

Johann Dupuis · Peter Knoepfel

# The Politics of Contaminated Sites Management

Institutional Regime Change and  
Actors' Mode of Participation in the  
Environmental Management of the  
Bonfol Chemical Waste Landfill in  
Switzerland

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ISBN 978-3-319-11306-7                      ISBN 978-3-319-11307-4 (eBook)  
DOI 10.1007/978-3-319-11307-4  
Springer Cham Heidelberg New York Dordrecht London

Library of Congress Control Number: 2014949199

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# Foreword

The Bonfol chemical waste landfill, one of the biggest of its kind in Switzerland, was in activity from 1961 to 1976. The formal procedure by the authorities demanding the clean-up of the site started at the beginning of the year 2000, and the task will be accomplished approximately in 2016 with costs close to 0.5 billion CHF. As the clean-up is still going on, this book is the first published using this particular case of contamination. One may wonder why this interest in the Bonfol site rather than other cases of success or failure in contaminated sites remediation processes in Europe, and how the lessons from this book can be applied to environmental management.

The authors of the present book put into context the “Bonfol affair”: one of the first attempts of implementing the Swiss policy on contaminated sites remediation. During this conflictual process, simultaneous measures by political authorities and actions by NGOs finally resulted in a decision of the industry to entirely clean up the site in a proper way, by application of the polluter-pays principle. With the accomplishment of the remediation process described in this book and the final disposal of chemical waste, the historical cycle of the tremendous post-Second World War development of the Swiss chemical industry and its harmful consequences for the environment seems to be closing. However, in the Basel region, as well as in France, Germany, in the USA, and in a few other areas in Switzerland, older landfills produced by the chemical industry are still waiting to be fully remediated. In these cases, political pressure from public authorities and civil society is lacking in order to convince the industry to do so.

This book shows that until the beginning of the 1980s, the development of environmental standards through legislation was in fact quite slow and hesitant in Switzerland. For example, development of legislation on water protection by the acts of 1955 and 1971 brought some progress, but did not succeed in improving significantly either water quality or practices in waste management and clean-up of soil contamination. The situation only changed drastically with adoption of the Environmental Protection Act of 1983, which introduced a coherent philosophy on environmental impact assessment, waste management, protection of air and soil, and finally evaluation and clean-up of contaminated sites. Furthermore, it is only

since the enactment of the ordinance on remediation of contaminated sites (CSO) in 1998 by the federal government that the clean-up movement was initiated. These policy developments paved the way for the current waste management practices and allowed us to finally consider and resolve the problems linked to the industrial heritage of the “Glorious Thirties.”

The authors of this research analyze the historical development of the legal environmental framework of Switzerland, of the perception of chemical waste landfills as pollution sources, and their consequences on waste management, in particular on waste disposal practices. With respect to the Bonfol case, the legal framework was completed by 1998 and all institutional conditions for the clean-up were already available at that date. However, the initiative by the government of the Canton Jura and the NGOs to demand remediation of the site started a long power struggle with the industry, and it finally took 10 years until the clean-up operations really started.

For readers who are interested in the mechanisms that command complex environmental projects that affect ecosystems and the daily life of populations in the long term, and for those who are interested in the relationship between industry, public authorities and civil society, this book is of particular interest. As a result of their research the authors hence mention: “Drawing lessons from the evidences gathered in this research, we conclude by debating the value of institutional flexibility for dealing with environmental issues such as contaminated sites. We argue that flexibility can only conduct to sustainable environmental management if environmental interests are sufficiently well represented in open and deliberative decision arenas, and if public authorities fully assume the role of arbitrator.” And furthermore: “The principal lesson that can be drawn from the case of the Bonfol contaminated site is that in flexible institutional contexts, and where the ecological management of an area is largely driven by the private sector, counterforces must be able to participate in the decision process, in order to ensure that a balance exists between the values, interests and resources that drive the decision-making process.”

The writer of this preface was engaged in the decision-making process on remediation of the Bonfol chemical waste landfill as a coordinator of the scientific committee that supported the government of the Canton Jura from 2000 to 2005. On the basis of my experience, I strongly support the analysis by the book’s authors: regulations that fix environmental standards and the relations between public institutions and governments on one side and industry and other private actors on the other side are the necessary basis for coherent environmental management. However, authorities of public political entities such as cantons and even the Swiss confederation as the central state do not always have either the financial possibilities or the necessary political power to fully apply the law. In these cases, under the current legislation, the conflict with NGOs and other representatives of civil society is predictable. However, there should be mechanisms to integrate all the social forces in the decision process, to come to optimal solutions and support the environmental sustainability of the projects.

In that sense, I am convinced that the book presented by Johann Dupuis and Peter Knoepfel is a very interesting contribution that provides a sound basis to improve the environmental decision-making processes in our society.

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# Acknowledgments

We would like to deeply thank, Linda Gubler, Benjamin Grether, Suzanne Cox, and Françoise Gisi for their help with this book.



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# Abbreviations

BCI	Basel Chemical Industries
CC	Civil Code
CO	Code of Obligations
CSO	Ordinance on the Remediation of Contaminated Sites
EEA	European Environment Agency
EPA	Federal act on the Protection of the Environment
FOEN	Federal Office for the Environment
LPEP	Federal Act on the Protection of Waters against Pollution
MAO	Ordinance on Protection against Major Accidents
NCHA	Federal Act on the Protection of the Nature and Cultural Heritage
OAPC	Ordinance on Air Pollution Control
OCRCS	Ordinance on the Charge for the Remediation of Contaminated Sites
OEPN	Office for Water and Nature Conservation of the Canton of Jura
SoilPo	Ordinance on the Pollution of Soil
TOW	Technical Ordinance on Waste
WPA	Federal Act on the Protection of Waters
WPO	Water Protection Ordinance





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# Chapter 1

## The Problem and Politics of Contaminated Sites

**Abstract** This introductory chapter draws the outlines of this book by exploring the extent of the problem of contaminated sites in Europe, and examining the political nature of contaminated sites management. We begin by presenting the state of the knowledge with regards to the impacts of contaminated sites in Europe, basing ourselves on the most recent data available. We demonstrate the strong relationship between the level and structure of economic activity, and the problem of contamination. We argue that contaminated sites management must be understood as a wicked problem, in which politics and the power relations between actors involved in decision-making play the front roles. We defend the idea that institutions, in the form of substantial regulation and procedural rules must exist in order to steer these processes towards environmentally sustainable outcomes. After briefly presenting the changes that have affected institutions and contaminated sites management in the era of governance, we introduce the project of this book of unraveling how certain characteristic of institutions might relate to the successful environmental management of contaminated sites.

Soil contamination is a worldwide issue that cannot be neglected in the present context where concerns about food sovereignty urge us to better conserve the environmental integrity of the soil, as a vital and non-substitutable resource for agricultural production. The soil is also central in a multitude of ecological processes that intervene in ecosystem dynamics. The health of many natural resources, for instance, ground and surface waters, forest, and the biomass in general depend on soil quality. Soil contamination occurs when the introduction of massive amounts of pollutants overwhelms the capacity of the soil to naturally buffer, filter and transform contaminants, which results in the durable accumulation of toxic substances (EEA, 2010). Depending on where the soil contamination takes place, a durable risk of water pollution, food contamination and human poisoning is created, which requires environmental remediation. The expression *contaminated sites* is hence increasingly being used as replacement for “contaminated soil”, because it better accounts for the consequences of soil contamination for the surrounding ecosystems and the local population in a defined area.

The awareness that soils are assets that need to be protected and conserved is recent. Up to the 1970s, regulations were lax. The dumping of all sorts of waste in any natural depression that the land would offer, and leaving the “nature” to take care of the disposal was often the common practice in waste management. These behaviors only started to cease when it was made clear that the sometimes dangerous and toxic material stored in the ground would inevitably affect ecosystems on the surface and also the nearby population. As in many environmental tragedies, preventive actions developed only after the occurrence of disasters. This is what happened almost simultaneously in the USA in the “Love Canal affair” of 1978 and in the “Lekkerkerk case” of 1979 in the Netherlands, when the local population discovered with horror that their houses were built on former chemical landfills containing highly toxic waste (Swartjes, 2011). The shock on the public opinion caused by these triggering events proved big enough to pave the way for the first regulations concerning soil contamination and remediation, which were enacted as soon as in 1980 in the case of the USA.<sup>1</sup>

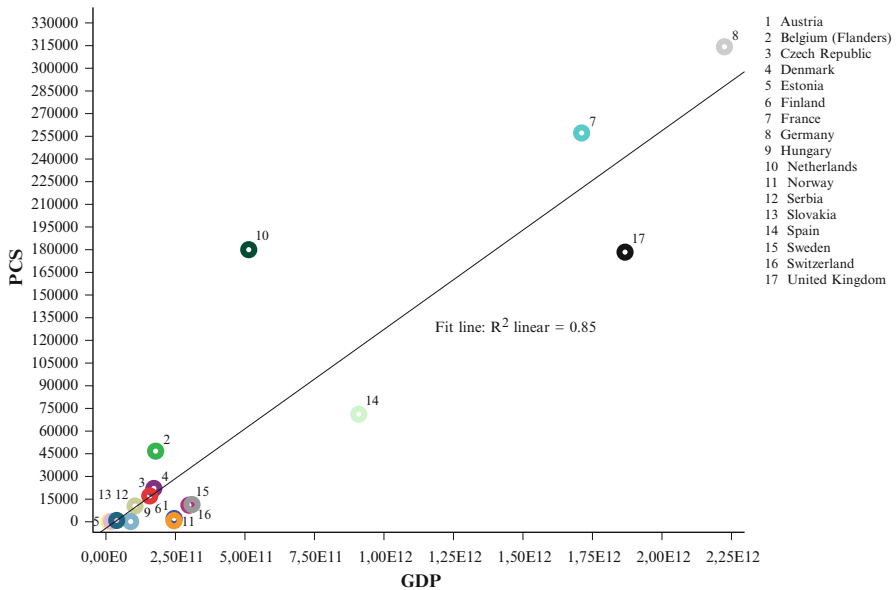
The impacts of contaminated sites on human health are insidious. People are affected through the ingestion of soil particles, inhalation, skin absorption or food consumption. Contaminated sites contain potentially dangerous amounts of multiple pollutants: heavy metals, polycyclic aromatic hydrocarbons (PAHs), monocyclic aromatic contaminants, persistent organic pollutants (POPs), volatile organic contaminants (VOCs) and other organochlorides (Swartjes, 2011). Some people, due to their young age, their profession or their poor standard of living are particularly exposed and vulnerable (Abrahams, 2002). However, no global figures currently exist on the health impact of contamination. This is due to the extreme difficulty of tracing the impacts of a specific contamination, and to isolate their effect of the swarm of other risk factors that affect human health. We are exposed to all kind of toxic substances on a daily basis, and almost every human body is loaded with remarkable amounts of contaminants. Furthermore, the symptoms of exposure to contamination range from subtle problems such as skin eruption, to brain damage, on up to cancer or death. The difficulty of undertaking medical observations and experiments on potentially affected humans also add to the problem of building evidences. For instance, even in the well-known case of the Seveso accident, a prototypical case of chemical disasters where thousands of people were potentially exposed to dioxins, some health impacts like birth defects proved difficult to confirm due to the lack of suitable data (Bertazzi, 1991).

