and Yamindou (2001), Hart and Mwinyihali (2001), Hatton et al. (2001), Jacobs and Schloeder (2001), Kalpers (2001), Matthew and Switzer (2001), Plumptre et al. (2001), Shanbaugh et al. (2003), Urdal (2005, 2008), Theisen (2008), Buhaug et al. (2008), and UNEP (2008).

other armed groups, as well as indirectly from human and economic crises created by the conflict. In sum, armed conflicts could result in the following five types of environmental damage:

- I. High levels of pollution around main military targets, in particular chemical industry;
- II. Ecosystems threatened, in particular river ecosystems;
- III. Food contamination resulting from soil pollution (also as a secondary effect of air pollution);
- IV. Drinking water contamination; and
- V. Human health stemming from the long-term effects of toxic/carcinogenic substances and radiation.

The First Persian Gulf War lasted from August 2, 1990 to February 28, 1991. The War against Iraq was initiated with United Nations authorization. When Iraqi troops were defeated at the end of the Persian Gulf War in the late February 1991, they set fire to more than 600 oil wells and pools of spilled oil in Kuwait. The ignition of these oil well fires created a serious threat to environmental and human health in the Persian Gulf region, in addition to significant economic damage to Kuwait's lucrative petroleum industry. The Kuwait oil fires burned for more than eight months, consuming an estimated five to six million barrels of crude oil and 70 to 100 million m<sup>3</sup> of natural gas per day. Between late February, when the first fires were ignited, and November 6, when the last fire was extinguished, smoke plumes containing a hazardous mixture of gaseous emissions and particulate matter engulfed a downwind area as large as 150 by 1000 km (Duncan 2004).

Throughout the 1990s, armed conflicts resulted in serious environmental damages in the Balkans. A study carried out by a team of expert staff from the Regional Environment Center for Central and Eastern Europe (RECCEE) and other contracted country experts shows that armed conflicts have had a strong impact on the human/built environment in Kosovo, as a result of Yugoslav Army activities (RECCEE 1999). One of the principal environmental concerns during and immediately after the conflict was the possible damage to the Danube. Most key industrial facilities—all of which are located alongside the Danube, along major tributaries such as the Sava, or on smaller tributaries such as the Lepenica and Morava—were targeted during the air strikes. Consequently, there were genuine fears that large quantities of hazardous substances could have entered the Danube system, with risk for people in Yugoslavia and, downstream in Bulgaria and Romania, through drinking contaminated water or eating contaminated fish (Sinha 2001). Under time pressures, environmental protection tends to have a low priority in reconstruction processes, leading to decisions where the environmental impact of an activity is not taken into consideration. This means that, sometimes even existing environmental legislation cannot be implemented or enforced.

### 11.2.3 *Managing War*

Armed conflict can also radically alter the political, social, and economic contexts by changing the balance of political power, eroding law and order, and destroying local and national economies, among others. All these would often fragment societies, disrupt traditional systems of environmental and natural resource management, divert resources away from development and conservation, and lower the priority of conservation in general. Although it is difficult today to deny the existence of the rules of international law which impose restrictions on combatants as to the way and manner in which armed conflicts are to be conducted, and the nature of weapons to be used in armed conflicts.

It can never be convinced that it is a right thing for men to destroy each others' lives. If human life is taken, it is, for whatever reasons, a case of murder. Then, as Alexander (2010) states,

[any] nation which, without sufficient reason, commences a war, or provokes a war, has an awful responsibility resting on it; and so also when a war is in progress, that nation which refuses to make peace, or insists on unreasonable conditions, is guilty of all the blood which may be shed, and all the misery produced.

There is no excuse for launching a war. As long as possible, every nation should avoid bloody wars. If a war is inevitable, the hurting non-war participants should be prevented; and the protection of the wounded personnel should be guaranteed (see Box 11.1). Finally, there are more choices or responses to situations of profound differences—a disagreement or conflict—depending on the way we balance our own interests and those of others:<sup>8</sup>

#### **Box 11.1 Doctors Without Borders**

Doctors Without Borders/Médecins Sans Frontières (MSF) is an international medical humanitarian organization created by doctors and journalists in France in 1971.

Today, MSF provides independent, impartial assistance in more than 60 countries to people whose survival is threatened by violence, neglect, or catastrophe, primarily due to armed conflict, epidemics, malnutrition, exclusion from health care, or natural disasters. MSF provides independent, impartial assistance to those most in need. MSF also reserves the right to speak out to bring attention to neglected crises, challenge inadequacies or abuse of the aid system, and to advocate for improved medical treatments and protocols.

MSF's work is based on the humanitarian principles of medical ethics and impartiality. The organization is committed to bringing quality medical care to people in crisis regardless of their race, religion, or political affiliation.

<sup>8</sup> Source: [www.convirgente.com/About-collaboration/Managing-differences/content.aspx?tabid=2236&code=en](http://www.convirgente.com/About-collaboration/Managing-differences/content.aspx?tabid=2236&code=en). Accessed on 28 Feb 2014.

MSF operates independently of any political, military, or religious agendas. Medical teams conduct evaluations on the ground to determine a population's medical needs before opening programs, aiming to fill gaps that exist (rather than replicating services that are already offered) or reach communities that are not being assisted. The key to MSF's ability to act independently in response to a crisis is its independent funding. 90% of MSF's overall funding (and 100% of MSF-USA's funding) comes from private, non-governmental sources. In 2009, MSF had 3.8 million individual donors and private funders worldwide.

As an organization, MSF is neutral. It does not take sides in armed conflicts, provides care on the basis of need alone, and pushes for increased independent access to victims of conflict as required under international humanitarian law.

(Source: <http://www.doctorswithoutborders.org/>)

- Avoiding: parties pretend that there is no difference and ignore it;
- Confrontation: the relationship between the protagonists becomes a permanent and open war;
- Flight: one party decides to let the other win, without offering resistance;
- Compromise: one of the most common solutions;
- Collaboration: in many cases, it is the most advantageous solution for both parties.

Generally, this behavior of 'avoiding' does not bring a solution and, often, over time, the difference is getting more important, which leads to another type of response. In the 'confrontation' games, each one tries to maximize its interests, leading to one party winning and the other one necessarily losing everything. With regard to 'flight', the frustration is high and the conflict is not resolved, but repressed, with a strong likelihood of a desire for revenge. For a compromise deal to work, each of the protagonists must give a little—and very often everyone is frustrated. As a rule, 'collaboration' does not arise spontaneously. It requires an intervention, for instance of a neutral, to allow parties to convert their positions, seemingly inflexible, into interests that are mutually beneficial. It is what is termed "win-win: both players are victorious".

## 11.3 Avoiding War

### 11.3.1 *An Ancient Story*

During the years of Emperor Kangxi (AD 1662 to 1722) of ancient China, there were two neighbors—named Zhang and Ye—in Tongcheng county, Anhui prov-

ince. One day, the two neighbors fiercely quarreled over the boundary of their yards. Both sides believed that they were the real owner of a narrow strip of land. Zhang's family had a senior official working in the court in Beijing; and the Ye was also a prominent family. Zhang's family wrote a letter to Zhang Ying—Minister of Rites (*libu shangshu*) of the Qing dynasty. After reading this letter, Minister Zhang replied with a short poem:<sup>9</sup>

A letter from afar is just for a small wall;  
 (qian-li-xiu-shu-zhi-wei-qiang)  
 To retreat for three feet will not harm you all.  
 (rang-ta-san-chi-you-he-fang)  
 Even though we still find the Great Wall;  
 (chang-cheng-wan-li-jin-you-zai)  
 Emperor Qin is no longer the owner of it at all!  
 (bu-jian-dang-nian-qin-shi-huang)

Yes, nobody in China has had such an ambition of territorial expansion as Qin Shihuang—the first and the most tyrannical emperor who had mobilized the largest amount of manpower and resources in Chinese history to construct a 5000-km long Great Wall for his empire. However, the Qin Empire only lasted for 15 years due to the emperor's large-scale mobilization of human and financial resources. Soon after the collapse of the Empire, Qin Shihuang completely lost all his power and respects in China forever. After reading Zhang Ying's letter, all of Zhang's family members were ashamed for their selfish and shortsighted behavior. So they decided to leave three feet of land out of their yard. Upon seeing this, Ye's family also retreated for three feet. As a result, a six-foot public lane was created between the two neighbors. And the two once-ever antagonistic families became good neighborhood.

For hundreds of years, Chinese rulers have applied the Zhang-Ye story to teach people in China.

### 11.3.2 *Compromise Through Negotiation*

In Chap. 9, we have evaluated five negotiation techniques on dispute settlement. According to their inherent characteristics, the costs and benefits of these five negotiation techniques differ significantly. In order to facilitate policymakers and practitioners to be more efficient during the settlement of cross-border disputes, let us clarify the advantages and disadvantages of these negotiation techniques. Specifically, our evaluation can be conducted in the following aspects (indicators): (i) the institutional complexity; (ii) the degree of external participation; (iii) the easiness in application; and (iv) the effect on dispute resolution (see Table 11.1 for details).

Obviously, in terms of the first three indicators (i.e., “institutional complexity”, “degree of external participation” and “easiness in application”), the preferential sequence for the selection of the settlement techniques should follow “Shelving Disputes → Negotiation → Mediation → Arbitration → Litigation”. However, in

<sup>9</sup> Note that the Chinese (Pinyin) text of the poem is shown within parentheses.



**Table 11.1** Comparative (dis)advantages of five techniques on dispute settlement. (Source: Defined by author based on Chap. 9)

Indicator	Negotiation	Mediation	Arbitration	Litigation	Shelving disputes
Institutional complexity	Simple (4)	Modest (3)	Complex (2)	Most complex (1)	Simplest (5)
Degree of external participation	Low (4)	Modest (3)	High (2)	Highest (1)	Lowest (5)
Easiness of application	Easy (4)	Modest (3)	Difficult (2)	Most difficult (1)	Easiest (5)
Effect on dispute resolution	Lowest (1)	Low (2)	Great (4)	Greatest (5)	Modest (3)
Aggregate score	13	11	10	8	18

Figures within parentheses are used to quantify (using “5” “4”, “3”, “2”, and “1” as the “highest” to the “lowest” scores, respectively) the four indicators

terms of the last indicator (i.e., “effect on dispute resolution”), the preferential sequence for the selection of the five settlement techniques should follow “Litigation → Arbitration → Shelving Disputes → Mediation → Negotiation”. Therefore, in order to avoid the conflicting result as mentioned above, we still need to make a more comprehensive comparison of these settlement techniques.

For the ease of comparison, let us roughly quantify (the numbers “5”, “4”, “3”, “2”, and “1” denote the “highest” to the “lowest” scores, respectively) each indicator, as follows:

- Institutional complexity: “simplest”=5, “simple”=4, “modest”=3, “complex”=2, “most complex”=1
- Degree of external participation: “lowest”=5, “low”=4, “modest”=3, “high”=2, “highest”=1
- Easiness in application: “easiest”=5, “easy”=4, “modest”=3, “difficult”=2, “most difficult”=1
- Effect on dispute resolution: “greatest”=5, “great”=4, “modest”=3, “low”=2, “lowest”=1

Obviously, the aggregate scores, shown in the last row of Table 11.1, simply suggest that the selection of the five settlement techniques should follow the preferential sequence “Shelving Disputes → Negotiation → Mediation → Arbitration → Litigation”. In practice, one or more techniques can be applied to each case of settlement negotiation till a final peace accord is achieved.

It should be noted that, in reality the selection of a settlement technique could be more complicated. In all circumstances, the “Shelving Disputes Strategy” will always be the simplest and the cheapest technique—it is also the last choice before any confrontation or conflict occurs.

## 11.4 The Art of Avoiding War

### 11.4.1 *Art-of-Avoiding-War Chart*

Many times, things get bad, but not bad enough to generate conflicts and wars. These situations can move from tense and hostile to conciliatory, given the right influence and the right attitude.

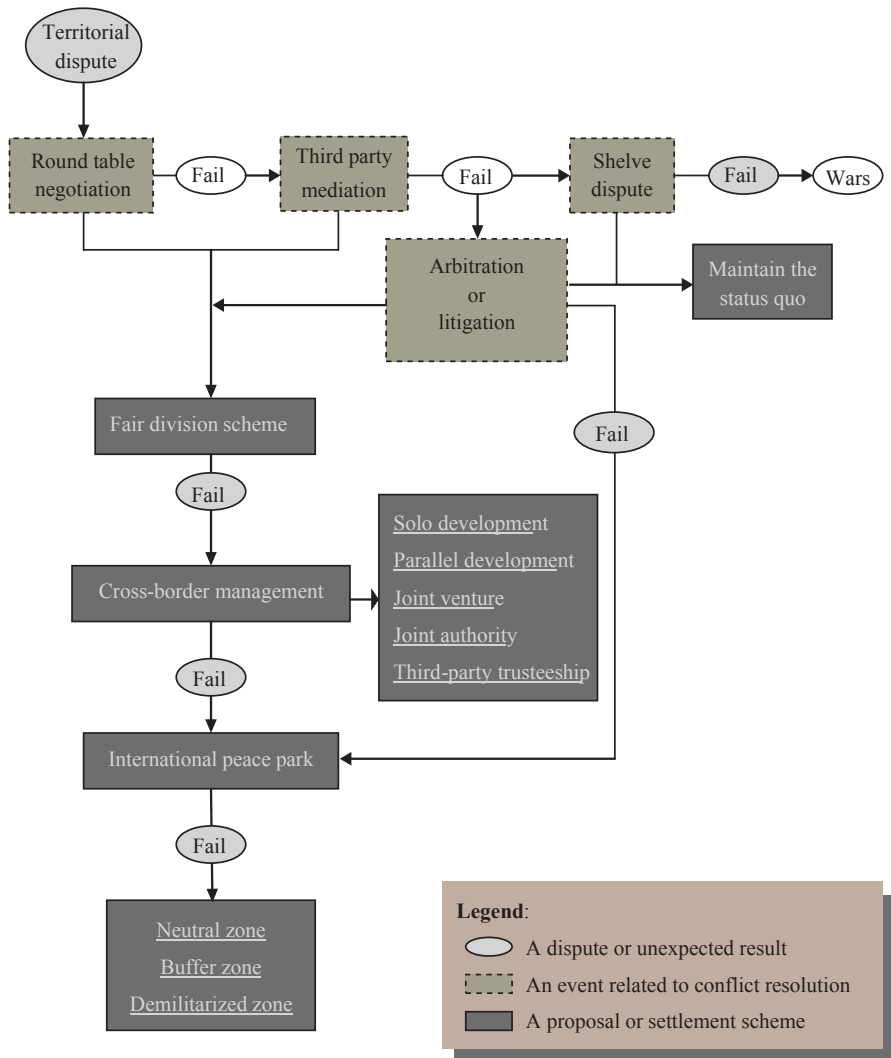
Regardless of many disagreements and disputes throughout the world, compromise may still be possible because a cross-border claim or provocation carries both benefits and costs. When these costs outweigh the value of the contestation, compromise becomes more attractive than confrontation. The cost a state bears for pressing cross-border disputes opens a bargaining space in which concessions over contested territory can be exchanged for other goals that a state may seek. When the bilateral (or multilateral) ties between the states become more important, cooperation in and delaying the settlement of their disputes will become more attractive than continuing to press claims.

However, conflict resolution and cross-border cooperation cannot be achieved automatically. The art or style of settlement negotiations also matters. In Chap. 9, several mechanisms or techniques are suggested for the settlement of cross-border disputes. Specifically, they include (i) negotiation, (ii) mediation, (iii) arbitration, (iv) litigation, and (v) shelving-disputes strategy. These negotiating techniques can be used to seek a cessation of hostilities and to facilitate cooperative behavior as a peaceful means to end a conflict or, when a conflict is largely intractable, reduce the tensions in cross-border areas.

No matter how good are the options for dispute settlement, without the follow-up efforts that should be taken jointly by all stakeholders concerned, cross-border conflicts may still be inevitable. According to Huth and Allee (2003), each case of dispute can be divided into three separate but related phases: (i) challenge the status quo, (ii) negotiation, and, if it failed, (iii) military escalation. Obviously, the second phase, which has been extensively discussed in this chapter, is particularly important. With successful treatment, it can link cross-border disputes to peace; otherwise, it will end up in war.

How will boundary disputes not end up in war? Overall, the dispute-resolution schemes (as discussed in previous chapters) can be combined as an integrated, user-friendly flowchart. Figure 11.1 presents a step-by-step roadmap for dispute resolution and conflict management.

Whenever a dispute is induced, let us begin this peace journey by developing a trusting and cooperative spirit through the step-by-step implementation of negotiations, mediation, and arbitration. Even though it is quite costly and a time-consuming process to go through all of the steps illustrated in this flowchart, it is the right direction toward the peaceful settlement of disputes. At the very least, the more time are consumed in the process of dispute settlement, the longer time (and the less likely) is the war to occur, and, naturally, the more opportunities are the peace to sustain. So don't abandon and try each node of this flowchart!



**Fig. 11.1** The “art-of-avoiding-war” flowchart. Notes: (1) The whole conflict-resolution process—each step of which is shown within a dotted rectangle—is characterized by, from the left to the right, an INCREASING LIKELIHOOD OF FURTHER INTENSIFIED CONFLICTS OR WARS. (2) In the proposed or settled schemes (shown within the black rectangles), the implementation costs follow an increasing pattern from top to bottom. (Copyright © 2014 by Rongxing Guo)

### 11.4.2 Toward a War-Free World

In most circumstances, Sun Tzu’s *The Art of War*, which has been discussed at the beginning of this chapter, is treated as a zero-sum game. By way of contrast, the “art

of avoiding war” is intended to achieve a win-win outcome through *peaceful* means. To this end, all parties concerned must be able to learn to make compromises to each other. This is the precondition to avoid a bloody war and to achieve a sustainable peace accord.

Unlike Sun Tzu who specialized in theories and tactics on how to win a war, Mencius (372–289 BC)—a famous educator and philosopher in ancient China—devoted himself to the promotion of peace in his professional career. In the *Analects of Mencius*, for example, he pointed out:

In the Spring and Autumn period there were no righteous wars [chunqiu wu yizhan]... The benevolent man has no enemy under heaven. When the prince the most benevolent was engaged against him who was the most the opposite, how could the blood of the people have flowed till it floated the pestles of the mortars? There are men who say “I am skilful at marshalling troops, I am skilful at conducting a battle!” They are great criminals. If the ruler of a state loves benevolence, he will have no enemy in the kingdom. (Cited from Mencius c. 300 BC, 1999/1999, 7B: 2–4)

While *The Art of War* (sunzi bingfa) was applied in numerous wars during the past 2500 years, Sun Tzu did not win the respect of all people, at least in China. One typical example is that sunzi—the pinyin form of Sun Tzu—has become a popular Chinese term used to subject somebody to indignities. As a matter of fact, “chunqiu wu yizhan” (“in the Spring and Autumn period there were no righteous wars”), which is described in the *Analects of Mencius*, has become a very popular Chinese saying. Ironically, *The Art of War* was just written by Sun Tzu at the Spring and Autumn period.

As humankind enters into the twenty-first century, when peace and cooperation become the main rhythm of our common homeland, it seems unlikely that the *Art of War* will become a must-read treatise by military personnel. Hopefully, with the appearance of the *Art of Avoiding War*, policymakers and practitioners will be better prepared to peacefully and effectively settle their territorial and other disputes that had once escalated to disastrous wars. Till that day comes, Sun Tzu and his descendant, Sun Bin, would still be much gratified, even if their “Art of War” would be replaced by the “Art of Avoiding War”.

As a matter of fact, Sun Tzu considered war as a necessary evil that must be avoided whenever possible. According to Sun Tzu, one must avoid massacres and atrocities because this can provoke resistance and possibly allow an enemy to turn the war in his favor. For the victor, “the best policy is to capture the state intact; it should be destroyed only if no other options are available”.

## 11.5 Case 11. Translating Sun Tze on the Art of War into English

No.	Traditional/simplified Chinese	Pinyin Chinese	Lionel Giles (1910)	R. L. Wing (1988)	Ralph D. Sawyer (1994)	Chow-Hou Wee (2003)
I	始計/始計	Shiji	Laying plans	The calculations	Initial estimations	Detail assessment and planning
II	作戰/作戰	Zhuozhan	Waging war	The challenge	Waging war	Waging war
III	謀攻/謀攻	Mougong	Attack by stratagem	The plan of attack	Planning offensives	Strategic attack
IV	軍形/軍形	Junxing	Tactical dispositions	Positioning	Military disposition	Disposition of the army
V	兵勢/兵勢	Bingshi	Energy	Directing	Strategic military power	Forces
VI	虛實/虛實	Xushi	Weak points and strong	Illusion and reality	Vacuity and substance	Weaknesses and strengths
VII	軍爭/軍爭	Junzheng	Maneuvering	Engaging the force	Military combat	Military maneuvers
VIII	九變/九變	Jiubian	Variation of tactics	The nine variations	Nine changes	Variations and adaptability
IX	行軍/行軍	Xingjun	The army on the march	Moving the force	Maneuvering the army	Movement and development of troops
X	地形	Dixing	Terrain	Situational positioning	Configurations of terrain	Terrain
XI	九地	Jiudi	The nine situations	The nine situations	Nine terrains	The nine battlegrounds
XII	火攻	Huogong	The attack by fire	The fiery attack	Incendiary attacks	Attacking with fire
XIII	用間/用間	Yongjian	The use of spies	The use of intelligence	Employing spies	Intelligence and espionage

## 11.6 Appendix

Laws, treaties, and documents of wars<sup>10</sup>

1. Convention for the Exemption of Hospital Ships, in Time of War, from The Payment of all Dues and Taxes Imposed for the Benefit of the State. The Hague, 21 December 1904.
2. Convention for the Amelioration of the Condition of the Wounded and Sick in Armies in the Field. Geneva, 6 July 1906.
3. Final Act of the Second Peace Conference. The Hague, 18 October 1907.
4. Convention (III) relative to the Opening of Hostilities. The Hague, 18 October 1907.
5. Convention (IV) respecting the Laws and Customs of War on Land and its annex: Regulations concerning the Laws and Customs of War on Land. The Hague, 18 October 1907.
6. Convention (V) respecting the Rights and Duties of Neutral Powers and Persons in Case of War on Land. The Hague, 18 October 1907.
7. Convention (VI) relating to the Status of Enemy Merchant Ships at the Outbreak of Hostilities. The Hague, 18 October 1907.
8. Convention (VII) relating to the Conversion of Merchant Ships into War-Ships. The Hague, 18 October 1907.
9. Convention (VIII) relative to the Laying of Automatic Submarine Contact Mines. The Hague, 18 October 1907.
10. Convention (IX) concerning Bombardment by Naval Forces in Time of War. The Hague, 18 October 1907.
11. Convention (X) for the Adaptation to Maritime Warfare of the Principles of the Geneva Convention. The Hague, 18 October 1907.
12. Convention (XI) relative to certain Restrictions with regard to the Exercise of the Right of Capture in Naval War. The Hague, 18 October 1907.
13. Convention (XII) relative to the Creation of an International Prize Court. The Hague, 18 October 1907.
14. Convention (XIII) concerning the Rights and Duties of Neutral Powers in Naval War. The Hague, 18 October 1907.
15. Declaration (XIV) Prohibiting the Discharge of Projectiles and Explosives from Balloons. The Hague, 18 October 1907.
16. Final Protocol to the Naval Conference of London, 26 February 1909.
17. Declaration concerning the Laws of Naval War. London, 26 February 1909.
18. Additional Protocol to the Convention relative to the Establishment of an International Prize Court. The Hague, 19 September 1910.
19. Manual of the Laws of Naval War. Oxford, 9 August 1913.
20. Treaty relating to the Use of Submarines and Noxious Gases in Warfare. Washington, 6 February 1922.

<sup>10</sup> Source: International Committee of the Red Cross (available at [www.icrc.org/ihl.nsf/INTRO?OpenView](http://www.icrc.org/ihl.nsf/INTRO?OpenView)). Accessed on 21 May 2010.

21. Rules concerning the Control of Wireless Telegraphy in Time of War and Air Warfare. Drafted by a Commission of Jurists at the Hague, December 1922–February 1923.
22. Protocol for the Prohibition of the Use of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare. Geneva, 17 June 1925.
23. Convention on Maritime Neutrality. Havana, 20 February 1928.
24. Convention for the Amelioration of the Condition of the Wounded and Sick in Armies in the Field. Geneva, 27 July 1929.
25. Convention relative to the Treatment of Prisoners of War. Geneva, 27 July 1929.
26. Treaty for the Limitation and Reduction of Naval Armaments, (Part IV, Art. 22, relating to submarine warfare). London, 22 April 1930.
27. Draft International Convention on the Condition and Protection of Civilians of Enemy Nationality Who Are on Territory Belonging to or Occupied by a Belligerent. Tokyo, 1934.
28. Treaty on the Protection of Artistic and Scientific Institutions and Historic Monuments (Roerich Pact). Washington, 15 April 1935.
29. Draft Convention for the Protection of Civilian Populations Against New Engines of War. Amsterdam, 1938.
30. Agreement for the Prosecution and Punishment of the Major War Criminals of the European Axis, and Charter of the International Military Tribunal. London, 8 August 1945.
31. Affirmation of the Principles of International Law recognized by the Charter of the Nuremberg Tribunal. Resolution 95 (I) of the United Nations General Assembly, 11 December 1946.
32. Convention on the Prevention and Punishment of the Crime of Genocide, 9 December 1948.
33. Convention (I) for the Amelioration of the Condition of the Wounded and Sick in Armed Forces in the Field. Geneva, 12 August 1949.
34. Convention (II) for the Amelioration of the Condition of Wounded, Sick and Shipwrecked Members of Armed Forces at Sea. Geneva, 12 August 1949.
35. Convention (III) relative to the Treatment of Prisoners of War. Geneva, 12 August 1949.
36. Convention (IV) relative to the Protection of Civilian Persons in Time of War. Geneva, 12 August 1949.
37. Principles of International Law Recognized in the Charter of the Nuremberg Tribunal and in the Judgment of the Tribunal, 1950.
38. Final Act of the Intergovernmental Conference on the Protection of Cultural Property in the Event of Armed Conflict. The Hague, 14 May 1954.
39. Convention for the Protection of Cultural Property in the Event of Armed Conflict. The Hague, 14 May 1954.
40. Protocol for the Protection of Cultural Property in the Event of Armed Conflict. The Hague, 14 May 1954.
41. Resolutions of the Intergovernmental Conference on the Protection of Cultural Property in the Event of Armed Conflict. The Hague, 14 May 1954.

42. Draft Rules for the Limitation of the Dangers incurred by the Civilian Population in Time of War. ICRC, 1956.
43. Human Rights in Armed Conflicts. Resolution XXIII adopted by the International Conference on Human Rights. Teheran, 12 May 1968.
44. Convention on the Non-Applicability of Statutory Limitations to War Crimes and Crimes against Humanity, 26 November 1968.
45. Respect for Human Rights in Armed Conflicts. Resolution 2444 (XXIII) of the United Nations General Assembly, 19 December 1968.
46. The Distinction between Military Objectives and Non-Military Objectives in General and Particularly the Problems Associated with Weapons of Mass Destruction. Edinburgh, 9 September 1969.
47. Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction. Opened for Signature at London, Moscow and Washington. 10 April 1972.
48. European Convention on the Non-Applicability of Statutory Limitations to Crimes against Humanity and War Crimes. Strasbourg, 25 January 1974.
49. Convention on the Prohibition of Military or Any Hostile Use of Environmental Modification Techniques, 10 December 1976.
50. Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (Protocol I), 8 June 1977.
51. Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of Non-International Armed Conflicts (Protocol II), 8 June 1977.
52. Resolution on Small-Calibre Weapon Systems. Geneva, 28 September 1979.
53. Final Act of the United Nations Conference on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May be Deemed to be Excessively Injurious or to Have Indiscriminate Effects. Geneva, 10 October 1980.
54. Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May be Deemed to be Excessively Injurious or to Have Indiscriminate Effects. Geneva, 10 October 1980.
55. Protocol on Prohibitions or Restrictions on the Use of Mines, Booby-Traps and Other Devices (Protocol II). Geneva, 10 October 1980.
56. Protocol on Prohibitions or Restrictions on the Use of Incendiary Weapons (Protocol III). Geneva, 10 October 1980.
57. International Convention against the Recruitment, Use, Financing and Training of Mercenaries, 4 December 1989.
58. Convention on the Rights of the Child, 20 November 1989.
59. Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on Their Destruction, Paris 13 January 1993.
60. Statute of the International Tribunal for the Prosecution of Persons Responsible for Serious Violations of International Humanitarian Law Committed in the Territory of the Former Yugoslavia since 1991, 25 May 1993.



61. San Remo Manual on International Law Applicable to Armed Conflicts at Sea, 12 June 1994.
62. Statute of the International Criminal Tribunal for the Prosecution of Persons Responsible for Genocide and Other Serious Violations of International Humanitarian Law Committed in the Territory of Rwanda and Rwandan citizens responsible for genocide and other such violations committed in the territory of neighboring States, between 1 January 1994 and 31 December 1994, 8 November 1994.
63. Protocol on Blinding Laser Weapons (Protocol IV to the 1980 Convention), 13 October 1995.
64. Protocol on Prohibitions or Restrictions on the Use of Mines, Booby-Traps and Other Devices, amended on 3 May 1996.
65. Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on their Destruction, 18 September 1997.
66. Rome Statute of the International Criminal Court, 17 July 1998.
67. Second Protocol to the Hague Convention of 1954 for the Protection of Cultural Property in the Event of Armed Conflict The Hague, 26 March 1999.
68. Optional Protocol to the Convention on the Rights of the Child on the involvement of children in armed conflict, 25 May 2000.
69. Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May be Deemed to be Excessively Injurious or to Have Indiscriminate Effects. Geneva, 10 October 1980. Amendment article 1, 21 December 2001.
70. Protocol on Explosive Remnants of War (Protocol V to the 1980 Convention), 28 November 2003
71. Customary International Humanitarian Law, March 2005.

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**Part III**  
**Application**

# Chapter 12

## Territorial Division and Cross-Border Linkage

For a long time, especially during the Cold War era, many international borders and border areas were treated as politically marginal and economically disadvantageous places. Along with the increasing trend of economic globalization, they are also the frontlines for their respective hinterlands to pursue international and cross-border trade and cooperation. Along with the increasing global interactions, cross-border areas are becoming more or more important to policy makers. To be sure, the efficiency of cross-border linkage depends on two main factors. The first one relates to the policy of cross-border management. More specifically, the tighter the policy of a border checkpoint, the lower efficiency is the cross-border communication. The other factor that hinders the efficiency of cross-border linkage concerns the hardware of border crossings.

Appropriate division and, if necessary, re-allocation of territories are also an important part of cross-border management, especially when these territories are in active dispute. After an appropriate division or exchange of the territories that were either in dispute or irrationally divided between states, national and local planners are able to improve the physical infrastructures of cross-border communication and transportation as well as to get businesses to invest in the follow-on development needed in the border areas. Furthermore, a mutually beneficial scheme on territorial exchange or division can also promote social and economic progress as well as help consolidate peace and stability.

### 12.1 Dividing Territories among Claimants

#### 12.1.1 Principles

Throughout history, physical terrain, political fiat, and conquest have divided the world into independent states and political entities. The result is the man-made and

sometimes arbitrary or even imposed boundaries.<sup>1</sup> However, not all of these political boundaries have worked well. Some disputed boundaries and cross-border areas may even evolve into the theaters of bloody fights and wars between antagonistic states.

Regardless of the existing boundary and territorial disputes, compromise may become possible because a state's claim over a disputed territory carries both benefits and costs. When these costs outweigh the value of contested territory, compromise becomes more attractive than confrontation. The cost a state bears for pressing territorial disputes opens a bargaining space in which concessions over contested territory can be exchanged for other goals that a state may seek. When the bilateral (or multilateral) ties between the states become more important, cooperation in and delaying the settlement of their territorial disputes will become more attractive than continuing to press claims.

Boundary and territorial disputes often stem from material and/or cultural claims; sometimes they may also emerge as a result of the fundamental changes in domestic and international environments. In certain circumstances, boundary and territorial disputes may even evolve into geopolitical games of big-power rivalry and competition. The smooth implementation of the "fair division scheme" requires compromises from all parties concerned. Below are two examples of such situation.

### ***12.1.2 Application I***

Changes in the Nepal–China boundary line can be distinguished by the overlying borderline on the maps before and after the border treaty of 1962. For this, if the northern borderline of the Map of Nepal prepared by Central Bureau of Statistics for population census in 1958/Map of Nepal published by Pradyumna P. Karan from the University of Kentucky USA in 1958, in which the country is divided into 38 districts and 491 Moujas, Praganna and Thum (administrative division and subdivisions), is overlaid on the map published by the Topographical Survey Branch of the Department of Land Survey in 1979, alterations in the borderline at several places can be recognized very well.

The joint boundary agreement between China and Nepal was signed on October 5, 1961. Under this agreement, some border areas have been adjusted according to their traditional uses, possessions and principle of convenience. And the territorial re-adjustment was made on the basis of 'give and take'. While comparing and computing the area of alterations in the borderline on those maps through graphical method, the exchanged areas between Nepal and China can be found in Fig. 12.1. In sum, Nepal acquired 2139.00 km<sup>2</sup> of land from China, and Nepal conceded 1836.25 km<sup>2</sup> of its existing territory to China, resulting in the net gain of 302.75 km<sup>2</sup> for Nepal (see Table 12.1). These exchanges of areas on the frontiers resulted from the change of shape of Nepal's northern borderline before and after 1962.

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<sup>1</sup> See Appendix for detailed data on these land boundaries.



**Fig. 12.1** The shifted boundary between China and Nepal. (Source: © 2014 by Buddhi N Shrestha (Bhumichitra Mapping, Kathmandu, Nepal))

**Table 12.1** A detailed territorial exchange scheme between China and Nepal. (Source: Shrestha 2003, pp. 71–72)

District	Area gained by Nepal (km <sup>2</sup> )	Area gained by China (km <sup>2</sup> )	Net loss (-) or gain (+) of China (km <sup>2</sup> )
Bajhang	–	140.00	–140.00
Darchula	–	48.50	–48.50
Dhading	–	36.25	–36.25
Dolakha	104.25	28.25	76.00
Dolpa	192.50	199.75	–7.25
Gorkha	56.25	280.50	–224.25
Humla	860.00	287.50	572.50
Manang	164.00	–	164.00
Mugu	–	356.00	–356.00
Mustang	352.50	108.00	244.50
Rasuwa	76.00	143.50	–67.50
Sankhuwasabha	68.00	67.50	0.50
Sindhupalchowk	–	32.00	–32.00
Solukhumbu	44.75	92.25	–47.50
Taplejung	220.75	16.25	204.50
Total	2139.00	1836.25	302.75

### ***12.1.3 Application II***

China and Russia share a borderline of more than 4000 km. In history, the border issues were important factors that hindered the normal development of their bilateral relations. The problem also caused longstanding tensions for the two countries, even triggering direct skirmishes such as Sino–Russian Eastern Railway Battle in 1929 and the Demansky (Zhenbao Dao) island Skirmish in 1969. The former USSR once posted an estimated number of 700,000 soldiers on its side of the controversial boundary, at a time when one million Chinese soldiers in China stood on the other side. In order to cope with the threat from the north, China launched the movement of “digging holes deep and accumulating food in large,” which mobilized all citizens to prepare for war. All of this affected, to a certain degree, the two countries’ economic development, especially in their disputed areas.

After the end of the Cold War, China and Russia readjusted their domestic and external strategies in order to improve their bilateral relations. On the one hand, China implemented a policy of solving disputes through peaceful negotiations based on respecting historical and present circumstances. On the other hand, the Russian Federation, realizing that Chinese position on the territorial request was reasonable, pursued a pragmatic policy on the border issues. This provided a flexible environment for Russia and China to solve their border re-demarcation issues. On May 16, 1991, China and Russia signed and ratified the agreement on the eastern part of the Sino–Russian border. China and Russia also signed the agreement on the western part of the borders. Beginning in 1991, the two sides surveyed the boundary, and finished the work of boundary demarcation in 1999, setting up 1183 boundary markers. The settlement of the Sino–Russian border question has tremendous significance. However, the territorial disputes between China and Russia had been resolved until the mid-2000s. See a case study at the end of this chapter.

## **12.2 Cross-Border Territorial Re-Allocation**

### ***12.2.1 Principles***

A territorial re-allocation or exchange scheme is designed for the benefit of at least one of, and, at the same time, to do no harm to the rest of, the states that are in possession of territories (or any other territorial-related resources) to be exchanged. During the past decades, plans for implementing territorial partition in disputed areas have given rise to the mechanism of land exchanges. The exchange of sovereignty over territories include swapping of territories with their population, swapping of empty territories, and swapping of empty territories in exchange for populated ones (Arad 2006).

In general, the basic principles for the exchange of territories are as follows:



- Swapping of territories according to their demographic characteristics
- Vital-to-existence principle
- Easy-access principle
- The principle of symmetry (if the territories to be exchanged are of same importance to both sides)
- The principle of reciprocity (if the territories to be exchanged have different strategic values to both sides)

To be sure, for the territorial exchange scheme to work well, there are some pre-conditions. First, the sovereignty or ownership over the territories must be clearly defined or not disputable. Second, all the territories to be exchanged must have some comparative advantages (in terms of economic value, strategic location, etc.) over each other.

After an appropriate re-allocation (exchange) of the territories that were either in dispute or irrationally divided between states, national and local planners are able to improve the physical (ground and underground) infrastructures of communication and transportation as well as to get businesses to invest in the follow-on development needed in those areas. Furthermore, a mutually beneficial scheme on territorial exchange can also promote social and economic progress as well as help consolidate peace and stability.

### ***12.2.2 Application I***

A common complaint of landowners is that the regulations to protect endangered species amounts to a taking of private property without compensation. Land swapping may solve this problem. In its basic form, the landowners would receive more commercially valuable land from governmental or other non-governmental organizations, in exchange for unusable endangered species habitat with greater conservation value (Yager 1993). An agreement has been reached between the Aerojet-General Corporation and the federal government to trade usable lands for endangered species habitat. They agreed to trade 2000 ha (5000 ac) of private Florida Everglades wetlands for 11,000 ha of the government's Nevada desert as well as a 99-year lease on 5700 additional hectares in Nevada. What do the federal government plan was to sell the wetlands to the South Florida Water Management District for controlling water resources, and the proceeds would be used to expand two wildlife refuges in the area. The Nevada property in the hands of Aerojet-General has 7000 ha set aside for protection of the desert tortoise, another protected species. The trade should work out to the benefit of all parties involved (McNeely 1988).

The benefits of land trades are obvious. The private owner receives a land which can help her/his land use plans. The government receives a land with high conservation value, and can manage the land more freely and effectively. Endangered species residing on the land are less likely to suffer habitat destruction at the hands of frustrated landowners who want the critter gone, and may even have their existing habitat improved (Schaerer 1996).

### 12.2.3 *Application II*

After the Second World War, the territory of Poland changed dramatically. On February 15, 1951 the governments of Republic of Poland and Union of Soviet Socialist Republics (USSR) signed a bill which confirmed the change of the eastern border of Poland. According to the agreement, Poland transferred to the Ukraine (the latter was part of the USSR) 480 km<sup>2</sup> of territory located west of the town of Sokal, which had been located in the Hrubieszów county of the Lublin Voivodeship (together with the towns of Belz, Sokal, Krystynopol and Uhnów as well as the railway “Rawa Ruska–Krystynopol”). In return, the USSR gave up a part of the Ukraine’s Drogobychskaya region (including the city of Ustrzyki Dolne and a few of villages), with a total area of 480 km<sup>2</sup>. According to the mutual agreement, all immovable properties on the exchanged territories (such as buildings, infrastructure, farms, railways and communications services) was automatically transferred to the new owner and both sides relinquished all future claims.<sup>2</sup>

There have been many other exciting examples concerning the cross-border territorial exchanges between neighboring states in Europe. For example, based on an agreement signed by Governments of the Czech Republic and Germany in Prague in April 2003, which was approved by the Czech Senate in November 2004, the Czech Republic and Germany would exchange almost 3000 m<sup>2</sup> of territory in connection with the Rozvadov–Waidhaus border crossing motorway construction project. Within the construction of the motorway, the border is to divide the planned motorway bridge at the west Bohemian crossing. The border line, however, had a different course, therefore the two countries decided to exchange their territories in the bridge’s surroundings. In early 2004, the Czech parliament also approved the exchange of almost 42,500 m<sup>2</sup> of land on the Czech–Austrian border, mainly due to changing river courses and somewhere also to facilitate people’s access to real estate.<sup>3</sup>

### 12.2.4 *Application III*

The present boundary between Jordan and Saudi Arabia was partly defined by a series of agreements between Britain and the government of what eventually became Saudi Arabia. The border was still partly undefined when Jordan became independent in 1946. During the following years, the Jordanians were eager for an expansion of the coast of the Gulf of Aqaba, and thus sought an additional territory primarily for building a port. On August 10, 1965, Jordan and Saudi Arabia con-

<sup>2</sup> Cited from “Agreement (with Protocol and Annexes) Concerning the Exchange of Sectors of Their State Territories,” signed by People’s Republic of Poland and the Union of Soviet Socialist Republics at Moscow on February 15, 1951. Available at [http://untreaty.un.org/unts/1\\_60000/13/3/00024116.pdf](http://untreaty.un.org/unts/1_60000/13/3/00024116.pdf). Accessed on 7 Feb 2011.

<sup>3</sup> Based on Guo (2012, pp. 86–87), which also gives other references.

cluded a bilateral agreement that realigned and delimited their land boundary. The realignment resulted in an exchange of territories. According to this agreement, Jordan ceded 7000 km<sup>2</sup> of land to Saudi Arabia and was given 6000 km<sup>2</sup> (Hartoqa 2006). As a result of this territorial exchange, the new boundary enabled Jordan to expand its port facilities and established a zone in which the two parties agreed to share petroleum revenues equally if oil were discovered. Under this agreement, the pasturage and watering rights of nomadic tribes are also protected inside the exchanged territories. The boundary measures 740 km from the point where Jordan, Saudi Arabia, and Iraq meet at Jabal Anazah to a point on the Gulf of Aqaba, approximately 18 km due south of the Jordanian port of Aqaba (Qojas 1999).

After decades of clashes between the Arabs and the Israelis, it seems that the Palestinian–Israelis peace talk is still in a deadlock. Geographers and demographers have put forward various proposals for land swaps in order to achieve a sustained peace in the two geographically intertwined states. For example, a scheme published in 1996 suggested that Israel would transfer the “Triangle area” (i.e., from Kafr Kassem in the south to Barta’a in the north) to the Palestinians. In return, the Palestinians would cede areas in the Jordan valley to Israel. Another scheme is that as part of a final settlement between Israel and the Palestinians, 450,000 Arabs now living under Israeli sovereignty—particularly the Arabs of East Jerusalem and the Arabs of the “Triangle”—would be placed under Palestinian sovereignty without any of them having to leave their homes (Arad 2006).

A more severe problem facing the Palestinians today is what is taking place in the Gaza Strip in which there is no direct geographical connection to the rest of the Islamic world. Indeed, the resolution of the Israeli–Palestinian conflict does not appear to be the responsibility of the two states alone. Egypt, Jordan, and Saudi Arabia also play their roles in facilitating the resolution of this conflict. As believed by many observers, the scheme of territorial exchange is an effective solution to sustainable peace. According to the scheme proposed by Ben-Arie (2004), Israel would cede territory in Negev to Egypt and allow a corridor highway to be built between Egypt and Jordan from this territory. The Israelis would get territory in the West Bank equivalent to the area the Palestinians receive from Egypt. And the Palestinians, of course, would be given a land (via which the Gaza Strip may get access to the rest of the Islamic world) in the Sinai peninsula.

## 12.3 Managing Border-Crossings

### 12.3.1 *The GWB Scandal*

The George Washington Bridge (GWB), a double-decked toll bridge, is the busiest motor-vehicle bridge in the world (see Fig. 12.2). It carries Interstate 95 and US Route 1/9 over the Hudson river between Fort Lee in New Jersey and northern Manhattan in New York City. On the New Jersey side of the bridge, the Palisades



**Fig. 12.2** George Washington Bridge looking from Manhattan to New Jersey. (Source: Fly Navy (28 April 2007) available at <http://www.flickr.com/photos/mgreene/476286568/>)

Interstate Parkway connects directly to the bridge's upper level, and the New Jersey Turnpike connects to both levels of the bridge. On the New York side, the 12-lane Trans-Manhattan Expressway heads east across the narrow neck of upper Manhattan, from the bridge to the Harlem river, providing access from both decks to 178th Street, the Henry Hudson Parkway and Riverside Drive on the West Side of Manhattan, and to Amsterdam Avenue and the Harlem River Drive on the East Side.

The Fort Lee lane closure of the George Washington Bridge is a US political scandal in which politicians of New Jersey conspired to create traffic jams in Fort Lee, New Jersey, starting at a New York-bound entrance to the GWB. The problems began on September 9, 2013, after two toll lanes (at one of the toll plaza entryways) were closed to local traffic from Fort Lee and surrounding communities and used for traffic from state and interstate expressways instead, resulting in massive back-ups in Fort Lee.

Beginning on September 9, 2013, two of the three dedicated toll lanes at one of the Fort Lee entrances to the upper level of the GWB were closed on orders from David Wildstein without notification of Fort Lee government and police officials. In an area that normally experiences a great deal of traffic, the lane closings caused a significant increase in traffic congestion. This led to major delays for school trans-

portation and police and emergency response within Fort Lee, in which a 91-old woman subsequently died of cardiac arrest (Zernike 2014).

On September 11, Robert Durando indicated in a Port Authority e-mail that, if the automated toll lanes were closed permanently in favor of one manned lane for local traffic, it would be “very expensive” since annual toll-collector costs would increase approximately \$ 600,000. This would have covered overtime, as well as stationing reserve employees when a scheduled toll collector was not able to work. He also indicated that there would be additional, but still to be determined costs, for Port Authority police due to their coverage of traffic for a greatly extended rush hour (Akin January 10 and 13, 2014).

On September 12, Port Authority engineers indicated that reported delays for local traffic greatly exceeded any time savings for the major highway traffic based on reported information for vehicle travel times on Interstate 95 and local traffic counts from that week. A PowerPoint analysis estimated that the extra daily morning rush hour time, 2800 vehicle-hours, endured by local traffic on a typical day greatly outweighed time savings, 966 vehicle-hours, of the I-95 traffic (Barro January 10, 2014).

On September 13, 2013, Patrick Foye, the executive director of the Port Authority and an appointee of New York Governor Andrew Cuomo, ordered that the lanes be reopened in a strongly worded e-mail to senior Port Authority officials and staff, including Bill Baroni and David Samson. In the e-mail, Foye repeatedly called the decision to close the lanes “hasty and ill-advised”, stated that the decision violated policy and long-standing custom at the Port Authority, and that he believed that closing the lanes “violates Federal Law and the laws of both States.” (Zernike 2014)

### 12.3.2 *Friendship Bridges*

Friendship Bridge is a name for bridges linking countries separated by rivers or straits. In a few of cases, there are also other names referring as to this kind of bridges, such as Peace Bridge, Fraternity Bridge, and Unity Bridge, each representing specific political or cultural meanings of its own. Still, the majority of cross-border bridges are constructed without these meanings. Figure 12.3 shows the Three-Country Bridge—called Dreiländerbrücke in German or La passerelle des Trois Pays in French—which connects Huningue (France) and Weil am Rhein (Germany), next to the tripoint near Basel (Switzerland).

The following reports several of this kind of bridges around the world.<sup>4</sup>

Afghanistan–Uzbekistan Friendship Bridge, which is a road and rail bridge across the river Amu Darya, connecting the town of Hairatan in the northern Balkh province of Afghanistan with Termez in Uzbekistan. The bridge was built by the Soviet Union and opened in 1982. It is the only fixed link across the Uzbek–Afghan border.

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<sup>4</sup> Data sources include Wikipedia and other miscellaneous news clippings.



**Fig. 12.3** The Three-Country Bridge connecting France and Germany, near Switzerland. (Source: Wladyslaw 4 August 2007)

The Brazil–Paraguay Friendship Bridge (Spanish: Puente de la Amistad, Portuguese: Ponte da Amizade) is an arch bridge connecting the Brazilian city of Foz do Iguaçu and the Paraguayan city of Ciudad del Este. The bridge was opened to traffic in 1965. The space between the main arches is 290 m. The bridge itself is 552 m long.

The Danube Bridge (formerly known as the Friendship Bridge) is a steel truss bridge over the Danube river connecting the Bulgarian bank to the south with the Romanian bank to the north and the cities of Ruse and Giurgiu, respectively. It is one of only two bridges connecting Romania and Bulgaria. Opened on 20 June 1954, the bridge is about 2224 m long. The bridge has two decks; a two lane motorway and a railway. Sidewalks for pedestrians are also included. The central part of the bridge (85 m) is mobile and can be lifted for oversized boats passage. The maintenance of the mobile part is Romania’s responsibility and is periodically checked. Border control stations are present on the bridge, due to its serving as a border crossing between the two countries. Since 2007 there has been no more customs control and the passport/identity card control is done “on one desk” either by the Bulgarian or the Romanian border police, being an “internal border” within the European Union.

The Qatar Bahrain Friendship Bridge (also referred to as the Qatar Bahrain Causeway) is a proposed causeway between the two Arab states of Qatar and Bahrain. The bridge is expected to open by 2022. The link between the two countries would be approximately 40 km in length, and support both a road and a railway. The link was expected to consist of a number of bridges and be a natural extension of

the King Fahd Causeway that connects Bahrain and Saudi Arabia, thus linking the entire region. These links include 18 km of artificial dikes and 22 km of viaducts and bridges. These bridges would be 40 m in height at places to allow maritime navigation. The eastern-end of the causeway in Qatar would be located at Ras Ashairij, 5 km south of the city of Zubarah. The opposite end of the causeway would link North of Askar in the Kingdom of Bahrain.

The First Thai–Lao Friendship Bridge is a bridge over the Mekong, connecting Nong Khai province and the city of Nong Khai in Thailand with Vientiane Prefecture in Laos—the city of Vientiane is approximately 20 km from the bridge. Opened on April 8, 1994, it was the first bridge across the lower Mekong, and the second on the full course of the Mekong. With a length of 1170 m, the bridge has two 3.5 m wide road lanes, two 1.5 m wide footpaths and a single 1000 mm gauge railway line in the middle, straddling the narrow central reservation. The rail gauge is 1000 mm. The official name of the bridge was changed by the addition of “First” after the Second Thai–Lao Friendship Bridge opened.

The Second Thai–Lao Friendship Bridge over the Mekong, which was open on January 9, 2007, connects Mukdahan province in Thailand with Savannakhet in Laos. Bridge construction began on March 21, 2004. Supports and spans were constructed on shore, then moved out onto pylons in the river by crane. The bridge is 1600 m long and 12 m wide, with two traffic lanes. Traffic on the bridge drives on the right, as in Laos, while traffic in Thailand drives on the left; the change-over is on the Thai side.

The Third Thai–Lao Friendship Bridge over the Mekong is a bridge that connects Nakhon Phanom Province in Thailand with Thakhek, Khammouane in Laos. The bridge’s foundation stone was laid on March 6, 2009, and it opened for traffic on November 11, 2011. The bridge is 1423 m long and 13 m wide. The name “Third Thai–Lao Friendship Bridge” was also previously used to refer to the planned bridge from Chiang Khong, Thailand to Huay Xai, Laos.

The Fourth Thai–Lao Friendship Bridge is a highway bridge over the Mekong river that links the Chiang Khong District of Thailand and Ban Houayxay in Laos. The bridge opened to the public on December 11, 2013. The bridge is 630 m long (with a main span of 480 m) and is 14.7 m wide. It is located about 10 km from Amphoe Chiang Khong (Chiang Khong District), in northern Thailand, and about 12 km from Ban Houayxay, the capital of Bokeo province, in northwestern Laos.

The China–North Korea Friendship Bridge (renamed from Yalu River Bridge in 1990) connects the cities of Dandong, China and Sinuiju, North Korea. It was constructed by the Japanese Army between April 1937 and May 1943, during their occupation of Korea and Manchukuo, to span the Yalu river. One of the few ways to enter or leave North Korea, it carries automobile and rail traffic. Pedestrians are not allowed to cross. About 60 m downstream are the remains of an older bridge constructed between May 1909 and October 1911. With a total length of 944 m, it was an iron truss bridge of 12 spans on stone piers. Both bridges were bombed by American aircraft during the Korean War (1950–1953). The bridges were repeatedly repaired. The 1911 bridge was left destroyed and only the newer 1943 bridge

repaired and used at the end of the war. The remaining spans of the old Yalu River Bridge were opened as a tourist attraction in 1993.

The Sino–Nepal Friendship Bridge is a bridge spanning the Bhote Koshi river, linking Kodari in Sindhupalchok district, Nepal and Zhangmu, China. The China National Highway No. 318 goes to Zhangmu and on to Shanghai. The Tibetan part of the highway between Zhangmu and Lhasa is known as the Friendship Highway.

The Tajik–Afghan Friendship Bridge connects the two banks of Darvaz region across the Panj river (further downstream known under the name Amu Darya) separating Tajikistan and Afghanistan, at town Khorugh. It was opened on 6 July 2004. The 135-m long suspension bridge has a single-track 3.5 m wide and a carrying capacity of 25 metric t. It carries both commercial and passenger traffic and represents a permanent overland link between the two countries.

The Tancredo Neves Bridge, also known as Fraternity Bridge (Portuguese: Ponte da Fraternidade, Spanish: Puente de la Fraternidad) connects the Brazilian city of Foz do Iguaçu with the Argentine Puerto Iguazú, crossing over the Iguassu river. The Fraternity Bridge's construction started on January 13, 1982, and was officially inaugurated on November 29, 1985, and named after Brazilian politician Tancredo Neves. The bridge is 489 m long, 16.5 m wide and 70 m high at its highest point.

The Unity Bridge is constructed on the Ruvuma river between Tanzania and Mozambique. In 2002 the two national governments made a formal agreement to build a new bridge across the river. The first foundation stones were laid both on Tanzanian and Mozambique sides on October 10, 2005. Construction was initially planned to be finished in 2008. The Unity Bridge was finally inaugurated on May 12, 2010. With a total number of 18 spans, this bridge is 720 m long and 13.8 m (wide, with a height up to 10 m. The rehabilitation of access roads on both sides of the bridge is to be started.

The Peace Bridge is an international bridge between Canada and the United States at the east end of Lake Erie at the source of the Niagara river, about 12.4 mile upriver of Niagara Falls. It connects the City of Buffalo, New York, in the United States to the Town of Fort Erie, Ontario, in Canada. The Bridge consists of five arched spans over the Niagara river and a Parker through-truss span over the Black Rock Canal on the American side of the river. The total length is 5800 ft (1768 m). The Peace Bridge was named to commemorate 100 years of peace between the United States and Canada. The building of the Peace Bridge was approved by the International Joint Commission on August 6, 1925. Edward Lupfer served as chief engineer. A major obstacle to building the bridge was the swift river current, which averages 7.5–12 miles/h.

## 12.4 Border Checkpoint Construction

Undoubtedly, the efficiency of cross-border linkage depends on border control policy: that is, the tighter the policy of a border checkpoint, the lower efficiency is the communication between the two sides of the border (we will discuss this in greater detail in Chap. 17). However, the hardware of border crossings also matters.



With the world's largest land border communication networks, the United States has 29 and 42 land ports (or border-crossing points) in its borders with Canada and Mexico, respectively. Each border-crossing location is composed of one or more lanes for both commercial and passenger vehicles and, in some land ports with Mexico, for pedestrians. The max number of lanes available for passengers to cross the Canada/US and Mexico/US land borders are shown in Table 12.2 and 12.3.

The construction and instrumentation of border checkpoints not only benefit citizens living in the border areas, it can also increase the efficiency of cross-border communication and promote cross-border trade economic cooperation for the countries involved.

### ***12.4.1 The Belarusian–Polish Border Project***

The project “Peschatka—Stage III (Belarusian–Polish border)” (No. PBU/LSP/09/005) is implemented in frames of Cross-border Cooperation Program “Poland–Belarus–Ukraine” 2007–2013.<sup>5</sup> The objective of the project is to contribute to the protection of external borders of the European Union by way of enhancing border management of the Republic of Belarus. Tasks of the project include:

1. Raising road border checkpoint' capacity.
2. Reducing border crossing time.
3. Increasing the effectiveness of the border infrastructure and clearance procedures.
4. Increasing security at the “Peschatka–Polowce” border crossing by way of extending the road border checkpoint.

The project, with the cross-border nature of its own, is symmetrical and will be implemented mainly on the Belarusian side in parallel with the Polish side on both sides of the border. Total budget of the project amounts to 12.1 million €. The project is financed out of the European Union funds with co-financing of the Belarusian side. European Union contribution to financing of the project amounts to 10.9 million €, amount of Belarusian co-financing amounts to 1.2 million € (10% of the grant amount for the project implementation). International technical assistance project is implemented by the State Customs Committee of the Republic of Belarus in cooperation with Podlaskie Voivodeship of the Republic of Poland.

The project will be realized through infrastructure construction for passengers, goods and pedestrians departure with the following crossing capacity in both directions:

- 50 trucks
- 1130 passenger cars
- 20 coaches.

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<sup>5</sup> In what follows in this section, all data cited are based on [http://gtk.gov.by/en/International\\_technical\\_assistance/Poland\\_Belarus\\_Ukraine/Peschatka](http://gtk.gov.by/en/International_technical_assistance/Poland_Belarus_Ukraine/Peschatka). Accessed on 1 Feb 2014.

**Table 12.2** The max number of lanes of US–Canadian border ports of entry. (Source: <http://apps.cbp.gov/bwt/index.asp> Accessed on 28 February 2014)

Port name (crossing name)	Commercial vehicles	Passenger vehicles	Pedestrian
Alexandria Bay (Thousand Islands Bridge)	3	8	N/A
Blaine (Pacific Highway)	3	6	N/A
Blaine (Peace Arch)	N/A	10	N/A
Blaine Point Roberts)	1	3	N/A
Buffalo/Niagara Falls (Lewiston Bridge)	4	6	N/A
Buffalo/Niagara Falls (Peace Bridge)	7	11	N/A
Buffalo/Niagara Falls (Rainbow Bridge)	N/A	17	N/A
Buffalo/Niagara Falls (Whirlpool Bridge)	N/A	2	N/A
Calais (Ferry Point)	N/A	2	N/A
Calais (International Avenue)	3	6	N/A
Calais (Milltown)	N/A	1	N/A
Champlain	10	10	N/A
Derby Line	2	3	N/A
Detroit (Ambassador Bridge)	13	19	N/A
Detroit (Windsor Tunnel)	1	10	N/A
Highgate Springs	1	5	N/A
Houlton	2	5	N/A
International Falls	1	2	N/A
Jackman	2	3	N/A
Lynden	1	4	N/A
Madawaska	1	2	N/A
Massena	3	6	N/A
Norton	1	2	N/A
Ogdensburg	3	5	N/A
Pembina	3	4	N/A
Port Huron (Bluewater Bridge)	6	12	N/A
Sault Ste. Marie (International Bridge SSM)	2	4	N/A
Sumas	2	5	N/A
Sweetgrass	2	4	N/A

After its completion, the final project (persons who get advantage from the project implementation) will benefit (i) citizens crossing the border between the Republic of Belarus and the Republic of Poland; (ii) citizens of the European Union countries (after completion of the road border checkpoint construction and the start of international movement); and (iii) citizens of Brest district of the

**Table 12.3** The max number of lanes of US–Mexican border ports of entry. (Source: <http://apps.cbp.gov/bwt/index.asp> Accessed on 28 February 2014)

Port name (crossing name)	Commercial vehicles	Passenger vehicles	Pedestrian
Andrade	1	3	4
Brownsville (B&M)	N/A	4	N/A
Brownsville (Gateway)	N/A	5	5
Brownsville (Los Indios)	4	4	N/A
Brownsville (Veterans International)	4	4	N/A
Calexico (East)	3	8	4
Calexico (West)	N/A	10	6
Columbus	1	2	N/A
Del Rio	2	6	N/A
Douglas	2	7	N/A
Eagle Pass (Bridge I)	N/A	5	N/A
Eagle Pass (Bridge II)	2	6	N/A
El Paso (Bridge of the Americas)	6	14	4
El Paso (Paso Del Norte)	N/A	12	14
El Paso (Stanton DCL)	N/A	3	2
El Paso (Ysleta)	8	12	3
Fabens (Fabens)	N/A	2	N/A
Fort Hancock (Fort Hancock)	N/A	2	N/A
Hidalgo/Pharr (Anzalduas International Bridge)	N/A	4	N/A
Hidalgo/Pharr (Hidalgo)	N/A	12	5
Hidalgo/Pharr (Pharr)	6	6	N/A
Laredo (Bridge I)	N/A	4	9
Laredo (Bridge II)	N/A	15	N/A
Laredo (Colombia Solidarity)	8	4	N/A
Laredo (World Trade Bridge)	16	N/A	N/A
Lukeville	1	5	N/A
Naco	1	2	N/A
Nogales (Deconcini)	N/A	8	6
Nogales (Mariposa)	7	6	N/A
Nogales (Morley Gate)	N/A	N/A	4
Otay Mesa (Commercial)	10	N/A	N/A
Otay Mesa (Passenger)	N/A	13	6
Presidio	2	3	N/A
Progreso Donna (International Bridge)	N/A	4	4
Progreso Progreso (International Bridge)	1	5	7
Rio Grande City	2	3	N/A

**Table 12.3** (continued)

Port name (crossing name)	Commercial vehicles	Passenger vehicles	Pedestrian
Roma	1	4	N/A
San Luis (San Luis I)	N/A	9	7
San Luis (San Luis II)	3	N/A	N/A
San Ysidro	N/A	24	15
Santa Teresa (Santa Teresa Port of Entry)	3	4	2
Tecate	2	2	2

### ***12.4.2 The New Hong Kong–Shenzhen Border Control Point***

Currently, the cross-boundary traffic between Hong Kong and Shenzhen is mainly concentrated in the western part of Hong Kong. With its closer ties with the mainland China, cross-boundary traffic is anticipated to have continuous increase in the long term. Due to physical constraints, existing boundary control points (BCPs) could hardly meet the anticipated future demand in terms of capacity, convenience and level of comfort. As a result, a new BCP will be needed to meet the cross-boundary traffic demand on the eastern side.<sup>6</sup>

A Hong Kong–Shenzhen joint study, which was launched in December 2006, explores the need, function and benefits of a BCP in the eastern part of the Hong Kong–Shenzhen (see Fig. 12.4). The study was completed in June 2008, confirming the need for the new BCP. On September 18, 2008, the two governments of Hong Kong and Shenzhen jointly announced the implementation of the new BCP with an aim to commencing operation of the new BCP in 2018.

The new BCP will be the seventh land boundary crossing between Hong Kong and Shenzhen, providing modern cross-boundary control facilities and services on the eastern side of Hong Kong. It will be connected with the Eastern Corridor in Shenzhen and provides a shorter route to the eastern part of Guangdong province and adjacent provinces such as Jiangxi and Fujian via the Shenzhen–Huizhou and the Shenzhen–Shantou Expressways. This will help extend the economic hinterland of Hong Kong and Shenzhen and promote further regional cooperation and development.

A new trunk road will be constructed to link up the BCP with Tolo Highway via Fanling Highway. It will also provide a convenient access to the proposed Ping Che/Ta Kwu Ling New Development Area and thus enhance future development and improve the overall transport network in the New Territories East.

The new BCP will serve cross-boundary goods vehicles (excluding those for fresh food, livestock and poultry, which would continue to use the Man Kam To BCP) and passengers traveling between Hong Kong and Shenzhen, Huizhou,

<sup>6</sup> The following heavily draws on the website material published by the Planning Department of HKSAR, available at <http://www.pland.gov.hk>. Accessed on 1 March 2014.

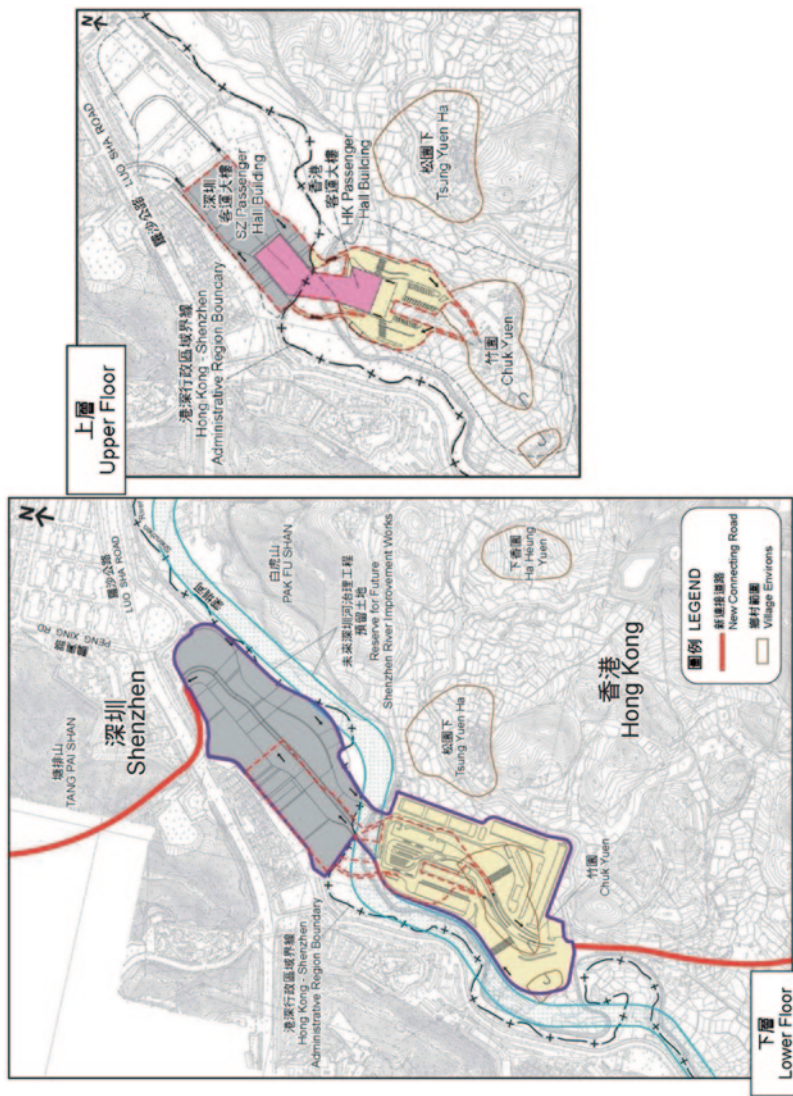


Fig. 12.4 The new Hong Kong-Shenzhen border control point (two floors). (Source: www.pland.gov.hk (courtesy of Planning Department of HKSAR))

Guangdong, Jiangxi and Fujian. It is estimated that by 2030, the new BCP will be handling about 20,600 vehicular trips and 30,700 passenger trips per day.

The design of the new BCP will adopt a ‘people-oriented’ approach. It is proposed to have an integrated passenger hall building over the Shenzhen river so as to minimize the distance of the immigration kiosks and customs checkpoints of the two sides. A two-storey design is also adopted to minimize land requirement, resulting in a footprint on the Hong Kong side of about 18 hectares. Facilities for goods vehicles and public transport interchange will be located on the ground floor while the upper floor, which is about one-fourth of the size of the ground floor, will serve passengers as well as private cars and coaches. Final design is subject to further study to be commissioned by the Civil Engineering and Development Department.

A dual 2-lane trunk road linking up the new BCP with the Tolo Highway is proposed. The length of the preliminary alignment is about 10 km, comprising 3 sections of tunnel (3.5 km long in total) and viaduct (6.5 km long). The final road alignment and its slip road connections are subject to detailed study to be commissioned by the Civil Engineering and Development Department.

The improvement of a section of the Shenzhen river (about 4 km long) starting from its confluence with Ping Yuen river to the eastern boundary of the new BCP will be implemented as part of the new BCP project. The actual alignment of the improvement works will be jointly delineated by the Drainage Services Department and the Shenzhen Government. A broad environmental impact assessment has been carried out and confirmed that the various environmental impacts of the new BCP and connecting road could be effectively mitigated to meet the statutory requirements of the Environmental Impact Assessment Ordinance. A full environmental impact assessment will be conducted at the next stage of the project to address any environmental concerns.

The implementation of the new BCP, the new connecting road and the Shenzhen river improvement works will require resumption of private land. Resite of an indigenous village in Ta Kwu Ling, namely, Chuk Yuen Village, is required for the BCP development. The Civil Engineering and Development Department plans to engage consultants to undertake an investigation and preliminary design for the development of the new BCP and its connecting road in April 2009. Besides, a working group on implementation of the BCP has been set up under the Hong Kong–Shenzhen Joint Task Force on Boundary District Development to coordinate technical works of both Hong Kong and Shenzhen sides.

## 12.5 Case 12. Dividing the Bolshoi Ussuriiskiy/Heixiazi Dao<sup>7</sup>

Bolshoi Ussuriiskiy islands is called Heixiazi Dao in Chinese. It also has another Chinese name, Fuyuan Delta. These islands are composed of Bolshoi Ussuriiskiy (or Heixiazi Dao in Chinese), Tarabarov (or Yinlong Dao in Chinese) and over 90

<sup>7</sup> This case study heavily draws on my early work (Guo 2007, pp. 45–47, 70–72, 248–249).

small islets and sandbars. The total area of these islands is nearly 375 km<sup>2</sup>. Bolshoi Ussuriiskiy islands is located at lat. 48°17'–48°27'N and long. 134°24'E–135°05'E, about 60 km from Amur river in the north, 40 km from Ussuri river in the southeast, and about 35 km from the Fuyuan waterway connecting the Amur and Ussuri rivers in the southwest. The biggest island, Bolshoi Ussuriiskiy, is located at the confluence of the Amur and Ussuri rivers. It is 11 km from Fuyuan county of Heilongjiang province, China, and only 1.5 km from Khabarovsk, Russia's major city in the Far East. In 1929, and as a result of the Soviet invasion, Bolshoi Ussuriiskiy and other islands in the Amur and Ussuri rivers were occupied by the USSR. But China never stopped claiming these islands thereafter. The USSR sent military service in these islands and encouraged Russian farmers to cultivate crops as well as to build resort. Orthodox churches were built in these two islands in memory of the dead soldiers in the fight of 1969.

In the 1990s, China and Russia successfully fixed their land boundaries with the exceptions of the Bolshoi Ussuriiskiy and Tarabarov islands. With regard to the boundary demarcation, China insisted that the boundary in the Amur river should be marked by the main water channel so that the Bolshoi Ussuriiskiy and Tarabarov islands will belong to China. However, Russia said that according to the Peking Treaty made by 1860, the boundary should divide the area between these two islands and the Chinese side, so that these islands should belong to Russia. In term of military strategy, these two islands are the natural barriers for protecting Khabarovsk. Once they belong to China and conflicts happen between these two countries, there would be no way to keep Khabarovsk free from safety because Khabarovsk city is too close to these two islands. Since these two islands had important economic and military values during the Cold War era, both sides show no sign for compromise. Because these two islands are in the center of Amur river, dividing Amur river into two sections, the fact that they belong to either side will symbol which side has more control over the Amur river.

In 2004, Russia agreed to cede 50% of the territories it had occupied to China; and China accepted this offer. On June 2, 2005, China and Russia signed, through careful examination and verification, the result of joint field mapping made in the disputed stretch of island-studded river along China's northeastern border with Russia. The agreement includes dividing in half the Bolshoi Ussuriiskiy (Heixiazi Dao) and Tarabarov (Yinlong Dao) islands at the confluence of the Amur and Ussuri rivers, near Khabarovsk, Russia's major city in the Far East. At the same year, the Russian Duma and the Chinese National People's Congress approved the agreement. Under the agreement, Russia would transfer approximately 174 km<sup>2</sup> of territory—which is largely uninhabited—to China.<sup>8</sup> The transfer took place on October 14, 2008. This ended a long-standing border dispute between Russia and China.

The 2004 boundary agreement has met with some controversies from China and Russia. The event has also sparked some discontent on both sides, with some Russians unhappy about the loss of territory, and some Chinese unhappy that the Chi-

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<sup>8</sup> See "Complementary Agreement between the People's Republic of China and the Russian Federation on the Eastern Section of the China-Russia Boundary," signed on October 14, 2004.

nese government has effectively surrendered claims over the other half of Heixiazhi island by accepting the Russian offer. Some Chinese commentators, especially the media in Hong Kong, Taiwan and overseas which are outside the control of PRC government censorship, criticized the PRC government for signing the agreement, which they regarded as sealing as permanent the loss of former Chinese territory, just like that of Outer Manchuria, to Russia. This portion of the agreement also stirred up some controversy among some Russian population.

However, the settlement of the Sino–Russian boundary disputes has been of tremendous significance. It further strengthens good neighboring relations between the two super countries and improves the bilateral trade development and regional economic cooperation. Furthermore, the peaceful settlement of a multilaterally approved and documentarily stated border between China and Russia is a big breakthrough in international relations.

## 12.6 Appendix

Data on international land boundaries of the world.

Country pair (in alphabetic order) <sup>a</sup>		Year of start	Length (km)
Afghanistan	China	1920	50
Afghanistan	Iran	1920	820
Afghanistan	Pakistan	1949	1810
Afghanistan	Tajikistan	1991	1050
Afghanistan	Turkmenistan	1991	670
Afghanistan	Uzbekistan	1991	150
Albania	Greece	1944	230
Albania	Macedonia	1993	150
Albania	Yugoslavia/Serbia	1993	250
Algeria	Libya	1962	960
Algeria	Mali	1962	1240
Algeria	Mauritania	1962	470
Algeria	Morocco	1976	1550
Algeria	Niger	1962	980
Algeria	Tunisia	1962	870
Andorra	France	1993	50
Andorra	Spain	1993	60
Angola	Congo	1975	190
Angola	Congo (DR)	1975	2240
Angola	Namibia	1990	1320
Angola	Tanzania	1975	2240
Angola	Zambia	1975	1050



Country pair (in alphabetic order) <sup>a</sup>		Year of start	Length (km)
Argentina	Bolivia	1884	650
Argentina	Brazil	1874	830
Argentina	Chile	1902	4730
Argentina	Paraguay	1895	1450
Argentina	Uruguay	1882	550
Armenia	Azerbaijan	1991	740
Armenia	Georgia	1991	160
Armenia	Iran	1991	40
Armenia	Turkey	1991	260
Austria	Czech Republic	1993	320
Austria	Germany	1990	630
Austria	Hungary	1955	250
Austria	Italy	1955	340
Austria	Liechtenstein	1990	30
Austria	Slovakia	1993	80
Austria	Slovenia	1992	240
Austria	Switzerland	1955	150
Azerbaijan	Georgia	1991	290
Azerbaijan	Iran	1991	480
Azerbaijan	Russia	1991	270
Azerbaijan	Turkey	1991	10
Bahrain	Saudi Arabia	1986	0
Bangladesh	India	1992	2090
Bangladesh	Myanmar	1972	210
Belarus	Latvia	1991	140
Belarus	Lithuania	1991	450
Belarus	Poland	1991	330
Belarus	Russia	1991	830
Belarus	Ukraine	1991	800
Belgium	France	1945	460
Belgium	Germany	1990	110
Belgium	Luxembourg	1945	110
Belgium	Netherlands	1945	320
Belize	Guatemala	1981	250
Belize	Mexico	1981	220
Benin	Burkina Faso	1960	240
Benin	Niger	1960	210
Benin	Nigeria	1960	680
Benin	Togo	1960	590
Bhutan	China	1971	400

Country pair (in alphabetic order) <sup>a</sup>		Year of start	Length (km)
Bhutan	India	1971	550
Bolivia	Brazil	1909	2470
Bolivia	Chile	1929	760
Bolivia	Paraguay	1935	750
Bolivia	Peru	1929	920
Bosnia/Herzegovina	Yugoslavia/Serbia	1992	500
Botswana	Namibia	1990	1330
Botswana	South Africa	1990	1500
Botswana	Zambia	1966	3
Botswana	Zimbabwe	1966	750
Brazil	Colombia	1942	1310
Brazil	Guyana	1966	990
Brazil	Paraguay	1895	990
Brazil	Peru	1909	1660
Brazil	Suriname	1975	340
Brazil	Uruguay	1882	730
Brazil	Venezuela	1899	1440
Brunei	Malaysia	1984	380
Bulgaria	Greece	1944	370
Bulgaria	Macedonia	1993	150
Bulgaria	Romania	1940	580
Bulgaria	Turkey	1913	190
Bulgaria	Yugoslavia/Serbia	1993	280
Burkina Faso	Ghana	1960	500
Burkina Faso	Ivory Coast	1960	410
Burkina Faso	Mali	1986	1080
Burkina Faso	Niger	1960	540
Burkina Faso	Togo	1960	100
Burundi	Congo (DR)	1962	210
Burundi	Rwanda	1962	260
Burundi	Tanzania	1962	390
Cambodia	Lao PDR	1954	370
Cambodia	Thailand	1953	660
Cambodia	Vietnam, Democratic Rep.	1975	880
Cameroon	Central African Rep.	1960	730
Cameroon	Chad	1961	1000
Cameroon	Congo	1960	440
Cameroon	Equatorial Guinea	1968	170
Cameroon	Gabon	1960	230

Country pair (in alphabetic order) <sup>a</sup>		Year of start	Length (km)
Cameroon	Nigeria	1961	1450
Canada	USA	1920	7940
Central African Rep.	Chad	1960	1110
Central African Rep.	Congo	1960	410
Central African Rep.	Sudan	1960	1000
Central African Rep.	Tanzania	1960	1260
Central African Rep.	Congo (DR)	1960	1260
Chad	Libya	1994	1070
Chad	Niger	1994	1150
Chad	Nigeria	1961	90
Chad	Sudan	1994	1260
Chile	Peru	1929	180
China	India	1961	1920
China	Kazakhstan	1991	1370
China	Korea, Dem. People's Rep.	1948	910
China	Kyrgyzstan	1991	820
China	Lao PDR	1961	310
China	Mongolia	1921	4330
China	Myanmar	1961	1530
China	Nepal	1961	1070
China	Pakistan	1963	410
China	Russia	1996	3310
China	Tajikistan	1991	410
China	Vietnam, Dem. Rep.	1954	950
Colombia	Ecuador	1942	490
Colombia	Panama	1920	270
Colombia	Peru	1942	1060
Colombia	Venezuela	1922	1960
Congo	Congo (DR)	1960	1430
Congo	Gabon	1960	1500
Congo (DR)	Rwanda	1962	200
Congo (DR)	Sudan	1960	520
Congo (DR)	Tanzania	1961	500
Congo (DR)	Uganda	1962	700
Congo (DR)	Zambia	1964	1850
Costa Rica	Nicaragua	1920	280
Costa Rica	Panama	1920	270
Croatia	Bosnia/Herzegovina	1992	710
Croatia	Hungary	1992	180

Country pair (in alphabetic order) <sup>a</sup>		Year of start	Length (km)
Croatia	Slovenia	1992	390
Croatia	Yugoslavia/Serbia	1992	210
Cyprus	Turkey	1974	140
Czech Republic	Germany	1993	570
Czech Republic	Poland	1993	530
Czech Republic	Slovakia	1993	210
Denmark	Germany	1990	60
Djibouti	Eritrea	1993	110
Djibouti	Ethiopia	1993	310
Djibouti	Somalia	1977	70
Dominican Republic	Haiti	1934	230
Ecuador	Peru	1942	1150
Egypt	Israel	1989	220
Egypt	Libya	1952	1100
Egypt	Sudan	1956	1250
El Salvador	Guatemala	1875	140
El Salvador	Honduras	1899	270
Equatorial Guinea	Gabon	1968	360
Eritrea	Ethiopia	1993	850
Eritrea	Sudan	1993	570
Estonia	Latvia	1991	240
Estonia	Russia	1991	250
Ethiopia	Kenya	1963	770
Ethiopia	Somalia	1960	1580
Ethiopia	Sudan	1993	1370
Finland	Norway	1945	650
Finland	Russia	1947	1200
Finland	Sweden	1921	460
France	Germany	1990	360
France	Italy	1947	400
France	Luxembourg	1944	60
France	Monaco	1993	2
France	Spain	1944	550
France	Switzerland	1944	450
Gambia	Senegal	1965	660
Georgia	Russia	1991	660
Georgia	Turkey	1991	230
Germany	Luxembourg	1990	100
Germany	Netherlands	1990	280
Germany	Poland	1990	400

Country pair (in alphabetic order) <sup>a</sup>		Year of start	Length (km)
Germany	Switzerland	1990	260
Ghana	Ivory Coast	1960	610
Ghana	Togo	1960	710
Greece	Macedonia	1993	210
Greece	Turkey	1944	160
Guatemala	Honduras	1899	210
Guatemala	Mexico	1868	820
Guinea	Guinea-Bissau	1974	330
Guinea	Ivory Coast	1960	460
Guinea	Liberia	1958	380
Guinea	Mali	1960	750
Guinea	Senegal	1960	260
Guinea	Sierra Leone	1961	580
Guinea-Bissau	Senegal	1974	330
Guyana	Suriname	1975	600
Guyana	Venezuela	1966	570
Honduras	Nicaragua	1960	630
Hungary	Romania	1920	360
Hungary	Slovakia	1993	480
Hungary	Slovenia	1992	80
Hungary	Ukraine	1991	100
Hungary	Yugoslavia/Serbia	1991	140
India	Myanmar	1948	1170
India	Nepal	1950	1050
India	Pakistan	1972	2610
Indonesia	Malaysia	1963	1260
Indonesia	Papua New Guinea	1975	750
Iran	Iraq	1932	1220
Iran	Pakistan	1958	830
Iran	Turkey	1921	440
Iran	Turkmenistan	1991	910
Iraq	Jordan	1946	160
Iraq	Kuwait	1993	250
Iraq	Saudi Arabia	1975	830
Iraq	Syria	1961	590
Iraq	Turkey	1939	300
Ireland	United Kingdom	1922	360
Ireland	United Kingdom	1922	360
Israel	Jordan	1995	390
Israel	Lebanon	1967	100

Country pair (in alphabetic order) <sup>a</sup>		Year of start	Length (km)
Israel	Syria	1976	90
Italy	Macedonia	1992	190
Italy	San Marino	1992	40
Italy	Switzerland	1919	490
Ivory Coast	Liberia	1960	480
Ivory Coast	Mali	1960	360
Jordan	Saudi Arabia	1965	740
Jordan	Syria	1967	330
Kazakhstan	Russia	1991	5540
Kazakhstan	Turkmenistan	1991	390
Kazakhstan	Uzbekistan	1991	2100
Kenya	Rwanda	1963	690
Kenya	Somalia	1963	680
Kenya	Sudan	1963	210
Kenya	Tanzania	1963	740
Korea, Dem. People's Rep.	Korea, Republic of	1949	280
Korea, Dem. People's Rep.	Russia	1948	20
Kuwait	Saudi Arabia	1969	210
Kyrgyzstan	Kazakhstan	1991	960
Kyrgyzstan	Tajikistan	1991	660
Kyrgyzstan	Uzbekistan	1991	880
Lao PDR	Myanmar	1954	210
Lao PDR	Thailand	1954	1540
Lao PDR	Vietnam, Dem. Rep.	1954	1570
Latvia	Lithuania	1991	430
Latvia	Russia	1991	210
Lebanon	Syria	1967	270
Lesotho	South Africa	1966	710
Liberia	Sierra Leone	1961	260
Libya	Niger	1994	350
Libya	Sudan	1994	400
Libya	Tunisia	1956	450
Liechtenstein	Switzerland	1990	40
Lithuania	Poland	1991	90
Lithuania	Russia	1991	210
Macedonia	Yugoslavia/Serbia	1993	200
Malawi	Mozambique	1975	1390
Malawi	Tanzania	1964	400

Country pair (in alphabetic order) <sup>a</sup>		Year of start	Length (km)
Malawi	Zambia	1964	720
Malaysia	Singapore	1965	90
Malaysia	Thailand	1957	410
Mali	Mauritania	1960	2120
Mali	Niger	1960	590
Mali	Senegal	1960	320
Mauritania	Morocco	1980	1610
Mauritania	Senegal	1960	600
Mexico	USA	1900	2480
Moldova	Romania	1991	390
Moldova	Ukraine	1991	790
Mongolia	Russia	1921	2830
Morocco	Spain	1956	10
Mozambique	South Africa	1975	490
Mozambique	Swaziland	1975	100
Mozambique	Tanzania	1975	680
Mozambique	Zambia	1975	440
Mozambique	Zimbabwe	1975	1110
Myanmar	Thailand	1948	1760
Namibia	South Africa	1994	890
Namibia	Zambia	1990	220
Niger	Nigeria	1960	1410
Norway	Russia	1947	180
Norway	Sweden	1945	1590
Oman	Saudi Arabia	1971	680
Oman	United Arab Emirates	1971	550
Oman	Yemen	1992	300
Poland	Russia	1991	210
Poland	Slovakia	1993	390
Poland	Ukraine	1991	390
Portugal	Spain	1816	1040
Qatar	Saudi Arabia	1971	70
Qatar	United Arab Emirates	1971	70
Romania	Ukraine	1991	500
Romania	Yugoslavia/Serbia	1944	430
Russia	Ukraine	1991	1380
Rwanda	Sudan	1962	430
Rwanda	Tanzania	1962	200
Saudi Arabia	United Arab Emirates	1971	480
Saudi Arabia	Yemen	1990	1400

Country pair (in alphabetic order) <sup>a</sup>		Year of start	Length (km)
Slovakia	Ukraine	1993	90
South Africa	Swaziland	1968	470
South Africa	Zimbabwe	1965	220
Sudan	Tanzania	1960	520
Syria	Turkey	1961	800
Tajikistan	Uzbekistan	1991	940
Tanzania	Uganda	1962	700
Tanzania	Zambia	1964	360
Turkmenistan	Uzbekistan	1991	1500
Uganda	Rwanda	1962	130
Uganda	Tanzania	1962	390
Zambia	Zimbabwe	1965	740

<sup>a</sup> All international land boundaries are listed in alphabetic order. For example, the land boundaries between North Korea, China, Russia, and South Korea are shown in the following three country pairs: (1) China–Korea (Democratic People’s Republic); (2) Korea (Democratic People’s Republic of)–Korea (Republic of); and (3) Korea (Democratic People’s Republic of)–Russia. Source: Guo (2012b, pp. 28–34)

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# Chapter 13

## Exploitation of Natural Resources in Cross-Border Areas

Rational exploitation and utilization of natural resources is more difficult in cross-border areas than in other areas. First of all, most cross-border areas are composed of either geographically- or geologically-dynamic features such as mountains, rivers, lakes.<sup>1</sup> As a result, there are rich natural and environmental resources in these cross-border areas.