More than 30 years after the discovery of the first contaminated sites, the problem is still terribly acute. The Commission of the European Communities (2006) considers that soil degradation cost up to a huge 38 billion of euros per year in Europe. One of the most comprehensive datasets available up to now on the issue of sites contamination (Panagos, Van Liedekerke, Jones, & Montanarella, 2012; Panagos, Van Liedekerke, Yigini, & Montanarella, 2013) indicates that about 2.5 millions sites are suspected of contamination<sup>2</sup> in Europe, of which 127,000 have

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<sup>1</sup>The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) also known as the Superfund, which was enacted on the 11th December 1980 regulates the issue of sites contamination in the USA.

<sup>2</sup>In the below, sites that are suspected of contamination are referred to as: “potentially contaminated sites” (PCS).



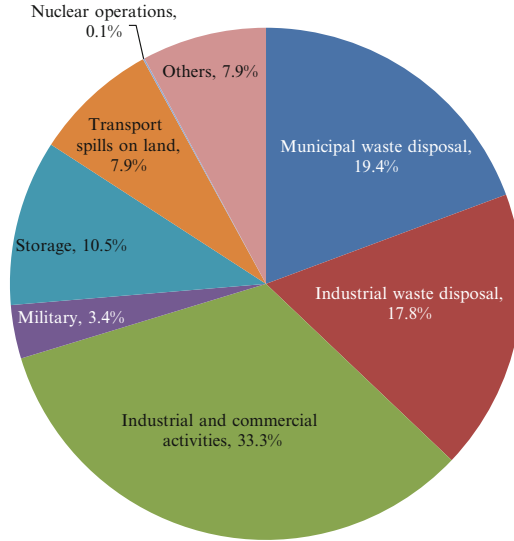
**Fig. 1.1** The relationship between gross domestic product and potentially contaminated sites in 17 European countries (Figure is based on the data on identified potentially contaminated sites from Panagos et al. (2013); GDP values are calculated based on the market prices of 1999 for the year 2005, and the source is: Eurostat database (<http://epp.eurostat.ec.europa.eu>))

been definitely confirmed.<sup>3</sup> 58,000 of these sites have already been remediated, but progress is slow and extremely costly. It is estimated that the sole management of contaminated sites currently costs a massive 6.5 billion euros a year at the European level of which 42 % on average is financed through public expenditures.

The fundamental factor that causes the problem of contamination is the local concentration of economic activities, and particularly of pollution-intensive industries. The density of the economic activity is almost mechanically related to contamination risks, especially in areas where waste-intensive production and consumption patterns prevail. Figure 1.1 supports this argument by showing the strong linear relationship ( $R^2=0.85$ ;  $p<0.01$ ) between the annual gross domestic product (GDP) and the amount of suspected contaminated sites in Europe. Unsurprisingly, Germany, the first economy of Europe, has the largest number of potentially contaminated sites, followed by France, and the Netherlands with its extremely dense economy.<sup>4</sup>

<sup>3</sup>These figures do not include the diffuse soil pollution by agricultural activities and the massive use of pesticides and chemical nutrients, which nevertheless represents an ever-growing problem.

<sup>4</sup>The current relationship between contaminated sites and economic activity in Europe points towards the refutation of the thesis of the environmental Kuznets curve. This theory advances that the relation between pollution and economic development is akin to an inverted-U shape: the pollution curve would grow concomitantly with the economy until a certain level of development is met (the point of inflexion), and then sink. The data we currently dispose of however shows the



**Fig. 1.2** Major sources of sites contamination in 22 European countries (Data from Panagos et al. (2013))

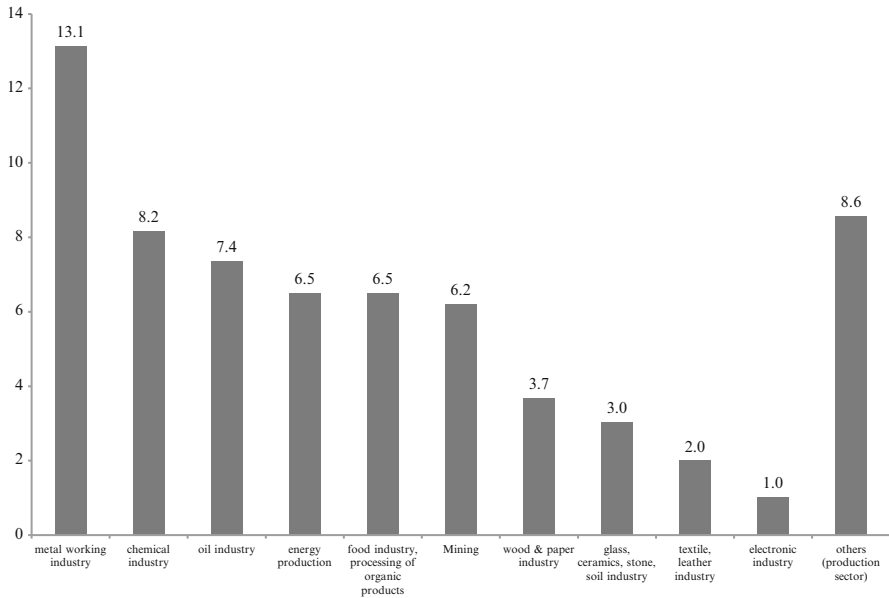
Figure 1.2 demonstrates that one third (33.3 %) of the confirmed sites contaminations in Europe are directly caused by pollution that arises from economic and commercial activities of the private sector. After that, the largest sources of contamination are household waste (19.4 %) that is managed in public landfills, followed closely by the waste produced by industry (17.8 %), which is generally far more toxic than household waste. Consequently, these facts strongly refute the often-asserted claim that responsibility for the problem of contaminated sites would be shared and societal. The private sector principally bears the factual responsibility for the problem of sites contamination, and this only adds to its moral responsibility: indeed, by fully reaping the benefits from its commercial and industrial activities, the private sector should also assume the entire cost of its negative externalities in forms of pollution and sites contamination.

Within economical activities, responsibility for sites contamination is of course not equally shared. Industrial production contributes more (60 %) than the service sector (32 %). Three sectors of production are principally involved in sites contamination (see Fig. 1.3): the metal industry (13.1 %), the chemical industry (8.2 %), and the oil industry (7.4 %). Therefore, it must be emphasized that the

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linear and constant increase in contamination that is linked to the level of economic development. For a systematic discussion and rebuttal of the environmental Kuznets curve see: (Chua, 1999; Wagner, 2007).





**Fig. 1.3** Major production sectors involved in sites contamination in 22 European countries (Data from Panagos et al. (2013))

problem of contaminated sites at the scale of a country is highly dependent on the structure and the concentration of the industry. Most contaminated sites are the legacy of the localized and intensive production of certain manufactured goods, which have toxic by-products that cannot be easily disposed of. The extent and magnitude of the problem of contaminated sites in Europe is also extremely worrying for the state of affairs in developing and emerging countries, where the offshoring of production factories since the 1960s is causing a concentration of these pollution-intensive industries (Dam & Scholtens, 2012).

The fact that the extent of the problem of sites contamination is subsequent to the structure and the level of development of the economy does not mean, however, that nothing can be done to reduce the present and future environmental and human health impacts of contaminated sites. We hence define *the environmental management of contaminated sites* as:

the decision-making process in which the various laws, rules and political-administrative programs of policies that pertain to contaminated sites are implemented, and choices and actions are made by actors about how the sources of contamination in a defined area are regulated or remediated, which ultimately determine the outcomes for socio-ecological systems.

Preventive environmental management of contaminated sites takes the forms of the various pollution control technologies that are voluntarily installed by private companies or which are commanded by the law. With regards to reactive management (or remediation), two opposite conceptions of the goals to attain dominate (see: Swartjes, 2011). First, the *multi-functional approach* requires the remediation process to reduce the environmental risks resulting from the contamination to zero, so that the resulting soil quality would allow us to use safely all of the goods and services provided by the surrounding ecosystems. The objective of multi-functionality generally implies *ex-situ* interventions that consist in excavation of the sources of the contamination, which are then treated and disposed of through various techniques (for instance incineration) in other locations. The multi-functional approach hence represents an ideal-model in terms of environmental sustainability. By contrast, *the fitness-for-use approach* only demands one to suppress the environmental risks in proportion to the present and anticipated land uses in the site area. For instance, the residual soil pollution level could be left higher in a commercial area than in an agriculture zone, where it would directly threaten food production. Fitness-for-use goals are often associated with *in-situ* techniques, which allow confining the contamination to a restricted zone of the site, which is then kept under constant surveillance. In this configuration, the sources of the contamination are not removed from the site, but the subsequent risks are mitigated and controlled. The fitness-for-use approach is however problematic with regards to both environmental sustainability and the polluter pays principles: the environment will remain polluted to a certain degree after remediation, and the polluters are not held accountable in proportion to the damage they have caused. A particularly clear and direct relationship exists between the cost and the environmental merits of remediation goals and instruments (EEA, 2007). The fitness-for use approach in conjunction with *in-situ* techniques is generally cheaper<sup>5</sup> (Summersgill, 2005). For instance, the stringent approach taken by Austria to remove systematically all the sources of contaminations in identified contaminated sites is leading to remediation costs that can easily exceed 5 million Euros per site, whereas the majority of remediation projects in Europe fall in the range of 50,000 to 500,000 euros, but for results that are often less satisfactory in terms of environmental integrity (EEA).

The difficulty of managing contaminated sites can be partially understood by examining three central features of this issue that compare to what Rittel and Webber (1973) have famously defined as *wicked problems* that are particularly difficult to tame:

- Firstly, contaminated sites are a problem that is the symptom of another problem. The proposed policy solution, namely environmental remediation, will never solve the source of sites contamination, which lies in the unsustainable levels of industrial production and the subsequent waste and externalities generation.

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<sup>5</sup>Of course, the cost of the remediation also relates to the size of the area that must be decontaminated. Vitrification is the only *in-situ* technique that is almost as expensive as the full excavation of polluted materials, due to its novelty and the technological means involved (Summersgill, 2005).

Although, the process of remediating contaminated sites is progressing, new contaminations are constantly discovered and others created as the results of industrial activities. For instance, the European Environment Agency (EEA) estimates that the number of polluted sites will continue to grow by about 50 % until 2025. In the long term, the EEA hopes that more stringent environmental policies will reduce the extent of the problem in Europe (EEA, 2007). However, if this were to happen it would only partially solve the problem, considering that the more stringent environmental protection in Europe could result in the outsourcing of pollution-intensive industries and thus in the intensification of the extent of contamination in regions with fewer environmental regulations or so-called “pollution havens” (Kellenberg, 2009; Matthews, 2010).

- Secondly, causality in sites contamination is complex, which hinders the application of the polluter pays principle and triggers conflicting negotiations. There are often multiple polluters behind a single contamination. Furthermore, contamination is a process that can span several years or even decades. Complicated investigations are required in order to determine the historical responsibilities in the contamination as well as the types of pollutants that are present. The time required and the uncertainty of these investigations is often exploited by the charged firms in order to resist or evade potential obligations in relation to the remediation. The large costs of remediation also constitute a powerful incentive for firms to try to minimize their contribution. Yet, the failure of identifying clear perpetrators results in remediation that ends up being carried out and financed by the public authorities with costs that plague public budgets.
- Thirdly, there is no strict stopping rule for the process of managing a contaminated site. In spite of the scientific knowledge, uncertainty remains about the environmental effects of the complex interactions of toxic substances found in contaminated sites. Resulting from this, the thresholds from which a site should be considered as contaminated, or the acceptable level of remaining pollution after the remediation, are subjective and variable. Environmental regulations sometimes fix clear pollution thresholds and remediation goals in the law, but the practice is generally to negotiate objectives and remediation techniques case-specifically, according to the perception of the severity of the contamination risks in the area and of how far the remediation process should go into the revitalization of a lost nature. The subjectivity of the process of managing contaminated sites and the lack of clear stopping rules is ultimately reflected in highly diverging objectives, cost and outcomes of contaminated sites policies in Europe.

The wicked character of contaminated sites management has major consequences for the governance of this issue. Although, contaminated sites management is often depicted as a highly rational and technical process in which expertise and scientific rationality play the front roles, partial solutions, complex causality and the absence of strict stopping rules create a setting in which determining the optimal and desirable environmental state of a polluted area is scientifically difficult (Weidner, 1993, p. 31). The environmental management of contaminated sites actually results from a negotiation process that frequently involves constellations of

actors with heterogeneous values, beliefs and interests with regards to the protection of the environment. *Politics*, that is the power relations between the actors involved in the decision-making, determine the “who gets what, when and how” (Lasswell, 1936). The apparently rational and technical management of contaminated sites hence frequently involve choices of a political nature about how laws and policies should be implemented to reach the level of environmental protection that is collectively constructed as desirable, in a process that can be called: *the politics of policy implementation* (Nakamura & Smallwood, 1980). These negotiation games “real actors play” (Scharpf, 1997) have two major features:

- Firstly, the NGOs and the local population, which are the main users of contaminated ecosystems, and the firms that assume the costs of the remediation process are likely to have strongly diverging interests in terms of the environmental ambition of the remediation. Assuming the bounded-rationality of actors (Simon, 1991), firms charged for the remediation and the cleanup will strongly prefer cost-minimizing solutions, whereas NGOs and the local population will lean towards environmentally optimal remediation. Due to the enormous costs of remediation, these disparate interests are likely to produce conflicting interactions, in which *social learning* (Sabatier & Weible, 2007), which is often presented in the literature as the panacea to solve environmental disputes, will not easily occur. In these types of conflicting constellations, public authority involvement is necessary, either as the arbitrator of public interest or as the mediator that builds the necessary trust, in order to reach a consensus (Cormick, 1980; Gàndara, 1995, pp. 17–25).
- Secondly, negotiations in the context of contaminated sites typically involve information asymmetry, which hinders the likelihood of successfully implementing the Coasian solution to environmental disputes (Coase, 1960). This would typically consist in direct bargaining between polluters and victims, which could, under certain conditions, allow determining the Pareto optimal level of residual pollution. However, the firms that have caused the contamination are the sole parties to truly know about the mix of toxic substances that have been introduced in the soil. Firms are also the most likely to dispose of the knowledge on the remediation techniques that are best able to deal with the pollutants originating from their activities. The quasi-monopoly over knowledge and information gives firms the power to disproportionately influence the negotiation process, which skews the bargaining outcomes away from environmentally optimal remediation, towards cost-minimizing approaches. The power asymmetry that results from this knowledge concentration can only be lessened by the engagement of policy resources such as independent third party expertise.

The negotiation games involved by the politics of contaminated sites do not take place in an institutional void. *Institutions* form the structure that bind these processes, and which should ensure, in an ideal world, that conflict and information asymmetry do not hinder the reaching of environmentally optimal outcomes. Institutions have two major effects on the environmental management of contaminated sites: on the one hand, they produce substantive regulations in the

forms of environmental laws, public policies, or property regimes that steer actors' choices and behavior (Héritier, 2002); on the other hand, they imply procedural norms that shape the structure, types and forms of relations between public and private decision actors that some scholars refer to as *modes of governance* (Mayntz, 2004; Provan & Kenis, 2008).

Institutions play a central role in the environmental management of a contaminated site, because they define the rules of the game that orientate the decision process in which actors interact, coalitions of values or interests form, and decisions are made. Deficits in the design of institutions are often the reason behind the deceiving outcomes of contaminated sites management in terms of environmental sustainability. For example, Ciba-Geigy, the former Swiss multinational chemical company<sup>6</sup> owned and operated a 5.7 km<sup>2</sup> site, bordering a school and several residential and recreational areas in Toms River, New Jersey (USA). From 1952 to 1990, the site was used to produce dyes, pigments, resin and epoxy additives.<sup>7</sup> The sludge and process waste that resulted from these activities were contained in drums and disposed of directly on site. Leachates contaminated the soil and the groundwater that is tapped by municipal and private wells. The area is believed to be the largest child cancer cluster in the United States (Pistone, 2010). In March 2001, after numerous litigations with the local population, Ciba-Geigy agreed to clean up the site in accordance with Federal and State regulations and with modalities decided with the Environmental Protection Agency for an estimated cost of 90 million dollars. The remediation included the removing of 35,000 drums containing toxic products that were transported off site to several waste facilities. However, 38,000 drums were left there, leaving a high risk of future leakages and contamination. According to Pistone, this sub-optimal outcome is the result of loopholes in the regulatory framework, and of too much agency discretion, which allowed Ciba-Geigy to negotiate and obtain the implementation of a lower than optimal remediation standard.

There are unfortunately reasons to think that Toms River is not an isolated case. Several experts make the observation that the way we manage contaminated sites has been changing. The early policies from the 1980s responded strongly to the first discoveries of severe contamination incidents by requiring costly remediation, based on a multifunctional approach, and frequently involved the full excavation of the contaminated material. But, the 1990s saw a transition towards the more flexible fitness-for-use-approach, which in some cases went along with the decentralization of the policy process, and the stimulation of public-private partnerships in dealing with the contaminations. (Rodrigues, Pereira, da Silva, Hursthouse, & Duarte, 2009; Swartjes, 2011; Vegter & Kasamas, 2011). This actually echoes the general trend in the conduct of environmental policies. From the 1950s to the 1980s, the policies imposed various forms of coercive, highly inflexible, norms on private companies known as "command and control". (Howlett, 2009). In the context of the neo-liberal turn, the command and control model was increasingly deemed as inefficient,

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<sup>6</sup>After merging with the company Sandoz, Ciba-Geigy became Novartis in 1996.

<sup>7</sup><http://www.epa.gov/r02earth/superfund/npl/ciba/index.html>

ineffective and as constituting a major infraction on the freedom of companies to commerce (Cole & Grossman, 1999). It was increasingly considered that governing models based on top-down hierarchical relationships between the public authorities and private companies were destined to fail in the *governance era*, characterized by complexity, and the loss of influence of the State in favor of the economy (Hill & Hupe, 2009, p. 1; Majone, 1998; Rhodes, 1997). The dominant view became that the State should limit itself to define a general and flexible regulatory framework, and leave it to the private companies themselves to define the best ways of managing their pollution through market solutions or voluntary agreements (Jordan, Wurzel, & Zito, 2003). Whether these changes in the conduct of policies have been successful is however still debated today (see: Bressers, de Bruijn, Lulofs, & O'Toole, 2011; Gray & Shimshack, 2011; Kagan, Gunningham, & Thornton, 2003; Koehler, 2007). Surprisingly however, the vast majority of researches on contaminated sites adopt a descriptive stance, and focus on depicting the current remediation approaches, omitting thereby to account for regulatory change and politics in these processes. Only a few implementation studies have adopted a more critical perspective, and attempted to explain how changes in governance approaches could affect the environmental outcomes of contaminated sites management (Bowman, 1985; Catney & Henneberry, 2012; Catney, Henneberry, Meadowcroft, & Richard Eiser, 2006; Daley & Layton, 2004; Knoepfel, 1995). More generally, it is also widely recognized that there is currently a lack of study which thoroughly explores the factors that lead to sustainability in environmental decision-making (Adger et al., 2003).

This book will contribute to filling this gap by conducting an in-depth longitudinal study of a crucial case of success in contaminated sites management, in which we investigate the mechanisms that lead to positive outcomes by scrutinizing the decision-making process, and the role of changing regulations and modes of governance. The case in question is that of a contamination caused by a chemical landfill near the tiny village of Bonfol in a countryside region of Switzerland that borders France. In what has become one of Switzerland's most notorious environmental controversies, the surroundings of this village were contaminated by the large-scale dumping of hazardous waste by Ciba-Geigy and other leading multinational chemical industries between 1961 and 1976. The process of remediating the Bonfol chemical landfill began around the end of the year 2000, almost concomitantly with the site of Toms River. However, despite the involvement of the same firm in both cases, the standard of environmental quality ultimately attained for the remediation of the Bonfol site is considered as a model that exceeds the legal requirements in force in Switzerland. The Bonfol chemical landfill hence makes a prime case for the reflection needed on the role of institutions in the management of contaminated sites, and by extension in other environmental issues.

This book is structured as follows. In Chap. 2, we begin by presenting our analytical framework and the research hypothesis that have driven this work, which rely extensively on the political science literature on institutions, environmental policy analysis, and implementation research. In Chap. 3, we expose the situation of contaminated sites in Switzerland and why the Bonfol chemical landfill can be

considered as a crucial case. The methods and data employed are described in Chapter 4. This is followed by an empirical analysis of the case in point (Chaps. 5, 6, 7 and 8), which includes a thorough longitudinal analysis of the institutions, and of the politics of the management of the Bonfol chemical landfill. Chapter 9 discusses our results and presents our conclusions and recommendations.

We believe that this book reflects the state-of-the-art in environmental policy research by investigating how the design of institutions and actors' involvement influence the environmental outcomes of decision-making processes. We hope our work will be of interest to all scholars, students and people who have an interest in environmental problems and their management, and for public administrators and politicians who would like to think about how contaminated sites could be better governed in the future.