Moreover, cross-border resource management is constrained by the number of independent stakeholders involved. The primary reasons for this come from the uneven spatial distribution of production factors as well as the non-cooperative cross-border mechanism resulting from two or more political regimes. Facing with the cross-border complexities, policymakers have been always shortsighted, emphasizing on the direct costs and benefits of their own regional development at the expenses of their neighbors. In addition, research institutions and international donor agencies have not paid full attention to the problems common in cross-border areas. Consequently, cross-border resource management remains a marginalized, easily forgotten topic.

### 13.1 Ground Resources

#### 13.1.1 *Resource Depletion*

Different political systems, when they meet at the border, will make cooperation on mutual problems much more complicated and difficult. For more than a century, leaders from both the US and Mexico have recognized the importance of the cross-border cooperation on water and environmental issues. Even with these institutional progresses, many problems still exist. Traditionally, Mexican municipalities have

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<sup>1</sup> See Appendix at the end of this chapter for more details.

had no secure and adequate source of funding so they have relied on state and federal governments. This made continuity in programs difficult and works against continuity in cross-border cooperation. In most circumstances, legislative and policy differences may hinder the effective management of cross-border economic activities. In addition, since each side (the US and Mexico) has its own standards to protect public health with an adequate margin of safety, there are difficulties in the adoption of common production standards, as well as the coordination of cross-border trade and investment.

In addition to other international issues associated with the US–Mexico border, there remain locally significant surface issues along Colorado and Rio Grande Rivers. For example, the waters of a number of international streams have yet to be apportioned. These include the Tijuana River in the Tijuana–San Diego area; and the Santa Cruz River, San Pedro River, and Whitewater Creek, which all cross the Arizona–Sonora border. The San Pedro River carries contaminants from the large copper works at Cananer, Sonoran into Arizona, and the New River, which rises south of Mexicali and flows northward to the Salton Sea in California, is perhaps the most polluted stream in the United States (Hansen 1989). In addition to water pollution in those cross-border rivers, principal solid waste and air pollution resulting from fast industrialization and population growth in both sides next to the border have also posed challenges to the governments of the United States and Mexico.

In the recent decades, due to industrialization and economical development such as farmland reclamation and other human activities, wetland in China is suffering a great loss in both area and structure. Even worse, global climate change has also played an important role in the worsening ecosystem. This can be witnessed by the Jingxin area, which is on the border of China, Russia, and North Korea. The study area is situated at Hunchun City in Yanbian Korean Autonomous Prefecture, Jilin Province. The coordinates are 42°27'N–42°40'N, 130°25'E–130°39'E and the altitude is 5–15 m above sea level. During the period from 1964 to 2004, both the patch number and the area of riverine and palustrine wetland dwindled sharply. Partially along with the construction of reservoirs, lacustrine wetland has increased during the same period; and, as a result, human-made wetland has also experienced a fast growth in size (see Table 13.1).

### ***13.1.2 Cross-Border Competition***

In many areas of the world water resources are shared transnationally but not managed jointly and, consequently, there are no prior principles to guide partners as to how much each of them can utilize from common water resources and for what purposes (Kliot et al. 2001, p. 231). Water pollution is a global problem and one that does not respect national boundaries. In certain circumstances, conflicts may arise because national interests differ and nations develop diverging policies and plans that are not compatible (Kirmani 1990; Frey 1993; Wolf 1998, 1999; Savenije and van der Zaag 2000). In general, many obstacles complicate the management of water resources.

**Table 13.1** Changes of wetland in the lower Tumen river area, 1964 and 2004. (Source: Zhu 2009)

Wetland type	1964 (October 5)			2004 (June 15)		
	Patch number	Total area (ha)	Area per unit of patch (ha)	Patch number	Total area (ha)	Area per unit of patch (ha)
Riverine	27	2168.583	80.318	2	966.685	483.342
Palustrine	57	1319.553	23.150	76	655.094	8.620
Lacustrine	10	555.295	55.530	11	638.651	62.605
Human-made	36	237.606	6.600	211	1929.108	9.143
Total	130	4281.037	32.931	300	4239.538	14.132

The study area is located in Jingxin, Yanji prefecture, Jilin province, China

These obstacles arise for two main reasons: firstly, because of the critical importance of water for human existence and secondly, because of its many uses—for drinking and domestic purposes, irrigation, fishing and navigation, hydropower generation, flood management, recreation, tourism and preservation. Various uses are often in conflict with one another and the satisfaction of one obstructs the fulfillment of the other (Kliot et al. 2001, p. 230). Other major difficulties in the management of transboundary water resources are their sheer scale and the frequent gaps between policies, plans and practices (Savenije and van der Zaag 2000, p. 14).

Globally, economic development has been accompanied by the exploitation of large amount of natural resources. Some resource-poor countries, such as Japan, rely on imported timber products for the processing of domestic goods, while less developed countries like the Republic of Congo rely on exporting wood to support their local economies. Technological innovations have made the harvesting of trees, particularly by clear felling, faster, easier, and more destructive. Environmentalists have warned of an ecological catastrophe if rainforests are completely destroyed; the side effects of deforestation could be:

- i. 25% of the world's species lost by the end of this decade. Animals and plants that lived in the rainforests could then be lost forever.
- ii. Many important potential resources could be lost. Only a fraction of the rainforest vegetation has been tested for possible medical use. Wild strains of many of the world's staple crops are in danger of being lost.
- iii. Indigenous inhabitants of the tropical rainforest may be displaced, their way of life and culture destroyed.
- iv. Greenhouse gases and carbon dioxide contribute to global warming. The burning of rainforests accounts for nearly 30% of the carbon dioxide released into the atmosphere. And
- v. Changes may occur in rainfall and air circulation and radiation from the sun may be greatly increased.<sup>2</sup>

<sup>2</sup> Cited from Guo (2012a, pp. 65–66).

### 13.1.3 *Different Countries, Different Laws*

The world is made of countries with different rules, regulations and laws. Within each country the rules, regulations and laws for that country apply. One country's legislation does not apply to another country. Different rules evolved because in different countries there are different histories, different habits, and different ways of life. It is almost certain that one country's rules, regulations and laws cannot be better suited to the other countries than to itself. International agreements do work most of the time in making life easier for international businesses. However, they are not always straightforward since some countries do not sign certain international agreements or they interpret these agreements differently.

Since the early 1980s, four environmental laws, eight natural resource protection laws, more than 20 administrative decrees and more than 30 ministerial regulations for pollution prevention and more than 300 environmental standards have been promulgated.<sup>3</sup> A relatively comprehensive legal system concerning environmental protection has taken shape over the past decades, ending the past situation of no laws in this regard. However, problems still remain. For example, in the field of the environment and resources, there is no appropriate legislation on solid wastes and toxic chemicals, radioactive pollution prevention and sustainable management of natural resources. Chinese legislation also faces the problems of lack of coordination and consistency with international treaties and conventions (ACCA21 1994, p. 1-1A-1).

It should also be noted that some articles of these laws have only been defined in principle, but not actionable. For example, Article 44 of the "Law of Mineral Resources of the People's Republic of China" (*kuangan ziyuan fa*), which was adopted on March 19, 1986, and revised on August 29, 1996, states:

... those who use destructive methods to extract mineral resources should refund the loss of damages and, if the resources have been seriously damaged, be additionally charged till the withdrawal of their certificates for mining permission at the most serious situation...

However, this article should be further clarified at least in the following aspects:

- i. which kinds of extraction methods should be defined as 'destructive' to mineral resources;
- ii. how to set up the standard of the 'serious damages' to resources;
- iii. how to calculate the 'loss of damages';
- iv. how to determine the amount of 'additional charges'; and
- v. what should be defined as the 'most serious situation'.

<sup>3</sup> These laws, regulations, and other relevant official documents have covered a broader range from air, inland water pollution control, protection of endangered wildlife, to the control of domestic marine pollution from offshore oil drilling and waste release into territorial seas (ACCA21 1994).

## 13.2 Underground Resources

### 13.2.1 Focus on the East China Sea

Over the course of the past decades, competition for hydrocarbon resources in the East China Sea has been intensifying and has hampered the improvement of relations between these East Asian neighbors. Under the United Nations Convention on the Law of the Sea (UNCLOS), China has the right to claim a continental shelf as far as 350 nautical miles. However, Japan also has the right to an EEZ extending 200 nautical miles from its shore. Since China's coast is within 400 nautical miles of the nearest undisputed Japanese island, China and Japan's claimed EEZs overlap in the East China Sea. In addition, in the southern part of the Sea, several uninhabitable islets, called Senkaku by Japan, Diaoyu by China, and Diaoyutai by Taiwan, also are at the center of long-lasting disputes between China (including both Taiwan and mainland China) and Japan. (Drifte 2008).<sup>4</sup>

China and Japan have been arguing for a long time over the settlement of their maritime boundary and territorial disputes and the development of the seabed hydrocarbon resources in the East China Sea. China is developing many oil/gas fields just to the west of what Japan claims is the median line separating the two countries' EEZs. This makes the Japanese government nervous, as it believes that China may be exploiting gas reserves located on the Japanese side (Economist, The 2005, p. 72). After much consideration China and Japan have deemed that joint development may be the only solution to the dispute; and they have basically agreed to proceed in this direction. The problem is that the two sides have different interpretations of what joint development means and which areas should be jointly developed. Japan believes that China must cease its current operations and that joint development can only be conducted along and around the median line claimed by Japan. But China thinks that the area for joint development is that between the Japanese-claimed median line and the continental shelf boundary claimed by China, including the area around the disputed Diaoyu/Senkaku islets.

China's state-owned oil companies have been producing oil and gas in three fields—namely, Pinghu, Chunxiao (named “Shirakaba” by Japan), and Tianwaitian (named “Kashi” or “Kashiide” by Japan)—and has begun to construct oil/gas platforms in several others including Longjing (called “Asunaro” by Japan), Canxue or Lengquan (called “Kikyo” by Japan), Duanqiao (called “Kusunoki” by Japan), and so on in the East China Sea (see Table 13.2 for more information about these oil/gas fields). To counter China's moves, Japan's Ministry of Economy, Trade and Industry has granted permission to a major Japanese private oil developer, Teikoku Oil Company, to conduct experimental drilling in an area just on the eastern side of the median line. If the company actually begins drilling in the disputed area, Japanese

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<sup>4</sup> More discussions about the Diaoyu/Senkaku issue can be found in Ching (1996), Drifte (2008), Dutton (2007), Fox (2008), Ji (1994), Ma (1984), Park (2005), Su (2005), Shaw (1999), and Valencia (2007), among others.

**Table 13.2** Summary of China's current oil/gas fields<sup>a</sup> in the East China Sea. (Sources: EIA (2008b); websites of CNOOC, SOGC and XOGOC; and the author's estimates)

	Pinghu	Chunxiao <sup>b</sup>	Tianwaitian <sup>c</sup>
Est. oil reserves (MMbbl)	2.4	3.8	0.5
Est. gas reserves (million cu.m)	736.2	4774.2	985.4
Investors (shareholders)	Shenergy (40%), CNOOC (30%), Sinopec (30%)	CNOOC (50%), Sinopec (50%)	CNOOC (50%), Sinopec (50%)
Operator	SOGC	XOGOC	XOGOC
Date(s) of construction	1996 (2005)	5/2003	NA
Date(s) of production	11/1998 (11/2006)	10/2005	9/2005
Daily output (million cu.m for gas; bbl for oil)	1.8 (gas, 2009); 1422 (oil, 2006)	9.1 (gas, 2009); (NA for oil)	0.5 (gas, 2007); 42 (oil, 2006)
Pipeline connected to	Shanghai	Ningbo (Zhejiang)	Ningbo (Zhejiang)

*CNOOC* China National Offshore Oil Corporation, *Shenergy* Shenergy Company Limited, China, *Sinopec* China Petrochemical Corporation Group, *SOGC* Shanghai Oil and Gas Operating Company Limited, China, *XOGOC* Donghai Xihu Oil and Gas Operating Company (a subsidiary of CNOOC)

<sup>a</sup> Other oil/gas fields include (1) Longjing (Japan names it as "Asunaro"), (2) Canxue (also with a Chinese name "Lengquan", and Japan uses another name "Kikyo"), (3) Duanqiao (Japanese name: Kusunoki), (4) Baoyunting, (5) Kongque, (6) Wuyunting, and (7) Yuquan

<sup>b</sup> Japan uses the name "Shirakaba".

<sup>c</sup> Japan uses the name "Kashi" or "Kashiide"

Coast Guard and Self-Defense Force escorts may be needed for security reasons since the Chinese navy would probably approach this area as well. This would be an unproductive and dangerous game for both sides.

### 13.2.2 Reasons of Discord

China has become the world's second-largest oil consumer, next to the United States. With more than half of its oil demand being met by imports, China's energy security is a much-discussed issue. Japan is also among the world's biggest energy consumers—it too relies on imports, mainly from the Middle East, for most of its oil consumption—as it tries to keep its huge economy running. At present, China needs more energy to fuel its rapidly growing economy and Japan, wishing to reduce its high dependence on oil from the unstable Middle East, is eager to seek different energy suppliers. But the two have found it difficult to cooperate in the East China Sea. One possible explanation is that, from the economic point of view, China is much more interested in the exploitation of oil/gas resources than Japan. This is directly perceived through the following factors.

First of all, the PRC government had a very serious problem with petroleum supply during the 1950s and 1960s. After the break-through discovery of several oil fields in northern China during the 1960s, China implemented a new, oil-oriented energy policy entitled “replacing coal by oil” (“*yi you dai mei*”) in order to reduce its coal-dominated energy consumption.<sup>5</sup> However, in the following decades, China’s exploitation of petroleum within its borders had not achieved as much positive progress as expected. Naturally, its exploration task for oil/gas deposits began to shift from inland to continental shelf sources (including in the East China Sea) in the mid-1970s.

Second, Southeast China’s coastal areas, particularly Shanghai municipality and Zhejiang province, are China’s most important industrial (and thus energy-consuming) bases. Unfortunately, they have almost no hydrocarbon resources on their own territories. Consequently, their domestic oil/gas supply must rely on imports from the far northern and western provinces and is therefore both costly and insufficient. By contrast, the transportation of oil and gas from the East China Sea’s continent shelf is much easier and cheaper (located within 500 km or so).

Third, the proven hydrocarbon reserves found in the East China Sea are located much farther from Japan’s main islands (where Japan’s central marketplaces are located) than they are from mainland China. Furthermore, given that an agreement on the joint development is reached with China, the deep Okinawa Trough would make Japan’s transportation of the gas exploited in the East China Sea to its main islands either technologically infeasible or economically unprofitable (this will be discussed in more detail in Sect. 4).

The above economic factors are not enough to completely explain the current difficulties in the East China Sea. Other factors are also responsible for the fruitless Sino–Japanese negotiations:

- Tactical asymmetry—Even without cooperation with Japan, China can still unilaterally exploit the hydrocarbon deposits on its part (i.e., the western part) of the East China Sea, though the exploitation cannot be economically maximized; however, this is not the case for Japan since all of Japan’s claims of the seabed resources have been located in the disputed area.
- Nationalist politics—This includes (1) China’s tough territorial-dispute negotiations with Japan and (2) Japan’s traditional uncompromising attitude toward territorial negotiations with its neighbors.<sup>6</sup>

In order to find possible ways to the Sino–Japanese cooperation, in a case study shown at the end of this chapter, we will present a spatial cost-benefit analysis of the Chinese oil/gas operations in the East China Sea.

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<sup>5</sup> This policy seemed to be quite effective. For example, the consumption share of crude oil in the total primary energy ranged from 1 to 8% from 1952 to 1965; however, it rose sharply to nearly 25% during the late 1970s (Guo 2013b; Fig. 4.4).

<sup>6</sup> Examples in this regard can be found in Japan’s fruitless negotiation with Russia on the Northern Territories/South Kurils—see, for example, deVillafraña (1993) and Kimura (2008).



### 13.3 Airspace Resources

#### 13.3.1 “Hey! You! Get off of My Cloud!”

On an overcast day in the western vicinity of Beijing, you will hear the booming sound of anti-aircraft guns from the mountainside of Xiangshan Hills Park. Please don't be startled. That was neither an air raid drill, nor in preparation for a coming war. Rather, it was the sound of Beijing meteorologists shooting canisters of silver iodide into the gathering clouds. The Beijing municipal government has instructed the meteorological workers to shoot at any clouds that could enhance the levels of rainfall over the drought-stricken city. In addition to Beijing, other major cities such as Tianjin have also called in soldiers to scan the sky for signs of clouds.

China's first man-made precipitation enhancement was conducted in 1958. It has now become the world's largest cloud seeder, using an array of methods to disperse chemicals into cloud layers in order to make rain: specialized airplanes, rocket shells and anti-aircraft guns are used to shoot canisters of chemicals like silver iodine, liquid nitrogen and calcium chloride into the sky so as to build up moisture in the clouds and increase rainfall. Between 1995 and 2003, China has spent a sum of US\$ 266 million on rainmaking technology in 23 provinces, autonomous regions, and municipalities, with some 35,000 people working in the field (China Meteorological Bureau 2004). In addition, numerous aircrafts, old anti-aircraft guns, balloons and even mountaintop dispersal devices have been employed by provincial and local metrological bureaus and rainmaking authorities (note that by law private companies are not entitled to conduct rainmaking activities in China) to fire chemicals into the clouds. Over the next five years from 2013 to 2018, the Chinese authorities would look to increase artificial precipitation by 3–5%. Despite having more than 7000 rocket launchers, 50-odd planes and nearly 7000 guns with which to shoot dry ice or silver iodide particles into the sky to encourage rainfall, the government is apparently unhappy with its progress (Zheng 2012).

This man-made precipitation enhancement has also been part of local meteorological authorities' efforts to establish a long-term mechanism aimed at minimizing losses caused by bad weather such as prolonged heat-waves or heavy fogs. Shanghai—the largest city of China—has resorted to artificial rain to cool down the city and slow down a power demand that is outstripping the supply. To precipitate the rain, an airplane travels over the city to create seed clouds with a catalyst like salt, silver iodide or dry ice. Any of the three can induces rainfall and thus lower the temperature (Liang 2004).

China has experienced almost all of the water-resource problems faced by countries across the world. China's rapid economic growth, industrialization and urbanization have outpaced infrastructural investment and management capacity, and have created widespread problems of water scarcity. The degradation of ground-water resources and the deterioration of ground-water quality have become striking environmental problems in many Chinese cities. In the areas of the North China

Plain, where about half of China's wheat and corn is grown as well as plenteous peach orchards, drought is an ever-looming threat.

The factors controlling the distribution of rainfall over the earth's surface include the belts of converging-ascending airflow, air temperature, moisture-bearing winds, ocean currents, the distance inland from the coast, and the presence of mountain ranges. Ascending air is cooled by expansion, which results in the formation of clouds and the production of rain. Conversely, in the broad belts of descending air are found the great desert regions of the earth, descending air being warmed by compression and consequently absorbing instead of releasing moisture. If the temperature is low, the air has a small moisture capacity and is able to produce little precipitation. When winds blow over the ocean, especially over areas of warm water (where the evaporation of moisture into the air is active) toward a given coastal area, that area receives more rainfall than a similar area where the winds blow from the interior toward the oceans. Areas near the sea receive more rain than inland regions, since the winds constantly lose moisture and may be quite dry by the time they reach the interior.

In China, when rare clouds appear over this often-parched region, it has been a common practice for workers at the local weather bureau to roll out anti-aircraft guns and blast away at the sky. The exploding shells contain fine particles of silver iodide, which scatter through the moisture-laden clouds. Provincial, county and municipal governments in almost all of the country's 32 provinces, autonomous regions and municipalities have set up weather modification bureaus assigned to regularly bombard the heavens with chemicals in the hopes of squeezing out more rainfall for demanding farmers and thirsty city dwellers.

### ***13.3.2 Fighting for Rainfall***

In contrast to the possible ecological problems resulting from the wide use of the precipitation enhancement technology, China is facing severe shortage in water supplies. Consequently, the use of the rainmaking technology will not be terminated. Rather, it might become more and more popular throughout this country. However, the utilization of this largely ineffective man-made precipitation enhancement technology will become an issue to be faced by all stakeholders concerned. With persistent drought still plaguing China, some neighbouring regions have begun squabbling over the rights to clouds. The most hotly debated topic is that up-wind neighbours will unfairly intercept clouds, thereby depriving downwind areas of rainfall. Given the severity of water scarcity, such sensitivity is not surprising. An example of a typical case of such so-called 'rain theft' arose in central China's Henan province, after a heavy rainstorm in 2004:<sup>7</sup>

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<sup>7</sup> Based on Liu (2004), China Daily (2004).

Between July 9 and July 11, 2004, a moisture-laden cloud drifted northeast across the sky of Nanyang in southern Henan province, China. This was very good news for all of the north-eastern administrative areas (including Pingdingshan, Zhumadian, Luohe and Xuchang cities and Zhoukou prefecture), since most of these areas were experiencing serious drought during that period.

In order to obtain a larger share of rainfall for themselves, the five cities and prefectures competed, using thousands of rocket shells and old anti-aircraft guns to shoot canisters of chemicals into the cloud. The final result of the rainmaking was significant but uneven in geographical distribution: the largest rainfall occurred in Pingdingshan and Xuchang cities (each recording a rainfall of 100 mm or more); while Zhoukou prefecture, with the same input as the other four cities, had only a 27 mm rainfall in its urban area and a paltry 7 mm rainfall in the rural area where the need for rainfall was the most urgent.

Zhoukou officials complained to a provincial newspaper *Dahe Bao* (Big River News) and to the national Xinhua News Agency that the neighbouring cities had milked the cloud system nearly dry even before it arrived in their area. Municipal officials later demanded legislation to regulate how to divvy up clouds. Meteorologists in Zhoukou were accusing their counterparts in Pingdingshan of overusing natural resources by intercepting clouds that would have been likely to drift on to other places—such as Zhoukou. ‘Some places have abused rainwater resources’, said a Zhoukou expert who asked not to be named. Zhoukou’s meteorological officials stated that the Pingdingshan Weather Modification Office had repeatedly seeded clouds that, if nature had been allowed to follow its course, would have scudded along to other places—such as Zhoukou—before delivering their rainfall.

The Pingdingshan office responded that “We didn’t grab the clouds away from other cities,” declared the office director, who gave his name only as Wang. “What we are doing is quite a scientific thing. And we reported our cloud-seeding schedule to the provincial government. I believe other cities also did so,” Wang said in a telephone interview with the *Washington Post* Correspondent, Edward Cody. “The water vapour resource is not like water resources in a river, which could be intercepted from points upstream. Or it is not like a cake—if I have a bite, others get only a smaller piece. Besides, clouds change while floating in the sky, so it is quite complicated.” (Cody 2004, p. A12)

## 13.4 Problems and Challenges

### 13.4.1 Technical Issues

Scientific rainmaking or precipitation enhancement began in 1946 when the American scientists Vincent Schaefer and Bernard Vonnegu at General Electric (GE), following up on some laboratory observations, ‘seeded’ a cloud with dry ice and then watched snow fall from its base. Until recent times it was thought that rain might be induced by explosions, updrafts from fires, or by giving the atmosphere a negative charge. Research shows that rain forms in warm clouds when larger drops of condensed water grow at the expense of smaller ones until they become large enough to fall; furthermore, in cold clouds super-cooled water below  $-15^{\circ}\text{C}$  freezes into ice crystals that act as nuclei for snow (Battan 1962, p. 46). On this basis, three methods were developed: (i) spraying water into warm clouds; (ii) dropping dry ice into cold clouds (where the dry ice freezes some water into ice crystals that act as natural

nuclei for snow); and (iii) wafting silver iodide crystals or other similar crystals into a cold cloud from the ground or from an airplane over the cloud (UWRL 1971).

It was also important to determine what kinds of clouds were suitable for seeding. It was found that, for reasons that were not very well understood, there were important differences between clouds formed over land and over sea, with many more but much smaller droplets in continental clouds. Since larger droplets are needed if rain is to form, this meant that continental clouds were much less likely than maritime ones to be a good source of rain, a discovery of considerable significance to would-be Australian rainmakers. The temperature of the upper levels of the cloud was found to be another crucial factor. In the case of both cumulus and stratiform clouds, provided this temperature was lower than  $-7^{\circ}\text{C}$ , seeding would inevitably be followed by precipitation within 20–25 min (Ryan and King 1997).

Existing rainmaking techniques have been only moderately successful. To judge the viability of a rainmaking program, it is important to establish that seeding made a difference—that is, it results in rain from clouds that would not otherwise have yielded it naturally. It was difficult to determine whether fluctuations in rainfall that occur at the time of cloud-seeding were produced by seeding or would have occurred naturally. Besides, the over-seeding can dissipate a cloud sometimes. Research conducted in China shows that even the best efforts of China's rainmakers produce increase in rainfall of only 10–15%. In addition, the vagaries of nature, such as wind direction and velocity, mean the effect of cloud-seeding on any given locality is difficult to predict (China Meteorological Bureau 2004, p. 31).

### 13.4.2 *Legal Issues*

First of all, let us clarify such question as who owns the right to use the cloud resource to produce water. In contrast to Brooks (1949, p. 119) who analogized clouds to be like wild ducks flowing over the land, Davis (1968, p. 104) suggested that clouds are 'rivers flowing through our skies'. Even more complicated is that of the deprivation of rainfall downwind from where cloud seeding has enhanced rainfall. The downwind atmosphere (clear air and clouds together) obviously has less water content as a result of the greater rainfall upwind, hours, or a day, earlier. If the upwind landowners have the legal right to use an artificial manner to receive a larger amount of rainfall than the naturally occurring rainfall, then downwind landowners have been deprived of rainfall.

Now we come to another scenario. If, in a few days, some of the rainfall from previous cloud seeding will have evaporated and contributed to a new cloud, thus renewing the cycle of water in the atmosphere. The new cloud will be larger as a result of the evaporation of the enhanced rainfall that was caused by previous cloud seeding. If the legal concern about downwind deprivation of rainfall would be better cast as a *delay* in downwind rain. If the delay is only a few days, such harm would be *de minimis* (Davis 1968, p. 116).

There are many issues relating to rainmaking that apparently has been ignored by the Chinese rainmakers and policymakers as well. The first neglected issue is to answer the question of who owns the right to use the extra water that is produced by cloud seeding. Standler (2002) envisions this issue arising in the context of a cloud seeder who is paid by farmer *A* to increase the rainfall on *A*'s land. Extra rain also falls on land owned by farmer *B*; *B*'s land is perhaps adjacent to *A*'s land, or at least near *A*'s land. We recognize that *B* has received a benefit from the extra rainfall, for which *B* paid nothing. From one point of view, *B* has been unjustly enriched. If a judge accepts this unjust enrichment argument, who should *B* pay: the cloud seeder (who caused the extra rain) or reimburse *A* for hiring the cloud seeder?

Without answering the above interesting questions about who owns the right to use the water that is produced by cloud seeing and even to use the cloud resources *per se*, the obvious solution to these problems (as well as many other potential problems) is to have the government regulate all cloud seeding in the target area.

### 13.4.3 Unresolved Issues

Conditions for the scientific regulation of cloud exploitation have not been mature, since many inherent features of the flying cloud resources have still not been known by humankind. It has been still difficult for meteorologists to test the effects of weather modification, such as determining precisely how much rainfall has been caused by rainmaking activities. The natural changes in the atmosphere are very fast and complex. Since it is not able to observe the atmosphere everywhere at all times, so the data collected are not complete.

We still have another bad news for China. Based on the historical climate data (1961–1980) and a series of regional hydrology models, some Chinese and western scientists predicted at an international conference held in Beijing in May 2002, that eastern and central China (the location, for instance, of those regional rivalries in rainmaking in Henan province discussed in the earlier section) will experience a hotter and drier climate during the 2001 and 2030, by which time their available water will decrease by 20%.<sup>8</sup>

Indeed, the irrational utilization of cloud resources among the neighbouring administrative areas is increasingly becoming a legal and institutional problem in China. Till now, China, like most of other countries, has not had any laws and administrative regulations dealing with the cloud resources as well as the rational application of man-made precipitation enhancement. If the disordered competition mentioned above in rainmaking continues to exist among the neighbouring administrative areas, further conflicts will inevitably occur in cross-border areas.

However, if this disordered competition in rainmaking continues to exist among the neighbouring administrative areas in China, perhaps someday in the future, the

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<sup>8</sup> More detail about their simulated results as well as models used in their simulation and can be found in Sun et al. (2002).

anti-aircraft guns and missiles that are currently used to shoot clouds to make rainfall might be turned to more militaristic purposes.

### 13.5 Case 13 The Cost-Benefit Analysis of the Oil/Gas Operations in the East China Sea

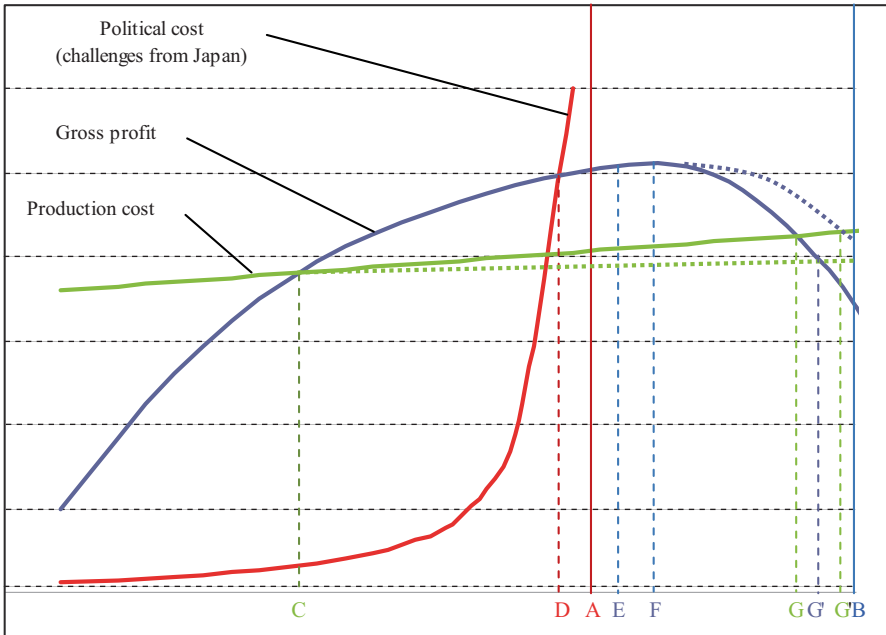
Because of domestic as well as geopolitical issues, it is unlikely that China and Japan could make any substantial concessions to each other in the exploitation of the disputed East China Sea. Is it possible for the two sides to shelve their long-standing maritime boundary demarcation disputes and find a pragmatic solution leading to a joint or cooperative development? To answer this question, let us first conduct a spatial cost-benefit analysis of the Chinese oil/gas operations in the East China Sea, which can be summarized diagrammatically in Fig. 13.1. All curves can be used to characterize both oil- and gas-field operations except the dotted curves that are used to represent the oil-field operations as compared to gas-field operations. In addition, the dotted curves can also be used to denote technological progress in seabed oil/gas production and transportation, through which the cost and profit curves can move away downwardly and upwardly, respectively. Finally, the three major curves are defined as the following:

- “Production cost” refers to a positive function with respect to distance from mainland China.
- “Gross profit” roughly follows an inverted-U shape curve with respect to distance from mainland China (since most of the hydrocarbon deposits are found around the center of the East China Sea).
- “Political cost” refers to political or, in the worst situation, military actions that would stop or seriously affect China’s oil/gas operations (it grows slowly at first but rises sharply near the boundary (i.e., “A”) claimed by Japan).

On the basis of this simplified model, the whole area with potential oil/gas deposits can be divided into different zones (i.e., CD, DA, AE, EF, FG, and GB). Since these zones have different geological features and changing cost-benefit coefficients on seabed oil/gas exploitation with respect to the distance from mainland China (shown in Fig. 13.1), different joint/cooperative models (as shown in Chapt. 7) can be adopted to fit in with them, respectively. Specifically, this can be arranged as follows:

Zone CD: This zone, in which the Pinghu oil/gas field is located, is under the full jurisdiction of China and is not claimed by Japan. Therefore it is excluded from my analysis of possible cooperation between China and Japan.

Zone DA: This zone is not claimed by Japan. However, China’s oil/gas operations in this zone have been protested by Japan, since Japan fears that China will siphon off gas from its side of the “boundary” (denoted by “A” in Fig. 13.1). Current Chinese oil/gas fields in this zone include Chunxiao and Tianwaitian, among others



**Fig. 13.1** Cost-benefit analysis of China’s oil/gas operations at the East China Sea. Notes: (1) *A* boundary claimed by Japan, *B* boundary claimed by China, *C* boundary beyond which oil/gas operations become profitable, *D* boundary beyond which China’s oil/gas operations cannot be conducted due to the political and military protests from Japan, *E* boundary in which the net profit (i.e., gross profit minus production cost) of oil/gas operations is the highest, *F* boundary in which the gross profit of oil/gas operations is the highest, *G*(*G'*) boundary beyond which oil/gas operations are not profitable. (2) *AB* area claimed by both China and Japan, *CD* area in which China has unilaterally conducted oil/gas operations

(each of which also has a Japanese name, as shown in the notes to Table 9.1).<sup>9</sup> The solo development model (in which China is the only operator and Japan receives a share of profit) may be applied to this zone. In fact, China has decided to welcome, as shown in its June 18, 2008 agreement with Japan, to Japan’s participation in the project in the Chunxiao field. Both sides have also agreed to discuss cooperation on the Tianwaitian oil/gas field.

Zone AE: This is the highest oil/gas-yielding zone in the East China Sea. China and Japan could apply the joint venture model or the joint authority model to this zone. The joint exploitation of the Longjing/Asunaro oil/gas field and its surrounding areas straddling both sides of Japan’s claimed median line, as defined in the 2008 Agreement, may be a good example of these kinds of cooperation between

<sup>9</sup> More precisely, these oil/gas fields are defined to be located around boundary “D” (shown in Fig. 13.1) beyond which China’s oil/gas operations cannot be conducted due to the high costs and risks stemming from political and military protests from Japan.

China and Japan. Besides, if Japan's exploitation of this zone is not economically feasible (due to its relatively long distance from this zone and the high cost of deploying a pipeline connecting it to Japan's central marketplace<sup>10</sup>), Zone AE may also be exploited under the solo development model. In this case, China would be the only operator and Japan would receive a share of the profit.

Zone EF: China's *net* profit of oil/gas exploitation within this zone follows a decreasing marginal rate (with respect to the distance from E to F). On the other hand, this zone is located closer to the Japanese side than Zones DA and AE. Thus, China and Japan may consider applying the joint venture model, the joint authority model, or the trusteeship model to this zone.

Zone FG: In this zone, China's *gross* profit from the exploitation of the seabed oil/gas will follow a decreasing marginal rate (with respect to the distance from F to G). Therefore, the joint venture model, the joint authority model, or the trusteeship model would be ideal choices.

Note that since China and Japan have different political and juridical systems from each other, the joint venture model may be more easily adopted to the joint development of the East China Sea than the joint authority model. In addition, if the oil/gas exploitation of the southernmost part of the East China Sea, including the Diaoyu/Senkaku islets, is arranged by using Taiwan as the marketplace then the profit curve would not follow such a decreasing marginal rate as those mentioned in the above cases in which oil/gas exploitation is conducted by treating mainland China as the marketplace. (Later I will discuss the political and economic feasibilities of Taiwan's participation in the oil/gas exploitation in the East China Sea.)