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## Chapter 2

# Institutions and the Environmental Management of Contaminated Sites: A Theoretical Framework

**Abstract** In this theoretical chapter, we argue that management of contaminated sites cannot be understood separately from the institutional context that binds these processes. Within the policy sciences, rational choice institutionalism is presently the dominant scientific paradigm in studies of the relationship between institutions and the outcomes of environmental management processes. However, in order to analyze contaminated sites management in modern democracies, we found it necessary to partially depart from this mainstream. We argue that there is in rational choice institutionalism a problematic oblivion of power and politics that leads to institutional determinism, a neglect of actor processes in environmental decision-making that produces causal reductionism, and a weak understanding of the socio-legal nature of institutions, which does not allow one to fully grasp the changes to environmental management that relate to the governance era. Therefore, we present our own theoretical framework that combines institutional analysis and policy process analysis, in order to study the politics of contaminated sites. Drawing from the literature on institutional regimes, policy process theories and network analysis, we discuss several research hypotheses on what might influence the environmental performance of contaminated sites management.

The management of a contaminated site is embedded in an institutional context that must be apprehended in order to understand the processes involved in ecological management. The work of renowned Anglo-Saxon scholars like Elinor Ostrom (1990) has contributed to demonstrate that besides economic and macro structural factors such as the GDP or the population, institutions are fundamental research objects to understanding why natural resources are under stress, and how ecosystems are actually managed.

Among the various approaches to institutional analysis that deal with environmental management, rational choice institutionalism (Ostrom, 2007b) has been the most fruitful analytical framework. However, in order to analyze contaminated sites management in European countries, and to account for the changes related to the governance era, we found it necessary to partially depart from this mainstream out of several reasons that will be discussed below, before we introduce our own theoretical framework.

## 2.1 A Critical Perspective on Rational Choice Institutionalism

First, institutions and governance, which are some of the most basic theoretical notions that underpin rational choice institutionalism, have become so widely used that they can be considered as “magic words” (Pollitt & Hupe, 2011) under which contradictory meanings are conflated. Notwithstanding the vagueness of the term of “institution” and the frequent confusions between the concepts of institute, organization, policy, regulations, formal and informal rules which can all be referred to as “institution”, at least four different theoretical perspectives on institutions exist, each with singular understanding of the meaning, scope and effects of institutions (Schmidt, 2010).<sup>1</sup> Scholars also mix different things under the concept of governance, which is employed alternatively to designate the structure of institutions (polity), the types of regulations and policy instruments (policy), the power interactions between decision actors (politics), or all of that at the same time (Treib, Bähr, & Falkner, 2007). Governance is moreover a normatively loaded concept, which has been conveyed by international institutions such as the OCDE or the World Bank. It entails the idea that governments are only one of the governing institutions in modern free market society and it is implied that self-regulation of private actors in highly decentralized settings performs better than steering by public authorities, although empirical backing for these claims has often been lacking (Bäckstrand, Khan, Kronsell, & Lövbrand, 2010; Mayntz, 2004; Offe, 2009). In order to avoid reproducing this *doxa* (Bourdieu, 1993) in scientific research, alternative concepts for thinking about governance and institutions must be sought.

There is also a problematic tendency in the rational choice literature to exaggerate the explanatory power of institutions by considering well-designed institutions as a panacea that will solve environmental problems (Ostrom, 2007a; Young, 2002, pp. 165–190). For instance, in one of the founding texts of the institutional analysis of environmental problems, Garrett Hardin (1968) uses the metaphor of a grazing land in a free access situation to demonstrate how the absence of institutional rules that restrict the right to use the land results in depletion. Largely influenced by the thinking of Malthus, Hardin presents a solution of enacting institutions that would limit access to natural resources. However, Hardin’s analysis is a case of *institutional determinism* (Radaelli, Dente, & Dossi, 2012) that omits the role of power and politics. Indeed, institutions are socially embedded constructs that are produced by domination and power (Giddens,

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<sup>1</sup> In order to clarify what we ourselves mean by institutions, and before we provide our own definition, we adopt for now the one suggested by Young (2013, p. 89):

“Institutions are collections of rights, rules, and decision-making procedures that give rise to social practices, assign roles to the participants in these practices, and guide interactions among the participants.”

1984). It is the state of the relations of force between actors that produces, at each moment, the crystallized rules and norms we call institutions (Bourdieu & Wacquant, 1992, p. 99).<sup>2</sup> Therefore, in real-life decision processes, power relations between the decision actors engaged in environmental management highly matter, in order to explain why institutions emerge and what functions they perform (Arts & Van Tatenhove, 2004). Hardin himself recognized that the root of the problem of resource depletion is not a lack of institutions as such, but the high-population density, which, in that case, is the reason why too much cattle is fed on the grazing land. Unfortunately, because economic incentives and the quest for continuous growth tend to be among the principal driving forces behind the social action of agents (Weber, 1978b, p. 7), the likelihood that dominant actor coalitions would support institutions that limit the use of natural resources that play an essential part in economic growth dynamic is relatively low.

One of the grounds behind the problematic determinism in mainstream institutional analysis is the temptation to predict the outcomes of decision-making processes based solely on institution characteristics, and thereby eclipsing the process by which causation unfolds. Institutions affect reality only because actors mediate and materialize their effects by conforming their behavior to institutional rules and norms. Actors who are involved in the complex power relations that constitute the decision process have heterogeneous interests and values, differing resources, and are therefore also likely to react differently to the same rule (Knoepfel, Larrue, Varone, & Hill, 2011). An actor's leeway in translating rules in congruent actions is the reason why the outcomes of the decision process can hardly be predicted based on the sole analysis of institutions (Scharpf, 2000). In order to understand how, and under what conditions, institutions might be able to steer decision processes towards environmentally sustainable outcomes, it is necessary to focus on the actor level, and to dig into the process by which institutions are reinterpreted by actors and materialized into actions and non-actions, and how (Bachrach & Baratz, 1963). This endeavor notably allows understanding why the intentions to protect the environment that can be found in many policy documents often stay on the paper: actors may resist or circumvent the various rules and behavioral norms that emanate from environmental rules and laws, which results in the phenomenon of the implementation deficit (Hupe, 2011; Owens & Bressers, 2013). Moreover, actors are not only capable of emancipating themselves from existing rules and norms, but can also produce innovation by engaging in a process of new rules creation (Laesslé, *in press*; Schweizer, Dupuis, & de Buren, 2013). In a nutshell, there is hence a complex dyadic relationship between actors' actions and institutions. Actors certainly tend to follow the rules of appropriate or exemplary behavior that are organized into institutions, which is referred to in the literature as the *logic of appropriateness* (see: March & Olsen, 1998; Olsen, 2007). However, actor actions are also driven by *the logic of consequentiality*: rules are

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<sup>2</sup>Bourdieu used the concept of "field" rather than of "institution" during his career, although these concepts have meanings that share many similarities.

variously interpreted, and institutional alternatives are sought as ways of perpetuating the self-interest of the actor.

In seeking answers about how institutions could steer environmental management processes towards more sustainable outcomes, a functionalist conception has prevailed in the rational choice literature. Institutions are usually defined according to their regulatory function. Schlager and Ostrom (1992) for instance distinguish between the rules that regulate the rights to access, to manage, to exclude from, or to alienate a specific resource. This functionalist understanding underpins a reflection on the good design of institutions. It is argued, for example, that one of the fundamental conditions for good management of ecosystems is the congruence between the rules specifying the amount of natural resources units that can be withdrawn by users and the local ecological conditions (Anderies, Janssen, & Ostrom, 2004; Cox, Arnold, & Tomás, 2010). These are illuminating insights that however neglect the socio-legal nature of institutions. Rational choice approaches do not distinguish the role of formal laws and public policies from the local and informal rules in ecosystems management, and the importance of the latter is often stressed over the former. Arguably, this picture does not fit the context of modern democracies, in which environmental management processes are dominantly based on the rule of law, which implies a hierarchy between formal and informal norms that we will discuss further below. Moreover, the functionalist understanding of institutions fails to account for the effects of the fundamental trend that has affected environmental management in the last decades: the pressure to privatize the management of common or public natural resources (see: Gerber, Nahrath, Reynard, & Thomi, 2008). In the next sections, we discuss how a socio-legal understanding of institutions can contribute to better problematize these issues.

## 2.2 A Socio-legal Reading of Institutions

Max Weber considered that the foundation of the efficacy of an institution is based on its capacity for producing formalized rules that generate predictable and calculable behavior among actors (Weber, 1978a). In this perspective, the power of institutions depends first on the degree of formalization of the rules they provide and on their legal status. Institutional rules can be *de facto*, meaning that they are the product of informal and sometimes non-written practices inherited from the past, or mutual consent of the actors concerned. By contrast *de jure* rules are the formally recognized product of the legal system (Schlager & Ostrom, 1992). Formalization also relates to the level of *generality* of the rule. Rules can have an extremely large scope and wide applicability or affect only a few individuals. Highly general rules tend to be abstract, whereas individual rules have more concrete provisions. In strict

legal terms, there is a clear *hierarchy of the norms* in most European democracies (Haarscher, 2005), whereby highly formalized rules provide secure and durable rights to actors that overrule the provision of less formalized or less general norms. In a sociological perspective, highly general and formalized rules are the most powerful mechanism of domination in complex societies. That is because, they tend to similarly inform “the behavior of all social actors, beyond any differences in status and lifestyle” (Bourdieu, 1986, p. 846).

Another trait of the socio-legal nature of institutions that is important to understand ecological management in modern democracies pertains to the distinction between public and private rules. Again, in a legal perspective, public rules originate from public law, and are the set of norms that regulate the vertical relations between the State and private parties, whereas private rules are the product of private law, which apply to horizontal dealings among private actors (Rosenfeld, 2013). For instance, public policies and environmental regulations fall within the category of public laws, whereas private property rights, or a contract between the owners of a water spring and a mineral water company would be based on the private law, which is codified by the civil code in the case of Roman-Germanic legal systems. Because the possibility of mutually adjusting private interests through private rules depends on the stability of public institutions, in most democracies, “the *res publica* must stand tall” (Supiot, 2013, p. 130) that is, public rules supersede private rules. There is also a functional reasoning behind the institutional primacy of public rules over private rules: in theory, private rules have the teleological function of regulating conflict between individuals, whereas public rules have the higher moral attribute of being driven by the general welfare.

The double distinction between the degree of generality and the public/private nature of rules can serve to draw a typology of formal institutions (Table 2.1), which help to comprehend the hierarchy between norms. In turn, the understanding of institutions as socio-legal constructs that are related by hierarchical relations allows us to fully grasp the claim of the governance literature claims that, since the 1980s, the State has been hollowing out the steering of social issues (Rhodes, 1997, 2007).