Zone GB: China's oil/gas operations would lose money (as shown in Fig. 13.1). By contrast, Japan would become more interested in this zone because of its proximity to Japan's marketplace.<sup>11</sup> Thus, the development of this zone may follow either the solo model (in which Japan is the only operator and China receives a share of profit from it) or the trusteeship model.

## 13.6 Appendix

A list of the natural features as international borders

After a look at the world map, you may simply find that many natural features (such as mountains, rivers, lakes, bays/gulfs and straits/channels) are selected as international borders. Below is a brief list of them.

<sup>10</sup> Since most of the proven hydrocarbon deposits in the East China Sea have been natural gas, we assume that production costs are highly dependent on the length of the pipeline connecting the gas field and central marketplaces.

<sup>11</sup> If a spatial economic model is built for Japan's oil/gas operations in the East China Sea, the cost-benefit pattern will be similar to that of Fig. 13.1.



## a. Mountains

- Belukha, Gol'tsy (4506 m): Kazakhstan–Russia
- Blanc, mont (4807 m): France–Italy
- Elgon, Mt. (4321 m): Kenya–Uganda
- Changbai-shan/Paektu-san (2744 m): China–North Korea
- Everest, Mt. (8848 m): China–Nepal
- Fairweather, Mt. (4663 m): Alaska–Canada
- Gasherbrum (8068 m): China–Pakistan
- Haltiatunturi (1328 m): Finland–Norway
- K2 (Godwin Austen) (8611 m): China–Pakistan
- Kamet (7756 m): China–India
- Kanchenjunga (8598 m): India–Nepal
- Karisimbi, Volcan (4507 m): Rwanda–D. R. Congo
- Korab (2751 m): Albania–Macedonia
- Lullaillaco, Volcan (6723 m): Argentina–Chile
- Makalu (8481 m): China–Nepal
- Margherita, Pk. (5109 m): D. R. Congo–Uganda
- Matterhorn (4478 m): Italy–Switzerland
- Neblina, Pico da (3014 m): Brazil–Venezuela
- Ojos del Salado, Nevado (6893 m): Argentina–Chile
- Pobedy, pik (7439 m): China–Russia
- Rosa, Monte (4634 m): Italy–Switzerland
- St. Elias, Mt. (6542 m): US–Canada
- Tupungato, Portezuelo de (6800 m): Argentina–Chile
- Zugspitze (2962 m): Austria–Germany<sup>12</sup>

## b. Rivers

- Abuna: Brizil–Bolivia
- Amu Darya: Turkmenistan–Uzbekistan–Afghanistan–Tajkistan
- Amur: China–Russia
- Arauca: Venezuela–Colombia
- Argun: China–Russia
- Cassai: Angola–D. R. Congo
- Congo: Congo–D. R. Congo
- Courantvne: Guyana–Suriname
- Cuando: Angola–Zambia
- Cuango: Angola–D. R. Congo
- Danube: Hungary–Slovakia; Bulgaria–Romania–Yugoslavinia
- Douro: Spain–Portugal

<sup>12</sup> The figures within parentheses are the heights (in meters) of these mountains (data source: World Atlas 1994).

- Drava: Hungary–Croatia
- Drina: Yugoslavia–Bosnia and Herzegovina
- Faleme: Senegal–Mali
- Gavalla: Liberia–Cote d’Ivoire
- Guapore: Brazil–Bolivia
- Javari: Peru–Brazil
- Lainoalven: Sweden–Finland
- Limpopo: South Africa–Botswana
- Logone: Chad–Cameroon
- Maroni: Brazil–French Guiana
- Mekong (Lancang): China–Myanmar–Laos–Thailand
- Meta: Venezuela–Colombia
- Mloomou: D. R. Congo–Central African Republic
- Niger: Niger–Benin
- Oder: Germany–Poland
- Okavango: Angola–Namibia
- Orange: Namibia–South Africa–Lesotho
- Oued Drad: Morocco–Algeria
- Oyapock: Brazil–French Guiana
- Prut: Moldova–Romania–Ukraine
- Pupumayo: Peru–Colombia–Ecuador
- Rhine: France–Germany–Switzerland
- Rio Grande: US–Mexico
- Rio Orinoco: Venezuela–Colombia
- Rio Paraguay: Brazil–Paraguay–Argentina
- Rio Uruguay: Uruguay–Argentina–Brazil
- Ruvuma: Tanzania–Mozambique
- Sava: Croatia–Bosnia and Herzegovina
- Tumen: China–North Korea–Russia
- Ubangi: D. R. Congo–Congo
- Ussuri: China–Russia
- Yalu: China–North Korea
- Zambezi: Namibia–Zambia–Zimbabwe

c. Lakes

- Lake Albert (between D. R. Congo and Uganda),
- Lake Chad (between Niger, Chad, Nigeria and Cameroon),
- Lake Kanba (between Zambia and Zimbabwe),
- Lake Mweru (between D. R. Congo and Zambia),
- Lake Nyasa (between Malawi, Mozambique and Tanzania),
- Lake Rudoff (between Ethiopia and Kenya),
- etc.

## d. Bays/Gulfs

- Bay of Bengal: Bangladesh–India–Myanmar
- Bay of Biscay: France–Spain
- Bight of Benin: Ghana–Togo–Benin–Nigeria
- Bight of Biafra: Cameroon–Equatorial Guinea
- Golfe de St. Malo: France–Is. Jersey/UK
- Golfo de Fonseca: El Salvador–Honduras–Nicaragua
- Golfo de Guayaquil: Ecuador–Peru
- Golfo de Venezuela: Venezuela–Colombia
- Gulf of Aden: Yemen–Djibouti–Somalia
- Gulf of Aqaba: Egypt–Israel–Jordan–Saudi Arabia
- Gulf of Bothnia: Sweden–Finland
- Gulf of Danzig: Poland–Russia
- Gulf of Finland: Finland–Russia–Estonia
- Gulf of Honduras: Honduras–Belize–Guatemala
- Gulf of Mannar: India–Sri Lanka
- Gulf of Mexico: Mexico–USA
- Gulf of Oman: Oman–United Arab Emirates–Iran
- Gulf of Riga: Latvia–Estonia
- Gulf of Tonkin/Beibu: China–Vietnam
- Persian Gulf: Iran–Iraq–Kuwait–Saudi Arabia–Bahrain–Qatar–United Arab Emirates
- Rio de la Plata<sup>13</sup>: Argentina–Uruguay

## e. Straits/Channels

- Bab el Manadeb: Yemen–Eritrea–Djibouti
- Balabac Strait: Malaysia–the Philippines
- Beagle Channel: Chile–Argentina
- Bering Strait: Russia–Alaska/US
- English Channel: England–France
- Korea Strait: Korea–Japan
- Mona Passage: Dominica Rep.–Puerto Rico/US
- Palk Strait: India–Sri Lanka
- Phillip Channel: Indonesia–Singapore–Malaysia
- Singapore Strait: Indonesia–Singapore–Malaysia
- Soya Kaikyo: Japan–Russia
- St. George’s Channel: England–Ireland
- Strait of Dover: England–France–Belgium
- Strait of Gibraltar: Spain–Morocco
- Strait of Hormuz: Iran–Oman
- Strait of Juan de Fuca: Canada–USA

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<sup>13</sup> Also as mouths of Rio Parana and Rio Uruguay.

- Strait of Malacca: Indonesia–Malaysia
- Strait of Otranto: Albania–Italy
- Torres Strait: Australia–Papua New Guinea
- Windward Passage: Cuba–Haiti
- Yucatan Channel: Mexico–Cuba

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# Chapter 14

## Cross-Border Economic Development and Cooperation

Globalization, as an increasingly dominant force since the last decades of the twentieth century, is shaping a new era of interaction among various political, cultural and economic groups throughout the world. As a result, it is increasing the contacts between people across various boundaries—geographical, political and cultural. When people say that ‘the world is becoming smaller every day’, they are referring not only to the increased speed of and ease of transportation and communications but also to the increased use of international market to buy and sell goods. Today, the interactions among people with different national and cultural identities are deeper than ever before. The most obvious evidence can be found from at least the following aspects:

- Foreign direct investment (FDI) topped US\$ 1.35 trillion in 2012, about 19 times the level in real terms in the 1970s.
- The average daily turnover in foreign exchange markets increased from around US\$ 10–20 billion in the 1970s up to about US\$ 4 trillion in 2010.
- People travel more around the world, with tourism more than doubling between 1980 and 2012, from 260 million to 1.035 billion travelers a year.
- International migration, despite the tight restrictions, continues to grow, with the workers’ remittance reaching \$414 billion in 2013.<sup>1</sup>

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<sup>1</sup> Data are cited from or calculated based on UNDP (1999, p. 25), World Tourism Organization (2013), and <http://unctad.org/en/pages/PressRelease.aspx?OriginalVersionID=143> and [www.bis.org/publ/rpfx13fx.pdf](http://www.bis.org/publ/rpfx13fx.pdf). Accessed on 28 Feb 2014.

## 14.1 Cross-Border Economic Development

### 14.1.1 *Patterns of Cross-Border Development*

Borders constitute barriers to economic exchange, and may therefore reduce gains from specialization and trade. Removing national borders allows the formation of larger domestic markets, which may have a positive effect on productivity and growth if market size matters for economic activity (Spolaore and Wacziarg 2005). Theoretically, there are at least two channels through which cross-border economic cooperation or integration could be conducted.

First, an increase in the flow of cross-border trade may increase the demand for transportation and distribution services produced at the border. In this outcome, the border serves as a land port. Second, the existence of transport costs may give one nation's firms that export to or that import from the other nation an incentive to locate their operations by shifting resources from interior regions to border regions with relatively low-costs. In this outcome, the border functions itself as an international production center (Hansen 1996). Indeed, sharing a common land border will always promote international trade and economic cooperation. For example, bilateral trade of France with the United Kingdom will be due to their proximity but with Germany will be further boosted by the effect of their common border in addition to their proximity.

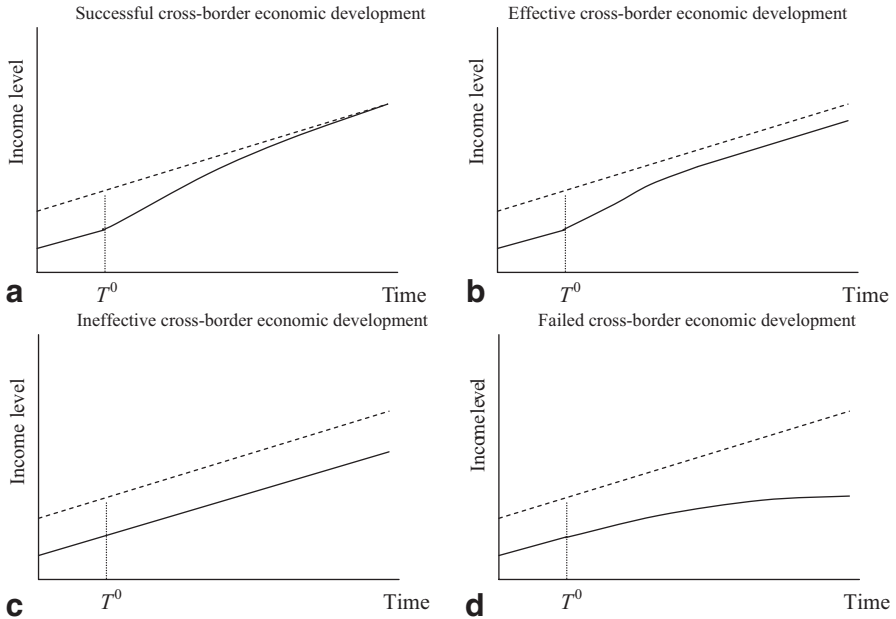
Through cross-border cooperation, the economic development of a border region can benefit from the following: (i) comparative advantages stemming from various factor-price differences between the two (or more) sides of the border; and (ii) economies of scale, which are created after the (partial) removal of border-control policies.

However, in practice, the dynamic effects of cross-border economic cooperation are significantly varied, which are usually determined by both internal and external conditions. Specifically, the economic growth patterns of lagging regions pursuing cross-border cooperation with advanced regions can be summarized into four basic categories, as follows:

- a. successful cross-border economic development,
- b. effective cross-border economic development,
- c. ineffective cross-border economic development, and
- d. failed cross-border economic development.

A “successful cross-border economic development” is defined by the criterion that the economic gap (or divergence) between the lagging and the advanced regions will diminish at first and vanish eventually (see Fig. 14.1a).<sup>2</sup> However, in an “effective cross-border economic development”, the economic gap (or divergence) will not vanish in the long run, though it will diminish at the early stage (Fig. 14.1b); and

<sup>2</sup> In this case, “comparative advantages” will also diminish (or even vanish) accordingly. But cross-border economic cooperation may still benefit from the “economies of scale”.



**Fig. 14.1** Growth patterns of lagging regions. Notes: (1)  $T^0$  denotes the date at which a cross-border development program starts. (2) Dotted lines denote the growth paths of the advanced region (which are assumed to be independent of the cross-border development program). (Source: Author)

in an “ineffective cross-border economic development”, the economic gap (or divergence) will not change over time (Fig. 14.1c). By “failed cross-border economic development”, it means that the economic gap (or divergence) between the lagging and the advanced regions will increase even if a cross-border economic development is announced (Fig. 14.1d). Then, which one of the above four categories can be used to describe the dynamic pattern of economic growth in the state of Chihuahua? And, what is the driving force behind this?

### 14.1.2 A Comparison of Five Cases

Over the course of the past decades, there have been various cross-border development programs in different parts of the world. They include, among others, the European Territorial Cooperation (formerly called the INTERREG programs) launched in the European Union (EU), the Indonesia–Malaysia–Singapore Growth Triangle (IMS-GT, formerly entitled the “Singapore–Johor–Riau Growth Triangle”), the Greater Tumen Initiative (GTI, formerly known as the Tumen River Area Development Program, or TRADP), China’s Special Economic Zones (SEZs), and



the US–Mexico Border Industrialization Program (BIP) (called “*maquiladoras*” in Mexico). The creation and organization of these cross-border development programs have provided many valuable times-series data and other specific information. Obviously, this will help theoreticians and practitioners involved in border regions with specific geographical, political and socioeconomic characteristics to assess the effectiveness of, and, hopefully, to derive useful policy implications for, cross-border development and cooperation.

The first post-war initiative of cross-border cooperation was established in the German–Dutch border region, with the creation of the euroregion, or EUREGIO, in 1958. Similar inter-state structures on cross-border cooperation (such as the Association of European Border Regions) were established during the 1960s and the 1980s in western and northern Europe. The cross-border cooperation was further promoted when the Single European Act (SEA) was implemented on July 1, 1987. After the adoption of a first list of 14 pilot cross-border actions in 1989, the European Community launched in 1990 a dedicated initiative: INTERREG. The INTERREG was renamed as the European Territorial Cooperation in 2007. The major tasks of the European Territorial Cooperation are threefold:

- i. Cross-border Cooperation
- ii. Transnational Cooperation, and
- iii. Interregional Cooperation

The Cross-border Cooperation sets out to “[help] transform regions located on either side of internal or external borders of the European Union into strong economic and social poles. In particular cross-border actions are encouraged in the fields of entrepreneurship, improving joint management of natural resources, supporting links between urban and rural areas, improving access to transport and communication networks, developing joint use of infrastructure, administrative cooperation and capacity building, employment, community interaction, culture and social affairs.”<sup>3</sup> From 2007 to 2013, territorial cooperation in European Union (EU) comprehends 75 programs in cross-border areas including external EU borders (Interact 2011).

The Indonesia–Malaysia–Singapore Growth Triangle (IMS-GT) was established by Indonesia, Malaysia and Singapore, whose aim is to strengthen the trilateral economic links and to make fuller use of the complementarities between the three neighboring countries. The predecessor of the IMS-GT, which was called the “Singapore–Johor–Riau Growth Triangle” (SIJORI-GT), started in 1989. The SIJORI-GT was a partnership arrangement between Singapore, Johor (in Malaysia), and Riau islands (in Indonesia) that combines the competitive strengths of the three partners to make the subregion more attractive to regional and international investors. More specifically, it was designed to link the infrastructure, capital, and expertise of Singapore with the abundance of natural and labor resources of Johor and Riau, relocating labor-intensive industries to such neighboring places as the

<sup>3</sup> Cited from the official website of INTERACT—an organization co-financed by the European Regional Development Fund (ERDF). Available at [http://www.interact-eu.net/etc/etc\\_2007\\_13/4/2](http://www.interact-eu.net/etc/etc_2007_13/4/2). Accessed on 15 April 2011.

Malaysian state of Johor and the island of Batam in the Indonesian province of Riau. As more Malaysian and Indonesian states joined the grouping, the IMS-GT was formed in 1994, which includes Singapore, the Malaysian state of Johor plus contiguous states, and the Indonesian province of Riau and contiguous provinces, with a total area of 334,000 km<sup>2</sup> and a population of 35 million.<sup>4</sup> Within the IMS-GT, government's role would be to support, encourage and facilitate flow of goods, services, investments, and people. The pioneering experience of the IMS-GT has led to the development of other growth areas in Southeast Asia. For example, the Indonesia–Malaysia–Thailand Growth Triangle (IMT-GT) represents the second major ASEAN effort at linking the three complementary areas of Indonesia, Malaysia and Thailand (Heng 2006).

On October 11–18, 1991, three countries (China, North Korea, and Russia), plus Japan, Mongolia, and South Korea, agreed to start the Tumen River Area Development Program (TRADP) in the conference convened by the United Nations' Development Program (UNDP) in Pyongyang, North Korea. After taking into account the strategic location of the Tumen River delta and its enormous potentialities of natural resources and of global trade, the UNDP mission predicted:

... If the region is to develop its expected potential over a span of approximately 20 years, there will be a need for as many as 10 or 11 modern marine terminals, and housing and related facilities for upwards of 500,000 people in new communities... All of the above ideas and factors reinforce the concept of Tumen delta area as a future Hong Kong, Singapore or Rotterdam with the potential for entropy trade and related industrial development akin to theirs.<sup>5</sup>

In 2005, a new program entitled “Greater Tumen Initiative” (GTI) was established. The GTI is a UNDP-led, intergovernmental cooperation mechanism in Northeast Asia, with a membership of five countries: China, North and South Korea, Mongolia, and Russia. As its name suggests, the GTI is a framework that seeks to promote economic cooperation within a much enlarged regional area, including more of Northeast China, as well as Mongolia's eastern provinces, Russia's Primorsky territory, South Korea's eastern port cities, and North Korea's ice-free Rajin port (Freeman 2011, p. 34). Since its creation, the GTI has remained a unique intergovernmental platform for economic cooperation and fostering sustainable development in the Northeast Asia. Unfortunately, due to the long-lasting political tensions in the Korean peninsula, the development of the Tumen delta area has not achieved any anticipated progress.

In addition to the above three cross-border cooperation programs, two others, located in the US–Mexico and the China–Hong Kong border regions, also are worthy of attention. And, since the initial conditions of the two border development programs are more similar to each other than to those of the three cases discussed in this section. Table 14.1 gives a brief comparison of all the five cross-border cooper-

<sup>4</sup> Data source: [www.cpu.gov.hk/english/documents/conference/e-sychia.rtf](http://www.cpu.gov.hk/english/documents/conference/e-sychia.rtf). Accessed on 15 May 2011.

<sup>5</sup> Cited from Miller et al. (1991).

**Table 14.1** A comparison of selected cross-border development and cooperation programs. (Source: Author)

Item	Border area					
	China–Hong Kong	China–N. Korea–Russia <sup>a</sup>	Indonesia–Malaysia–Singapore	Mexico–US	West Europe <sup>b</sup>	
Year of start	1979	1991 (2005)	1989 (1994) <sup>(c)</sup>	1965	1990 or later	
Initial border conditions:						
(1) Political/policy difference <sup>d</sup>	High	High	Low	High	Low	
(2) Economic/income divergence	High	Low	High	High	Low	
Number of participants	2	3(5) <sup>e</sup>	3	2	2 or 3 in each case	
Key agreement or act (year)	CEPA (2003)		AFTA (1992, 1995)	NAFTA (1994)	SEA (1987)	
Selected references	Wong and Chu (1985); Sit (1989; Sit and Yang 1997); Ye et al. (1999); Shen et al. (2000)	Davies (2004), Guo (2013a, b, 2005), Tsuji (2004), Freeman (2008)	Kumar (1994), Lee (1991), Naidu (1994), Heng (2006)	Gibson and Renteria (1985), Hansen (1996), Villarreal (2011)	Cappelline and Batey (1993), Guo (2013a, b), Interact (2011)	

*AFTA* ASEAN Free Trade Area, *CEPA* Closer Economic Partnership Arrangement, *NAFTA* North America Free Trade Agreement, *SEA* Single European Act  
<sup>a</sup> Its formal name is Greater Tumen Initiative (GTI), which was originally known as the Tumen River Area Development Program (TRADP) before 2005

<sup>b</sup> From 2007 to 2013, there are 75 cross-border cooperation programs (including external EU borders)

<sup>c</sup> This program, first established in 1989, only includes Singapore, the Johor state of Malaysia, and the Riau province of Indonesia

<sup>d</sup> Generally, cross-border political/policy difference can be defined as “High” in most transnational areas, especially before the latter evolve into politically integrated ones. However, what I mark here are only based on the differences of the five cases included in this table

<sup>e</sup> This includes three riparian nations (China, North Korea, and Russia), plus Mongolia and South Korea

ation programs (the US–Mexico and the China–Hong Kong border regions will be examined and compared in more details in the case study at the end of this chapter).

## 14.2 Special Economic Zones

A Special Economic Zone (SEZ) is a geographical area that has special economic and other treatments that are more free-market-oriented than the rest of a country. The SEZs are exempt from national laws regarding taxes, quotas, FDI-bans, labor laws and other restrictive laws in order to make the goods manufactured in the SEZ at a globally competitive price. Usually the goal of SEZs is to increase foreign direct investment by foreign investors, typically an international business or a multinational corporation.

Usually, SEZs are located on or near land borders beyond which there are mature economies. For example, the reason why China created the Shenzhen SEZ is due to its proximity to Hong Kong. The other three Chinese SEZs are located in Shantou and Zhuhai (close to Macau) of Guangdong province and in Xiamen (close to Taiwan) of Fujian province. The SEZs have been implemented using a variety of institutional structures across the world ranging from fully governmental to ‘fully’ private. In many cases, public sector operators and developers act as quasi-government agencies in that they have a pseudo-corporate institutional structure and have budgetary autonomy. The SEZs are often developed under a public-private partnership arrangement, in which the public sector provides off-site infrastructure, equity investment, soft loans, bond issues, etc.

The SEZs can also have other specific types or names, including free trade zone, export processing zone, industrial park, free port, and other specialized zones. It is worth noting that some of these SEZs have, though with different names, similar functions.

### 14.2.1 *Free Economic Zone*

A Free Economic Zone (FEZ), similar to a SEZ, is designated by law to facilitate foreign investment, and thereby to strengthen national competitiveness and seek balanced development among regions by improving the business environment for foreign-invested enterprises and living conditions for foreigners.

There are eight FEZs in South Korea, which are Incheon Free Economic Zone (IFEZ) in 2003, Busan–Jinhae Free Economic Zone (BJFEZ) in 2004, Gwangyang Free Economic Zone (GFEZ) in 2004, Saemangum Free Economic Zone (SGFEZ) in 2008, Yellow Sea Free Economic Zone (YESFEZ) in 2008, Daegu–Gyeongbuk Free Economic Zone (DGFEZ) in 2008, East Coast Free Economic Zone (EFEZ) in 2013, and Chungbuk Free Economic Zone (CBFEZ) in 2013.

### ***14.2.2 Free Trade Zone***

A Free Trade Zone (FTZ) is a geographically fenced-in, tax-free area that provides warehousing, storage, distribution facilities for trade, shipping, and import/export operations in a reduced regulatory environment, meaning they generally have less stringent customs controls and sometimes fewer labor and environmental controls. These zones generally focus on the tangible operations of international trade. Many FTZs attract labor-intensive manufacturing such as assembly-oriented production of apparel, textiles, and electrical goods.

Most FTZs are located in developing countries: Brazil, Colombia, India, Indonesia, El Salvador, China, the Philippines, Malaysia, Bangladesh, Pakistan, Mexico, Costa Rica, Honduras, Guatemala, Kenya, Sri Lanka, Mauritius and Madagascar have export processing zones (Sargent and Matthews 2009).

### ***14.2.3 Export Processing Zone***

An Export Processing Zone (EPZ) is similar to free-trade zones in that they encompass large land estates that focus on foreign exports, but they differ in that they do not provide the same degree of tax benefits or regulatory leniency. They instead provide a functional advantage to investors seeking to capitalize on the economies of scale that a geographic concentration of production and manufacturing can bring to a trade region. These zones are beneficial to a host country, if they are successful, because the host country does not have to provide reduced tariffs or regulations but it still benefits from increased trade to the region.

In 1997, 93 countries had set up export processing zones employing 22.5 million people, and five years later, in 2003, the export processing zones in 116 countries employed 43 million people (Sargent and Matthews 2009).

### ***14.2.4 Industrial Park***

An Industrial Park not only provides manufacturing or production benefits like other SEZs, but it also provides unique benefits of local, centralized development efforts. The Industrial Parks are generally created by national or local governments to revitalize or gentrify a distressed urban area. The Empowerment Zone in Chicago is an example of an Enterprise Zone. It was created to revitalize certain south and west Chicago neighborhoods and bring trade to the area by increasing public safety, providing better job training, creating affordable housing, and fostering cultural diversity.

### **14.2.5 Free Port**

A Free Port is typically very expansive zone that encompasses many different goods and service-related trade activities like travel, tourism, and retail sales. The variation of products and services available to a Freeport cause them to be more integrated with the host country's economy. Most encourage a fully integrated life on-site for those who work in the Free port, as opposed to just using the SEZ for manufacturing, production and shipping.

### **14.2.6 Other Specialized Zones**

In addition to the above-mentioned SEZs, other zones can be established to promote highly technical products and specialized services unique. Many of these zones focus on the production and promotion of science and technology parks, petrochemical zones, highly technical logistics and warehousing sites, and airport-based economies.

A single SEZ can contain multiple 'specific' zones within its boundaries. The most prominent examples of this layered approach are Subic Bay Freeport Zone in the Philippines, the Aqaba Special Economic Zone Authority in Jordan, Sricity Multi-product SEZ and Mundra SEZ in India.

The first modern special economic zone was created in Puerto Rico in 1942. Since then, 135 countries, many of them emerging markets, have developed over 3000 special economic zones. Their development has helped to improve global trade and international economic cooperation, creating over 70 million jobs and hundreds of billions of dollars in trade revenue for these countries (Murray 2010).

In China, SEZs were founded by the central government in the early 1980s. The most successful SEZ, Shenzhen, has developed from a small village into a city with a population over 10 million. Following the Chinese examples, SEZs have been established in several countries, including Brazil, India, Iran, Jordan, Kazakhstan, Pakistan, the Philippines, Poland, South Korea, Russia, Ukraine, United Arab Emirates, Cambodia, and North Korea. India has also played a significant role in the founding and establishment of SEZs. It has the largest outsourcing industry in Asia.

## **14.3 Cross-Border Mergers and Acquisitions**

The trend toward economic globalization is rising and as globalization's popularity grows worldwide, companies are inclined to develop globally. Therefore, cross-border mergers and acquisitions (M&A) are becoming more fashionable today as they offer increased opportunities and cheaper alternatives to building companies. However, cross-border M&A is still complicated and contains many variables that can lead to business failures.

### ***14.3.1 What is Cross-Border M&A?***

If a company or investor starts a new venture in a foreign country by constructing new operational facilities from the ground up, this kind of investment is called “green-field investment.” This investment strategy is opposite to that of the so-called “brown-field investment.” With regard to the latter, which is also called “mergers and acquisitions” (or M&A) it means that a company or entity purchases or leases existing production facilities to launch a new production activity.

The basic difference between M&A and green-field investment is the implementation differences. M&A is an investment model by expanding the internal organization of firms through the external market trading, which regards the enterprise as a special commodity. At first the acquiring firms often overpay for the assets of the acquired firm. What is more, in the beginning, it will not increase host country’s production capacity.

When an investor starts up a new venture from scratch, it takes a lot of time and efforts, including such matters as looking for location, renovating the office, hiring staffs, and designing the product and marketing. On the opposite, cross-border M&A helps one to save a lot of time and efforts. In addition, advantages of M&A also include:

1. Brand resources: Skillful staffs, operational know-how and brand will be taken over. A good M&A deals will generate synergy effect to one or both parties, whether it is an improvement in technology or better brand name to open new market.
2. Economies of scale: When two companies in the same industry merged, the combined market share will help the company become more competitive in pricing and marketing, stronger power to negotiate with his suppliers, higher production capacity, and so on.
3. Diversification: When two companies in the different industries merged, this will help the company become more diversified. It is widely known that the variety of products or income diversification into several sectors will help reducing business risk.

In order to continue business growth, all companies face the reality of market competition. The key to win the competition relies upon how a company allocates its limited managerial resource. Regardless of what size of the company, M&A is an unavoidable issue. Some companies may grow through M&A by enlarging their market shares, some may want to grow to secure a higher capability to finance. On the other hand, some may want to dispose their non-core sectors to achieve a better focus strategy.

### ***14.3.2 Forms of Cross-Border M&A***

There are many forms of cross-border M&A. Basically they can be divided into two types—one involves capital movement and the other without capital investment.

In the former, M&A is, in a narrow sense, the so-called ‘company buyout,’ which includes the following forms:

- Acquisition—which includes stock purchase (such as transfer of shares and issuance of new shares) and asset purchase (such as partial asset transfer and total asset transfer);
- Merger—which includes absorption, new company formation and new company spin-off; and
- Spin-off—which includes absorption spin-off.

In a broad sense, cross-border M&A includes the above forms as defined as narrow sense as well as the following forms:

- Stock exchange—which includes reinforced business and alliance relationship; and
- Joint venture—which includes risk-deduct form parent company.

With regard to the type of cross-border M&A without capital investment, it includes the following:

- Joint development—which enables collaboration in research and development (R&D);
- Original-equipment manufacturer (OEM) partnership—which enables collaboration of manufacturing resource; and
- Sales tie-up—which enables collaboration of marketing or distribution resource.

However, there are challenges and risks associated with cross-border M&A. Different countries have different laws and business regulations, and therefore, labor and tax issues arise when integrating companies move cross borders. Also, developing countries usually have less refined business market structure than developed countries. This brings several complex variables to the cross-border M&A deal and complicates the business merging process.

Overall, cross-border M&A could increase a company’s share prices greatly, but many obstacles can also exist. Understanding the business structure of both countries involved in a cross-border M&A process and learning from similar cases are imperative. Specifically, although keeping pace with the rapid changes of globalization is important for a corporation, decision-makers should use all the resources available before investing in unfamiliar countries.

## 14.4 Cross-Border Trade and Management

Globalization, as an increasingly dominant force since the last decades of the twentieth century, is shaping a new era of interaction among various political, cultural and economic groups throughout the world. As a result, it is increasing the contacts between people across various boundaries—geographical, political and cultural. When people say that ‘the world is becoming smaller every day’, they are referring



not only to the increased speed of and ease of transportation and communications but also to the increased use of international market to buy and sell goods. Today, the interactions among people with different national and cultural identities are deeper than ever before.

### ***14.4.1 Concepts and Definitions***

By border trade, it generally refers to the flow of goods and services across the international borders between jurisdictions. In this sense, it is a part of normal trade that flows through standard export/import frameworks of nations. In China, border trade is defined the one that is conducted by people living on the frontier areas within 15 km (sometimes 20 km) away from an international boundary (Cihai 1999, p. 1250). Subject to the government approval, border trade may enjoy tariff exemption for a certain amount of goods (in monetary value) and may be able to receive a reduced tariff rate for remaining goods.

However, cross-border trade is now usually known to have a much larger scope than border trade. Moreover, cross-border trade (or commerce), though similar to international trade is still different form the latter. For example, after of the return of Hong Kong to the People's Republic of China, the trade between Hong Kong and China may not be precisely defined as "international trade." But it belongs to "cross-border trade."

With regard to cross-border trade, one of the major driving forces contributing to its remarkable growth might be technological advance in transportation and communications. Intuitively, wide application of e-commerce and the declining of distance-related transactions costs have increasingly contributed to the growth of global trade.

### ***14.4.2 Cross-Border e-Commerce***

While transactions are conducted via electronic devices, they may be transported using digital mechanisms, such as the download of a product from the Internet. It is the latter that provides the enabling mechanisms to foster the growth of electronic commerce. The actual and projected growth rates and uses of the Internet indicate that electronic commerce is no passing fad, but rather a fundamental change in the way in which businesses interact with one another and their consumers. The followings present the most obvious potential benefits from engaging in electronic commerce:<sup>6</sup>

- a. Internet and web-based electronic commerce can reach a more graphically dispersed customers base

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<sup>6</sup> Based on Greenstein and Feinman (2000, pp. 2–3).

- b. procurement processing costs can be lowered
- c. cost of purchasing can be lowered
- d. reductions in inventories
- e. lower cycle times
- f. better customer service; and
- g. lower sales and, marketing costs

China's cross-border e-commerce is developing rapidly with outstanding features. E-commerce transactions between China and other countries increased 32% to 2.3 trillion yuan (US\$ 375.8 billion) in 2012 and accounted for 9.6% of China's total international trade. More than 90% of cross border e-commerce transactions in 2012 were exports to other countries from China. The US purchased the most goods from China, 17.2% of the total, including both purchases by businesses and consumers. Europe was next at 16.3%, followed by Hong Kong (15.8%), South Asia (10%), Japan (7.4%), Korea (4.3%) and India (2.3%). Popular categories for cross-border e-commerce trade include electronics, apparel and sporting goods. Business-to-business (B2B) transactions—mostly overseas companies ordering online from Chinese firms—accounted for about 95% of that cross-border trade, with Chinese consumers buying from foreign web sites (i.e., business-to-consumer (B2C) transactions) the most of the rest (Tong 2013).

Cross-border e-commerce provides a new-type of trading platform in which the digitalization and electronization of exhibition, negotiation and conclusion of a business will finally realize the import and export of products. E-commerce has made it much more convenient for consumers to purchase commodities across political and administrative borders than traditional marketing model (see Box 14.1). In 2013, as one of its first waves of projects initiated in the Shanghai Free Trade Zone (SFTZ), Shanghai launched a pilot cross-border e-commerce platform (pronounced in Chinese as 'kuajing tong' in abbreviation). Products sold on the platform are generally 30% cheaper than those in retail stores (Xin 2014).

#### **Box 14.1 Will Taobao Help China to Unify Taiwan?**

Cross-border e-commerce has made it much more convenient for consumers to purchase commodities across the Taiwan Straits than traditional marketing model. Since 2013, netizens from Taiwan were discussing about how Taobao, China's leading e-commerce platform, might be the first to help China to "reunify" Taiwan.

Taobao Marketplace is a website for online shopping in the Chinese language, similar to eBay and Amazon, and is operated by the Alibaba Group in mainland China. Its convenient shopping method is very popular among people from both sides of the Straits. However, the Taiwanese netizens claimed that when shopping, they had to use the 'Taiwan Province, China' address option as it saves high shipping fees and delivers quickly. In addition, some shops offer free shipping nationwide, which also includes Taiwan.

Some Taiwanese Taobao users have said online that they were upset about the Taiwan Province address registration. They even criticize those who shop on Taobao for having no backbone, but the shoppers defended themselves by saying that they place little political significance on choosing “Taiwan Province” and appreciate the site’s prices and quality, and that it is merely a ruse to save money.

Nevertheless, the website has one more choice. One can also choose “overseas” and then select Taiwan. However, overseas shipping fees in some stores are much higher than the domestic ones: the “Taiwan Province” shipping fee is 50 yuan (about US\$ 8.3), while the “overseas” shipping fee is 200 yuan (about US\$ 33).

### 14.4.3 Trade Dispute Settlement

A dispute arises when one country adopts a trade policy measure or takes some action that one or more fellow-WTO members consider to be breaking the WTO agreements. Settling disputes is the responsibility of the Dispute Settlement Body (DSB—the General Council in another guise), which consists of all WTO members. The DSB has the sole authority to establish “panels” of experts to consider the case, and to accept or reject the panels’ findings or the results of an appeal. It monitors the implementation of the rulings and recommendations, and has the power to authorize retaliation when a country does not comply with a ruling.<sup>7</sup>

**First stage:** consultation (up to **60 days**). Before taking any other actions the countries in dispute have to talk to each other to see if they can settle their differences by themselves. If that fails, they can also ask the WTO director-general to mediate or try to help in any other way.

**Second stage:** the panel (up to **45 days** for a panel to be appointed, plus six months for the panel to conclude). If consultations fail, the complaining country can ask for a panel to be appointed. The country “in the dock” can block the creation of a panel once, but when the DSB meets for a second time, the appointment can no longer be blocked (unless there is a consensus against appointing the panel). The panel’s final report should normally be given to the parties to the dispute within six months (or three months in cases of urgency). The main stages are:

- **Before the first hearing:** each side in the dispute presents its case in writing to the panel.
- **First hearing:** the complaining country (or countries), the responding country, and those that have announced they have an interest in the dispute, make their case at the panel’s first hearing.

<sup>7</sup> Based on [http://www.wto.org/english/thewto\\_e/whatis\\_e/tif\\_e/displ\\_e.htm](http://www.wto.org/english/thewto_e/whatis_e/tif_e/displ_e.htm). Accessed on 25 Feb 2014).

- **Rebuttals:** the countries involved submit written rebuttals and present oral arguments at the panel's second meeting. I
- **First draft:** the panel submits the descriptive (factual and argument) sections of its report to the two sides, giving them two weeks to comment.
- **Interim report:** The panel then submits an interim report, including its findings and conclusions, to the two sides, giving them one week to ask for a review.
- **Review:** The period of review must not exceed two weeks. During that time, the panel may hold additional meetings with the two sides.
- **Final report:** A final report is submitted to the two sides and three weeks later, it is circulated to all WTO members. If the panel decides that the disputed trade measure does break a WTO agreement or an obligation, it recommends that the measure be made.
- **The report becomes a ruling:** The report becomes a ruling or recommendation of the DSB within 60 days unless a consensus rejects it. Both sides can appeal the report.

## 14.5 Case 14. A Tale of Two Border Regions in Transition

In Mexico, the plants set up under the Border Industrialization Program (BIP) are called “maquiladoras” and the industry is called the “maquila” industry. Most of Mexico’s assembly activities are located along the border with the United States, concentrating on six towns from Tijuana, just south of San Diego, California, on the Pacific Ocean, to Matamores opposite Brownsville, Texas, near the Gulf of Mexico. The development in Mexico’s northern border area has been strongly influenced by the proximity to the United States. In addition, the implementation of the North American Free Trade Agreement (NAFTA) also plays an important role.<sup>8</sup> All these geographical and institutional factors have established the State of Chihuahua as one of the leading entities in economic growth and development in Mexico. Thanks to the Maquiladora Export Industry (IME)—which requires a variety of services to mobilize their supplies and finished goods to and from the United States—and the enactment of the NAFTA, one of the fastest growing sectors in the economy of Chihuahua was the transportation, storage and communications sector. The period of 1993–2006, measuring the sector’s growth based on GDP at constant prices for 1993, registered an extraordinary growth of 191.3% (OECD 2011).

Guangdong’s development is believed to be the most important episode for China’s economic miracle (Lee 1995; Shen et al. 2000). For the second half of the nineteenth and much of the twentieth centuries, Hong Kong and mainland China were separated by an international boundary marked by a river called “Shenzhen”. The Chinese characters, Shenzhen, mean a deep gutter. However, no one would

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<sup>8</sup> Since the implementation of the NAFTA in 1994 till 2009, Mexico’s share of US imports has increased from 7 to 12%, and its share of Canadian imports has doubled to 5% (data source: [http://www.indexmundi.com/mexico/economy\\_profile.html](http://www.indexmundi.com/mexico/economy_profile.html). Accessed on 19 May 2011).

have expected that the “gutter” had served as a forbidden frontier between the socialist China and the British Hong Kong in the mid-twentieth century, and have also served as a strong economic engine for Guangdong province since then. The proposal for establishing Special Economic Zones (SEZs) was finally approved by the National People’s Congress of China in 1980. Among the factors contributing to the rapid economic growth of Guangdong province, Guangdong’s geographical adjacency to Hong Kong and its cultural linkages to the dynamic economies in Southeast Asia are worthy of mention. As a coastal province, Guangdong has a huge number of natives and their descendants scattered in several dozens of countries and regions, particularly in Hong Kong and other Southeast Asian economies. During the past decades, especially since the handover of Hong Kong from the UK to China in 1997 and the implementation of the Closer Economic Partnership Arrangement (CEPA) in 2003, the development of Hong Kong has positively influenced that of Guangdong, and vice versa. What is more, there are many mutual complementarities between Guangdong and Hong Kong in terms of, among others, natural resource endowment, industrial structure, and marketing and managing skills. Through cross-border cooperation, the above comparative advantages have contributed to the economic growth of both Guangdong and Hong Kong substantially.

The differences and similarities of geographical, social and economic conditions between Chihuahua and Guangdong are briefly summarized in Table 14.2. In 2010, after being converted to US dollars by their respective exchange rates, Chihuahua’s per capita GDP (US\$ 15,015) is more than double that of Guangdong (US\$ 7013). In terms of purchasing power parity (PPP), however, Guangdong’s per capita GDP (US\$ 18,100, 2008) would be slightly higher than Chihuahua’s (US\$ 16,000, 2008). What is more, for the period from 1990 to 2010, Guangdong’s per capita GDP ratio to China’s average level is much higher than Chihuahua’s. Nevertheless, Fig. 14.2 shows that Guangdong’s per capita GDP as a ratio of China’s has been declining constantly for the period since the mid-2000s; while Chihuahua’s has been rising for the period from the mid-1990s to 2010 (with the exceptions in a few of years).

Note that Fig. 14.2 doesn’t imply that Guangdong’s cross-border cooperation had better economic results than Chihuahua’s. Frankly, it is quite difficult—if not impossible—to conduct any consistent comparison of the determinants of the outward-oriented economic performances between Chihuahua and Guangdong that do not have any similar geographical, historical and social conditions. However, my estimated coefficients on cross-border cooperation (CBC) show that, from 1993 to 2009 Guangdong’s net increase of per capita GDP was 222% that of the rest of China, while Chihuahua’s CBC coefficient (266%) was even larger (see the last row of Table 14.2 for details). This would suggest, at least to an approximate extent, that cross-border economic cooperation has performed better in Chihuahua than in Guangdong during the period from 1993 to 2009.

Till now, one thing seems to be certain: cross-border cooperation will benefit regional economic development, even though its effect differs from region to region. Moreover, as will be discussed in greater detail in the following section, institutional and administrative reorganizations play a key role in the long-term performance of cross-border economic cooperation.

**Table 14.2** How cross-border cooperation works in Chihuahua and Guangdong, 1993–2009. (Sources: NBS (2010), INEGI (2009), OECD’s Metropolitan Regions Database (supplied by Ms. Jose-Luis Alvarez-Galvan via e-mail of April 29, 2011), and author)

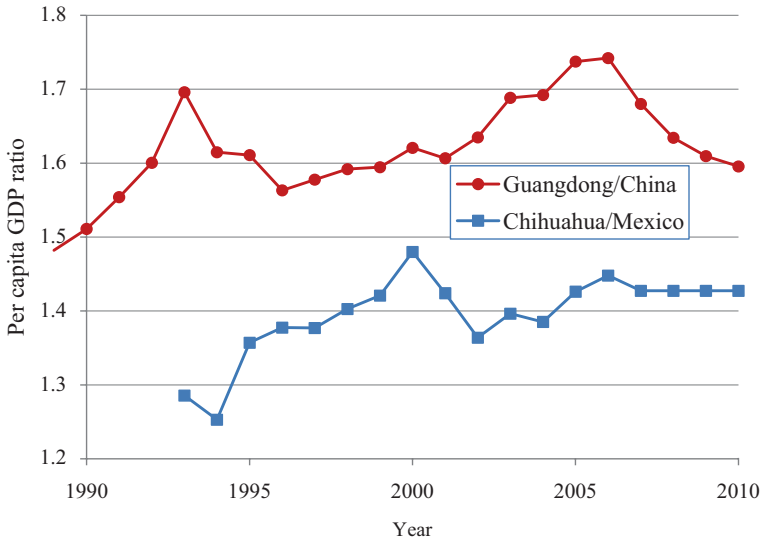
Indicator	Chihuahua state, Mexico	Guangdong province, China
1. Population (million persons)	3.36 (2008)	95.44 (2008)
2. Land area (thousand sq. km)	247.51	180.00
3. Per capita GDP at current prices/PPP rates (US\$)	15,015 (2010)/16,000 (2008)	7013(2010)/18,100 (2008)
4. Geographical and physical features	Inland (1/3 being desert)	Coastal area; ideal for agricultural production
5. Length of international border	937 km (with Texas and New Mexico of US)	30 km (with Hong Kong)
6. Hinterland	Mexico	China
6(a) Population (million persons)	112 (2010)	1360 (2010)
6(b) Land area (million sq. km)	1.96	9.60
7. Adjacent overseas markets (investors)	US Mainland	Hong Kong, Taiwan, Japan, S. Korea, ASEAN
8. CBC coefficient (1993–2009) <sup>a</sup>	2.66	2.22

<sup>a</sup> The CBC (cross-border cooperation) coefficient is used here to represent the ratio of the net increase of incomes (or per capita GDPs) of a border region pursuing cross-border economic cooperation (during a given period of time) relative to that of another similar region without any cross-border economic cooperation (during the same period of time). See Eq. (2.9) of Chap. 2 for a more detailed description of the CBC coefficient

A brief review of Mexico’s national and regional developments simply suggests that Chihuahua’s share of the national GDP has substantially increased since 1993, when it contributed to 3.92% of the GDP of Mexico. During the second half of the 1990s, Chihuahua recorded high rates of GDP growth, always above the national average, which allowed it to reach a share of 4.52% of the country’s total GDP in 2000. During 2001–2002, the state was affected by an economic recession in the United States. Since 2003, Chihuahua’s economy started on a vigorous recovery. This allowed it to increase, again, its share of the Mexican economy. Chihuahua’s share of the national economy was 4.61% in 2006. And in 2007 it was 4.59%.<sup>9</sup>

From a cross-border perspective, however, the story is a quite complicated. After computing Chihuahua’s per capita GDPs relative to Texas’s (in percent), it seems that there are approximately two cycles of cross-border economic divergence-convergence in the state of Chihuahua (see Fig. 14.3). The first divergence-convergence cycle occurred during the period from 1992 or 1993 to 2000, while the second one

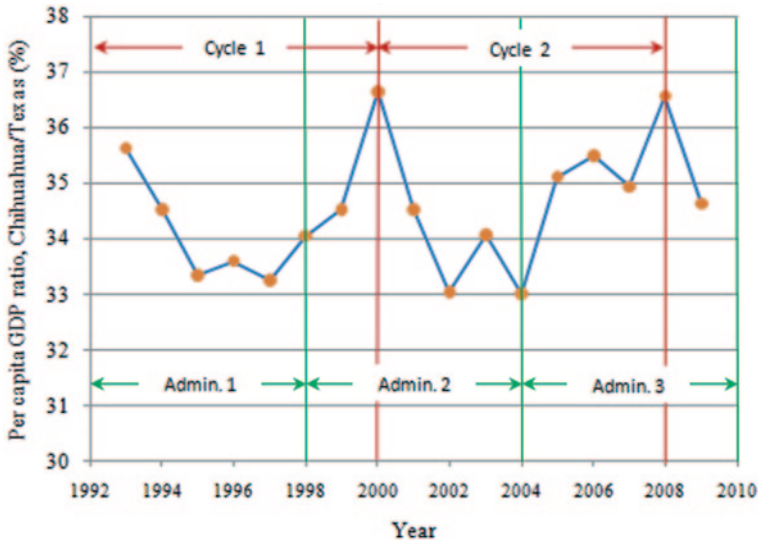
<sup>9</sup> Sources: INEGI (2009), CIES (2009), and OECD’s Metropolitan Regions Database (supplied by Mr. Jose-Luis via e-mail of April 29, 2011).



**Fig. 14.2** Per capita GDPs relative to national levels, Chihuahua and Guangdong. Note: All per capita GDP data are in current prices. (Sources: (1) NBS (various years) for China's data and (2) OECD's Metropolitan Regions Database for Mexico's data)

ranged from 2000 to 2008. This phenomenon may be accidental. If not, there may be other political and institutional reasons responsible to Chihuahua's cross-border growth cycles. Before moving ahead to explain this puzzle, let us bear the following facts in mind: (i) from 1992 to 1998 Francisco Barrio of the National Action Party (NAP) was the governor; (ii) from 1998 to 2004 Patricio Martínez García of the Institutional Revolutionary Party (IRP) was the governor; and (iii) from 2004 to 2010 José Reyes Baeza of the IRP was the governor.

Indeed, there are significant incentives in Mexico for new political leaders to differentiate themselves from their predecessors, even they come from the same political parties. And, local elections are fought on the basis of particularistic commitments and the personalities of those in the race. Typically, new administrations often introduce new policies, processes, programs, and projects and curtail, rename, or end those of their predecessors (Grindle 2006, p. 60). All these administrative characteristics, if they do exist in the state of Chihuahua, could inevitably result in economic fluctuations. More specifically, Chihuahua's time-series economic behaviors within each governor's tenure should have been characterized by the cycle of "faster growth first, followed by slower growth (or stagnation)" (which can also be defined as the inverted U-shape growth pattern) or of "slower growth (or stagnation) first, followed by faster growth" (which can also be defined as the U-shape growth pattern). Assume that there is no such growth cycles in the state of Texas of the United States (or at least such cycles exist less significantly in Texas than in Chihuahua), Chihuahua's cross-border economic divergence-convergence cycles persist (see Fig. 14.3).



**Fig. 14.3** A cross-border economic puzzle. Notes: (1) The per capita GDP data of Chihuahua are in chained 2000 PPP dollars; and those of Texas are in chained 1997 dollars. (2) Administrations 1, 2 and 3 represent the governors Francisco Barrio (of National Action Party), Patricio Martínez García (of Institutional Revolutionary Party) and José Reyes Baeza (of Institutional Revolutionary Party), respectively. (Sources: Created by author based on (1) ‘Anuario de estadísticas por entidad federativa’ (Statistics Yearbook at State Level) (for Chihuahua’s data) and (2) Bureau of Economic Analysis (BEA), US Department of Commerce (for Texas’ data))

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# Chapter 15

## Border Sightseeing and Cross-Border Tourism

In most circumstances, borders are negative assets. Borders per se are always barriers for cross-border linkages, which reduce the efficiency of and, naturally, the costs for cross-border linkage and border-related social and economic activities. This is particularly so from the perspective of local residents. However, borders may be transformed into positive assets under certain conditions. They may attract tourists who do not live in border areas. As a special type of scarce resources, borders can serve as very special natural and artificial scenes.

At present, many transnational borders have large, unexplored market in tourism. Cross-border tourism may be promoted by the natural and geographical features of the borders themselves, or by other cultural and historic activities in the cross-border regions. In both cases, border areas have a greater attraction for visitors, especially for those who come far away from these border areas. If regional and local administrators utilize this kind of advantage and overcome existing cross-border barriers, border sightseeing cross-border tourism can definitely promote the development of local economies and can improve people's livelihood significantly.

### 15.1 Borders as Scarce Resources

#### 15.1.1 *Border Markers*

A border marker (boundary marker, boundary stone or border stone) is a physical marker that identifies the start of a land boundary or the change in a boundary, especially a change in direction of a boundary. There are several other types of named border markers, known as pillars, obelisks and corners.

Border markers can also be a border line running in a straight line to determine that border. Boundary markers have often been used to mark critical points on boundaries between countries, states or local administrations but have also been

used to mark out the limits of private land-holdings especially in areas where fences or walls are impractical or unnecessary.

Boundary markers, traditionally, were often made of stone, but later many have been made with concrete or a mixture of materials. They are typically placed at a notable or especially visible point. Many are inscribed with relevant information such as the abbreviation of the boundary holder and often a date. In a few of cases, they are constructed as sculptures and other forms of artworks, as can be found in the tripoint of Germany, France, and Switzerland, in the background of the Three-Country Bridge (see Fig. 15.1).



**Fig. 15.1** The tripoint of Germany, France, and Switzerland. Note: The building located over the waters in the distance is the “Three-Country Bridge” (Source: Benutzer 17 February 2008)

### **15.1.2 *Borders as History Tellers***

Till now, there have been over 300 international land boundaries, which stretch over 250,000 km, and separate over 200 independent states and dependencies, areas of special sovereignty, and other miscellaneous entities in the world (Guo 2012b, p. 5). Throughout history, most of these boundaries have been formed in terms of culture as well as physical terrain, political fiat, and conquest. As a result, borders or border markers can also be a teller of major historical events.

Lady Mengjiang is a Chinese folk tale about the Great Wall of China. The story is about the separation of a loving couple and their tragic ending as a result of building the Wall during the Qin dynasty (221—206 BC). Mengjiang's husband was caught by imperial officials and sent to build the Great Wall. Not hearing from her husband after his departure, Mengjiang sewed warm clothes for him and decided to set off to look for him. Saying farewell to her parents, she packed her luggage and started her long journey. She climbed over mountains and went through the rivers. She walked day and night, slipping and falling many times; finally she reached the eastern end of the Great Wall at the present Shanhaiguan (meaning: 'mountain-sea pass').

Upon her arrival, bad news came to her, however, that her husband had already died of exhaustion and was buried into the Great Wall! Mengjiang could not help crying. She sat on the ground and cried and cried. Suddenly with a tremendous noise, a 400 km-long (248-mile-long) section of the Great Wall collapsed over her bitter wail. The workmen and supervisors were astonished. Emperor Qin Shihuang happened to be touring the wall at that exact time, and he was enraged and ready to punish the woman...

Between the eastern end of the Great Wall that was toppled by Mengjiang and the sea where she committed suicide, the Temple of Lady Mengjiang was established in later years. It has now been a tourist attraction today.

## **15.2 Borders and Tourism**

### **15.2.1 *Borders as Tourist Destinations***

Chung Ying Street (or "zhongying jie" in Chinese pinyin) is a street on the border between Hong Kong (a former British colony) and Shenzhen, Guangdong province, China, within the border town of Shatoujiao (or Sha Tau Kok in Cantonese). One (western) side of the street belongs to Hong Kong; while the other (eastern) side the city of Shenzhen. In 1899, the street was a river which was used by the British as the political border between Hong Kong and mainland China. The river dried before World War II. The dried river was then renamed to Chung Hing Street (zhongxing jie), and later renamed to Chung Ying Street. The Street was a famous place for shopping during the 1970s and the early 1990s. For some period of time, it had been one of the most favorable places for Chinese tourists from the mainland to visit and



**Fig. 15.2** Café in Baarle–Nassau (Netherlands), on the border with Belgium (right side). (Source: <http://en.wikipedia.org/wiki/Baarle-Nassau>)

buy foreign goods there. However, the prosperity has declined since the twenty-first century due to the policy that most people can easily apply to visit Hong Kong. At present, the Chung Ying Street is transforming to a border sightseeing place.

The exclaves and counter-enclaves located in the cross-border areas of Belgium and the Netherlands have been one of the most complicated geographical landscapes in the world (see Fig. 1.4 of Chap. 1). The border's complexity results from a number of medieval treaties, agreements, land-swaps and sales between the Lords of Breda and the Dukes of Brabant. At that period of time, predominantly agricultural or built environments became constituents of Brabant and other parts devolved to Breda, resulting in very complicated borders between Belgium and the Netherlands. These distributions were ratified and clarified as a part of the borderline settlements arrived at during the Treaty of Maastricht, signed in 1843 by Belgium and the Netherlands. The general principle under which the borders were established is according to where Catholic Belgians and Dutch Protestants were living at the time.

Living in such an enclaved village as Baarle brings its both problems and unique opportunities. Since each house is deemed to pay taxes in the country where its front door is located, it is an old tradition in Baarle to move the front door some meters if that is profitable for the taxes, especially for shops. In addition, as a result of its special political scenes, the border itself has attracted a lot of touristic traffic for village Baarle. For many years the shops in Belgium were open on Sundays, those in the Netherlands not—with the exception of those in Baarle. Taxes in Belgium and The Netherlands differed sometimes, so one could go shopping between two tax-regimes in one single street (see Fig. 15.2).

### **15.2.2 *Borders as Barriers to Tourism***

All products relating to border sightseeing or border tourism have one common feature—that is, borders are the key component of their products offered to tourists. However, it should be noted that border tourism is still different form cross-border tourism (which will be discussed in next section). For example, the Korean DMZ (see Case 10 of Chap. 10) has been a sightseeing attraction from both South and North Korea. Due to the political and military tensions over the Korea peninsula, cross-border tourism has never been available there.

Situated in Central Eastern Europe, the Tatra Mountains (Tatry in Polish and Slovak, and Tátra in Hungarian) have a total area of 750 km<sup>2</sup>. A characteristic feature of the Tatras mountain range is its great diversities of geological structure and of relief in nature. Another one lies in its political feature: the mountain range forms a natural border between Slovakia and Poland; of the total area, three quarters (designed as a national park called “Tatransko Narodny Park”) belong to Slovakia and one quarter (designed as a national park called “TatrzaĔski Park Narodowy”) to Poland. In November 1992 the whole mountain range was awarded the status of the UNESCO-MaB Biosphere Reserve. Due to the outstanding beauty of nature and a good accessibility, the area has attracted several millions of visitors every year (Taczanowska 2004).

The Tatra Mountains belong to relatively small transboundary areas in Europe. In spite of its bio-geographical unity, the mountain range is managed by two national parks: the Polish and the Slovak one. Crossing the Polish–Slovak border on tourist trails is regulated by the bilateral agreement which was signed by the governments of Poland and Slovakia in July 1999. So far only one tourist border-crossing has been opened in the Tatra Mountains, which is situated on the Rysy peak at the altitude of 2500 m above sea level. Apart from Poles and Slovaks, citizens from 33 other nations are allowed to cross the border there for tourist purposes within specified seasons and hours (Taczanowska 2004). Since Poland and Slovakia have not joined the group of Schengen countries, freer movement across their border is not possible at present.

### **15.2.3 *Cross-Border Tourism***

International tourism, by its definition, refers to movements of people across international borders for a variety of purposes including leisure but also includes business tourism, visiting friends and relatives, religious pilgrimage etc. (Hampton 2009). While there is no agreed definition of cross-border tourism, it is proposed that a day trip (whether leisure, business, visiting friends and relatives or grocery shopping) is a form of tourism if it crosses an international border (Timothy and Butler 1995).

### 15.2.4 *Integral Tourism: “1 + 1 > 2”*

Cross-border tourism has more economic values than border tourism. On the one hand, people conducting cross-border tourism can benefit from the international differentials in prices of goods. On the other hand, Cross-border tourism can promote cross-border trade and socio-economic cooperation. One sub-set of the tourism literature that could be further developed concerns cross-border shopping for instance between the UK and France, the US and Canada or Hong Kong and mainland China.<sup>1</sup>

Sometimes, cross-border tourism can induce a few of negative socio-cultural impacts. Examples of these negative impacts include child prostitution, sex tourism and gambling facilitated by differing legal systems and cultural norms between adjacent countries (Oppermann 1998; Sofield 2006; Gelbman 2008). This is commonly associated with the uneven cross-border development and the dis-coordination of legislative and institutional systems and policies among all the countries concerned.

The development cross-border tourism still has been restricted by various institutional and policy barriers created by various neighboring nations. Since people who want to pay cross-border visits are assumed to leave their home country for host countries, they should pay extra fees or costs including via application fees, customs duties, etc. Therefore, in order to promote cross-border tourism, cross-border coordination and cooperation in such fields as visa policy, customs duty, border-control point, and road construction must be enhanced between all countries concerned.

Cross-border tourism may be promoted by the natural and geographical features of the borders themselves, or by other cultural and historic activities in the cross-border regions. In both cases, border areas have a greater attraction for visitors, especially for those who come far away from these border areas. Along the US–Mexico border, there is a geo-strategic region for tourism and for commercial exchange. In this area, the cities of Juárez, Chihuahua, Las Cruces, New Mexico and El Paso, Texas, form a bio-region united by cultural, historic and natural resources with common characteristics. These resources have the potential to generate benefits for communities on both sides of the border. As in the case of Mexico, cross-border tourists made up 42 % of all Mexican tourism in 2005, and nearly 23 % of total tourism revenues were generated by frontier tourism and cross-border excursions from the United States (Cuevas-Contreras and Zizaldrá-Hernández 2011).

The municipal areas of Ciudad Juarez and El Paso, as a bi-national cross-border region, do not have in place a process of integral tourist planning that could ease private and public decisions in matters of regional tourist development and investments. Cooperative development and investment could allow both communities to harvest the benefits of cross-border tourism. For these cities, and for the entire border region as well, successful tourism requires the participation and coopera-

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<sup>1</sup> See, for example, Follo (2003), Lau et al. (2005), Timothy and Butler (1995), Timothy and Tosun (2003) and Lew and McKercher (2002).



tion of all stockholders involved, with the goals of improving communications and incorporating the most modern tools and technologies. A comprehensive approach to cross-border planning and cooperation will have to demonstrate the ‘characteristics of a cross-border network’ in which transactions are achieved in a context of reciprocity and in relationships of interdependency.

### ***15.2.5 Sustainable Tourism***

The quality of the environment, both natural and man-made, is essential to tourism. However, tourism’s relationship with the environment is complex. It involves many activities that can have adverse environmental effects. Many of these impacts are linked with the construction of general infrastructure such as roads and airports, and of tourism facilities, including resorts, hotels, restaurants, shops, golf courses and marinas. The negative impacts of tourism development can gradually destroy the environmental resources on which it depends.

Negative impacts from tourism occur when the level of visitor use is greater than the environment’s ability to cope with this use within the acceptable limits of change. Uncontrolled conventional tourism poses potential threats to many natural areas around the world, especially to the areas crossing political borders in which environmental damage and protection follow more complicated patterns). (We will discuss cross-border environmental and ecological protection in Chap. 16.) More specifically, it can put enormous pressure on an area and lead to impacts such as soil erosion, increased pollution, discharges into rivers or the sea, natural habitat loss, increased pressure on endangered species and heightened vulnerability to forest fires. It often puts a strain on water resources.

The Bulgarian–Serbian border area includes 12 administrative units: six districts in Bulgaria (Vidin, Montana, Sofia, Sofia-city, Pernik, and Kyustendil) and the equivalent six districts in Serbia (Bor, Zaječar, Nišava, Pirot, Jablanica, and Pčinja). This program—called “Let’s share our future developing sustainable tourism”—is financed by the European Union through the Instrument for Pre-Accession (IPA) Fund and co-financed by the governments of Bulgaria and Serbia.<sup>2</sup>

The objective of the project is to develop cross-border tourism, to promote cooperation between Serbia and Bulgaria by developing joint tourist destination packages and by improving the know-how of the key actors. The most significant results of the project will be a joint work program. Priority fields in the border region, which have been conducted through development of a tourism joint work program, include economic cooperation, environmental protection, nature and cultural heritage, integral construction of infrastructures, and so on. Another strong cross-border impact will be the creation of one dualistic destination—tourism will be promoted on both Bulgarian and Serbian sides of the border.

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<sup>2</sup> Source: <http://crossborderchallenge.org/index.php>. Accessed on 5 March 2014.

## 15.3 Tourism Across Climate Zones

### 15.3.1 About Climate Zones

In geography, temperate latitudes of the globe lie between the tropics and the polar regions. The north temperate zone extends from the Tropic of Cancer (approximately 23.5° north latitude) to the Arctic Circle (approximately 66.5° north latitude). The south temperate zone extends from the Tropic of Capricorn (approximately 23.5° south latitude) to the Antarctic Circle (at approximately 66.5° south latitude) (McColl 2005, p. 919). Usually, the changes in these regions between summer and winter are generally relatively moderate, rather than extreme hot or cold.

However, in certain areas, such as Asia and central North America, the variations between summer and winter can be extreme because these areas are far away from the sea, causing them to have a continental climate. In general, high latitude regions usually have a very cold winter versus a relatively comfortable summer; and low latitude regions usually have a very hot summer versus a relatively comfortable winter. This kind of temperature differences between high and low latitude regions may become a driving force for tourists from high-latitude regions to spend winter vocations in low-latitude regions and for those from low-latitude regions to spend summer vocations in high-latitude regions.

### 15.3.2 An Unusual Phenomenon

Sanya of Hainan province, China is situated between 18°09' and 18°37' latitude, giving it the tropical monsoon climate of this region. Sanya is one of the three prefecture-level cities of Hainan and the southernmost city on the Chinese island. Covering an area of 1920 km<sup>2</sup> with 209-km long coastline, this city has many natural advantages. Possessing a number of excellent harbors, the city is an important port for import and export of trade with foreign countries. Of all the rapidly growing tourist meccas in China, Sanya is arguably the most complete of the lot—it exists solely for tourism.

In 2000, the ratio of usual floating population was only 13.7%. According to China's Sixth National Population Census, which was conducted on November 1, 2010, Sanya's total population is 685,400 thousand, of which 200,100 thousand (near 30%) are usual floating population ('usual floating population' means those who had resided, as of the date when the census was conducted, in Sanya for over six months). Of Sanya's total usual floating population, only less than 30% come from Hainan province.<sup>3</sup> This phenomenon is quite unusual in China.

More unusual is that the majority of the floating people are not from neighboring provinces of Hainan. They come from Northeast China! At present, Heilongjiang

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<sup>3</sup> Source: [www.systats.gov.cn/rkpc\\_page.php?xuh=2513](http://www systats.gov.cn/rkpc_page.php?xuh=2513). Accessed on 28 Jan 2014.

province has about 300,000 thousand tourists and workers living in Sanya, of which nearly 130,000 thousand are from Harbin city—capital of Heilongjiang province.<sup>4</sup> During my stay at Sanya city from January 18 to 30, 2014, eight or nine of ten people I encountered in the streets were Northeast-dialect speakers as taxi drivers, grocers' owners and hotel managers, among others. When I joked with them that they were the landlord of Sanya city. They simply responded: "No. Sanya is a city of Heilongjiang province!"

### ***15.3.3 'Sanya City, Heilongjiang Province'***

On May 20, 2010, the No. 1 Affiliated Hospital of Harbin Medical University, jointly with the Sanya Land Reclamation Hospital of Hainan, established a Medical Care Center in Sanya city. Meanwhile, the Harbin Medical Insurance Management Center signed, with Hainan province, a medical care agreement in which health insurance card holders of from Harbin can receive free treatments in the Center in Sanya. This has made Sanya city a true place of Heilongjiang province!

Of course, the large number of immigrants from Heilongjiang and two other Northeast provinces (Jilin and Liaoning) into Sanya have also brought about negative effects—environmental, social and cultural. And, during my stay at Sanya, there were various news and reports on the cross-provincial distrust and conflicts. However, it seems that the interprovincial immigration can only but be speeded up along with the rising of people's income level on the one hand, and the improvement of air and rail transportation networks in China, on the other. It is expected that, as time goes, more and more Northeast Chinese will become permanent residents of Hainan and, in particular, of Sanya city, Hainan province. Some decades ago, many Han Chinese moved from the starved central China to the colder, but sparse northeast China. Now, their late generations are moving via an opposite direction, but with the same goal—in search of a better life.

As a matter of fact, Sanya is not the place that attracts visitors from Heilongjiang province alone. People from other places with a long, cold winter—including not only those in northern China but also South Korea and Russia—have also preferred spending their vocations in southernmost resorts of China, especially in Sanya (see Fig. 15.3). Perhaps, someday in the future, there will be news that Sanya, or part of it, is a place of the Russian Federation or South Korea.

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<sup>4</sup> Data source: <http://heilongjiang.dbw.cn/system/2010/05/20/052520203.shtml>. Accessed on 28 Jan 2014.



Fig. 15.3 A tri-lingual road signpost located in a southernmost resort of China. (Source: Courtesy of Gao Ming (2014-2-4))

## 15.4 Case 15. Why Does the Demographic Gravitation not Work?

Demographic gravitation is introduced by Princeton University astrophysicist John Quincy Stewart in 1947 (Stewart 1948). It is a concept of social physics, attempting to use equations and notions of classical physics (such as gravity) to seek insights into and even laws of spatial demographic behavior. A basic conception within it is that large numbers of people, in a city for example, actually behave as an attractive force for other people to migrate there, hence the notion of demographic gravitation. It has been related to earlier works such as William John Reilly's law of retail gravitation (Reilly 1931) and George Kingsley Zipf's intercity movement of persons (Zipf 1946).

Demographic gravitation applies Newtonian formulas of gravitation to that of "the interrelations of people" on a wide geographic scale, elucidating such notions as the demographic force of attraction (DFA). In brief, one of the simplest form of demographic gravitation is written as the following:

$$\text{DFA} = \frac{\text{POPULATION}_i \text{POPULATION}_j}{\text{DISTANCE}_{ij}} \quad (15.1)$$

**Table 15.1** Data on interprovincial floating population in Sanya and other variables

	Usual floating population in Sanya (in 2010, persons)	Total population (in 2010, million persons)	Distance from Sanya (km)	Per capita GDP in 2010 (yuan)
Anhui	4509	59.5	1702	20,749
Beijing	634	19.6	2773	71,938
Chongqing	4771	28.8	1293	27,475
Fujian	5002	36.9	1330	39,906
Gansu	891	25.6	2057	16,097
Guangdong	14814	104.3	667	44,070
Guangxi	7501	46.0	786	20,759
Guizhou	3075	34.7	896	13,229
Hebei	1766	71.9	2241	28,351
Heilongjiang	8425	38.3	3440	27,048
Henan	10,432	94.0	1880	24,552
Hubei	7679	57.2	1453	27,877
Hunan	12304	65.7	1214	24,411
Inner Mongolia	1642	24.7	2516	47,213
Jiangsu	2268	78.7	1070	52,642
Jiangxi	6252	44.6	1398	21,181
Jilin	2509	27.5	3209	31,557
Liaoning	2782	43.7	2930	42,189
Ningxia	163	6.3	2269	26,693
Qinghai	270	5.6	2177	23,986
Shaanxi	1806	37.3	2030	27,103
Shandong	2076	95.8	2175	40,853
Shanghai	308	23.0	1877	74,547
Shanxi	1044	35.7	2201	25,743
Sichuan	12,883	80.4	1485	21,362
Tianjin	557	12.9	2437	70,996
Tibet	25	3.0	2253	16,876
Xinjiang	965	21.8	5200	24,884
Yunnan	1078	46.0	1030	15,699
Zhejiang	2897	54.4	1715	50,899

Data on population are based on the sixth National Population Census, which was conducted on November 1, 2010. “Usual floating population” means those who had resided, as of the date when the census was conducted, in Sanya for over six months (available at [http://www.systats.gov.cn/ztfx\\_page.php?xuh=2327](http://www.systats.gov.cn/ztfx_page.php?xuh=2327). Accessed 28 January 2014). Data on the “distance from Sanya”, which are based on those of the provinces’ capital cities, are calculated by author. Data on per capita GDP are from NBS (2011)

In Eq. 15.1,  $DFA_{ij}$  is the demographic force of attraction between places  $i$  and  $j$ .  $POPULATION_i POPULATION_j$  is the product of populations of the  $i$ th and  $j$ th plac-

**Table 15.2** Regressions for the determinants of interprovincial floating population in Sanya

Explanatory variable	Regression (1)	Regression (2)	Regression (3)
Constant	-14.540 <sup>a</sup> (4.891)	-12.422 <sup>b</sup> (4.530)	-10.671 <sup>b</sup> (4.941)
ln(Population)	1.401 <sup>a</sup> (0.186)	1.429 <sup>a</sup> (0.189)	1.507 <sup>a</sup> (0.175)
ln(Distance)	-0.286 (0.345)	-0.200 (0.356)	-0.729 <sup>c</sup> (0.389)
ln(GDPPC)	-	-0.316 (0.324)	-0.255 (0.297)
COLD	-	-	0.990 <sup>b</sup> (0.398)
Coefficient of correlation (R <sup>2</sup> )	0.734	0.744	0.794
SE of regression	0.776	0.777	0.709
F-statistic	37.283	25.125	24.147
Sig. of regression	0.000	0.000	0.000
Number of observations	30	30	30

Dependent variable is the natural log of usual floating population in 2010; ln(Population) is the natural log of each province's population in 2010; ln(GDPPC) is the natural log of each province's per capita GDP in 2010; and ln(Distance) is the natural log of each province's distance from Sanya. COLD denotes a dummy, which is set as 1 for the provinces of Heilongjiang, Inner Mongolia, Jilin, Liaoning, Ningxia, Qinghai, and Xinjiang (all of which have the lowest average temperatures in China) and as 0 for other provinces

<sup>a</sup>, <sup>b</sup>, <sup>c</sup> denote statistically significant at greater than the 1, 5 and 10% levels, respectively

es.  $DISTANCE_{ij}$  represents the distance between the geographical centers of gravity of the  $i$ th and  $j$ th places (in km). Obviously, the above equation shows that the demographic force of attraction (DFA) grows along with the increase of the populations of any two places and the decrease of the distance between them.

In order to illustrate how the application of the demographic gravitation, let us take the cross-provincial floating of population of Sanya as an example.

According to the 2010 Census, Sanya has 685,408 permanent residents, living in an area of 1920 km<sup>2</sup>. The city is renowned for its tropical climate and has emerged as a popular tourist destination. As of 2010, there are 121,328 usual floating population<sup>5</sup> living in Sanya but originally coming from all mainland provinces of China (see Table 15.1). In order to estimate how the interprovincial floating population in Sanya is determined, let us first take the natural logarithm of Eq. 15.1. As a result, we obtain a simplified gravity model:

$$\ln(DFA_{ij}) = a_0 + a_1 \ln(POPULATION_j) + a_2 \ln(DISTANCE_{ij}) \quad (15.2)$$

In Eq. 15.2, “ $i$ ” denotes Sanya and “ $j$ ”, which ranges from 1 to 30, denotes each of the 30 provinces of China.  $DFA_{ij}$  is represented by the  $j$ th province's floating population in Sanya. Since  $POPULATION_i$  in Eq. 15.1 is a constant, it has been excluded from Eq. 15.2. Using the data shown in Table 15.1 and the SPSS software,

<sup>5</sup> “Usual floating population” means those who had resided, as of the date when the census was conducted, in Sanya for over 6 months.

our estimated result of Eq. 15.2 shows that the interprovincial floating population in Sanya is positively related to the population scale of each province; but that the negative effect on distance is not statistically significant (see the second column of Table 15.2).

Since people from richer places are usually found to have more material foundations for traveling, might income level be a variable explaining interprovincial population floating in Sanya? To this end, let us construct a revised gravity model by including GDPPC—per capita gross domestic product (GDP), as the following.

$$\ln(\text{DFA}_{ij}) = a_0 + a_1 \ln(\text{POPULATION}_j) + a_2 \ln(\text{DISTANCE}_{ij}) + a_3 \ln(\text{GDPPC}_j) \quad (15.3)$$

However, our estimated result (shown in the third column of Table 15.2) shows that the coefficient on the GDPPC variable is not statistically significant, suggesting that the interprovincial demographic gravitation in Sanya has nothing to do with income level. Again, the distance variable is still not found to have statistically meaningful effect on the interprovincial demographic gravitation in Sanya.

Do all these regressions mean that the interprovincial demographic gravitation does not work in Sanya? Before answering this question, let us pay some attention to the climatic differences between Sanya—the southernmost city—and the northernmost provinces of China. In January (the coldest month in winter), the average temperatures of Heilongjiang, Inner Mongolia, Jilin, Liaoning, Ningxia, Qinghai, and Xinjiang provinces ranges from  $-8.4^\circ\text{C}$  (or  $16.9^\circ\text{F}$ ) to  $-19.4^\circ\text{C}$  (or  $-2.9^\circ\text{F}$ ). As a tropical city, in January Sanya has an average temperature of  $21.7^\circ\text{C}$  (or  $71.1^\circ\text{F}$ ).<sup>6</sup> As a result, it is natural to assume that many people from northern China—especially from Northeast China—have found Sanya as their tourist destination in winter.

After we add a new explanatory variable—COLD—into Eq. 15.4, the estimated coefficient on distance now becomes statistically significant at the 5% level (shown in the fourth column of Table 15.2). This result shows that the interprovincial demographic gravitation in Sanya is now negatively related to distance, which conforms to the general law of demographic gravitation.

$$\ln(\text{DFA}_{ij}) = a_0 + a_1 \ln(\text{POPULATION}_j) + a_2 \ln(\text{DISTANCE}_{ij}) + a_3 \ln(\text{GDPPC}_j) + a_4 \text{COLD} \quad (15.4)$$

In the revised gravity model (shown in Eq. 15.4), COLD denotes a dummy variable, which is set as 1 for the seven northern provinces (i.e., Heilongjiang, Inner Mongolia, Jilin, Liaoning, Ningxia, Qinghai, and Xinjiang) and as 0 for the other provinces. The estimated coefficient on COLD (shown in Table 15.2) suggests that,

<sup>6</sup> Data source: Liu (2010, p. 37).

ceteris paribus, the usual floating population of the seven coldest provinces are 2.691 times (i.e.,  $\exp(0.990)=2.691$ ) that of the other provinces.

However, in all regressions, we cannot find that the level of per capita GDP (GDPPC) of a province is not a positive factor promoting people from that province to stay at Sanya in winter. This may be explained by the fact that the data on population shown in Table 15.1 do not include short-term (less than six-month) visitors in Sanya. Nevertheless, the estimated coefficient on GDPPC is not statistically significant in all our regressions, leaving a space for researchers to investigate into how Chinese people will do after they become rich.

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# Chapter 16

## Cross-Border Environmental and Ecological Protection

Three elements have been among the leading sources of environmental damage in recent decades: population growth, economic growth driven by highly polluting manufacturing industries and industries that are powered by non-renewable forms of energy. Without new incentives and opportunities, the rapidly growing population of most developing countries, with its increasing demand for energy and food, will accelerate the deforestation and transformation of forestland and wetland into cropland. But fragile ecosystems can only exacerbate the vicious circle of poverty.

Cross-border environmental pollution in the narrow sense is defined as those pollutants that cross political boundaries due to natural forces, such as running water, wind velocity, atmospheric movements and ocean currents. This is called natural cross-border pollution. In addition, some pollutants are transferred by human actions. For example, highly polluting industries or pollutants in developed countries are exported to undeveloped counties when industries are relocated to avoid labor laws, environmental standards or for taxation minimization. This is called social cross-border pollution. Of course, it should be acknowledged that much of this removal of pollutants is a combination of both natural and social factors. Thereby, cross-border pollution in a broad sense embodies not only pollutants produced by natural factors, but also pollutants made by social factors.

### 16.1 Environmental Politics

#### 16.1.1 *Global Warming, Common Issues*

It has been a common knowledge that increasing temperatures can result in the rise of sea level. This is mainly done through the addition of water to the oceans from the melting of glaciers and other continental ice sheets. Current sea level rise has occurred at a mean rate of 1.8 mm per year for the past century (Church and White

2006), and more recently, during the satellite era of sea level measurement, at rates estimated near  $2.8 \pm 0.4$  to  $3.1 \pm 0.7$  mm per year from 1993 to 2003 (Chambers et al. 2003; Bindoff et al. 2007). Current sea level rise is due significantly to global warming. If there is no technological revolution, global warming will continue to increase sea level over the coming century and longer periods.<sup>1</sup>

Climate change will have a significant impact on the sustainability of water supplies in the coming decades. A new analysis, performed by consulting firm Tetra Tech for the Natural Resources Defense Council (NRDC), examined the effects of global warming on water supply and demand in the contiguous United States. The study found that more than 1100 counties—one-third of all counties in the lower 48—will face higher risks of water shortages by mid-century as the result of global warming. More than 400 of these counties will face extremely high risks of water shortages.<sup>2</sup>

The Arctic sea ice September minimum extent reached new record lows in 2002, 2005, and 2007 (39.2% below the 1979–2000 average. In 2007, Arctic sea ice broke all previous records by early August—a month before the end of melt season, with the biggest decline ever in Arctic sea ice minimum extent, more than a million square kilometers—which opened, in the first time in human memory, the Northwest Passage completely (NSIDC 2010). Furthermore, recent projections of sea ice loss suggested that the Arctic Ocean would likely be free of summer sea ice sometime between 2059 and 2078 (Bo et al. 2009), while another estimate puts this date at 2030 (Roach 2009).

### 16.1.2 *Dividing the Arctic*

Growing evidence that global warming is shrinking polar ice has added to the urgency of several nations' territorial claims in the Arctic in hopes of establishing resource development and new shipping lanes, in addition to protecting sovereign rights (Eckel 2007). At present, the agreed maritime boundaries on the Arctic region include the following (IBRU 2008):

- Canada-Demark (Greenland): continental shelf boundary agreed on December 17, 1973
- Demark (Greenland)-Iceland: continental shelf and fisheries boundary agreed on November 11, 1997
- Demark (Greenland)-Norway (Jan Mayen): continental shelf and fisheries boundary agreed on December 18, 1995 following adjudication by the International Court of Justice (ICJ)
- Demark (Greenland)-Iceland-Norway (Jan Mayen): tripoint agreed on November 11, 1997

<sup>1</sup> See Bindoff et al. (2007) and Meehl et al. (2007) for more detailed analyses.