**Table 2.1** A socio-legal typology of formal institutions

Degree of generality	Public	Private
High	Public law	Private law
	Public policy	Civil code
Medium	Regional political program	Contracts
Low	Administrative decision	Private arrangement
	Implementation act	Mutually agreed upon norm

### 2.3 The Theoretical Puzzle: The Management of Contaminated Sites in the Era of Governance

With respect to environmental issues, the era of governance can be interpreted as a move away from the use of highly formalized public rules, towards informal and private regulations such as market-based instruments, contracts or voluntary agreements, a trend which is particularly visible in novel regulation domains such as climate change (Baranzini & Thalmann, 2004; Jordan, Wurzel, & Zito, 2003).

The ontological differences between rules of different socio-legal nature contribute to explain why some analysts consider this evolution, and more generally, a trend towards privatization of natural resources governance as “a tragedy of enclosure” (Monbiot, 1994; Saurin, 1993). Indeed, and by definition, natural resources that are uniquely regulated by private rules – i.e., private property regime or common property of a restricted group of individuals – are managed, before everything, in the sole interest of their owners. The symbolic violence that results from the appropriation of parts of the environment by well-defined groups of actors through private rules does however not necessarily lead to less well managed ecosystems; and this paradox is one of the principal lessons taught by rational choice institutionalism (Acheson, 2006; Ostrom, 2005, pp. 236–240).

Fortunately, this trend towards privatization of natural resources governance is probably overstated. Private and informal rules do not simply substitute the provisions of existing formal public rules, but add, or are juxtaposed in new layers of regulations. This is due to the democratic principle of the hierarchy of norms, which implies that private and informal regulations exist only *in the shadow of the hierarchy* of higher level norms (Scharpf, 1997, pp. 195–217).

Moreover, an increasing use of informal and private arrangements in ecosystem management for instance does not necessarily imply absence of the State. Rather, the juxtaposition of public and private regulations goes hand in hand with a *hybridization of the public authority* (Conca, 2005): public authorities are increasingly involved in the regulation of public problems through private means. This occurs, for instance when the State acts as a private entity, in order to negotiate pollution reduction agreement with a company through the conclusion of bilateral contracts. In this respect, one can argue that the governance era does not represent the end of governmental intervention in environmental management, but rather an opening of renewed public – private interactions.

Still, the increasing use of private or hybrid arrangements and rules of less generality in ecosystem management raises several questions regarding the capacity to manage environmental issues such as contaminated sites. From a socio-legal perspective, the era of governance implies the loss of the State’s capacity to reach calculable environmental objectives by way of public rules of high generality to the profit of negotiated and case-by-case solutions through private arrangements that have, for better or worse, less predictable outcomes on the environment. Does the flexibility associated to private and informal regulations lead to better environmental outcomes in the context of contaminated sites management? Or on the contrary, does a retreat from the practice of governing through highly formalized public rules relate to

sub-optimal outcomes? Furthermore, one might also ask whether the complex convolution of rules with different socio-legal attributes create new coordination conflicts that impede effective environmental management. In order to answer these research questions, an original conceptual framework is presented below.

## 2.4 A Conceptual Framework for Analyzing the Politics of Contaminated Sites

Taking stock of the limitations formulated in the above, namely, conceptual polysemy, institutional determinism, and finally the lack of a socio-legal comprehension of institutions, we propose an analytical concept that is based both on the research framework on public (environmental) policy and implementation processes by Knoepfel et al. (2011) and the approach to institutional analysis called *the institutional regime* (Gerber, Knoepfel, Nahrath, & Varone, 2009; Knoepfel, Nahrath, & Varone, 2007). This analytical concept organized in Fig. 2.1 involves three levels of analysis: institutional regime (1) environmental management process (2) and environmental outcomes (3).

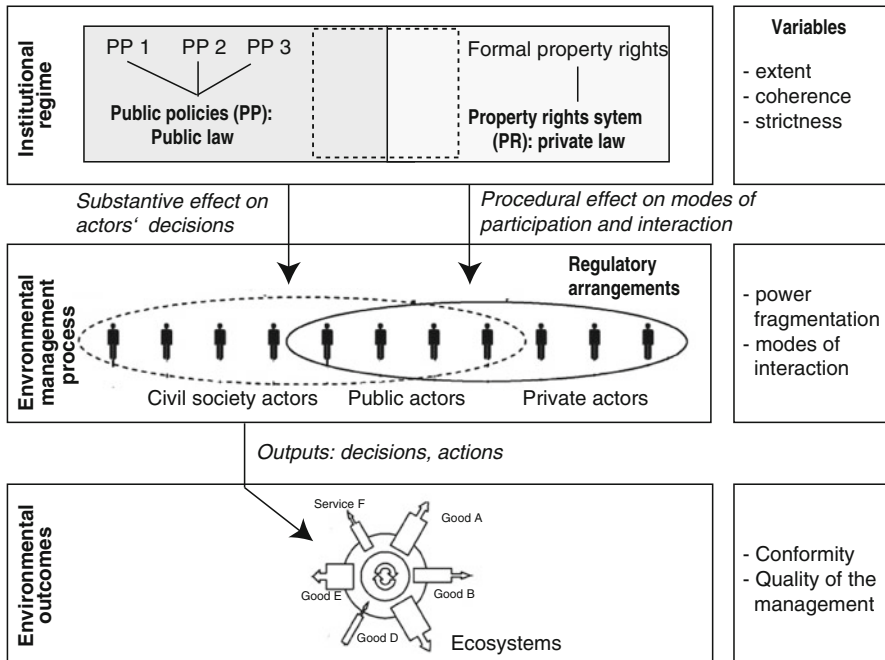


Fig. 2.1 Theoretical framework: the politics of contaminated sites (“PP” means public policy. Modified from Dupuis and Knoepfel (2013) and Gerber et al. (2009))



The epistemology behind this conceptual framework resembles the actor-centered institutionalism of Renate Mayntz and Fritz Scharpf (Mayntz & Scharpf, 1995; Scharpf, 1997). We bring politics and power games back into focus, by recasting institutions in the games real actors play in environmental management.

Our conceptual framework is also grounded in implementation research, which is mainly concerned with the study of how formal policy objectives are translated into concrete actions by field actors (Barrett, 2004; Barrett & Fudge, 1981; Hjern & Hull, 1982). We hence conceive of environmental management as a decision process about how ecosystems and natural resources should be used and conserved, and in which procedural rules, and environmental regulations are implemented with more or less success. The ambition of our framework is thus to unravel the process by which these formal institutions are materialized into actions that produce environmental outcomes by the actors engaged in the environmental management process.<sup>3</sup>

Our framework accounts for the hierarchy of norms of modern democracies, and the phenomena of norms juxtaposition and public authority hybridization by detangling two levels of institutional rules according to their socio-legal nature. First, we refer to the general and highly formalized public and private rules that structure the environmental management process as “institutional regime” (Gerber et al., 2009). Second, we use the concept of “regulatory arrangements” (Schweizer et al., 2013) to designate the ad-hoc and more or less formalized rules that public or private actors may adopt in the course of the environmental management process aside institutional regimes. We hope that by applying these theoretical lenses to the management of contaminated sites, we might learn something about the conditions under which formal policies and self-regulation can combine and produce successful outcomes. Below, we turn to a description of the concepts, indicators and hypotheses that we use to apprehend the three levels of analysis our framework describe and their relationships.

### ***2.4.1 The Institutional Regime of Contaminated Sites***

The effects of formal institutions on the management process are conceptualized using *the institutional regime framework*. This framework originates from a section of the literature on public policy analysis which incorporates findings of rational choice institutionalism, in order to comprehend the complex relationship between institutions and the sustainability of natural resources management (Gerber et al., 2009; Knoepfel et al., 2007). This approach is relatively close to Elinor Ostrom’s Institutional Analysis and Development Framework (IAD) (Ostrom, 2007b), but has developed a far more comprehensive understanding of the role of public policies and formal institutions in the governance of natural resources. The institutional

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<sup>3</sup>We must underline that we do not focus on the process by which actors strive to modify formal policies and rules which is generally the focus of policy process approaches (Sabatier, 2007).

regime framework also widens traditional policy analysis by including formal private rules such as property rights for analyzing the management processes that relate to natural resources, and by incorporating a “regime approach” that is better able to deal with boundary spanning issues such as environmental contamination (Jochim & May, 2010; May, Sapotichne, & Workman, 2006).

“Institutional regime” designates all the formal regulations (public and private) that pertain to the management of a specific natural resource. In the context of this study, the natural resource under enquiry is the *site*, which we define as:

The entire complex of natural resources, that is the air, soil, water and biomass and their interactions, within a precisely defined and delimited area.

By extension, the institutional regime of contaminated sites designates:

The set of formal public and private law rules that allocate various forms of rights and obligations to the actors involved in the management of the contaminated site.

The institutional regime hence determines the legal conditions, under which actors may use a certain site, in particular as a receptacle for pollution or waste. The rules produced by the institutional regime have two principal effects on the management process. On the one hand, substantive rules (or regulations) influence the behavior of actors by constraining or enabling certain decisions and actions. On the other hand, procedural rules partially define the constellation of actors who can participate in the management process, and make precise the nature of the relations that must be established between public and private actors (Knoepfel et al., 2011, pp. 95–117). The strength of these two effects, and by extension, the capacity of an institutional regime to steer the management process towards defined outcomes, depends on two characteristics, which have been identified by previous researches. These are the *extent*, and the *coherence* of an institutional regime (Knoepfel et al., 2007). For this study a third criterion is proposed, the effect of which we would like to test further: *strictness*.

#### 2.4.1.1 Extent

“Extent” is a criterion that enables evaluation of whether or not a regime assumes the regulatory function of limiting the uses of the environment that can cause damages. Table 2.2 lists seven uses of the environment that highly contribute to sites contamination. The extent concerns the presence of a formal regulatory act with regards to these uses (for a similar approach see: Knill, Schulze, & Tosun, 2012; Koski, 2007).

**Table 2.2** Uses of the environment that adversely impact sites

Production of waste
Discharge of wastewater into surface and ground waters
Discharge of wastewater in the soil
Storage/disposal of solid waste into the soil
Emission of atmospheric pollutants
Harm to the biodiversity
Activities generating the risk of future impacts

The idea behind using the extent as indicator is based on the finding of the rational choice institutionalism that rules must exist that hinder the overuse of the capacity of ecosystems to naturally buffer pollutants and externalities in diverse forms (Ostrom, 1990, p. 90). In the absence of such rules, a site would be in the same situation Garrett Hardin depicted in *the tragedy of the commons* (1968) and that is, the lack of institutional counter-incentives to contamination or resource depletion. If the necessity of rules fulfilling this restricting function is highly agreed upon in the literature, a more open question relates to whether this task should be assumed by the institutional regime and its highly formalized rules or by case-specific regulatory arrangements between actors. For instance, some scholars have criticized the regulatory approaches that formalize highly abstract and general ecological thresholds in national level rules, which do not always fit the attributes of local ecosystems (Holling & Meffe, 1996).