<sup>2</sup> Cited from <http://www.nrdc.org/globalwarming/watersustainability/index.asp>. Accessed on 16 Dec 2011.

- Demark (Greenland)-Norway (Svalbard): continental shelf and fisheries boundary agreed on February 20, 2006
- Iceland-Norway (Jan Mayen): fisheries boundary following the 200 nm limit of Iceland's EEZ agreed on May 28, 2980; continental shelf boundary and joint zone agreed on October 22, 1981
- Russia-USA: single maritime boundary agreed on June 1, 1990.

However, there are still disagreements between other nations. For example, Norway and Russia disagree on the alignment of their maritime boundary in the Barents sea: Norway claims the boundary should follow the median line, while Russia seeks a 'sector' boundary extending due. Canada claims that the waters of its Arctic archipelago are historic internal waters, and has enclosed them within a system of straight baselines. Under normal circumstances there is no automatic right of innocent passage through internal waters for foreign ships. However, other states (particularly the USA) argue that the channels in the archipelago which form part of the "Northwest Passage" through the Arctic qualify as straits used for international navigation under Part III of the UNCLOS, and that there is therefore a right of transit passage through the straits for foreign ships. While the Northwest Passage was under permanent ice cover, the debate was largely academic—but with the polar ice cap retreating and the Passage becoming increasingly navigable, the question of which legal regime applies has become increasingly pressing. Similar issues affect the straits of the "Northeast Passage" are around Russia's Arctic coastline.<sup>3</sup>

Further territorial disputes and political uncertainty will emerge if these nations hope to exploit the natural resources and establish new shipping lanes in the Arctic Ocean, in addition to protecting their respective sovereign rights there. Certain portions of the Arctic region are in dispute for various reasons. Canada, Denmark, Norway, Russia and the United States all regard parts of the Arctic Ocean as their respective "national waters" (territorial waters out to 12 nautical miles) or "internal waters".

Even though all of these countries have officially regarded the waters beyond the limit of 12-nautical mile territorial sea as international waters, there also are disputes regarding the rights to passage along "international seaways." In May 2008, Danish Foreign Ministry and Greenland invited foreign ministers from Canada, Norway, Russia and the United States to Ilulissat, Greenland to discuss how to divide borders in the changing Arctic region, and how to enhance cooperation against climate change affecting the Arctic.<sup>4</sup> At the Arctic Ocean Conference, the five countries announced the Ilulissat Declaration on May 28, 2008. However, the Declaration does not state clearly how these nations will resolve their territorial disputes in the Arctic.

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<sup>3</sup> Cited from <http://www.durham.ac.uk/ibru/resources/arctic>. Accessed on 6 Jan 2012.

<sup>4</sup> See "Denmark aims for meeting of Arctic nations to discuss borders" (available at <http://web.archive.org/web/20080229021337>). Accessed on 16 Dec 2011).

## 16.2 Common Issues, Differing Views

Despite the current trend towards global economic integration, policies for economic development and environmental protection in developed countries differ from those of developing countries. Consideration must be given to the different development stages of countries. Almost all developed countries have followed a development pattern that saw the creation of pollution-generating industrialization at the first stage of economic development which were superseded by less polluting industries later on. These countries developed their economies at the cost of the wholesale depletion of natural resources and the growth of large-scale polluting industry, which saw, in particular, the unsustainable depletion of resources in order to bolster their economic development. While, at present, most developed countries have seen improvements in management of the environment, many less developed countries are still on the road to repeating the development path others have followed.

Three elements have been among the leading sources of environmental damage in recent decades: population growth, economic growth driven by highly polluting manufacturing industries and industry that is powered by non-renewable forms of energy. Without new incentives and opportunities, the rapidly growing population of most developing countries, with its increasing demand for energy and food, will accelerate the deforestation and transformation of forestland and wetland into cropland. But fragile ecosystems can only exacerbate the vicious circle of poverty. If these problems are not addressed properly, all efforts to achieve sustainable development in fragile regions will inevitably be jeopardized.

### 16.2.1 *Cross-Border Separation*

Although many industrialized countries have adopted rather similar environmental legislation, the policies and specific measures on environmental management differ from country to country. With regard to air pollution emission charges, for example, most European countries have implemented policies to encourage the early adoption of pollution control equipment with the revenues returned to those paying the charge as a subsidy for installing the equipment. In Japan, however, the emission charge is designed to raise revenue to compensate victims of air pollution.

The following presents a French-Japanese comparison in more details. The French air pollution charge system has been in effect since 1985. The charge is levied on all industrial firms having a power generating capacity of 50,000 W or more or industrial firms discharging over 2500 t of sulfur or nitrogen oxides per year. The charge is levied on the amount of actual sulfur oxides emitted. Some 90% of the charge revenue is recovered by charge payers as a subsidy for pollution control equipment, while the remaining 10% is used for new technological developments (Tietenberg 2000, pp. 379–80).

In Japan the charge takes on a different function. As a result of four important legal cases where Japanese industries were forced to compensate victims for pollution

damages caused, in 1973 Japan passed the Law for the Compensation of Pollution-Related Health Injury. According to this Law, victims of designated diseases, upon certification by a council of medical, legal, and other experts, are eligible for medical expenses, lost earnings, and other expenses; they are not eligible for other losses such as pain and suffering. Two classes of diseases are funded: specific diseases where the specific source is relatively clear and nonspecific respiratory diseases where all polluters are presumed to have some responsibility.

### ***16.2.2 A US–Mexico Example***

Environmental issues associated with the gap between developed and developing countries when countries that share a common border are at different levels of development may also have a cross-border dimension. Even though political regions positioned side by side and separated only by a common political border may be very similar in natural geography, they may display enormous differences in their individual economic performance and level of development. The US–Mexican border area is a typical case in point. In Mexico, for example, border municipalities average only about one-fifth the average income level in the United States. Still, the figure represents more than twice the average per capita income of other cities in Mexico (Herzog 1990, p. 47).

One result of this disparity is that investment capital is drawn to the border region to take advantage of low wages, low tax rates, and lax public controls over labor standards and waste disposal. The economic and population growth linked to this development pattern in the US–Mexico border area has had a significant effect on urban and regional air quality in the border region. Today, air pollution presents a major environmental risk for some border communities. Border residents are exposed to elevated concentrations of carbon monoxide, sulfur dioxide, ozone, and particulate matter. Emissions from industrial sources; residential combustion for both heating and cooking; trash burning; and cars, trucks, and buses and dust from unpaved roads are significant contributors to poor air quality. In some border communities, inhalation exposure to toxics, including pesticides, is a significant concern. In addition, air pollutant emissions within and outside the border region also threaten visibility in some border protected areas, such as the Big Bend National Park in Texas (EPA 2001, p. 27).

International agreements alone do not guarantee effective cross-border management of environmental issues; administrative or legislative differences are further complicating factors that must be addressed. For example, the “Agreement between the United States of America and the United Mexican States on Cooperation for the Protection and Improvement of the Environment in the Border Area” was signed in La Paz, Baja California Sur, Mexico on August 14, 1983. Bilateral efforts to protect and improve air quality in the border area between the two countries began with the signing of two annexes to the *La Paz Agreement*. Annex IV, signed in 1987, outlines a sulfur dioxide emission limit for border copper smelters. Annex V, signed in 1989,

**Table 16.1** The health-based ambient air quality standards, United States vs. Mexico. (Source: EPA 2001)

Pollutant	Period average	United States	Mexico
Carbon monoxide (CO)	8 h	9 ppm	11 ppm
	1 h	35 ppm	
Nitrogen dioxide (NO <sub>2</sub> )	Annual	0.053 ppm	
	1 h		0.21 ppm
Ozone (O <sub>3</sub> )	8 h	0.08 ppm	
	1 h	0.12 ppm	0.11 ppm
Sulfur dioxide (SO <sub>2</sub> )	Annual	0.03 ppm	0.03 ppm
	24 h	0.14 ppm	0.33 ppm
Particulate matter smaller than 2.5 micrometers (PM <sub>2.5</sub> )	Annual	15 µg/m <sup>3</sup>	
	24 h	65 µg/m <sup>3</sup>	
Particulate matter smaller than 10 micrometers (PM <sub>10</sub> )	Annual	50 µg/m <sup>3</sup>	50 µg/m <sup>3</sup>
	24 h	150 µg/m <sup>3</sup>	150 µg/m <sup>3</sup>
Total suspended particulate matter (TSP)	Annual	15 µg/m <sup>3</sup>	75 µg/m <sup>3</sup>
	24 h	65 µg/m <sup>3</sup>	260 µg/m <sup>3</sup>
Lead (Pb)	Quarterly	1.5 µg/m <sup>3</sup>	1.5 µg/m <sup>3</sup>

ppm parts per million, µg/m<sup>3</sup> micrograms per cubic meter

directs the United States and Mexico to assess the causes of and develop solutions to air quality problems in border cities. In addition to the *La Paz Agreement*, the Clean Air Act, as amended in 1990, authorizes the US Environmental Protection Agency (EPA), in cooperation with its counterpart Mexican agencies, to monitor and improve air quality in regions along the border (EPA 2001, p. 27).

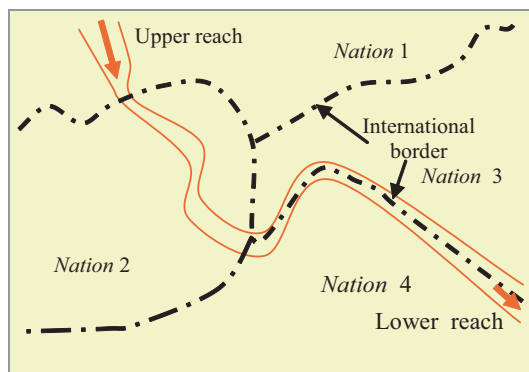
Both the United States and Mexico have also set health-based ambient air quality standards. Cross-border problems persist, however, since each side (the US and Mexico) has its own standards to protect public health with an adequate margin of safety. This has led to difficulties in cross-border coordination. For example, the standard of Ozone (O<sub>3</sub>) (1 h average) is 0.11 ppm for Mexico, while it is 0.12 ppm for the United States; the standard of Sulfur Dioxide (SO<sub>2</sub>) (the arithmetic mean of 24 h) is 0.33 ppm for Mexico, while it is 0.14 ppm for the United States (see Table 16.1).

## 16.3 Cross-Border Pollution Control

### 16.3.1 *Environmental Kuznets Curve*

There is a long line of thought suggesting that environmental quality changes with respect to income level. Theoretical papers by Gruver (1976); John and Pecchenino (1992), and Seldon and Song (1995) have derived transition paths for pollution,

**Fig. 16.1** The asymmetry of water pollution in a transnational river system



abatement effort and development under alternative assumptions about social welfare functions, pollution damage, the cost of abatement, and the productivity of capital. Empirical studies (Hettige et al. 1992; Shafik 1994; Selden and Song 1994; Grossman and Krueger 1995) have searched for systematic relationships by regressing cross-country measures of ambient air and water quality on various polynomial specifications of income per capita. In the empirical studies based on the cross-national data of the 1980s, Grossman and Krueger (1991) and Shafik and Bandyopadhyay (1992) demonstrate three types of relationships:

- i. Environmental quality (as indicated by ‘municipal wastes per capita’ and ‘carbon dioxide emissions per capita’) declines steadily as incomes increase;
- ii. Environmental quality (as indicated by ‘population without safe water’ and ‘urban population without adequate sanitation’) increases steadily as incomes increase; and
- iii. Environmental quality (as indicated by ‘urban concentration of particulate matter’ and ‘urban concentrations of sulfur dioxide’) first declines but then increases with incomes increase.

In a more synthesized term, the relationship between environmental pressures and income levels has been summarized to follow an inverted U curve.<sup>5</sup> This phenomenon is also known as the environmental Kuznets curve (EKC), due to the similarity with the relationship between the level of inequality and income per capita considered by Kuznets (1955). According to the EKC hypothesis, environmental pressures increase as income level increases at the initial stage of economic development, but later these pressures diminish along with the income levels (see Fig. 16.1). The simplest form of the mathematical expression can be written as

$$y = a + bx + cx^2 + \varepsilon \quad (16.1)$$

<sup>5</sup> See, for example, Lucas et al. (1992), World Bank (1993, 1995), Panayton (1993), Selden and Song (1994), Shafik (1994), Grossman and Krueger (1995), Holtz-Eakin and Selden (1995), and Rock (1996).

where  $y$  is the level of environmental damage,  $x$  is the current level of per capita output, and  $\varepsilon$  is the unobservable residual.  $a$  is constant, and  $b$  and  $c$ , to be estimated, reflect the influences of income level on environmental quality. Obviously, according to the EKC hypothesis,  $b > 0$  and  $c < 0$ .

The theoretical work has shown that a EKC, or inverted-U, relationship can result if a few plausible conditions are satisfied as income increases: Constant or falling marginal utility of consumption; rising marginal disutility of pollution; constant or rising marginal pollution damage; and rising marginal abatement cost (Hettige et al. 1997). The empirical results are roughly consistent with an EKC for conventional air pollutants such as suspended particulates and sulphur dioxide, but the results for water pollution are mixed. In most cases, however, the implied trajectories are sensitive to inclusion of higher-order polynomial terms in income whose significance varies widely. Structural interpretation of the estimates remains ad hoc, since the existing studies have incorporated almost no evidence about actual emissions in developing countries.

### 16.3.2 Empirical Evidence

In many cross-border areas, the natural and human systems are interacting under irreversible conditions. This could make the cross-border management of natural and environmental resources become extremely difficult. Let us look at a cross-border river as an example. Given one place in a river that receives pollutants, water quality indicators may differ significantly between the downstream and the upstream.<sup>6</sup> The determinants of water pollution will become more complicated when the rivers are serving as transnational boundaries.

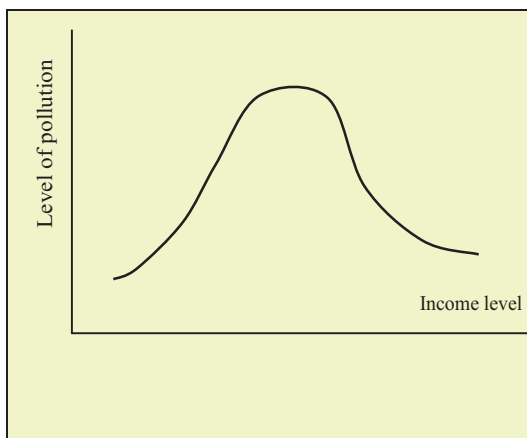
Suppose that in the upper reach of a transnationally shared river (as shown in Fig. 16.2), Nation 1's wastes discharged into the river affect the water quality of Nation 2 (and, to a lesser extent, that of Nations 3 and 4 in the river's lower reaches, eventually) more than that of Nation 1 itself; by contrast, in the lower reaches of the river, water quality is jointly affected by the wastes discharged by Nations 3 and 4. Consequently, the incentives (disincentives) for the policy-makers concerned to reduce (increase) the wastes discharged into the river differ from nation to nation. For example, Nation 1 will reduce the wastes discharged into the river, if it has reached an agreement concerning pollution control with some (not all) of Nations 2, 3 and 4, but the reduction will be further promoted if the agreement has been reached by all of the four states.

Do cross-border areas follow the EKC hypothesis? To answer this question, let us look at the Lower Mekong Basin (LMB). Measuring more than 4000 km in length, the Mekong river is one of the longest rivers in the world. Geographically, the LMB—an area of 600,000 km<sup>2</sup>—contains Cambodia, Lao PDR, north and northeast regions of Thailand and the Mekong delta of Vietnam. The LMB's water

<sup>6</sup> See Jackson and Jackson (2000, pp. 310–25) for different patterns of water pollution with respect to the distance in rivers.



**Fig. 16.2** Pollution as a function of income level (the EKC hypothesis)



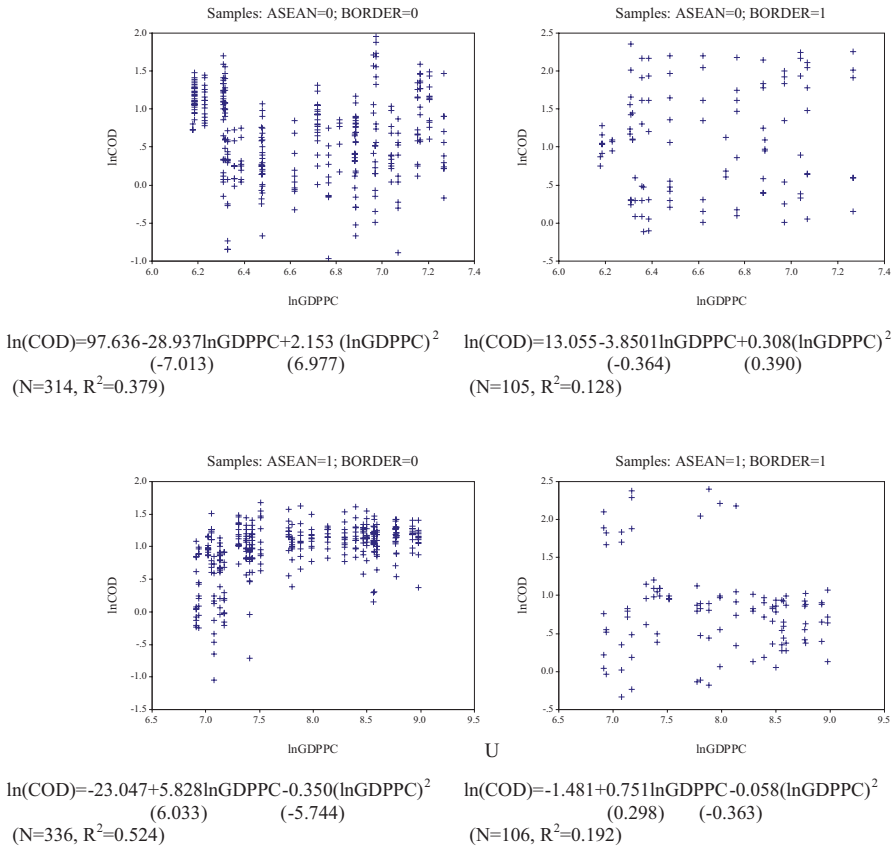
resources have sustained the livelihoods of the basin's people. Today, the basin has served as the basis for a variety of water-related activities—watershed management, irrigated agriculture, fisheries, navigation and transport, hydropower development, tourism, and recreation. As the dominant hydrological structure in Southeast Asia, the Mekong river plays a key role in virtually every aspect of human life.

The classification of these data is based on the following approaches: BORDER (representing 'international border'); and ASEAN (representing 'ASEAN membership'). Specifically, we divide the whole samples into four groups according to the following criteria:

- BORDER equals 1 for the sample to be collected at a place near an international border and 0 otherwise;
- ASEAN equals 1 for the sample to be collected at a place with the Association of Southeast Asian Nations (ASEAN) membership and 0 otherwise.

The water quality indicator of the LMB is represented by chemical oxygen demand (COD). The estimated results, as shown in Fig. 16.3, are less statistically significant for BORDER to be equal to 1 than otherwise. Thus they suggest that the determination of water pollution is more complicated in cross-border areas than in other areas. In other words, when dealing with the determinants of cross-border water pollution, care should be taken with respect to the application of the EKC hypothesis; or the non-economic factors should be included.

As for the areas far away from the transnational borders at the LMB (that is, for the samples when BORDER equals 0), all the estimated coefficients of the explanatory variables are statistically significant at one percent level (see Fig. 16.3). However, their environmental implications differ in different circumstances. For example, when ASEAN=0 (that is, without the ASEAN membership), water pollution does not follow the EKC hypothesis. On the other hand, however, when ASEAN=1 (that is, with the ASEAN membership), water pollution follows an inverted U-shape



**Fig. 16.3** The environmental and economic relationships (by group of samples). Notes: (1) *COD* chemical oxygen demand, the unit of which is milligram per liter (mg/l); *TOTP* total phosphate, the unit of which is milligram per liter (mg/l). (2) R<sup>2</sup> and N are the coefficient of correlation and the number of observations respectively. Figures within parentheses are t-statistic values

curve with respect to income level (with the turning point at US\$ 4129).<sup>7</sup> This result is consistent with the EKC hypothesis: pollution increases at first with respect to income level and then decreases after per capita GDP is larger than US\$ 4129.

It is worth noting that the ASEAN membership (that is, ASEAN = 1) did not play any significant role in the water pollution reduction of the LMB’s transnational border areas (that is, for BORDER to be equal to 1). The result indicates that the role of the ASEAN mechanism in transnational water pollution had not been significant for the data from 1985 to 2000. But since the whole sample I used here can be controlled by many other variables such as the ‘Cold War’ and other specific country dummies (including Vietnam, Thailand, Laos, and Cambodia), a more sophisticated

<sup>7</sup> The turning point is obtained by deriving the first-order differential of the dependent variable (lnCOD) with respect to the explanatory variable (lnGDPPC) be zero.

model may be needed before any conclusion about the determinants of transnational water pollution is reached.

At the end of this chapter, there is a case study for a more detailed analysis of the Mekong river.

## 16.4 Cross-Border Bioinvasions

### 16.4.1 *A Few Words About Bioinvasions*

There is no doubt about the increasing awareness of the importance of international and cross-border transactions in our daily life. When people say that ‘the world is becoming smaller every day,’ they are referring not only to the increased speed and ease of transportation and communications but also to the increased use of international and cross-border market to buy and sell goods. The overall heightened presence of foreign goods, foreign producers and even foreign-owned assets causes many to question the impact and desirability of all international and cross-border transactions. An increasing number of companies are now relying on production chains that straddle many politically distinctive areas. Raw materials and components may come from different linguistic or religious areas and be assembled in another, while marketing and distribution take place in still other venues. Consumers’ decisions in, for example, New York or Shanghai may become information that has an almost immediate impact on the products that are being made—and the styles that influence them—all over the world.

However, strict border control measures are by no means an unnecessary thing, at least in some circumstances. While cross-border dependence may be profitable, it also raises risks and transactional costs. This totally depends on the internal and external conditions concerned. As a result, some economies will inevitably face frustrations in dealing with cross-border relations, and these frustrations will be magnified for small sub-areas.

Bio-invasion is now thought to be the second gravest threat to biodiversity in North America, after habitat destruction and degradation (CEC 2000). The magnitude of exotic plant invasions in some countries is startling. In the USA, the plants are spreading across federal lands at an estimated rate of 1860 ha per day (Asher and Harmon 1995). As exotic plants colonize lands adjacent to wilderness, it is usually only a matter of time before they invade the wilderness as well. Exotic species can also be introduced via waterways, wildlife, and wind. This problem is compounded in wilderness because removal methods are limited to the minimum tool necessary to do so.

Biosecurity has multiple meanings and is defined differently according to various disciplines. The original definition of biosecurity started out as a set of preventive measures designed to reduce the risk of transmission of infectious diseases in crops and livestock, quarantined pests, invasive alien species, and living modified

organisms (Koblentz 2010). When confronted with widespread distribution and the minimum tool requirement, exotic plant management in wilderness can be a serious obstacle to maintaining natural conditions (Kelson and Lillieholm 1999). Another example is purple loosestrife (*Lythrum salicaria*), which was introduced from Europe in the mid-1800s as a garden ornamental. The loosestrife has been widely spreading in North America, invading wetland habitats where it dominates native plants and deprives waterfowl and other species of food sources (Pimentel et al. 1999).

Species that become invasive can be introduced either intentionally or unintentionally through pathways (or vectors). These include transportation (by water, land and air; in the goods themselves, in dunnage, packing materials or containers, in or on ships, planes, trains, trucks or cars); agriculture; horticulture and plant nursery stock; aquaculture industry; live food fish industry; bait fish; ornamental pond, water garden and the aquarium pet trades. Where there are no natural predators, they can come to dominate ecosystems, and can alter the composition and structure of food webs, nutrient cycles, fire cycles, and hydrology and energy budgets, threatening agricultural productivity and other industries dependent on living resources. As those once-ever forbidden borders become more and more open, bio-invasions are expected to increase. Border control is essential to stem the tide of bio-invasion and the damage it causes.

### ***16.4.2 Stop Invasive Species***

Many species of heavy-bodied cyprinid fish are collectively known in the United States as Asian carp. Asian carp have been a popular food fish in Asia for thousands of years. However, many people in North America associate Asian carp with a bottom feeding, highly bony species which is not widely regarded as food.

During the 1970s Asian carp were introduced to the US as a management tool in fish farms. However, the fish escaped into the Mississippi river and other water bodies during floods, and have upended the native ecosystems there. Asian carp, due to their huge size and ability to reproduce, have out-competed native fish varieties, and have also become a dominant presence in several parts of the Mississippi and its tributaries.

Some species of Asian carp cause harm when they are introduced to new environments. The black carp feeds on native mussels and snails, some of which can be already endangered; grass carp can alter the food webs of a new environment by altering the communities of plants, invertebrates and fish; and silver carp feed on the plankton necessary for larval fish and native mussels (USDA 2012).

A brief timeline of American fight against the Asian carp is briefly reported as the following:<sup>8</sup>

- 1970s: Asian carp are introduced to the United States as a management tool for aqua culture farms and sewage treatment facilities. The carp have made their way north to the Illinois River after escaping from fish farms during massive flooding along the Mississippi River.
- In 2002, the US Army Corps of Engineers completes an electric fish barrier in the Chicago Sanitary and Ship Canal, the only navigable aquatic link between the Great Lakes and the Mississippi River drainage basins.
- In 2003, several adult, fertile black carp are first captured from the Atchafalaya and other rivers connected to the Mississippi River.
- Construction of a second, permanent electric fish barrier begins in 2004. In addition to the canal, the Corp has identified 18 sites in five additional states, from Minnesota to New York, that allow for movement of Mississippi basin carp into the Great Lakes.
- In November, 2009, carp genetic material is detected beyond the two electric barriers, leaving only a single lock/dam on the Calumet River between the detected presence and Lake Michigan.
- In July, 2007, all silver carp and large-scale silver carp are declared by the US Department of the Interior to be invasive species under the Lacey Act.
- On June 22, 2010, a 19-pound Asian carp is found near the shore of Lake Michigan, in Lake Calumet, about six miles downstream from Lake Michigan, by a commercial fisherman hired by the state of Illinois to do routine fish sampling in the area. The fish confirms DNA evidence that Asian carp have indeed breached the electric fish barrier on the Chicago Sanitary and Ship Canal.
- On August 24, 2010, a carp reportedly knocks a kayaker out of competition in a Missouri River race at Lexington in western Missouri.
- In 2010, the Great Lakes and Mississippi River Interbasin Study (GLMRIS) is launched to explore options and technologies, collectively known as Aquatic Nuisance Species (ANS) controls, that can be applied to prevent ANS transfer between the basins through aquatic pathways.
- The Stop Asian Carp Act of 2011 is introduced to require the Secretary of the Army to study the feasibility of the hydrological separation, such as electric barriers, of the Great Lakes and Mississippi River Basins.
- In July 2012, Congress includes the “Stop Invasive Species Act” as an amendment to a transportation bill it approved. The Act requires the US Army Corps of Engineers to speed up implementation of strategies to protect the Great Lakes from Asian carp.
- In 2012, the US Senate and House introduce new bills aimed at combating the spread of Asian carp into the Great Lakes by expediting some items of the Stop Asian Carp Act of 2011.

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<sup>8</sup> Source: Tip of the Mitt Watershed Council, Petoskey, Mississippi (available at <http://www.watershedcouncil.org/learn/aquatic%20invasive%20species/asian-carp/>). Accessed on 13 Feb 2014) and other miscellaneous news clippings.

- In May 2013, a test for silver carp eDNA in the waters of Sturgeon Bay in Lake Michigan near Green Bay, Wis. is positive. May is a month when the carp are active.
- In early January 2014, the US Army Corps of Engineers releases the Great Lakes and Mississippi River Interbasin Study (GLMRIS).
- On June 10, 2014, President Barack Obama signs the water projects bill under which a lock in Minneapolis will be closed to prevent invasive carp from spreading upstream. The lock is the northernmost navigational structure on the Mississippi River. Under the legislation signed, the Upper St. Anthony Falls lock will be closed to boat traffic.

The GLMRIS has recommended eight options to keep at least 13 varieties of marine invaders, collectively called aquatic nuisance species, or ANS, out of the Great Lakes, which form a vital component of the local economies in the Great Lakes basin. Two of the alternatives evaluated include hydrologic separation with physical barriers to restore the natural Great Lakes-Mississippi River basin divide. The alternatives included continuing with existing measures such as the creation of permanent physical and electronic barriers separating the Great Lakes from the Mississippi river. The measures would take 25 years to complete and cost as much as US\$ 18 billion in its most drastic form.<sup>9</sup> It also would cause the greatest cost impact on commercial cargo. Much of the overall cost would be tied up in flood management basins and miles of runoff tunnels which would have to be built to reduce increased risks of flooding in the Chicago area.

## 16.5 Creating Boundaries for Protected Areas

### 16.5.1 *What is Protected Area?*

The definition of a protected area adopted by the World Conservation Union (IUCN) is the following: “An area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means” (IUCN 1994). Although all protected areas meet the general purposes contained in this definition, in practice the precise purposes for which protected areas are managed differ greatly. The following are the main purposes of management: (i) scientific research, (ii) wilderness protection, (iii) preservation of species and genetic diversity, (iv) maintenance of environmental services, (v) protection of specific natural and cultural features, (vi) tourism and recreation, (vii) education, (viii) sustainable use of resources from natural ecosystems, and (ix) maintenance of cultural and traditional attributes.<sup>10</sup>

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<sup>9</sup> The full text of the report is available at [www.michigan.gov/documents/dnr/Wethington\\_339137\\_7.pdf](http://www.michigan.gov/documents/dnr/Wethington_339137_7.pdf). Accessed 18 Feb 2014).

<sup>10</sup> Cited from [www.wcmc.org.uk/protected\\_areas/data/sample/iucn\\_cat.htm](http://www.wcmc.org.uk/protected_areas/data/sample/iucn_cat.htm). Accessed on 23 Sept 2011.

A variety of arrangements for protected areas exist, all following the same principle, but applied under completely different conditions (landscape, ecological, political, social, etc). Hence, a wide diversity can be observed in the criteria for their creation and management. There are five aspects that are commonly considered in their creation. These are:

- Size: determined based on factors such as the objectives for creation of protected areas, availability of land, traditional land use systems, threats and opportunities.
- Ecology: protected areas vary depending on their focus on the landscape, habitat and/or species conservation, each of which demands a different approach for their creation.
- Legislation: several international treaties and conventions (e.g. Convention on Biological Diversity, World Heritage Convention) and national level guidelines for protected areas (e.g. Nepal) recommend creation of protected areas.
- Social and institutional: creation of protected areas also involves consideration of issues such as traditional rights of local communities, type of development activities to minimize negative impacts of conservation, local organizations to manage protected areas and land tenure.

Over the course of the past 100 years, protected natural areas have been the traditional means of conserving nature. There are currently over 120,000 protected areas covering 12.2% of the Earth's land area, 5.9% of the territorial seas and only 0.5% of the extraterritorial seas (territorial seas extend from the shore to 12 nautical miles offshore; extraterritorial seas are those marine areas beyond the territorial seas (UNEP-WCMC 2008). The World Conservation Union (IUCN) originally recognized 10 categories of protected areas in 1978. Two important categories, biosphere reserves and World Heritage Sites, are in fact not management categories but international descriptions overlying other categories. The fourth World Parks and Protected Areas Congress, held in Caracas in 1992, reduced this list of ten categories to a preliminary list of five: scientific reserves or wilderness areas, national parks, natural monuments, habitat or species management areas and protected landscapes/seascapes. The IUCN has defined a series of protected area management categories based on management objective, as the following:<sup>11</sup>

- i. Ia: Strict Nature Reserve (a protected area managed mainly for science). It refers to an area of land and/or sea possessing some outstanding or representative ecosystems, geological or physiological features and/or species, available primarily for scientific research and/or environmental monitoring.
- ii. Ib: Wilderness Area (a protected area managed mainly for wilderness protection). It refers to a large area of unmodified or slightly modified land, and/or sea, retaining its natural character and influence, without permanent or significant habitation, which is protected and managed so as to preserve its natural condition.
- iii. II: National Park (a protected area managed mainly for ecosystem protection and recreation). It refers to a natural area of land and/or sea, designated to (a) protect

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<sup>11</sup> Examples of each of these categories are provided in the *Guidelines for Protected Area Management Categories* (IUCN 1994).

the ecological integrity of one or more ecosystems for present and future generations, (b) exclude exploitation or occupation inimical to the purposes of designation of the area and (c) provide a foundation for spiritual, scientific, educational, recreational and visitor opportunities, all of which must be environmentally and culturally compatible.

- iv. III: Natural Monument (a protected area managed mainly for conservation of specific natural features). It refers to an area containing one, or more, specific natural or natural/cultural feature which is of outstanding or unique value because of its inherent rarity, representative or aesthetic qualities or cultural significance.
- v. IV: Habitat/Species Management Area (a protected area managed mainly for conservation through management intervention). It refers to an area of land and/or sea subject to active intervention for management purposes so as to ensure the maintenance of habitats and/or to meet the requirements of specific species.
- vi. V: Protected Landscape/Seascape (a protected area managed mainly for landscape/seascape conservation and recreation). It refers to an area of land, with coast and sea as appropriate, where the interaction of people and nature over time has produced an area of distinct character with significant aesthetic, ecological and/or cultural value, and often with high biological diversity. Safeguarding the integrity of this traditional interaction is vital to the protection, maintenance and evolution of such an area.
- vii. VI: Managed Resource Protected Area (a protected area managed mainly for the sustainable use of natural ecosystems). It refers to an area containing predominantly unmodified natural systems, managed to ensure long term protection and maintenance of biological diversity, while providing at the same time a sustainable flow of natural products and services to meet community needs.

The size of a protected area reflects the extent of land or water needed to accomplish the purposes of management. For example, for a Category I area, the size should be that needed to ensure the integrity of the area to accomplish the management objective of strict protection, either as a baseline area or research site, or for wilderness protection. For a Category II area, the boundaries should be drawn sufficiently widely that they contain one, or more, entire ecosystems which are not subject to material modification by human exploitation or occupation (IUCN 1994).

### ***16.5.2 Internationally Shared Protected Areas***

For various reasons, many of these protected areas exist along international boundaries, which suggest the existence of cross-border ecosystems. These are especially likely where protected areas in different countries adjoin across international boundaries.<sup>12</sup> Fragile regions are particularly important to natural and ecological conservation because of the fact that they often cover interdependent ecosystems. Nature does not recognize political boundaries, however, and in many cases, species

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<sup>12</sup> See, for example, Guo (2012a, pp. 147–62) for a list of the internationally adjacent protected areas recognized by the World Conservation Union (IUCN 1998).



continue to migrate across those borders as they always have, regardless of customs and regulations. Pursuing cross-border cooperation and the creation of bilateral and/or multilateral cooperative mechanisms in internationally adjacent areas is a vitally important contribution to the management of natural and biological resources.

The benefits of cross-border cooperation in internationally shared protected areas are summarized as the following:

- A larger contiguous area will better safeguard biodiversity since very large areas are needed to maintain minimum viable populations of some species (particularly large carnivores).
- Where populations of flora or fauna cross a political or administrative boundary, cross-border cooperation promotes ecosystem or bioregional management.
- Reintroduction or natural recolonization of large-range species is facilitated by cross-border cooperation. For rare plant species needing *ex situ* bank and nursery facilities, one facility for both parks will be cheaper to set up.
- Pest species (pathogens, insects) or alien invasives that adversely affect native biodiversity are more easily controlled if joint control is exercised rather than having a source of infection across the boundary.
- Wildfires cross boundaries, and better surveillance and management is possible through joint management.
- Poaching and illegal trade across boundaries are better controlled by cross-border cooperation. Cooperation is needed for effective law enforcement. Joint patrols in border areas become possible.
- Joint research programs can eliminate duplication, enlarge perspectives and the skills pool, standardize methodologies, and share expensive equipment. More cost-effective and compelling education materials can be produced, and joint interpretation is stronger concerning shared natural or cultural resources.
- Joint training of park staff is more cost effective and usually benefits from greater diversity of staff with different experiences.
- Cross-border cooperation improves staff morale and reduces feeling of isolation. Contact with cultural differences enriches both partners. Cross-border cooperation makes staff exchanges easier, and staff exchange programs have shown their worth.
- Expenses for infrequently used heavy equipment, aircraft rental for patrols, etc., may be shared.
- A cross-boundary pool of different expertise is available for problem solving.<sup>13</sup>

With regard to the establishment of border-contiguous protected areas and the management of abutting protected areas, special consideration should be given by national or sub-national governments in the following situations:

- Where boundaries are located in shared water bodies such as rivers or lakes, and perhaps even for shared underground aquifers, e.g., Rio Grande at Big Bend/ Cañon Santa Elena (USA–Mexico); or where an important earth feature such as

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<sup>13</sup> Based on Hamilton et al. (1996).

a mountain or a glacier or a coral reef contains national or sub-national boundaries, e.g., Mt. Kanchenjunga (India, Nepal, China), Israel-Jordan Coral reef in Red Sea; needed for Mont Blanc, which has no protection, between Italy, France, and Switzerland.

- Where a natural ecological system straddles one or more boundaries and needs to be managed as a single ecological unit in order to preserve essential species, communities, and ecological processes, e.g., ibex in La Vanoise and Gran Paradiso, which move across the Alps in winter–summer ranges from Italy to France.
- Where local communities and indigenous peoples in natural areas are linked across boundaries by shared ethnic or socio-cultural characteristics, traditions, and practices, e.g., indigenous native hunting in Kluane (Canada)/Wrangell-St. Elias (USA).
- Where the use or management of shared natural resources is or may become a locus of contention, e.g., oil at the Ecuador/Perú border where, after armed conflict, a truce and a Peace Ecological Reserve was established in the Sierra del Condor.
- Where there is a need to cooperate against common threats to ecosystems and their integrity, e.g., fire or invasive alien species, with agreements such as that between Quetico Wilderness Park (Canada) and Boundary Waters Wilderness Canoe Area (USA) for fire response.
- Where there is a boundary or territorial dispute; or where, after a period of armed conflict, there is a need to rebuild confidence and security for local communities and provide a stable foundation for conservation and sustainable development.<sup>14</sup>

## 16.6 Case 16. A Model of Cross-Border Water Pollution

In order to avoid spurious regressions on the determinants of water pollution within the Lower Mekong Basin (LMB) in Sect. 16.3.2 of this chapter, let us introduce three dummy variables:

- BORDER1 (with values of ‘1’ denoting “international border across which a river runs” and ‘0’ for otherwise cases);
- BORDER2 (with values of ‘1’ denoting “international border along which a river runs” and ‘0’ for otherwise cases); and
- DISPUTE (with values of ‘1’ denoting “international border around which there is a territorial dispute” and ‘0’ for otherwise cases).

We assume that the efforts on the reduction of transnational water pollution should not be emphasized if all nations concerned have not reached any bilateral or multilateral agreement on cooperation. We intend to clarify whether or not ASEAN membership has played a role in the reduction of transnational water pollution (here

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<sup>14</sup> Based on Sandwith et al. (2001).

ASEAN is also treated as a dummy variable). To investigate whether or not ASEAN membership has played a role in the reduction of transnational water pollution, we also include ASEAN as a dummy variable. In addition, since the early period of the years 1985–2000 is marked by the Cold War, which could affect to certain degree the bilateral or multilateral cooperation of the LMB, the time dummy (COLDWAR) will be employed.

Finally, after each of the four countries is treated as a dummy, the political economy analytical model is written as the following:

$$\begin{aligned} \ln(\text{COD}_{ijt}) = & \alpha_0 + \alpha_1 \ln(\text{GDPPC}_{it}) + \alpha_2 [\ln(\text{GDPPC})]^2 \\ & + \alpha_3 \text{BORDER1}_{ij} + \alpha_4 \text{BORDER2}_{ij} + \alpha_5 \text{DISPUTE}_{ij} \\ & + \alpha_6 \text{ASEAN}_{it} + \alpha_7 \text{COLDWAR}_{it} + \sum \alpha_{7+k} \text{COUNTRY}_k + \mu_{ijt} \end{aligned} \quad (16.2)$$

where  $\ln(\cdot)$  is the natural logarithm of the variable in parenthesis;  $k=1, 2$  and  $3$ , representing country dummies of Thailand, Vietnam, and Lao, respectively;  $\text{COD}_{ijt}$  is the indicator of water quality—chemical oxygen demand, measured in milligram per liter (mg/l)—of Nation  $i$  at water quality station  $j$  in year  $t$ ,  $\text{GDPPC}_{it}$  is the per capita GDP of Nation  $i$  in year  $t$ , and  $\mu$  is the unobservable residual.  $\alpha_0$  is constant, and  $\alpha_1$  and  $\alpha_2$ , to be estimated, reflect the influences of geographical and economic factors on water quality. The remaining variables included in Eq. (16.2) are dummies.  $\text{BORDER1}_{ij}$  is 1 for water quality station  $j$  to be close to an international border across which a river runs and 0 otherwise.  $\text{BORDER2}_{ij}$  is 1 for water quality station  $j$  to be located at an international border along which a river runs and 0 otherwise.  $\text{DISPUTE}_{ij}$  is 1 for water station  $j$  to be on or around a disputed boundary and 0 otherwise.  $\text{ASEAN}_{it}$  is 1 for Nation  $i$  to hold the ASEAN membership in year  $t$  and 0 otherwise.

Since Eq. (16.2) includes various political factors, it may provide statistical information about the influences of these factors on transnational water pollution. Specifically, the coefficients on the dummies variables (BORDER1, BORDER2, DISPUTE, ASEAN and COLDWAR) may be either positive or negative. If water pollution is more serious in transboundary and disputed areas than in the other areas,  $\alpha_3$ ,  $\alpha_4$  and  $\alpha_5$  are expected to be positive. If the ASEAN provides an opportunity for its member nations to enhance the multilateral cooperation in the reduction of water pollution,  $\alpha_6$  is expected to be negative. In the same way, if water pollution is more serious in the Cold War period (represented by the second half of the 1980s in the research) than in the post-Cold War period (represented by the 1990s in the research),  $\alpha_7$  is expected to be positive. It is worth noting that socioeconomic activities in the upper Mekong riparian nations (such as Myanmar and Yunnan province of China) have also affected the water quality of the LMB. However, it looks technically plausible that these impacts have already been represented, at least partially, by the inclusion of the dummy ‘BORDER1’ in Eq. (16.2).

Our data on the water quality of the LMB are provided by the Mekong River Commission (MRC). The original data are month-based statistics including 21 indicators in 71 water quality stations of Thailand, Vietnam, Lao PDR, and Cambodia

(only from 1993 to 2000). The data on per capita GDP (GDPPC) is measured in terms of purchasing power parity (PPP) international dollars. The sources for the GDPPC data of the LMB are the following: (1) ASEAN Secretariat, ASCU Database (<http://www.aseansec.org/macroeconomic/gdp>); (2) *Global Economic Outlook Database of IMF* and *UN Yearbook of Asia-Pacific*; (3) the Penn World Table (PWT)<sup>15</sup>; and (4) *World Development Indicators* (various issues, released by the World Bank). For those that are not available from official sources, we will use the roughly estimated GDPPC data for Vietnam (at years from 1986 to 1990) and for Cambodia (at years from 1986 to 1990 and from 1992 to 1994). Thailand's GDPPC data on its LMB are re-adjusted based on its national GDPPC (PPP) level and the per capita income ratios of North and Northeast regions to the nation as a whole (Israngkura 2003, p. 285). Since Vietnam's income gaps between the Mekong delta and the other regions are not significant from 1985 to 2000, we will use its national data to represent the LMB's.

Table 16.2 reports the estimated results for regressions of transnational water pollution in terms of natural logarithms of COD. Let us first look at regressions that include only two economic variables (denoted by natural logarithm of GDPPC and its square). Clearly, regression (1) of Table 16.2 does not provide evidence in support of the EKC hypothesis.

Why do the estimated results not fit with the EKC hypothesis? The reason might be three-fold. First, with the exception of Thailand, the LMB is still at the initial stage of economic development—most of its per capita GDPs being around or even lower than those of the low-income nations. Second, although there is certain evidence that environmental quality may be improved along with the increase in income level (especially in developed nations), none of the pollutants examined in the existing literature fulfills the EKC hypothesis unequivocally (see Ekins 1997; Roca et al. 2001, among others), or at least the result remains unclear (Stern and Common 2001). Third, technological innovation and economic and environmental policies could be analyzed as independent shocks that can take place at very different income levels and probably simultaneously affect countries with quite different income levels (Roca et al. 2001). For example, Unruh and Moomaw (1998) show that the 1973 oil price shock had an enormous influence on the behavior of CO<sub>2</sub> emissions in all the OECD countries they studied, in spite of the important differences in per capita income.

Even worse, the possible existence of multicollinearity between the two variables (natural logarithm of GDPPC and its square) would have resulted in the insignificantly estimated coefficients.<sup>16</sup> Next, we will put aside our attempt to estimate an EKC and focus on the other issues of our interests. The estimated results on the natural logarithms of COD, shown as regression (3) of Table 16.2, provide strong evidence in support of the view that water pollution tends to be positively related to

<sup>15</sup> These data are available at [http://pwt.econ.upenn.edu/php\\_site/pwt\\_index.php](http://pwt.econ.upenn.edu/php_site/pwt_index.php).

<sup>16</sup> We conducted a joint test of the significance of the two income variables and found that the multicollinearity problem does exist (the Pearson correlation is 0.999, which is statistically significant at the 1% level).

**Table 16.2** Regressions for transnational water pollution (chemical oxygen demand)

Explanatory variables	(1)		(2)		(3)	
	Coeff.	Std. error	Coeff.	Std. error	Coeff.	Std. error
(Constant)	-1.317	2.208	-4.346 <sup>c</sup>	2.420	-2.623 <sup>a</sup>	0.623
$\ln(\text{GDPPC})$	0.422	0.581	0.964	0.611	0.518 <sup>a</sup>	0.088
$[\ln(\text{GDPPC})]^2$	-0.018	0.038	-0.029	0.039	-	-
BORDER1	-	-	-0.317 <sup>a</sup>	0.064	-0.317 <sup>a</sup>	0.064
BORDER2	-	-	0.147 <sup>a</sup>	0.046 <sup>a</sup>	0.14 <sup>a</sup>	0.047
DISPUTE	-	-	1.108 <sup>a</sup>	0.077	1.016 <sup>a</sup>	0.077
ASEAN	-	-	-0.018	0.050	-0.043	0.046
COLDWAR	-	-	0.438 <sup>a</sup>	0.060	0.428 <sup>a</sup>	0.059
THAILAND	-	-	-0.863 <sup>a</sup>	0.144	-0.866 <sup>a</sup>	0.144
VIETNAM	-	-	-0.413 <sup>a</sup>	0.064	-0.411 <sup>a</sup>	0.064
LAO	-	-	-0.591 <sup>a</sup>	0.065	-0.602 <sup>a</sup>	0.063
N	864		864		864	
R <sup>2</sup>	0.040		0.333		0.333	
F	19.184		53.707		47.147	
Sig.	0.000		0.000		0.000	

(1) Dependent variable is the natural log of chemical oxygen demand, i.e.,  $\ln(\text{COD})$ ;  $\text{GDPPC}$  GDP per capita,  $\text{BORDER1}$  international border across which a river runs,  $\text{BORDER2}$  international border along which a river runs, and  $\text{DISPUTE}$  international border around which there is a territorial dispute,  $\text{ASEAN}$  Association of Southeast Asian Nations,  $\text{COLDWAR}$  Cold War (see Appendix A for more details). (2) Country dummies only include Thailand, Vietnam, and Lao PDR, with Cambodia being excluded. (3) Ordinary Least Squares (OLS) estimation is used; N, R<sup>2</sup>, F and Sig. are the number of observations, coefficient of correlation, F-statistic value, and overall significance of the regression, respectively. (4) <sup>a</sup> and <sup>c</sup> denote that the estimated coefficients are statistically significant at the 1 and 10% confidence levels, respectively. (5) “-” denotes that explanatory variable is excluded from regression

income level. The coefficients on the natural logarithm of GDPPC, which are statistically significant at the 1% level in both regressions, suggest that a one percent increase of per capita GDP will see a 0.578% of COD.

In regression (3), the estimated coefficients on  $\text{BORDER1}$ ,  $\text{BORDER2}$  and  $\text{DISPUTE}$  show that the COD pollutants would decrease by an average rate of about 0.272 (that is,  $1 - \exp(-0.317)$ ) mg/l when the Mekong river flows across the transnational borders; they would increase by an average rate of about 0.158 (that is,  $\exp(0.147) - 1$ ) mg/l when the Mekong river flows along the transnational borders. In both cases the COD pollutants would increase by an average rate of about 1.762 (that is,  $\exp(1.016) - 1$ ) mg/l near the disputed areas.

Why is the estimated coefficient on  $\text{BORDER1}$  negative for COD? This might result from the fact that  $\text{BORDER1} = 1$  is usually represented by remote mountainous areas (such as the China-Myanmar-Lao PDR border area in the north and by the Cambodia-Vietnam border area in the south), where the COD pollutants (such as

sewage effluent, agricultural run-off including animal wastes, as well as industrial effluents from paper mills, food-processing, etc.) are usually very low.

In general, two reasons might be used to demonstrate the differing effects of BORDER1 and BORDER2: First of all, in areas near ‘the international border across which a river runs’ (denoted by BORDER1) *only* the upper side (nation) of the border has incentives to discharge wastes regardless of whether or not the upper and lower sides (nations) have reached any agreements; whereas in areas near ‘the international border along which a river runs’ (denoted by BORDER2) *both* sides (nations) of the border, given that each of them is defined as an egomaniacal economy, have incentives to discharge wastes if they are not seriously restricted by any effective agreements. Second, as for the LMB, BORDER1 is usually located at the agriculturally based areas (such as those between China, Myanmar and Lao PDR; as well as those between Cambodia and Vietnam) where industrial pollutants (such as sewage effluent, as well as industrial effluents from paper mills, food-processing, etc.) are usually kept lower than the urban areas.

Our estimated coefficients on COLDWAR (see regression and (3) of Table 16.2) suggest that, compared to those of the 1990s, the average level of COD pollutants during the Cold War era increased by about 0.534 (that is,  $\exp(0.428) - 1$ ) mg/l. Since we have already included another time-related political dummy (ASEAN)—which had different values from 1985 to 2000—in our regressions, the above results might be mainly generated by the political tensions between the LMB nations during the Cold-War era, if there were no other convincing reasons. However, as shown in regression (3) of Table 16.2, the role of the ASEAN dummy in the reduction of the COD pollutants is not statistically significant. How to plausibly interpret these phenomena? The effects of ASEAN membership on the transnational reduction of the COD pollutants might be offset by the following: first, the management of the Mekong River’s water has been inefficient as a result of the separate developments of the upper and lower basin and China whose status as a powerful country makes it not interested in cooperating in the Mekong’s management (Kliot et al. 2001, p. 245). Second, during the last decades of the twentieth century, the continuous conflicts on the Indochina peninsula hampered transnational cooperation in this area.

The estimated coefficients on the boundary variables (BORDER1 and BORDER2) show that the political influences on water pollution differ in different types of border areas. More specifically, political influence on transnational water pollution is more significant in areas near the international border along which a river runs (denoted by BORDER2) than in places near the international border across which a river runs (denoted by BORDER1). It looks plausible that in the BORDER1 areas *only* the upper side (nation) of the border has incentives to discharge wastes regardless of whether or not the upper and lower sides (nations) have reached any agreements, whereas in the BORDER2 areas *both* sides (nations) of the border, given that each of them is defined as an egomaniacal economy, have incentives to discharge wastes if they are not seriously constrained by any effective agreements. The estimated coefficients on ASEAN and COLDWAR present information about

the positive roles of the ASEAN membership as well as the post Cold-War détente between the LMB nations in the reduction of transnational water pollution.

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# Chapter 17

## Cross-Border Crimes and Border Control

Cross-border areas per se pose various difficulties for coordinated management of social and economic activities in the increasingly interactive world. When addressing such cross-border issues as security, organized crime, drug trafficking, and human smuggling, both countries sharing a common border suffer as a result of this symbiotic contraband trading, and therefore both have an obligation to help contain it. Moreover, closer collaboration will bring greater success on this front than would additional unilateral effort, however vigorous. Interdiction at the frontier can only partially impede trafficking in people and goods. For this reason, both demand reduction and interior enforcement in of all countries concerned are crucial components of any long-term solution to security problems at the border.

### 17.1 Cross-Border Crimes

#### 17.1.1 *The Golden Triangle*

The Golden Triangle is one of the major illicit opium-producing areas in the world. An area that overlaps the mountains of four countries: China, Laos, Myanmar, and Thailand, the area has been one of the most extensive opium-producing areas of the world. Opium and heroin base produced in northeastern Myanmar are transported by horse and donkey caravans to refineries along the Thailand–Burma border for conversion to heroin and heroin base. Most of the finished products are shipped across the border into various towns in North Thailand and down to Bangkok for further distribution to international markets. In the past major Thai Chinese and Burmese Chinese traffickers in Bangkok have controlled much of the foreign sales and movement of Southeast Asian heroin from Thailand, but a combination of law enforcement pressure, publicity and a regional drought has significantly reduced their role. As a consequence, many less-predominant traffickers in Bangkok and

other parts of Thailand now control smaller quantities of the heroin going to international markets.

The 4,900 km (3,050 mile) Mekong snakes from China into Southeast Asia, where it forms the boundaries between Myanmar and Laos, and then between Thailand and Laos. In 2001, the four countries signed an agreement to regularize shipping on the river. On October 5, 2011 two Chinese cargo ships were attacked in the “Golden Triangle” area, with 13 crew members being murdered. The deaths triggered a public uproar in China, where the safety of nationals abroad has become an increasingly sensitive topic. China and its neighbors have decided to launch joint patrols to protect ships along the Mekong. The Chinese side has bought five ships for the patrols. The boats will patrol key areas along the Mekong, offering protection for legal cargo ships from China, Laos, Myanmar, and Thailand.

### 17.1.2 *Can Fences Stop Crimes?*

Mexico is the principal, proximate source of illegal drugs coming into the United States, as well as the principal destination for guns illegally purchased in and shipped from the United States. In addition, hundreds of thousands of people cross the border illegally each year, the majority of which are migrants from Mexico seeking work in the United States. On average, there are 700,000 to 850,000 new unauthorized migrants arriving annually by all modes of entry. An estimated 6.2 million (or 56%) of all unauthorized migrants are from Mexico.<sup>1</sup>

Since 2002, several initiatives have been launched to address cross-border issues such as security, organized crime, drug trafficking, and human smuggling. For example, in 2002 Mexico and the United States signed the US–Mexico Border Partnership and Action Plan (known as the Smart Border Agreement), which harmonizes point-of-entry operations, combats alien smuggling, and improves screening of third-country nationals. In 2003 Mexico launched Operation *Centinela* to strengthen detention operations of certain unauthorized immigrants and to improve measures to target organized crime and human trafficking. The United States and Mexico also formalized the Permanent Program against Human Smuggling aimed at prevention, victim’s assistance, and information exchange. In its border control efforts, the US government employs electronic sensors, night vision scopes, ground vehicles, aircraft, and unmanned aerial vehicles. In addition, hundreds of miles of fence along the US-Mexico border, mostly in California and Texas, have also been constructed (see Fig. 17.1).

However, greater bi-national security cooperation at the border is still needed to the success of these efforts. At present, the two most serious obstacles to closer collaboration are deficits in law enforcement capacity and the absence of mechanisms to coordinate operations across the border. To address these problems, the agencies in charge of border enforcement should be made parallel—either by reconfiguring

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<sup>1</sup> Source: [www.migrationinformation.org/feature/display.cfm?ID=407](http://www.migrationinformation.org/feature/display.cfm?ID=407). Accessed on 18 Nov 2011.



**Fig. 17.1** The US-Mexico border fence on the beach on the Pacific. Copyright © 2006 by James Reyes

existing bureaucracies or creating entire new agencies—and sufficient resources should be invested in these agencies to guarantee their professionalism. Making such changes requires political will on both sides of the border.

## 17.2 Counter Cross-Border Crimes

### 17.2.1 *The Tri-Border Area*

The junction of Argentina, Brazil, and Paraguay is a tri-border area (TBA), where the Iguazú and Paraná rivers converge (see Fig. 17.2). The TBA is defined by three closely grouped population centers, one in each of three countries: the Argentine city of Puerto Iguazú, the Brazilian city of Foz do Iguacu, and the Paraguayan city of Ciudad del Este (formerly Puerto Presidente Stroessner). The region's most famous landmark is Iguassú Falls (Port., Iguacu Falls), which straddles the Argentina-Brazil border between Brazil's Paraná state and Argentina's Misiones province.

The population in the TBA is concentrated in three border cities. Of these, the largest is Ciudad del Este in Paraguay, which in 2010 had a population of 390,000, while the smallest with a population of 82,000 is Puerto Iguazú, Argentina. The



**Fig. 17.2** The junction of Argentina, Brazil, and Paraguay. Note: This is a view of the triple border taken from Puerto Iguazu, Argentina on Saturday, December 2, 2006. The land mass in the upper right is Brazil, separated from Argentina by the Iguazu River. The land mass in the upper left is Paraguay, separate from Argentina/Brazil by the Parana River. The large buildings located in the distance are located in Ciudad del Este, Paraguay. (Source: Seyon)

tourist-centric Brazilian city Foz do Iguazu has a population of 300,000. The Arab and other Asian immigrant communities, which make up an important part of the urban population in the TBA, are estimated to approximately 50,000 (FMSO 2002).

The TBA is an important tourist area. Visitors can see the Tancredo Neves bridge, which connects the Argentine city of Puerto Iguazú and its Brazilian neighbor, Foz do Iguazu. At the convergence of the borders, each of the three bordering countries has erected an obelisk, painted in the national colors of the country in which it is located. All the three countries can be seen from each of the obelisks. In the early 1970s, when Brazil and Paraguay were seeking to exploit the energy-generating and tourist potential of Iguassú Falls and to promote regional trade, government planners established a free-trade zone in the rapidly growing boomtown city of Ciudad del Este, thereby allowing Argentines and Brazilians to purchase cheap electronic products there (Junger 2002, p. 196). The TBA soon became a lawless jungle corner of Argentina, Brazil, and Paraguay.

### **17.2.2 Counter Cross-Border Crimes**

In addition to Islamic terrorist groups, the TBA provides a haven that is geographically, culturally, economically, and politically highly conducive for allowing organized crime and the corrupt officials who accept their bribes or payoffs to operate in a symbiotic relationship that thrives on drug and arms trafficking, money laundering, and other lucrative criminal activities. Numerous organized crime groups are known to use the TBA for illicit activities such as smuggling, money laundering, and product piracy. Indigenous crime groups operating in the TBA include the Argentine, Brazilian, and Paraguayan mafias. In addition, there are also non-indigenous mafias from the other places.

The thriving business of importing counterfeit Compact Disks (CDs) and CD-ROMs from Asia is linked to organized crime in Korea, Lebanon, Libya, and Taiwan. The Hong Kong Mafia is particularly active in large-scale trafficking of pirated products from mainland China to Ciudad del Este and maintains strong ties with terrorist groups in the TBA. Unspecified Chinese mafias in the TBA are reportedly seeking to expand into Argentina in order to establish themselves into the duty-free zone of San Luis Province. At least two Chinese mafia groups in the TBA—the Sung-I and Ming families—engage in illegal operations with the Egyptian al-Gama'a al-Islamiyya (Hudson 2010).

The exchange-evasion model used by Brazilian money launderers in the TBA consists of making deposits in exchange houses in Foz do Iguacu, from where they are distributed into CC-5-type accounts in exchange houses in Ciudad del Este. The CC-5 account is a special account created by the Central Bank of Brazil, supposedly for foreigners, in order to allow Paraguayan money to be more cheaply and quickly converted to dollars and deposited on the same day in local Brazilian banks.

The US counter-tourist exports have found that one can easily use the CC-5 account to launder money by opening an account in Ciudad del Este in the name of a fictitious person and having the amount transferred back to Brazil. During the 1996–1999 period, the scheme mounted by Banestado helped hundreds of political traffickers, and smugglers to send, land and other tax havens. The Foz do Iguacu CC-5 accounts scheme had six steps, as follows:<sup>2</sup>

- i. The individuals who wanted to send money abroad using irregular methods opened contact with a group of 12 money exchangers in Foz do Iguacu;
- ii. The 12 money exchangers, all of whom own exchange houses based in Paraguay, opened accounts in five banks in Foz do Iguacu, depositing a total of 12 billion reais. The accounts were opened using about 2000 phony names;
- iii. From the five accounts in Foz do Iguacu, the money was remitted abroad through CC-5;
- iv. In the Banestado branch in New York, the money was deposited in the name of companies registered in off-shore havens;

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<sup>2</sup> Source: [http://veja.abril.com.br/120602/p\\_046.html](http://veja.abril.com.br/120602/p_046.html). Cited from Hudson (2010).

- v. After closing the 137 accounts in New York, the money was remitted to the account of 35,000 final beneficiaries, most of them held by juridical people, also located in off-shore havens.

## 17.3 Visa Systems and Policies

### 17.3.1 *A Brief History*

A visa is an endorsement on a passport indicating that the holder of passport is allowed to enter, leave, or stay for a specified period of time in a country. The word 'visa' comes from the Latin word, meaning "paper that has been seen. Visa is a document or mark showing that a person is conditionally authorized to enter or leave the territory for which it was issued, subject to permission of an immigration official at the time of actual entry. The authorization may be a document, but more commonly it is a stamp endorsed in the applicant's passport (or passport-replacing document).

The country issuing the visa typically attaches various conditions of stay, such as the territory covered by the visa, dates of validity, period of stay, whether the visa is valid for more than one visit, etc. Visas are associated with the request for permission to enter (or exit) a country, and are thus, for some countries, distinct from actual formal permission for an alien to enter and remain in the country.

Visa system has a long history. In ancient times, passports and visas were usually the same type of travel documents. In the modern times, visas have become separate documents, with passports acting as the primary travel documents. However, in West Europe, before World War I, passports and visas were not generally necessary for moving from country to another. Passports and visas became usually necessary travel documents since then (see Box 17.1).

#### **Box 17.1 How Powerful is your Passport?**

More than a simple grant of access into a country, passports and the visas they contain are a reflection of geopolitics, the relationship between two nations, and a country's status relative to the rest of the world.

Recent data show which countries have the most powerful and least powerful passports in terms of gaining visa-free access to other countries. For being able to enter the largest number (i.e., 173) of countries visa-free, Brits, Swedes and Finns have been deemed holders of the most powerful passports in the world. The US comes in second along with Germany, Luxembourg and Denmark with 172. Below are the most powerful passports in the world:

- 173: UK, Sweden, Finland
- 172: US, Germany, Luxembourg, Denmark
- 171: Belgium, Italy, Netherlands
- 170: Canada, France, Ireland, Japan, Norway, Portugal, Spain
- 168: Austria, New Zealand, Switzerland
- 167: Australia, Greece, Singapore
- 166: South Korea
- 165: Iceland
- 163: Malaysia, Malta
- 159: Liechtenstein

Data source: see Appendix.

The appendix, at the end of this chapter, shows more details about existing visa-free and visa-on-arrival regimes around the world.

### 17.3.2 *Visa Types*

A visa generally gives non-citizens clearance to enter a country and to remain there within specified constraints, such as a limit on the time spent and/or a prohibition against employment in the country. Some countries do not require a visa a result of reciprocal treaty arrangements. The possession of a visa is not in itself a guarantee of entry into the country that issued it, and a visa can be revoked at any time.

A visa application must be made in advance of departure. This gives the country enough time to evaluate and process the applicant's circumstance, such as financial security, reason for applying, and details of previous visits to the country.

Each country has its own categories and names of visas. The most common types and names of visas include:

- Transit visa, granted for those passing through a country to a destination outside that country. Validity of transit visas are usually limited by short terms.
- Short-stay or visitor visa, granted for short visits to the host country, such as private visa, tourist visa, visa for medical reasons, business visa, working holiday visa, athletic or artistic visa, and refugee visa.
- Long-stay visa, valid for longer but still finite stays, such as student visa, temporary worker visa, journalist visa, residence visa, and asylum visa.
- Immigrant visa, granted for those intending to immigrate to the issuing country (in order obtain to the status of a permanent resident), such as spousal visa or partner visa, marriage visa, and pensioner visa.
- Official visa, granted to officials doing job for their governments or otherwise representing their countries in the host country, such as the personnel of diplomatic missions.



In addition, some countries may grant tourists without a visa or by obtaining a visa on arrival with normal passport. Some countries that allow visa on arrival do so only at a limited number of entry points. Some countries such as the European Union member states have a qualitatively different visa regime between each other as it also includes freedom of movement.

Government authorities usually impose administrative entry restrictions on foreign citizens in three ways—countries whose nationals may enter without a visa, countries whose nationals may obtain a visa on arrival and countries whose nationals require a visa in advance. Nationals who require a visa in advance are usually advised to obtain them at a consular representation of their destination country. Several countries allow nationals of countries that require a visa to obtain them online.

## 17.4 Customs and Border Control

### 17.4.1 *Customs Around the World*

Customs is an authority or agency in a country responsible for collecting and safeguarding customs duties and for controlling the flow of goods including animals, transports, personal effects and hazardous items in and out of a country. Depending on local legislation and regulations, the import or export of some goods may be restricted or forbidden, and the customs agency enforces these rules. The customs authority may be different from the immigration authority, which monitors persons who leave or enter the country, checking for appropriate documentation, apprehending people wanted by international arrest warrants, and impeding the entry of others deemed dangerous to the country.

In most countries customs are attained through government agreements and international laws. A customs duty is a tariff or tax on the importation (usually) or exportation (unusually) of goods. In the Kingdom of England, customs duties were typically part of the customary revenue of the king, and therefore did not need parliamentary consent to be levied, unlike excise duty, land tax, or other forms of taxes.

Customs procedures for arriving passengers at many international airports, and some road crossings, are separated into Red and Green Channels. Passengers with goods to declare (carrying items above the permitted customs limits and/or carrying prohibited items) should go through the Red Channel.

Passengers with nothing to declare (carrying goods within the customs limits only and not carrying prohibited items) can go through the Green Channel. Passengers going through the Green Channel are only subject to spot checks and save time. But, if a passenger going through the Green Channel is found to have goods above the customs limits on them or carrying prohibited items, they may be prosecuted for making a false declaration to customs, by virtue of having gone through the Green Channel. Below gives some brief customs information for selected nations:<sup>3</sup>

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<sup>3</sup> Based on the websites of various official websites.

- China: According to the revised categorization of imported goods and tariff rates, which was effective from April 15, 2012, the tariff rates range from 10 to 50%. For goods with a value of less than 50 yuan, there are no taxes.
- Czech Republic: For values up to 22 €, there are no taxes (it is free); from 22 € up to 150 €, it is necessary to pay 21% value-added tax (VAT); from 150 €, it is necessary to pay VAT and customs. Customs may be from 0 to 10%, the amount depending on the type of imported goods.
- European Union: The basic customs law is harmonized across Europe. This includes customs duties and restrictions. Customs tax from 150 €. In addition, see regulations of each Member State.
- Germany: For values up to 22 €, there are no taxes (it is free); from 22 € up to 150 €, it is necessary to pay 7–19% VAT; from 150 €, it is necessary to pay VAT and customs.
- Romania: Customs may be very strict, especially for shipped goods (from anywhere outside the EU). Up to 10 € goods/package
- USA: The United States imposes tariffs or ‘customs duties’ on imports of goods: 3% on average. The duty is levied at the time of import and is paid by the importer of record. Individuals arriving in the United States may be exempt from duty on a limited amount of purchases, and on goods temporarily imported (such as laptop computers) under the ATA Carnet system. Customs duties vary by country of origin and product, with duties ranging from zero to 81% of the value of the goods.

### ***17.4.2 Do You have Anything to Declare?***

Food, plant material and animal products from overseas—including many common souvenirs—could introduce serious pests and diseases, especially between two countries with significantly distinctive climates. To protect its plant, animal and human health, environment and important agricultural industries, Australia has implemented a very strict quarantine and inspection system.

The Australian Quarantine and Inspection Service (AQIS) requires that all passengers must declare for inspection all food, plant material (including seeds, flowers and wooden items), and animal products on arrival in Australia. Some products may require treatment to make them safe. Other items that pose pest and disease risks will be seized and destroyed by the AQIS. When you plan a travel to Australia, the following tips are useful. Before you land in Australia, you will be given an Incoming Passenger Card. This is a legal document. You must tick YES to declare if you are carrying any food, plant material or animal products. If you have items you don’t wish to declare, you can dispose of them in quarantine bins in the airport terminal. Your baggage may be X-rayed, inspected or checked by a detector dog team. If you fail to declare or dispose of any quarantine items, or make a false declaration:<sup>4</sup>

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<sup>4</sup> Source: <http://www.daff.gov.au/aqis/travel/entering-australia/cant-take>. Accessed on 3 March 2014.

- You will be caught
- You could be fined \$ 220 on-the-spot, or
- You could be prosecuted, fined more than \$ 60,000 and risk 10 years' jail and a criminal record.

Goods from many countries are exempt from duty under various trade agreements. Certain types of goods are exempt from duty regardless of source. Customs rules differ from other import restrictions. Failure to properly comply with customs rules can result in seizure of goods and civil and criminal penalties against involved parties. United States Customs and Border Protection (“CBP”) enforces customs rules. All goods entering the United States are subject to inspection by CBP prior to legal entry.

## **17.5 Strong Borders, Secure Nations**

### ***17.5.1 Border Checkpoint***

In today’s globalized society, the number of international passengers is growing dramatically. As new risks and global threats emerge, governments are calling for higher level of security at the borderlines in order to reinforce the protection of their homeland security. Prevention of unlawful cross-borders activities and fight against criminal organizations at land and maritime borders implies the implementation of thorough and comprehensive surveillance and control systems.

A border checkpoint is a place, generally between two countries, where travelers or goods are inspected. Authorization often is required to enter a country through its borders. Access-controlled borders often have a limited number of checkpoints where they can be crossed without legal sanctions. Arrangements may be formed to allow or mandate less restrained crossings (e.g. Schengen Agreement). Land border checkpoints can be contrasted with the customs and immigration facilities at sea-ports, international airports, and other ports of entry. Checkpoints generally serve two purposes:

- To prevent entrance of individuals who are either undesirable (e.g., criminals or others who pose threats) or are simply unauthorized to enter.
- To prevent entrance of goods that are illegal, subject to restriction or to collect tariffs.

Checkpoints are usually manned by a uniformed service (sometimes referred to as customs service or border Patrol Agents). In some countries (e.g. China, Japan), there are border checkpoints when both entering and exiting the country; while in others (e.g. US, Canada), there are border checkpoints only when entering the country.

The Schengen Area is one of the greatest achievements of the European Union (EU). It is an area without internal borders, an area within which citizens, many

non-EU nationals, business people and tourists can freely circulate without being subjected to border checks. Since 1985, it has gradually grown and encompasses today almost all EU States and a few associated non-EU countries. While having abolished their internal borders, Schengen States have also tightened controls at their common external border on the basis of Schengen rules to ensure the security of those living or travelling in the Schengen Area.

The Schengen Borders Code governs the crossing of the external border, facilitating access for those who have a legitimate interest to enter into the EU. A special Local Border Traffic Regime has also been established to facilitate entry for non-EU border residents who frequently need to cross the EU external border. A common visa policy further facilitates the entry of legal visitors into the EU. EU State authorities need to cooperate on border management to ensure the security of citizens and travelers in the EU. A number of information sharing mechanisms are central to this cooperation:<sup>5</sup>

- The Visa Information System (VIS) allows Schengen States to exchange visa data, in particular data on decisions relating to short-stay visa applications.
- The Schengen Information System (SIS) allows Schengen States to exchange data on suspected criminals, on people who may not have the right to enter into or stay in the EU, on missing persons and on stolen, misappropriated or lost property.

VIS and SIS are operated by the EU Agency for large-scale IT systems (eu-LISA). It is also necessary to ensure the security of travel documents to fight against the falsification and counterfeiting of travel documents and to establish a reliable link between the document and its holder.

### ***17.5.2 Border Control System***

While the number of visa-free and other bilateral or multilateral cooperation agreements increases, which has made it much easier for people to travel around the world, international airports have to process and identify the increasing numbers of passengers. Efficient border controls protect the safety of passengers and air traffic and make an important contribution to the fight against international terrorism.

Electronic Border Control Management System (e-BCMS), which embraces all relevant border control processes, can be developed to meet these challenging requirements. It has been specifically designed to process compatible travel documents. These include machine-readable travel documents and e-passports with chips or visas. The e-BCMS can automatically scan biometric data such as fingerprints and facial images and compare them with the data stored on the document chip. In addition, the systems can provide a comprehensive database of information

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<sup>5</sup> Source: [http://ec.europa.eu/dgs/home-affairs/what-we-do/policies/index\\_en.htm](http://ec.europa.eu/dgs/home-affairs/what-we-do/policies/index_en.htm). Accessed on 18 March 2014.

about arrivals and departures or transit data. The e-BCMS also automatically checks the passenger's personal data and the travel document's expiration date. What is more, the solutions can be connected to external databases, both national and international, making cross-border security cooperation much easier than before.

## 17.6 Case 17. U.S. Customs and Border Protection

U.S. Customs and Border Protection (CBP) is responsible for guarding nearly 7000 miles of land border the United States shares with Canada and Mexico and 2000 miles of coastal waters surrounding the Florida peninsula and off the coast of Southern California. The agency also protects 95,000 miles of maritime border in partnership with the United States Coast Guard.

To secure this vast terrain, CBP's US Border Patrol agents, Air and Marine agents, and CBP officers and agriculture specialists, together with the nation's largest law enforcement canine program, stand guard along America's front line.

- CBP officers protect America's borders at official ports of entry, while Border Patrol agents prevent illegal entry into the United States of people and contraband between the ports of entry.
- CBP's Office of Air and Marine, which manages the largest law enforcement air force in the world, patrols the nation's land and sea borders to stop terrorists and drug smugglers before they enter the United States.
- CBP agriculture specialists prevent the entry of harmful plant pests and exotic foreign animal diseases and confront emerging threats in agro- and bioterrorism.

The CBP has created smarter borders by extending our zone of security beyond our physical borders. The Container Security Initiative was announced in January 2002 as a strategy to secure and protect the United States against terrorism and acts of terror involving the international maritime supply chain. CBP stations teams of US officers in 58 operational foreign seaports to work together with host country counterparts to identify and inspect potentially high-risk shipments before they reach the US. More than 80% of maritime containerized cargo destined to the US originates in or transits through a CSI port and is screened prior to being laden aboard a US-bound vessel.

CBP has implemented joint initiatives with our bordering countries, Canada and Mexico: The Smart Border Declaration and associated 30-Point Action Plan with Canada and The Smart Border Accord with Mexico. The Secure Electronic Network for Travelers' Rapid Inspection (SENTRI) allows pre-screened, low-risk travelers from Mexico to be processed in an expeditious manner through dedicated lanes. Similarly, on our northern border with Canada, we are engaging in NEXUS to identify and facilitate low-risk travelers. Along both borders, CBP has implemented the Free and Secure Trade program. The FAST program utilizes transponder technology and pre-arrival shipment information to process participating trucks as they arrive at the border, expediting trade while better securing our borders.

In addition to that CBP takes a broad view of border security, pushing its security perimeter outward from the physical borders whenever possible so that the geographic border is the last line of defense, specific regions also call for implementation plans that are developed and tailored to address them. The following is an analysis of three major border regions: the northern border region, the southwest border region, and the southeast coastal border region.

**Northern Border Region.** The northern border is defined as the area between the United States and Canada, running from Washington State through Maine, including the Great Lakes Region. It is the longest common border between any two countries that is not militarized or actively patrolled. The terrain, which ranges from dense forests on the west and east coasts to open plains in the middle of the country, is composed of sparsely populated Federal, State, and tribal lands along the immediate border area.

Several major Canadian cities are proximate to the US border. Historically, these Canadian cities, and the northern border in general, have yielded significantly lower numbers of illegal incursions when compared with the southwest border. However, attempts at illegal immigration and smuggling regularly occur in this region, and known terrorist affiliates and extremist groups have an undisputed presence along the northern border in both the United States and Canada.

**Southwest Border Region.** Spanning more than 2000 miles, the border with Mexico includes extremely harsh and inhospitable terrain that represents a significant challenge to border security efforts. Since the events of September 11, 2001, the southwest border has assumed an even greater significance to national security. The border provides a nexus point where three transnational threats converge: drug trafficking, alien smuggling, and terrorism.

The most common threats in the southwest border region continue to be contraband smuggling and human trafficking. In addition to the 33 legitimate crossing points, the border includes hundreds of miles of open desert, rugged mountains, the Rio Grande River, and the associated coastal waters, collectively providing an ideal environment for cross-border criminal activity. Drug and human traffickers exploit the border in two directions, smuggling drugs and people from Mexico into the United States, and moving billions of dollars in currency and weapons from the United States into Mexico. Smuggling and the potential exploitation of smuggling techniques by terrorists present a significant national security vulnerability that CBP, along with its wide range of partners, has been working diligently to address.

**Southeast Coastal Border Region.** The southeast coastal border presents a unique surveillance and interdiction environment. With more than 2000 miles of border to patrol, aircraft coupled with surface interdiction assets and ground agents are a force multiplier to effectively counter threats in this region. Similar to the northern border, the Gulf Coast region represents a significant challenge because of the limited ability to maintain comprehensive awareness of low-altitude aircraft or water-surface activity across large geographic areas.

These threats often include a combined aerial and maritime contraband smuggling effort originating from the Yucatan peninsula and the Caribbean islands, proceeding to the southern islands of the Bahamas and Florida's western coast through-

out the rest of the United States. The territories of Puerto Rico and the US Virgin islands are at the forefront of this threat, consisting primarily of illegal alien and narcotics smuggling via marine vessels. Smugglers often operate under the cover of darkness. These marine vessels use maximum speed, stopping periodically to change fuel tanks and check for surveillance.

Sources: CBP (2009) and [www.cbp.gov/xp/cgov/about/mission/cbp.xml](http://www.cbp.gov/xp/cgov/about/mission/cbp.xml).

## 17.7 Appendix

Visa-free and visa-on-arrival regimes around the world.

The following table lists visa policies of all countries by the number of foreign nationalities that may enter that country for tourism without a visa or by obtaining a visa on arrival with normal passport. Some countries such as the European Union member states have a qualitatively different visa regime between each other as it also includes freedom of movement.

Afghanistan	28
Angola	40
Antigua and Barbuda	130
Armenia	55
Australia	167
Austria	168
Azerbaijan	56
Bahamas	137
Bahrain	69
Bangladesh	41
Barbados	137
Belgium	171
Benin	55
Bolivia	73
Botswana	70
Bulgaria	141
Burundi	41
Burkina Faso	53
Canada	170
Cape Verde	57
Central African Republic	48
Chile	141
Congo	39
Costa Rica	122
Cote d'Ivoire	55

Croatia	129
Czech Republic	155
Denmark	172
Djibouti	40
Dominican Republic	52
Ecuador	74
El Salvador	113
Equatorial Guinea	41
Eritrea	36
Ethiopia	41
Fiji	78
Finland	173
France	170
Gambia	68
Germany	172
Greece	167
Guatemala	114
Guinea	53
Guinea-Bissau	47
Guyana	78
Honduras	114
Hungary	157
Iceland	165
India	52
Indonesia	53
Iran	40
Iraq	31
Ireland	170
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Japan	170
Kenya	68
Kiribati	78
Korea, North	41
Korea, South	166
Kosovo	38
Kuwait	77
Kyrgyzstan	56
Lebanon	38
Lesotho	68
Libya	39



Liechtenstein	159
Luxembourg	172
Macau	118
Macedonia	103
Madagascar	48
Malaysia	163
Maldives	80
Mali	53
Malta	163
Marshall Islands	77
Mauritania	55
Mauritius	123
Mexico	132
Moldova	59
Mongolia	51
Morocco	51
Mozambique	48
Myanmar	40
Namibia	68
Nauru	78
Nepal	37
Netherlands	171
New Zealand	168
Nicaragua	109
Niger	53
Nigeria	47
Norway	170
Pakistan	32
Palau	72
Panama	121
Papua New Guinea	75
Paraguay	124
Peru	80
Philippines	58
Portugal	170
Qatar	71
Romania	141
Samoa	81
Sao Tome and Principe	50
Senegal	55
Serbia	104
Seychelles	126

Singapore	167
Slovakia	155
Slovenia	155
Solomon Islands	84
Somalia	32
South Sudan	39
Spain	170
Sri Lanka	38
St. Kitts and Nevis	131
Sudan	38
Suriname	72
Sweden	173
Switzerland	168
Syria	39
Taiwan	130
Tajikistan	48
Thailand	68
Tinor Leste	47
Togo	53
Tonga	80
Tuvalu	81
Ukraine	77
United Arab Emirates	72
United Kingdom	173
United States	172
Uruguay	132
Uzbekistan	52
Vanuatu	79
Vatican City	130
Venezuela	128

Source: <http://www.movehub.com/blog/world-passport-power>. Accessed on 28 June 2014

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# Chapter 18

## Managing Cross-Cultural Differences

A senior fellow from the Brookings Institution, Washington, DC, told me of his unhappy experience in China when he served as a senior US government official during the Clinton Administration. He was engaged in a series of important negotiations with his Chinese partners in Beijing. On the way toward a meeting hall, he walked behind his secretary, and when he arrived at the meeting room, a security guard stopped him impolitely at the door, but gave a welcome to his secretary (a young lady). Indeed, this was a diplomatic fault from the Chinese side. However, that situation is somewhat understandable in China (at least to those people who adhere to tradition) since it was the security guard's duty to prevent all irrelevant personnel from going through.