In order to measure the extent of the institutional regime, we will use, in the empirical part of this book, a *rating* system based on Table 2.2. The presence of each type of regulatory function earns the regime one point; hence a regime with the maximum extent would be awarded seven points and non-existent regime would get zero points.

#### 2.4.1.2 Coherence

In this research framework, the term coherence refers to balancing of the objectives adopted in relation to the protection of sites and the different instruments provided by formal regulations to attain them. What is involved here is the evaluation of the extent to which the goals and means of formal regulations are congruent. Coherence is a qualitative criterion, which is frequently used in public policy analysis (Goggin, 1986; Matland, 1995; Mazmanian & Sabatier, 1989). It is based on the idea that the internal contradiction between objectives and instruments often explain deficits in policy implementation. Coherence also refers to the degree of coordination between the multitude of formal, public and private rules that constitute a regime. Obviously, a coherent regime is particularly desirable so that coordination conflicts between rules with contradictory objectives or effects are well managed. Rational choice approaches emphasize this point as well by asserting that rules allocating the right

to withdraw resource units should be coherent with the rules imposing limits based on some ecological threshold (Cox et al., 2010). This is also referred to as *integration* in the policy literature (Lafferty & Hovden, 2003). The coherence of the institutional regime is important, not only because statutory incoherence produces self-contradictory messages, which must be reorganized, reinterpreted and translated by actors into actions that make sense and that perform the desired tasks, but also because they incite actors to ignore these rule of indeterminate meaning.

The coherence of an institutional regime may only be measured on a qualitative basis through analytical research by analyzing the validity of the causal chain relating goals and means, and through comparison of the provisions of potentially conflicting rules. We propose to measure this characteristic simply using a nominal scale: “weak”, “average” and “strong” (1 to 3 scale).

### 2.4.1.3 Strictness/Flexibility

Strictness is a measure of the coercive force represented by the institutional regime. A strict regime has a considerable number of obligations that impose defined and detailed behavioral norms on the firms responsible for the contamination. For instance, the obligation to limit pollution according to defined emission standards, or to remediate a site once a specific threshold has been exceeded (see Fig. 2.2). The

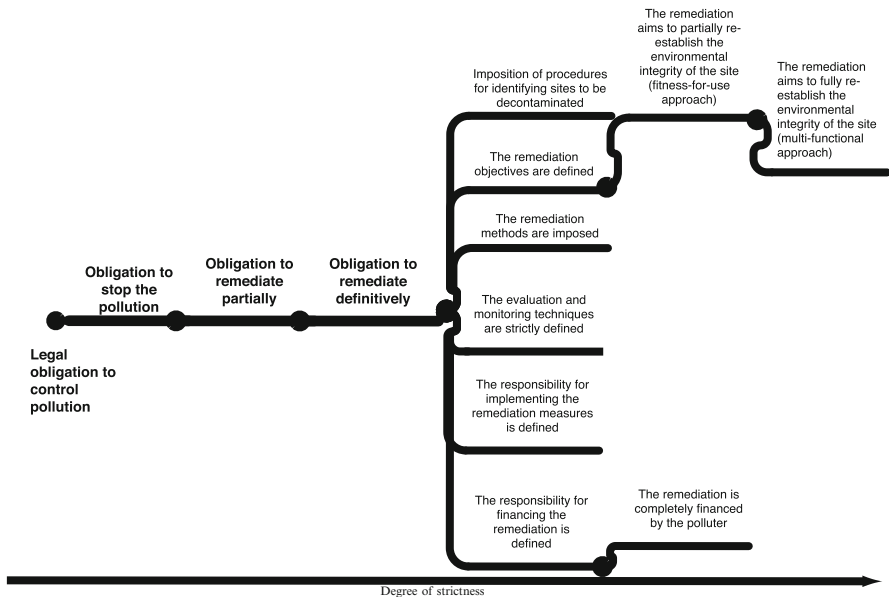


Fig. 2.2 Degree of strictness of a regime for the protection of contaminated sites (Modified from Dupuis and Knoepfel (2013))

strict regime leaves little scope for maneuver to the actors of the management process. Under a strict regime, the management process has the advantage of being more predictable and comparable throughout a territory in accordance with a straightforward top-down conception of policymaking. However, the clear disadvantage of rules stringency is that the associated obligations may not always suit the specific site features and preferences of the stakeholders, who may therefore resist them (Knoepfel et al., 2011, pp. 174–177). Some scholars also argue that strict and rigid top-down rules are myopic by nature and that their unexpected consequences are worse than the environmental issues they attempt to solve (Holling & Meffe, 1996).

Strict institutional regimes have become increasingly contested in the era of governance. The legitimacy of strict regimes relies uppermost on their democratic character, that is, the behavioral norms and obligations they impose are enacted by public actors who are democratically elected and accountable (*input legitimacy*). However, strict regimes can be criticized for having no *throughput legitimacy*, i.e. the quality of deliberation and participation in strict regimes is low because formal rules impose rigid and non-negotiable codes of conduct to stakeholders. Finally, in a globalized context where the authority and the steering capacity of the State is said to have weakened (Meadowcroft, 2007), the *output legitimacy* of strict regimes, that is the efficiency and effectiveness of their implementation, is also questionable (see: Papadopoulos & Warin, 2007).

The flexible regime, in contrast, voluntarily contains few obligations. It provides regulatory frameworks that leave considerable scope for maneuver to the actors responsible for implementing the measures in question. Hence, the flexible regime allows for case-by-case application on a participative basis. This freedom translates into highly diverse processes and results from region to region. The advantage of this is that it guarantees a form of respect of local realities and stakeholder preferences. Furthermore, the deliberative aspect of decision making and the inclusion of private stakeholders contribute to avoidance of the throughput and output legitimacy gap, which supposedly affect strict regulations (Bäckstrand et al., 2010). Recently in academic discussions about how to manage environmental change such as climate change, many scholars have urged that flexibility is a necessary condition for success (Folke, Hahn, Olsson, & Norberg, 2005; Lebel et al., 2006) as it allows formulating adaptive clauses that fit the local ecological situation (Craig, 2010; Ruhl, 2010).

Based on a review of the scientific literature on the protection of contaminated sites (Bone et al., 2011; Christie & Teeuw, 1998; Ferguson, 1999; Hodson, 2010; Reijnders, 2009; Rodrigues, Pereira, da Silva, Hursthouse, & Duarte, 2009; Veenman, 2006; Vegter & Kasamas, 2011), we developed Fig. 2.2 which details the criteria that can be used for assessing the strictness of an institutional regime. We propose that the strictness of a regime be measured on the basis of the number of obligations it imposes on the polluter. For instance, a very stringent regime would not only force private firms to control pollution levels, but imposes a multi-functional approach to remediation, and full coverage of all the contamination costs in accordance with the polluter must pay principle. The regime is evaluated based on the below-presented tree diagram. We opted for a “hierarchical” classification, as the presence of certain obligations is conditional on that of others. Each time a criterion

is fulfilled by the analyzed regime, a “step” is taken to the right. Each step is allocated one point. As a result, a score of zero indicates that a regime is completely flexible, and a score of 13 suggests that the regime is as strict as it could be.

#### **2.4.1.4 Research Hypotheses on the Effect of the Institutional Regime on Environmental Management Outcomes**

Only a few studies have attempted to empirically test the effect of institutions attributes such as extent, coherence and strictness on environmental outcomes (for a recent review see: Fiorino, 2011). According to the literature on institutional regimes which has produced a substantial amount of empirical studies (Gerber, 2006; Knoepfel, Kissling-Naef, & Varone, 2001; Knoepfel, Kissling-Näf, & Varone, 2003; Nahrath, 2003; Reynard, 2000), the strength of institutional regimes is often related to positive environmental outcomes. We hence propose to test the validity of this assumption in the context of contaminated sites management and formulate the following research hypothesis:

H<sub>1</sub>: The coherence, extent and strictness of the institutional regime in force (strong regime) correlate positively with the environmental outcomes of contaminated sites management.

If this assumption appears to be overly blunt, we actually do believe that the effect of institutional regimes shall not be conceived as deterministic: environmental outcomes are not mechanically related to institutional effects. An institutional regime certainly provides a structure of organized incentives that influences the choices actors make in relation to environmental management, but these decision processes are inherently contingent and largely unpredictable. Therefore, theoretical predictions based on institutions’ attributes should only be considered as a counterfactual against which the empirical reality can be gauged (Scharpf, 2000). Bearing this in mind, we describe below how institutional regime rules intervene in the mechanism of producing decisions and actions in relation to contaminated sites management.

#### **2.4.2 *The Decision-Making Process in Contaminated Sites Management: Actor Games, Resources, Rules, and Modes of Participation and Interaction***

We conceive the management of contaminated sites as a highly complex process, framed by institutional regime effects, in which constellations of strategic actors have heterogeneous preferences and values; these actors, variably endowed with

resources, participate and interact according to different modes, in an attempt to produce decisions and actions (the outputs) that are congruent with their self-interest (Knoepfel et al., 2011, pp. 117–119).

There is a multitude of factors that can intervene in the mechanism that controls decision process outcomes. In order to reduce this complexity, we focus on four factors described below: actor games, resources, institutional rules, and mode of participation and interaction.

#### **2.4.2.1 Actor Games: The Confrontation of Values and Interests**

The decision process in contaminated sites management can be conceptualized, in a very simplistic way, as a three-player game (the iron triangle) that is governed by public authorities, firms responsible for pollution and civil society representatives. If one assumes the view that actors are bounded rational beings driven by self-interest (Ostrom, 2007b, pp. 30–32), then firms and civil society representatives are likely to clash over the management of the contaminated sites. Firms are cost-minimizers that will seek to reduce the cost of remediation. For instance, in the context of the USA, Ciba, the former chemical multinational, has transparently exposed its strategy of dealing with contamination victims and environmental agencies as external customers that need to be satisfied cost-effectively (Wise, 1995). By opposition, the organizations defending civil society are likely to campaign for remediation that fully eliminates environmental risks and the residual pollution, no matter the costs. The behavior of civil society representatives ought not be considered as a purely value-driven demonstration of environmental activism, but also responds to the functional necessity of demonstrating the visibility and the social utility of these organizations in perpetual need of financial and public support (Salamon, 1994). In-between these two contrasting interests, the role of public authorities as stakeholders in the negotiation is rather difficult to anticipate. As an entity bound by the rule of law, the margin of maneuver of the public authority is supposedly limited. The public authority should act as the agent responsible for concretization and follow up of the provisions of the institutional regime. However, implementation research demonstrates that, in reality, public actors often deviate from this textbook picture (Hupe, 2011). We will come back to this issue below, in the section about the modes of participation and interaction.

#### **2.4.2.2 The Power of Resources**

In decision-making, the power to act and influence can be understood as endowment in resources of action that can be engaged to weigh on the outcomes of the decision process. Our understanding of the role of resources in decision games is highly similar to Pierre Bourdieu's notion of "capital":

We can picture each player as having in front of her a pile of tokens of different colors, each color corresponding to a given species of capital she holds, so that her *relative force in the*

*game*, her *position* in the space of play, and also her *strategic orientation towards the game* [...] the moves that she makes, more or less risky or cautious, subversive or conservative, depends both on the total number of tokens and on the composition of the piles of token she retains, that is, on the volume and structure of her capital. (Bourdieu & Wacquant, 1992, p. 99)

Knoepfel et al. (2011, pp. 67–95) identify ten principal tokens as resources in decision games: money, personnel, law, information, organization, consensus, time, infrastructure, political support and force. The balance of force in the negotiations depends on the distribution of these resources among decision actors. Of course, resources are generally not equally shared. Notwithstanding the obvious case of money, there is, in contaminated sites management, a structural power inequality in favor of firms that results from information asymmetry. This information asymmetry is the consequence of the fact that the polluting firms are often the sole parties who dispose of knowledge about the types of pollutants that were introduced in the soil and the techniques that should be used to remove them. This structural bias in information can be offset, if civil society or public authorities dispose of sufficient other tokens, for instance, money and organization, for engaging scientific experts to produce counter-analysis of the state of the pollution and of the best remediation methods.

### 2.4.2.3 Rules Compliance and Rules Alteration

The various laws and formal rules of the institutional regime can be thought of as a meta-resource (Bourdieu, 1993) that structures these power games. The substantive rules of the regime, by restricting or enabling certain decisions or actions, influence the other resources actors can enlist in driving the decision process towards their interest.

Moreover, formal laws and policies also produce procedural rules that partially define who can participate in decision-making, and codify the nature of relations that must be established between public actors, and private and civil society actors. These norms of participation and interaction are absolutely fundamental, because they determine the players of the decision game, and how the public authority will use the resources of force and law, in order to lead the decision process towards outcomes that are congruent with the institutional regime specifications. However, rules are just rules, and just as in the game metaphor, actors with enough resources can cheat, by circumventing, ignoring or trespassing on the rules.

Formal rules are not static entities that are impermeable to changes. The institutional regime evolves; regulations and procedural rules are modified by policymakers. Moreover, the joint-decisions that result from actors' negotiations are not durable in time. A change in the balance of power, or the participation of a new actor in decision-making can result in new decisions that contradict and overrule the previous ones. In order to stabilize the outputs of the decision process, and to ensure the consistency of future decisions, actors who are willing to maintain the status quo can resort to enacting institutions and rules (that we call regulatory arrangements), for creating a path-dependence that will bind future actions. Regulatory arrangements



are case-specific rules that can perform the same functions as the institutional regime. Regulatory arrangements can take the form of public rules of low generality such as implementation acts or administrative decisions, or can relate to the private law, for instance, in the case of contracts. Regulatory arrangements do not even need to be in written forms; oral agreement or habits can be the source of long lasting behavior and actions.

The emergence of regulatory arrangement can be encouraged by the procedural rules of the institutional regime. For instance, the subsidiarity principle, which is at the core of the institutional organization of some federal States, implies that, whenever possible, decentralized and private dealings should be preferred to public and centralized intervention in social problems (Gerber et al., 2008; Linder, 1994, pp. 54–56). Theoretically, if the principle of the hierarchy of norms were always respected, regulatory arrangement would be purely compliant and complementary to the institutional regime. However, in reality, these two institutional layers can conflict, as we will discover in the empirical part of this book.

#### **2.4.2.4 Actors' Mode of Participation and Interaction in Decision-Making: The Traditional, the Market, the Corporatist, and the Network Models**

The mode of participation and interaction in decision-making refers to the number and the types of actors (public, private, civil) that have a concrete right of voice in the decision arena, and the kind of mutual relations they establish. The modes of participation and interaction in decision-making are not only vital to understand the outcomes of environmental management processes, as some scholars argue (Carlsson & Sandström, 2007; Huitema et al., 2009; Sandström & Carlsson, 2008), but they are at the center of the debates raised by the Rio process about the needed democratization of natural resources governance, which is often plagued by the lack of transparency to the public, and weak accountability of decision-makers acting behind closed doors. The modes of participation and interaction are akin to the “modes of governance” that some scholars like to refer to (Treib et al., 2007), but we prefer not to use this expression, in order to avoid the conceptual confusion that we have already discussed in the above.

The mode of participation and interaction that prevails in a decision process depends on a variety of rules. As we mentioned earlier, the procedural rules of the institutional regime contributes, for instance, by giving to environmental organizations the right to appeal or to contest decisions that have an impact on nature. Modes of participation and interaction also depend on more informal norms such as the administrative culture, and habits of how private and civil actors are dealt with. Finally, rules about who is legitimate to intervene and with what attributes can also be defined during the decision-making process through the adoption of regulatory arrangements. In our view, modes of participation and interaction are rarely givens. We like to think of mode of participation and interaction as resulting from politics and power relations, as actors will strive to be in the nodal point of the decision

network, excluding actors with conflicting interests. Ultimately, public actors endowed with the authority of the law have the responsibility of delineating the structure of these interactions. Mode of participation and interaction can hence be understood as an iterative management choice of prime importance that public actors make on how to interact with private and civil actors (Klijn & Koppenjan, 2000).

Within modern political sciences, two theoretical approaches have embraced the project of making predictions about the outcomes of decision processes based on the structure and the types of relation between decision actors, namely *the network* and the *governance* approaches (see: Bevir & Richards, 2009; Fawcett & Daugbjerg, 2012; Provan & Kenis, 2008). Two dimensions of the network of relations between actors can serve to build a typology of modes of participation and interaction. The first is the degree of fragmentation/concentration of power. In general, the greater the number of actors that are given access to the decision-making arena, the more fragmented the power, and vice versa. The second concerns the nature of interactions between public, and private or civil actors. The relationships between actors may essentially be vertical and hierarchical in type or horizontal and cooperative (Adam & Kriesi, 2007). Based on these two criteria, the following typology of four models of participation and interaction may be proposed (Table 2.3):

- The *legal/traditional* mode, in which public authorities interact with private and civil actors through vertical and hierarchical relations, in accordance to the principal-agent model; (Howlett, 2009);
- The *market* mode, application of which has mainly been attempted based on the *new public management* ideal, through the extensive delegation of tasks to private and civil organizations based on hierarchical relationships arising from competitive relations on the market (Peters & Pierre, 1998);
- The *liberal corporatist* mode is typical of consensual democracies like Switzerland and Belgium, in which “cosy” horizontal relationships (Knill & Lenschow, 1998), characterized by trust are instituted between the public and a few business actors (Katzenstein, 1985, pp. 105, 130; Lijphart, 1999, pp. 37–38; Siaroff, 1999).
- Finally, the *network* mode which is characterized by the active participation of companies and civil society members in open networks, which are coordinated by horizontal and deliberative relationships. The network mode corresponds to the ideal participation model of *environmental governance* that the Rio process and the Aarhus convention attempt to implement (Jänicke & Jörgens, 2007; Jordan et al., 2003; Kravchenko, 2007; Lemos & Agrawal, 2006).

**Table 2.3** Models of participation and interaction (Modified from Adam & Kriesi, 2007; Dupuis & Knoepfel, 2013)

<i>Fragmentation of power</i>	Modes of interaction between public and private sectors	
	Vertical and hierarchical	Horizontal and cooperative
<i>Weak</i>	Legal/traditional	Liberal corporatist
<i>Strong</i>	Market	Network

Of course, these ideal-types are somehow too broad and their use must be contextualized (see Sect. 3.2.2 for an application to Switzerland). Nevertheless, for public authorities, opting for one or another of these models of participation and interaction with private and civil society actors is a high stake that relates to the challenge of establishing patterns of interaction that are likely to favor the emergence of environmentally optimal decisions and actions. Much of the scientific literature emphasizes that public actors should favor decision process structures that enable *social learning*, the mechanisms through which actors with conflicting orientations and interests might learn from one another, in order to reach a mutual understanding that will favor the emergence of consensual decisions (Pahl-Wostl, 2009; Rijke et al., 2012). This requires the public actor to act as a facilitator who builds trust between other actors, which however is not necessarily possible with the kind of highly antagonistic constellations of actors that are likely to develop in contaminated sites management. Current approaches to the governance of environmental issues thus often fail to consider the role of conflict in decision actors' interactions. Conflictuality, and sometimes hostility are frequent attitudes between coalitions of actors with opposed "core-beliefs" (Sabatier & Weible, 2007) about the intrinsic value of the environment. It is hence not rare that the environmental decision process is caught in a struggle between pro-environment and pro-economy coalitions with clashing beliefs with regards to how to deal with pollution problems (Ingold, 2010). Mutual learning may often seem a mere wishful thinking in contexts where actors strive to obtain decision outcomes that are in their self-interest. *Bargaining* based on exchange of political resources, rather than cooperation based on trust, can be the main way of interacting for opposing coalitions seeking to reach well-defined goals and unwilling to learn from one another. Consequently, the actors' mode of participation and interaction in decision making is central to understand how conflict is managed in order to produce desirable environmental outcomes.

#### **2.4.2.5 Research Hypotheses on the Effect of the Modes of Participation and Interaction in Decision-Making**

Scholars have diverging expectations regarding the performance of models of participation and interaction in decision-making processes that relate to the environment.

According to Scruggs (1999), as a mode of relating between private and public actors, corporatism would yield better results than the legal/traditional modes of governance. In particularly technical areas like the remediation of contaminated sites, the State is in a situation of dependence towards the firms, which possess the know-how of remediation technologies. Hence, the establishment of direct forms of cooperation between companies and public authorities is inevitable. Furthermore, firms are generally more willing to cooperate in the context of corporatist relationships, which offers them the most freedom to act. Private companies are far more

inclined to respect the “rules of the game” if privileged and trusty relationships are established with the public authorities responsible for monitoring the application of the law. The liberal corporatist model is hence said to favor the emergence of jointly decided measures, the political acceptability of which increases the likelihood of successful implementation (Fiorino, 2011; Jänicke & Jörgens, 2007; Scruggs, 1999, 2001). Hence, one could postulate that:

H<sub>2</sub>: The establishment of a liberal corporatist mode of participation and interaction is most suited to ensuring the environmental outcomes of contaminated sites management.