According to the security guard's reasonable judgment, senior officials should be followed by junior staff, and therefore the young American girl who was allowed to enter must have been assumed to be of the lowest rank and, definitely, the last US official to be joining that meeting. Who cares about the old man behind her? Alas, the young Chinese security guard would have had a difficult time after his boss saw the US guests off.

### 18.1 Values and Rules

#### 18.1.1 Intercultural Differences

As well as describing the content of libraries, museums, moral and religious codes of conduct, the word 'culture' is commonly used to describe social life. As such, 'culture' is the living sum of symbols, meanings, habits, values, institutions, behaviors and social artifacts which characterize a distinctive and identified human population group. It confers upon individuals identity as members of some visible community and standards for relating to the environment, for identifying fellow

members and strangers, and for deciding what is important and what is not important to them (Goulet 1980, p. 2). The application of the term culture to the attitudes towards and behavior of corporations arose in business jargon during the post-Cold War era.

When answering the question as to how an economy was influenced by culture, we have to remember that there was no pristine economy which was somehow later influenced by culture; rather, the economy has always been culturally influenced, from inside and outside, from the beginning (Sayer 1997, p. 18). It is usually thought that culture influences economic outcomes by affecting personal traits such as honesty, thrift, the willingness to work hard and openness to strangers. Culture is divided into various elements that can be both a resource for and an obstacle to economic development.

Unlike many other religious adherents, such as Buddhists and Taoists, Western Christians, especially the Protestants, eliminate the distinction between secular and religious life. Hard work was enjoined to glorify God; achievement was the evidence of hard work; and thrift was necessary because the produced wealth was not to be used selfishly. Accumulation of wealth, capital formation and the desire for greater production became a Christian duty. By analyzing the role of cultural factors in the Western economies, we can further track its influence elsewhere.

For example, the Anglo-Saxon genotype is based on the individualistic behavior and competitive pragmatism, which is reflected in the liberal economic system of the USA, Great Britain and other European countries. Given the historic differences of the European countries, one might, however, distinguish between the 'bourgeois' culture of Germany, which implies the existence of industrial, or applied, activities and the 'aristocratic' culture of Great Britain, which reflects the significant interest of British entrepreneurs in management, law and finance. The 'bourgeois' type of economic activity also typifies the Netherlands, Sweden, Switzerland and the north of Italy, where it coincides with regions influenced by the Protestant ethic (Maslihenko 2004).

### ***18.1.2 East versus West***

Historical evidence suggests that the Western countries gradually pulled ahead of the rest of the world from the sixteenth century.<sup>1</sup> Specifically, Northern Italy and Flanders played the leading role from the sixteenth to seventeenth century, the Netherlands from then until the end of the eighteenth century, the UK and Germany in the nineteenth and the USA since then. The main institutional characteristics of Western society that have favored its development can be broadly summarized as follows: (1) the recognition of human capacity to transform the forces of nature through rational investigation and experiment and (2) the ending of feudal con-

<sup>1</sup> See North and Thomas (1973), North (1981, 1990) and Abramovitz (1986) for the varieties of European experience on the importance of institutions or differential social capability.

straints on the free purchase and sale of property, followed by a whole series of developments which gave scope for successful entrepreneurship (Maddison 1996, p. 50). However, country situations differ greatly throughout the world and it is difficult to reach any generalized conclusion about the influence of deeper layers of causality. For this we need individual country narratives. At the same time, it is also worth noting that the western style institutions may not work well in other economies, which may have different demographic, cultural and historical conditions.

The ethical beliefs of Confucianism have consistently remained within the bounds of a set of orthodox principles governing interpersonal relationships in most East Asian economies. They have been officially applied to all strata of society: loyalty, filial piety, benevolence, righteousness, love, faith, harmony and peace. As a result, East Asia has developed a different culture in relation to economic development from the rest of the world, in response to its own particular environment and social conditions. For instance, unlike the majority of Westerners, East Asians in general care more about their spiritual interests (including the richness of spiritual life and harmonization of feeling) than material ones. All of these have determined or at least partially influenced East Asia's economic life and structure, the result of which is a particular economic culture (see Table 18.1). Since the late twentieth century, same intellectual and social traditions, which were blamed for East Asia's backwardness, have subsumed into a broader concept—Asian values—and have helped explain the remarkable economic success in East Asia and prepared the region for global dominance in what was to be the 'Pacific century'.

**Table 18.1** Eastern versus Western cultures: values. (Source: based on Lewis 2003)

Western views	Eastern views
Democracy	Hierarchy
Equality	Inequality
Self-determination	Fatalism
Individualism	Collectivism
Human rights	Acceptance of status
Equality for women	Male dominance
Status through achievement	Status through birth or wealth <sup>a</sup>
Facts and figures	Relationships <sup>a</sup>
Social justice	Power structures
New solutions	Good precedents
Vigor	Wisdom
Linear time	Cyclic time
Results orientation	Harmony orientation

<sup>a</sup> Some of the East Asian views have to some extent changed or westernized, especially in newly industrialized economies

Since the end of the Cold War, there have been concerns about the role of culture in the formation of bilateral and multilateral economic relations. Each culture not only provides the basis of identity (race, ethnicity) and the mode of communication (language), but also distinguishes the motives for human behavior and the criteria of evaluation (religion). For example, the comparatively smooth creation of the European Union (EU) is the product of a common European culture or some sub-European cultures that have been to some extent integrated. By contrast, the South Asian Association for Regional Cooperation (SARC), formed in 1985 and including seven Hindu, Muslim and Buddhist states, has been ineffectual, even to the point of not being able to hold meetings. Another similar example is Israel and Palestine, both of which share a narrow territory along the eastern coast of Mediterranean Sea, west of the Jordan River and the Dead Sea. Cultural and religious conflicts between the Israelis and Palestinians have always been a Gordian knot for world leaders since the beginning of the Second World War.

Founded in the 1960s, the Association of Southeast Asian Nations (ASEAN) is based to a large extent on cultural heterogeneity (which includes, among others, Buddhism, Islam, Christianity, Confucianism and atheism). In fact, the ASEAN was designed to achieve 'economic cooperation rather than economic integration'. As a result a free trade area has not been contemplated. In 1978, the ASEAN put into force a preferential trade arrangement (PTA) granting 10 to 15% margins of preference on 71 commodities and industrial projects. A stronger free trade proposal had been rejected during negotiations. Between 1985 and 1987 the ASEAN leaders agreed to expand the list of sectors in the PTA and to increase the margin of preferences. Until 1989, however, the fraction of goods eligible for regional preferences was still only in the order of 3%.<sup>2</sup> A series of talks beginning in the early 1990s led to the decision to create the ASEAN Free Trade Area (AFTA). Furthermore, the treatment of non-tariff barriers is vague. Even if fully implemented, the AFTA will still allow intra-bloc tariffs.

## 18.2 Organizational Behaviors

### 18.2.1 Intercultural Differences

Before the early twentieth century, technological innovation had been contributed mainly by individual inventors or small-scale entrepreneurs. But now the great bulk of it—such as the space shuttle and the Internet, to list but two—is conducted by prominent firms with substantial budgets, as well as by governments. As a result the process of technological innovation has become more complicated than ever before. Specifically, the technological and related products are positively related to capital stock of, and personnel engagement in, technological innovation. In addition, technological innovation is also related to the educational levels, as the content of education changes over time to accommodate to the growing stock of knowledge.

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<sup>2</sup> Data source: Frankel et al. (1997a, pp. 267–268), which also gives other references.

There has been a proliferation of specialized intellectual disciplines to facilitate the absorption of knowledge and to promote its development through research.

There is a difference in understanding and definition of manpower and creativity between the East and the West. Creativity is the driving force behind the development of technology, economy, arts and culture as a whole. As a result it is a multi-level and complex process that covers all fields. Although Asian traditions are conservative in comparison, and the social climate and ideological make-up of the West are more liberal, each of them has valid contributions towards creativity. Western culture lays emphasis on individuals' contribution. Perhaps there may be some historical or religious reasons, but the mainstay of Western culture is individualism. This trait is manifested in the adulation of individual heroes in Western culture. The individuals' heroic exploits and contributions are placed above collective effort. The advantage of this is that it can spur people on to greater heights. The flaw is that it results in self-centered individualism, which affects creativity indirectly (Pan 2006). Creativity is a multi-level and complex process, involving many different factors. At a certain level, creativity requires the coordination of all sides, and the Eastern culture, which lays emphasis on collectivities, can play a positive role in this.

Modern science originated from Europe. The characteristic of Western culture is reflected in making bold hypotheses followed by the meticulous search for evidence. The basis of science is the experiment. Not only can the experiment verify the soundness of the hypothesis, it can also improve or debunk it. It is due to these cultural traits that Westerners are more used to making bold hypotheses. As a result, many important and revolutionary discoveries were made. The disadvantage of this is that some of these new ideas and hypotheses may not have solid foundations, but this fault is a minor one where creativity is concerned. The traditional Eastern system emphasizes building a solid foundation, and then builds up the basic knowledge step by step. However, Eastern tradition places too much emphasis on foundations (Pan 2006). Sometimes, diversity means creativity (see Box 18.1).

### **Box 18.1 Our Creative Diversity**

At its twenty-sixth session, in 1991, the General Conference of UNESCO adopted a resolution requesting the Director-General, in cooperation with the Secretary-General of the United Nations, to establish an independent World Commission on Culture and Development (WCCD) comprising women and men drawn from all regions and eminent in diverse disciplines. *Our Creative Diversity*, the Commission's first report, was designed to address a diversified audience across the world, ranging from community activists, field workers, artists and scholars to government officials and politicians. Its aim is to show them how culture shapes all our thinking, imagining and behavior. It is the transmission of behavior as well as a dynamic source of change, creativity, freedom and the awakening of innovative opportunities.

The central argument advanced in *Our Creative Diversity* is that development embraces not only access to goods and services, but also the opportunity to choose a full, satisfying, valuable and valued way of living together, thus encouraging the flourishing of human existence in all its forms and as a whole (WCCD 1995). Even the goods and services stressed by the narrower, conventional view are valued because of what they contribute to our freedom to live in the manner to which we aspire. Culture, therefore, however important it may be as an instrument of development (or an obstacle to development), cannot ultimately be reduced to a subsidiary position as a mere promoter of (or an impediment to) economic growth. The role of culture is not exhausted as a servant of ends—though in a narrower sense of the concept this is one of its roles—but it is the social basis of the ends themselves.

### 18.2.2 South versus North America

It is difficult to ignore the fact that people's behavior patterns vary with distinct cultural backgrounds (see Table 18.2). Naturally, one would ask to what extent these variations are important for economic analysis in general and economic growth in particular. Are there significant influences of cultural traditions and behavioral norms on economic success and achievement? This is a subject in which much interest has been taken by sociologists and historians as well as economists. If we want to pay attention to cultural influences on economic performance in general and business behavior in particular, certain amount of skepticism toward lofty theories may not be improper. And yet the justified skepticism toward cultural theory does not give us enough reason to reject altogether the manifest influence of culture on human behavior (Sen 2000).

**Table 18.2** Eastern versus Western cultures: organizational patterns. (Source: based on Lewis 2003)

Western views	Eastern views
Individual as a unit	Company and society as a unit
Promotion by achievement	Promotion by age and seniority <sup>a</sup>
Horizontal or matrix structures	Vertical structures
Profit orientation	Market share priority
Contracts as binding	Contracts as renegotiable
Decisions by competent individuals	Decisions by consensus
Specialization	Job rotation
Professional mobility	Fixed loyalty

<sup>a</sup> Some of the East Asian views have to some extent changed or westernized, especially in newly industrialized economies



Although most economies in the Latin American area are more closely related to Western culture than to any others, their economic performances have been poorer than those of the Western world. It seems very likely that the heavy-handed regulatory tendencies in government, chronic inflation, a long history of debt default and fiscal irresponsibility and long-standing political instability were important in keeping Latin American growth and levels of income well below those of North America.<sup>3</sup> Furthermore, Catholicism led to greater emphasis on ritualistic and contemplative approach and collectivistic action as contrasted with the more individualistic and competition-oriented approach of Protestant Reformation. The result of this was an upgrading of the role of the Church and a consequent downgrading of the role of the individual. Thus, different from that of the Western nations, a system of nation-states only emerged in far propinquity in the Latin American area, with insignificant trading relations and relatively difficult intellectual interchange in spite of their linguistic and cultural similarities.

Among the major differences between the Latin American area and the Anglo-dominated North American area is that the majority of Latin Americans are more culturally collectivistic than the North Americans; or, in other words, North Americans are more culturally individualistic than the Latin Americans. For example, in their comparison of Latin American (Brazil) and North American (the USA) cultures' preferences of styles of negotiation, Pearson and Stephan (1999) find that Brazilians favor styles of negotiation that express a concern for the outcomes of others, whereas Americans favor styles of negotiation that reflect a concern for their own outcomes.

## 18.3 Wealth and Distribution

### 18.3.1 *Intercultural Differences*

The term 'cultural pattern' refers to the way in which people relate to one another. This differs to some extent from society to society. The primary kind of cultural pattern is based on kinship. In most societies, a family unit includes only the father and mother and the unmarried child (children); but it can also be larger, including more relatives, as in India and some African economies. In the Democratic Republic of Congo those who call themselves brothers include those whom would be called cousins and uncles in other parts of the world. The extended family fulfills several important social and economic roles. It provides mutual cooperation, psychological support and a kind of economic insurance or social security for its members. In a world of tribal warfare and primitive agriculture, this kind of family support was invaluable. However, in modern societies, this kind of family system becomes inefficient in promoting economic development, due to, at least in part, the lack of individual incentives for capital accumulation and controls over population growth.

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<sup>3</sup> See Maddison (1992) for an analysis of twentieth century constraints on performance in Brazil and Mexico, and Maddison (1995) for a much longer-term assessment of Mexico's institutional heritage.

In India the joint family system (*baradari*) is generally accepted as having not only stimulated population growth but also restricted capital accumulation. The caste system is another obstacle to India's economic development. In a particular caste, each member has a specific occupational and social role, which is hereditary. This hierarchical system to a large extent segregates the population into mutually exclusive groups, which prevents people from raising productivity by changing their economic activities. This gives no allowance for aptitude, intelligence or new ideas in allocating jobs and little possibility of firing someone for inefficiency. During the British rule 56,000 km of railways were built and irrigation was extended eightfold in India. Conquerors of India, however, were neither absorbed into the Hindu culture nor were able to modify this caste system. Instead, they simply added themselves as another layer to a complex system of social segregation and siphoned their profits out India. Consequently, there was little growth in per capita national income in India during their rule. When the British left, most of the Indian population there were still illiterate (Maddison 1996, p. 55).<sup>4</sup>

In a different way, but one that has in-depth economic implications is that Islamic thinkers have likewise sought dynamic approaches to development problem-solving within the boundaries of their own value systems. Because the *Shari's* (Islamic law) prohibits the taking of interest, 'Islamic banks' neither pay nor charge it. Since the banks must remain viable, they spread the risks flowing from their borrowing and lending by receiving a share of profits from the borrowers, and distributing proportionate shares to their depositors. Technically and ethically, such payments are not considered to be interest. Islamic banks claim that they are simply facilitating the circulation of money in ways that generate productive activities. Their example shows how a religious norm can alter 'modern' practice, instead of itself being eliminated by the dictates of modernity (Shanker 1996).

### 18.3.2 Empirical Evidence

Based on the cross-national data from the 1980s and the 1990s, we may conduct a simplified statistical test on the determinants of income inequality. Our estimated results (see Table 18.4 of a case study at the end of this chapter) reveal that income inequality is an inverse-U shaped function of income level, following the tradition of Kuznets. Besides, our estimated result also provides evidence to support the view that income inequality increases with respect to religious diversity. This may be explained by the fact that income (re)distribution from the rich to the poor can be more easily conducted between individuals with same religious beliefs than between individuals with different religious beliefs.

Compared to religious diversity, linguistic diversity's role in the formation of income inequality is ambiguous in our analysis. In other words, it seems that income (re)distribution from the rich to the poor is not enhanced between people speaking a common language.

More detailed analysis can be found in Case study 18 at the end of this chapter.

<sup>4</sup> For a detailed account of the Indian economy during the colonial period, see Roy (1999).

## 18.4 Consumption Patterns

Modern life has been simultaneously characterized and influenced by different cultures. When people say that ‘the world is becoming smaller every day’, they are referring not only to the increased speed and ease of transportation and communication but also to the increased use of international and intercultural market to buy and sell goods. The overall heightened presence of foreign goods, foreign producers and even foreign-owned assets causes many to question the impact and desirability of all international and intercultural economic transactions. An increasing number of companies are now relying on production chains that straddle many politically and culturally distinctive areas. Raw materials and components may come from different linguistic or religious areas and be assembled in another, while marketing and distribution take place in still other venues. Consumers’ decisions in, for example, New York or Tokyo may become information that has an almost immediate impact on the products that are being made—and the styles that influence them—all over the world. As a result it is reasonable to assume that culture is playing an increasing important role in our contemporary economic life.

### 18.4.1 *Why Engel’s Law Fails*

There are great disparities in consumption patterns throughout the world. According to Engel’s Law, the proportion of total expenditure on food and other basic necessities drops as income level rises. Expenditure on education, leisure recreation and others, on the other hand, is seen to be more income-elastic. Nevertheless, it is necessary to be cautious in applying Engel’s Law to cross-national or cross-cultural analysis. Statistical data show that some countries with same or similar income levels can have very variable consumer expenditure patterns, while some countries with different income levels may demonstrate the same or similar consumer expenditure patterns—which does not confirm with Engel’s Law. For example, the following is reported by the World Bank (1993, pp. 256–257):

Expenditure on food ranges from 38% in Kenya to 64% in Tanzania (both are lower-income economies) and from 25% in Hungary to 35% in Argentina and South Korea (both are upper-middle-income economies); for clothing and footwear, from 7% in Peru to 16% in Thailand (both are lower-middle-income economies); for rent, fuel and power, from 8% in Tanzania to 17% in Bangladesh (both are lower-income economies) and from 7% in Thailand to 23% in Iran (both are lower-middle-income economies); for medical care, from 2% in Senegal to 6% in Iran (both are lower-middle-income economies); for education, from 1% in Bangladesh to 10% in Kenya (both are lower-income economies); for transportation and communication, from 9% in Japan to 14% in Canada and USA (all are high-income economies), from 5% in Senegal to 10% in Peru (both are lower-middle-income economies), and from 2% in Tanzania to 7–8% in India and Peru (all are lower-income economies).

It seems very likely that only non-economic factors, including ethnic and religious ones, can account for the above variations.

### **18.4.2 Intercultural Differences**

Each person is part of many different identity groups simultaneously, thus learning and becoming part of all their cultures. Each of us is culturally unique because each adopts or adapts differently the attitudes, values and beliefs of the groups to which we belong. Thus, all communication becomes intercultural because of the various group identities of those communicating (Singer 1998). The major challenge to us is how to examine the differences that make us unique and to discover ways to be more effective in overcoming the barriers these differences have created.

Race and ethnicity—elements reflecting the primary characteristics of a culture—have direct influences on economic activities. The names of many existing ethnic groups can lead to information about their social and economic conditions. Quite a few reveal the major occupation of these peoples. For example, in the language of the Lahu people, ‘Lahu’ means ‘roasting tiger-meat on fire’, which can be gathered that the Lahu people used to live by hunting. This can also be witnessed by their neighbors in Southwest China, the Dai and the Hani, who called themselves Mushe (‘the hunters’). There is a small ethnic group entitled ‘Oroqen’ (which has two meanings: ‘people who herd tamed deer’ and ‘people who live on the mountains’) living in the Greater and Lesser Xing’an Mountains between Mongolia, Russia and Northeast China. Another ethnic group, also living in Northeast China, call themselves the Daur (meaning ‘cultivator’), indicating that these people engaged in agriculture during ancient times.

Besides, the etiquette and content of food differ from culture to culture. For example, people with Latino-origin are accustomed to a diet rich in complex carbohydrates. This includes corn and corn products, beans, rice and breads. Proteins include beans, eggs, fish and shellfish, beef, pork, poultry and goat. Because frying is a common cooking method, the Mexican diet tends to be higher in fat. The type of bean depends on the culture. Cubans, Southern Mexicans, Central Americans and Venezuelans use black beans. Northern Mexicans, Dominicans and Puerto Ricans prefer pinto or pinta beans. Cubans, Central South Americans and Hispanic Caribbeans use red kidney beans. Dominicans and Puerto Ricans also use pigeon peas. Venezuelans and Brazilians use chickpeas or garbanzo beans. Latino foods are not always spicy. Oregano, tomato, garlic and black pepper are used to flavor foods by cooks from Cuba, Puerto Rico and the Dominican Republic (USDA 2002). Cuisine for Africans, sometimes referred to as ‘soul food’, may include the use of collard greens and other leafy green and yellow vegetables, legumes, beans, rice and potatoes. Food preparation includes frying, barbecuing and service foods with gravy and sauces. Home-baked pies and cakes are common.

In a traditional Asian diet, rice is the mainstay and commonly eaten at every meal. Pork and poultry are the primary protein sources. Significant quantities of dried beans and nuts are also eaten. Fruits and vegetables also make up a large portion of the Asian diet. Since ancient times, the Chinese have employed many cooking methods, including braising, boiling, braising with soy sauce, roasting, baking, grilling, scalding, deep-frying, steaming, drying and salt-preserving. By contrast, the Western cuisine is much simpler. Western cuisine seldom uses the ingredients

in Chinese cuisine, such as jelly fish, sea cucumbers, shark's fins, bird's nests, bean curds (tofu), oyster sauce, black bean sauce, salty shrimp paste, soy sauce and so on. Besides, Western cooking adds herbs like rosemary, dill, sage, oregano, thyme and tarragon, all of which are seldom found in the traditional Chinese food. The Chinese cuisine uses ginger, spring onions, mints, corianders, white pepper and so on but does not contain cheese, butter, cream or milk in traditional food; neither the Chinese have chocolate mousse, apple pie, cheese cakes, and fruit tarts in their diet. Besides, there is a main difference between the traditional Chinese and the Western eating habits: unlike the way in the West, where forks and knives are used everyone has his or her own plate of food, in China the dishes are placed on the center of a table and everybody shares with each other using chopsticks.

## 18.5 Marketing Strategy

Each individual of our human being has been socialized in a unique environment. Important aspects of the environment are shared, and these constitute a particular culture. Culture poses communication problems because there are so many variables unknown to the communicators. As the cultural variables and differences increase, communication costs and intercultural misunderstanding will appear. That is, as noted by Gudykunst (1994), "When we travel to another culture or interact with people from another culture in our culture, we cannot base our predictions of their behavior on our cultural rules and norms. This inevitably leads to misunderstanding. If we want to communicate effectively, we must use our knowledge of the other culture to make predictions. If we have little or no knowledge of the other person's culture, we have no basis for making predictions."<sup>5</sup>

### 18.5.1 Intercultural Negotiation

Language, as the major tool of communication, is an obvious starting point for the exploration of differences between cultures. Every language carries a weight of values, of sensibilities, of approaches to reality—all of which insinuate themselves into the consciousness of those who speak it. To a certain extent, linguistic differences have decisively influenced global trade and marketing. Although it is not the only tool in building trusting relationships, doors usually open more quickly when knocked on by someone who speaks a familiar language. Sharing a common language, however, does not necessarily mean effective communication in technical terms. More important is the understanding of 'hidden messages', which determines the effectiveness of the communication. Proper communication takes both technical understanding of the spoken words and cultural understanding of the 'hidden meaning'.

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<sup>5</sup> Cited from Harris et al. (2004, p. 42).

**Table 18.3** Eastern versus Western cultures: communication styles. (Source: Based on Lewis 2003)

Western styles	Eastern styles
Direct	Indirect
Blunt	Diplomatic
Polite	Very courteous
Talkative	Reserved
Extrovert	Introvert
Persuasive	Recommendations
Medium-strong eye contact	Weak eye contact
Unambiguous	Ambiguous
Decisive	Cautious
Problem solving	Accepting of the situation
Interrupt	Does not interrupt
Half listens	Listens carefully
Quick to deal	Courtship dance
Concentrates on power	Concentrates on agreed agenda

Intercultural communication is a process whereby individuals who are culturally different from each other on such important attributes as their value orientations, preferred communication codes, role expectations and perceived rules of social relationship. Although most cultural groups have their own communication styles, the differences of communication styles between the Asian and the Western worlds are most distinct (see Table 18.3). To a certain extent, linguistic differences have decisively influenced negotiations. Proper communication takes both technical understanding of the spoken words and cultural understanding of the ‘hidden meaning’. For example, when a Japanese manager says in a business negotiation ‘It is very difficult’ (which is a polite manner of refusal in Japanese society), the American partner would probably ask the Japanese side to find a solution, finding the expression to be more ambiguous (in the American point of view). In the contemporary Chinese society, by contrast, ‘We have some difficulties’ implies ‘It would be O.K. under certain conditions.’

Compared to language, religion can provide more insights into the characteristics of a culture.<sup>6</sup> What is more important, religion can have a deep impact not only on attitudes towards economic matters but also on values that influence them. Specifically, religious attitudes and values can help to determine what we think is right or appropriate, what is important, what is desirable and so on. For example, Catholics used always to eat fish on Fridays; milk products are popular among Hindus, many of whom are also vegetarians. Americans love beef, yet it is forbidden to Hindus; tabooed food in Muslim and Jewish culture is normally pork, eaten extensively by the Chinese and others. Many deluxe restaurants usually cater to diverse diets to offer ‘national’ dishes to meet varying cultural tastes. Besides, Luqmani et al. (1980) suggests a package of marketing strategies for the Muslim world, among them: ‘to

<sup>6</sup> For an earlier study of the economic ethnic of the Protestantism and Catholics, see Weber (1904); and the recent one of the Jewish, Christian and Muslim, see, for example, Wilson (1997).

use religious holidays such as the end of Ramadan as the major selling time for food, clothing, and gifts'; 'to use 'excessive' profits for charitable purposes'; 'to access female consumers by saleswomen, catalogs, home demonstrations'; and so on.

### ***18.5.2 Tips for Intercultural Negotiation***

Business negotiation is a process in which two or more economic entities come together to discuss common and conflicting interests in order to reach an agreement of mutual benefit. In cross-cultural negotiations, the negotiation process differ in language, cultural conditioning, negotiating styles, approaches to problem solving, implicit assumptions and so on. Fisher (1980) addresses five considerations for analyzing cross-cultural negotiations: (i) the players and the situation; (ii) styles of decision making; (iii) national characters; (iv) cross-cultural noise; and (v) interpreters and translators. There are various differences in distinct cultures. Sometimes, ignoring intercultural differences may bring about unwanted consequences.

The tips shown below may help to highlight negotiation differences in nine distinct cultures:

- With Africans: Africa is a diverse continent on which to do business. According to the World Bank's annual "Doing Business" report, sub-Saharan Africa is, on average, the most difficult place to do business in the world when it comes to red tape. The notable challenge facing companies doing business includes the reality that Africans in most territories suffer from extreme poverty. There is also the further enormous challenge of language. While there are some cases of a lingua franca—such as Swahili in much of East Africa and French in parts of West Africa—there is a seemingly endless number of regional dialects in many countries. The Democratic Republic of the Congo, for example, has more than 200 ethnic groups. This reality demands a very different approach to volume customer management than that of single-language markets...
- With Arabs:<sup>7</sup> Junior managers enter first, followed by senior executives; take time to establish rapport and relationships; expect to mix business and personal information to establish individual support, trust and commitments; utilize a go-between in the negotiation; to gain concessions, they may try to make you feel guilty and then obligated; they like to bargain and are skilled at making deals; be patient, enjoy the process and be willing to compromise...
- With North Americans:<sup>8</sup> It is a good idea to prepare an agreed-upon agenda before the meeting; be prompt in starting time; prepare and pass on minutes of the meeting afterwards; the chairperson presents first; focus on issues one at a time; solicit input from all attendees; expect open discussion and debate; share problem-solving ideas; assign individual action items; be direct, assertive, involved and action oriented...

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<sup>7</sup> Based on Elashmawi (2001).

<sup>8</sup> Based on Elashmawi (2001).

- With Latin Americans:<sup>9</sup> Latin American business executives tend to be extrovert, impatient, talkative, and inquisitive. Interpersonal skills are often considered more important than professional competence and experience. Latins are not very interested in schedules or punctuality. The pace of negotiations is slower in Latin America than in Europe. The best policy is to wait for your Latin counterparts to initiate any “small talk” and follow their lead in establishing rapport. Latins follow a top-down decision making process, where employees follow a trusting subservience to their superior as task orientation is dictated from above. Opinions of experienced middle-mangers and technical staff do not always carry the weight that they would do in the UK. Meeting formalities must be followed; the two senior executives should sit facing each other. Be sensitive to the fact that Latins tend to stand and sit extremely close to others...
- With Chinese: Junior members should follow senior members. Only senior members on both sides are expected to talk, unless junior members are invited to do so; do not interrupt, even if a mistake is made (take notes and share corrections in private occasions); expect a large negotiating team and long lunch breaks; “face” is important; realize that the power of the negotiator may be limited, and that sometimes assistants or even secretaries to top officials are even more useful than deputies; remember that there is a difference in negotiating with Chinese receiving Western educations...
- With Western Europeans. To say that the Western European market is diverse would be a gross understatement. European countries are highly receptive to new developments that improve efficiency and reduce costs and suggests there are two key opportunities to look for: products or services born out of a technological breakthrough and clever ways to serve the needs not currently recognized or acknowledged by European customers. Marketing products to Western European customers can be approached on two levels: pan-European or country-specific. However, cultural and language barriers are making it difficult to find success with pan-European programs. To ensure messages are understood, experts recommend packaging, labeling and promotion be created for each individual country...
- With Eastern Europeans. Remember that the habits and behavior inherited from the communist period may still be in evidence. When a foreign firm invests in an Eastern European country in order to maintain their competitive advantage internationally, it must be able to quickly replicate their embedded resources within the affiliate. In addition, foreign firms have to cope with specific barriers to change inherited from the communist legacy. To make its affiliates work according to Western criteria, foreign investors have to overcome these barriers. The local firm’s capacity to learn and the willingness of local workers to change skills and habits are two important factors...
- With Indians: An Indian who hesitates to say “No” may actually be trying to convey that he or she may worry whether the job can be done; aggressiveness can often be interpreted as a sign of disrespect; only the senior person might speak,

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<sup>9</sup> Based on Castle and Carrasco (2007).



and the junior members may maintain silence; Westernized Indians can be quite assertive and direct; politeness and honesty go a long way in establishing the fact that your intentions are genuine...

- With Japanese:<sup>10</sup> You are expected to deal with a homogeneous group of up to four, junior and middle managers; try to establish harmonious, cooperative relationships, giving time to lunch and/or dinner and entertainment; follow their rule of “etiquette”, such as, token gifts called “presenta” which are exquisitely wrapped—use holidays to exchange greetings; focus on middle managers who make recommendations to senior managers who make the final decisions.

## 18.6 Case 18. Cultural Influences on Income (Re)distribution

The inverted-U hypothesis on the relationship between income distribution and economic development was first proposed by Kuznets (1955), who suggested that inequality tends to widen during the initial stage of economic development, with a reversal of this tendency in the later stage.<sup>11</sup> There is mixed evidence for this hypothesis. A number of cross-sectional studies (such as Paukert 1973; Cline 1975; Chenery and Syrquin 1975; Ahluwalia 1976; Deininger and Squire 1998) support this hypothesis. However, the studies of Fields (1991), Jha (1996), and Eichera and Garcia-Penalosab (2001) show that there is no tendency for poorer countries to yield increased rather than decreased inequality or for richer countries to yield decreased rather than increased income inequality.

Based on the cross-national data from the 1980s and the 1990s (details about these data are not given here but are available upon request), we can conduct a simplified statistical test on the determinants of income inequality. Our estimated results reported in Table 18.4 reveal that income inequality is an inverse-U shaped function of income level, following the tradition of Kuznets (see Fig. 18.1 for the scatter diagram). The above results do reflect an influence of growth on income distribution. Besides, our estimated result reported in Reg. (2) of Table 18.4 provides some evidence to support the view that income inequality increases with respect to religious diversity (see Fig. 18.2 for the scatter diagram). This may be explained by the fact that income (re)distribution from the rich to the poor can be more easily conducted between individuals with same religious beliefs than between individuals with different religious beliefs. In fact, such issues as justice, equality and common prosperity between the rich and the poor have been mentioned in many religious scriptures.

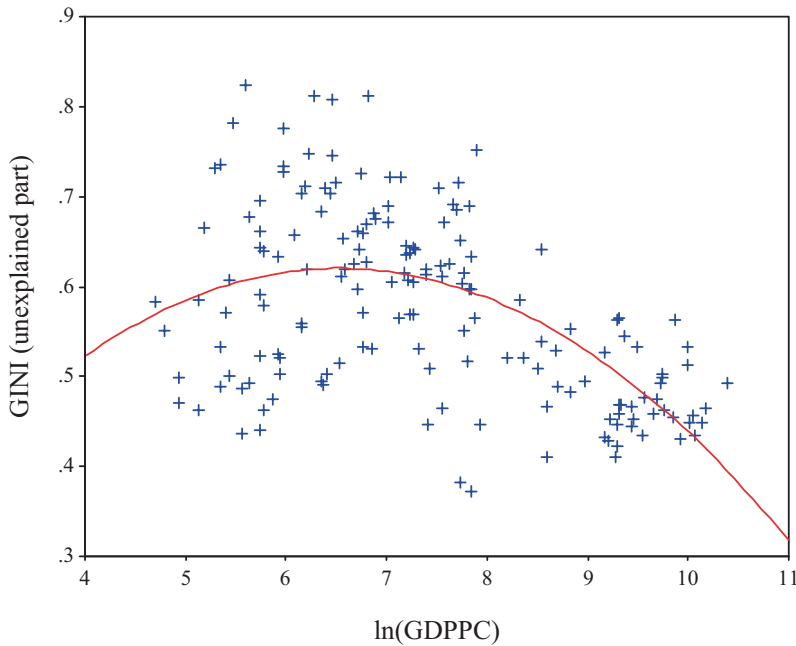
<sup>10</sup> Based on Elashmawi (2001).

<sup>11</sup> For an introductory literature on the empirical tests of the ‘inverted-U’ hypothesis, see Anand and Kanbur (1993).

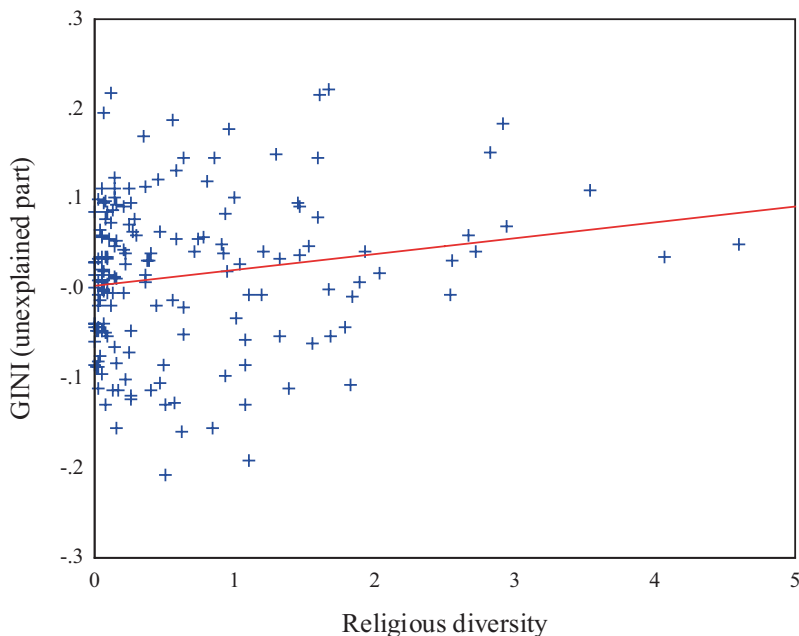
**Table 18.4** Cultural influences on income (re)distribution

Explanatory variable	Reg. (1)	Reg. (2)	Reg. (3)
Constant	-0.079 (0.182)	-0.163 (0.190)	-0.066 (0.200)
lnGDPPC	0.169 <sup>a</sup> (0.049)	0.192 <sup>a</sup> (0.051)	0.169 <sup>a</sup> (0.053)
lnGDPPC square	-0.013 <sup>a</sup> (0.003)	-0.015 <sup>a</sup> (0.003)	-0.013 <sup>a</sup> (0.003)
LANGUAGE	-	-0.001 (0.002)	-0.029 <sup>c</sup> (0.018)
RELIGION	-	0.018 <sup>b</sup> (0.008)	0.016 <sup>b</sup> (0.008)
LANGUAGE*lnGDPPC	-	-	0.005 (0.003)
Number of observations	164	164	164
F	31.92	17.41	14.47
R sq.	0.283	0.303	0.313

The dependent variable is Gini coefficient. lnGDPPC is the natural log of GDP per capita. LANGUAGE and RELIGION are the linguistic and religious diversity indexes. The term LANGUAGE\*lnGDPPC is the product of the LANGUAGE index and lnGDPPC  
<sup>a</sup>, <sup>b</sup> and <sup>c</sup> denote statistically significant at the 1, 5 and 10% levels, respectively



**Fig. 18.1** Gini coefficient versus income level



**Fig. 18.2** Gini coefficient versus religious diversity

Compared to religious diversity, linguistic diversity's role in the formation of income inequality is ambiguous. Our estimated result shows that the income inequality is negatively related to linguistic diversity, though it is statistically insignificant (see Reg. (2) of Table 18.4). In other words, it seems that income (re)distribution from the rich to the poor is not enhanced between people speaking a common language. Might be there a nonlinear relation between income inequality and linguistic diversity? Our estimated coefficients on the linguistic diversity (LANGUAGE) and on its interactive term with the natural log of GDPPC (LANGUAGE\*lnGDPPC) (see Reg. (3) of Table 18.4) show that linguistic diversity tends to reduce income inequality in poor nations and tends to increase income inequality in richer nations. However, since the estimated results are not statistically significant at the 10% level, we still cannot conclude that in richer nations income (re)distribution from the rich to the poor can be more easily conducted between individuals speaking a common language than between those speaking different languages.

Since the samples included in this analysis only include less than 100 countries in the 1980s and 1990s, we still need more empirical evidence to explain the relationship between income inequality and linguistic diversity.

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# Conversion from Customary to Metric Units

US customary unit	Metric equivalent
1 inch (in)	25.4 millimeter (mm)
1 foot (ft)	0.3048 m (m)
1 yard (yd)	0.9144 m (m)
1 mile (mi)	1.609344 km (km)
1 foot (ft)	0.30480061 m (m)
1 mile (mi)	1.609347 km (km)
1 league (lea)	4.828042 km (km)
1 fathom (ftm)	1.8288 m (m)
1 cable (cb)	219.456 m (m)
1 nautical mile (nm)	1.852 km (km)
1 acre	4046.873 square kilometers (sq. km)
1 section	2.589998 square kilometers (sq. km)
1 fluid dram (fl dr)	3.6966911953125 milliliter (ml)
1 teaspoon (tsp)	4.92892159375 milliliter (ml)
1 tablespoon (Tbsp)	14.78676478125 milliliter (ml)
1 fluid ounce (fl oz)	29.5735295625 milliliter (ml)
1 shot (jig)	44.36029434375 milliliter (ml)
1 gill (gi)	118.29411825 milliliter (ml)
1 cup (cp)	236.5882365 milliliter (ml)
1 (liquid) pint (pt)	473.176473 milliliter (ml)
1 (liquid) quart (qt)	0.946352946 liter (l)
1 (liquid) gallon (gal)	3.785411784 liter (l)
1 (liquid) barrel (bbl)	119.240471196 liter (l)
1 oil barrel (bbl)	158.987294928 liter (l)
1 (dry) pint (pt)	0.5506105 liter (l)
1 (dry) quart (qt)	1.101221 liter (l)

US customary unit	Metric equivalent
1 (dry) gallon (gal)	4.404884 liter (l)
1 peck (pk)	8.809768 liter (l)
1 bushel (bu)	35.23907 liter (l)
1 (dry) barrel (bbl)	115.6271 liter (l)
1 Fahrenheit degree (F)	$5/9(F-32)$ Celsius degree (C)

This table only contains selected customary units; most of the conversion factors may not be exact  
Source: Author based on <http://www.sciencemadesimple.com/conversions.html>

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