However, views on the hypothesis of a positive correlation between establishment of corporatist relations and environmental outcomes are much disputed. According to other scholars, corporatist agreements are structurally incapable of guaranteeing environmental protection as a quest for economic growth, which is the main objective of companies, comes into conflict with ecological considerations. Furthermore, the prioritized cooperation between public authorities and companies implied by corporatism runs the risk of capture of the State by private interests. Decisions taken through corporatist arrangements might reflect the private interests of companies more than the public and general interest in the protection of the common natural environment (Crepaz, 1992, 1995). For these reasons, extension of the circle of actors actively involved in decision-making to include civil society representatives in the context of decentralized, and participative or deliberative networks is often deemed pivotal (Fiorini, 2006; Huitema et al., 2009; Pattberg, 2007; Reed, 2008). Through the greater inclusion of civil society representatives, the adoption of the network model is seen as enabling avoidance of the risk of public interest being captured by private interests. Therefore, the network model is often seen as one of the factors that contribute to environmental quality (Andersson & Ostrom, 2008; Newig & Fritsch, 2009). It follows that:

H<sub>3</sub>: The establishment of a network mode of participation and interaction is most suited to ensuring the environmental outcomes of contaminated sites management.

The superiority of the network model that has been fostered by international agreements such as the Rio declaration of 1992 and the Aarhus convention of 1998 (Kravchenko, 2007) is however not universally acknowledged.<sup>4</sup> The multiplication of the actors involved in the decision-making process could constitute an obstacle to efficient decision-making (Pressman & Wildavsky, 1984; Tsebelis, 1995). The inclusion of NGOs, whose positions are often very far removed from those of private

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<sup>4</sup>See also Sect. 3.2.2.3.

companies, automatically increases the transaction costs and the possibility of reaching a consensus. Moreover, the participation of NGOs may contribute, by comparison with the corporatist model, to increasing the conflictive nature of the relationships among actors, and polarizing the deliberations. Accordingly, the inclusion of NGOs may cancel out the potential benefits of corporatist arrangements based on trust between public authorities and a few private actors. It follows that:

H<sub>4</sub>: The establishment of a network mode of participation and interaction involves an increase in transaction costs as compared with that of a corporatist mode.

## 2.5 Measuring the Environmental Outcomes of Contaminated Sites Management

Now that we have proposed a conceptual framework and several hypotheses, we come to a definition of our dependent variable and the question of how to measure the environmental outcomes of contaminated sites management.

Many researches in the field of rational choice institutionalism fail to define what they consider as successful practices of environmental management, creating a *dependent variable problem* (Dupuis & Biesbroek 2013; Green-Pedersen, 2004). This is of course related to the complexity of ecosystem interactions, and the uncertainty that characterizes our current knowledge with regards to questions such as the real extent of the anthropogenic alteration of an ecosystem's vital functions. This also reveals the fact that the meaning of concepts such as environmental performance, or *sustainability* are much contested, and no agreement currently exists on how to measure them (Goodland, 1995; Siche, Agostinho, Ortega, & Romeiro, 2008). The difficulty in assessing environmental impacts also relates to the fact that any assessment or judgment on the state of the environment is necessarily normative. The extent to which nature should be protected and conserved is a sensitive issue that triggers conflict in society, which is furthermore appropriated by political parties. In this context, developing universally valid indicators to measure success in environmental management is a daunting task. This is particularly true in the case of contaminated sites management, which involves acts of pollution committed in the past. The moral liability of polluters with regards to past events partially depends on whether the polluter knew about the environmental consequences of his actions. This is however extremely challenging to determine, and the temptation to condemn these issues anachronistically, on the basis of the evaluation criteria that would be used to assess current practices in environmental management, is difficult to avoid.

Within the political sciences, implementation research and the evaluation sciences have been the most active disciplines in elaborating ways to measure

environmental outcomes (May & Winter, 1999; Mickwitz, 2003; Rauschmayer, Berghöfer, Omann, & Zikos, 2009). In these approaches, the inherent difficulty of measuring the outcomes (the final effects) of environmental regulations has been long recognized (Knill et al., 2012). As a way to deal with this issue, output indicators that measure quality aspects of the decisions and actions taken are frequently used. We fall within the scope of this approach and propose to focus on *the environmental performance of the outputs of contaminated sites management* as a proxy for successful environmental outcomes. Thereby we suggest a relative, rather than an absolute, conception of success. Performance is hence assessed relative to the structural conditions in which the outputs are produced; that is the institutional regime, as the legal frame of reference, and the historical state of knowledge about pollution risks and remediation techniques, as a yardstick for evaluating management practices. We hence propose two indicators in order to measure performance:

- *Compliance*: conformity of the outputs of the contaminated site management with the formal rules of the institutional regime (May & Winter, 1999; Mazmanian & Sabatier, 1989; Pressman & Wildavsky, 1984). What is involved here is examination of the legality of the actors' practices. This is measured by comparing legal provisions with the empirical actions of actors involved in contaminated sites management. The coding for this indicator is simply "yes" or "no".

*Diligence*: the attention devoted to the quality of the environmental management compared to the state-of-the-art. What is involved here is verification of the extent to which the practices of the actors correspond to the optimum in terms of the technologies and knowledge available at the time. This is measured by comparing possible technological alternatives with the empirical actions of actors involved in contaminated site management through historical analysis. We measure the quality of the environmental management using a nominal scale: "weak", "average" and "strong".

## 2.6 Summary of the Theoretical Approach

This chapter has described the analytical lenses we will use to research contaminated sites management. In a nutshell, we propose to depart from the mainstream rational choice approaches by formulating a conceptual framework (Fig. 2.1) that emphasizes and links the role of formal institutions to the decision-making process in which actors, lead by actors' values and interests, interact in structures that are more or less open and in which power is more or less equally shared. We have suggested that, within the complex mechanisms that produce decisions relatively to contaminated sites management, two factors might be pivotal to explain performance: the strength of certain regulation characteristics such as coherence, extent, and strictness as well as actors' mode of participation and interaction in decision-making. We will explore the relevance of this theoretical framework in the empirical

chapters of this book, after having presented the Swiss context and the methods used for this research.

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# Chapter 3

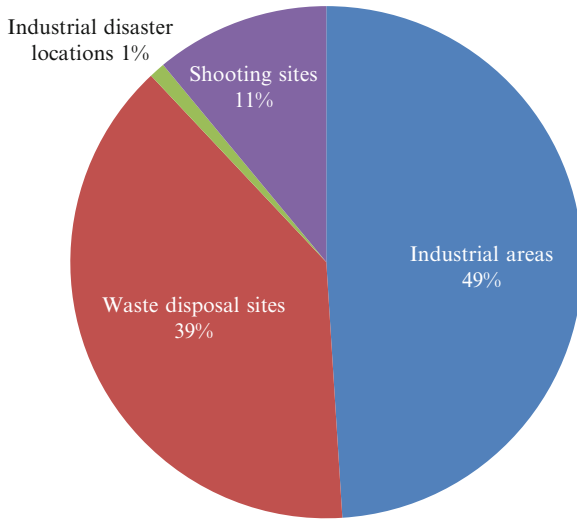
## Environmental Management and Contaminated Sites in Switzerland

**Abstract** This chapter describes the specificities of Switzerland with regards to contaminated sites management. Basing ourselves on European and national data sources, we sketch the extent of the problem of contamination in Switzerland and try to compare that with the wider picture of Europe. Emphasizing data scarcity and the knowledge gap on the true consequences of sites contamination for the people and ecosystems of Switzerland, we show nevertheless some evidence that the situation is less bad in Switzerland than in the average European country. We argue that this might be due to the historical structure of the industry of Switzerland, and also the performance of its institutional regimes for natural resources protection. Hence, we briefly present the main characteristics of environmental regulations in Switzerland, and the main institutional rules that codify the modes of participation and interaction of actors in environmental management. The chapter hence allows the reader to broadly understand environmental decision-making in modern Switzerland, and makes the point that in-depth longitudinal case studies are necessary to grasp the legacy of contaminated sites management in terms of present environmental outcomes.

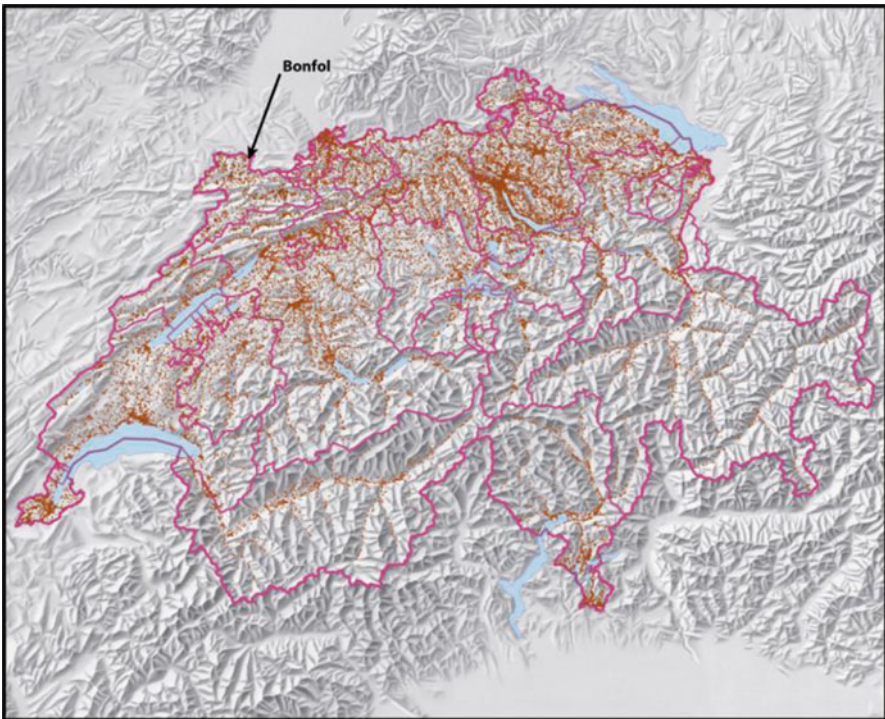
### 3.1 The Extent of the Problem of Contaminated Sites in Switzerland

Switzerland has engaged in the process of remediating its contaminated sites since 1998. In order to evaluate the extent of the problem at a national scale, four types of locations were inventoried: waste disposal sites, industrial areas, shooting sites, and places where industrial hazards occurred. The process led to the (re)discovery of as much as 38,000 sites that are potentially contaminated. 49 % of these sites are in industrial areas, 39 % correspond to waste disposal sites, 11 % to shooting sites, and 1 % to industrial disaster locations (see Fig. 3.1).

Figure 3.2 demonstrates the extent of the problem by showing a map of Switzerland, where the dots represent the position of potentially contaminated sites. Due to the alpine landscape of Switzerland, potentially contaminated sites concentrate mostly in the north of the country, where the low-lying topography allows for the concentration of population and economic activities.



**Fig. 3.1** Types of potentially contaminated sites in Switzerland (Data from FOEN (2013))



**Fig. 3.2** Location of potentially contaminated sites in Switzerland (Source: (FOEN, 2014a). The dots in this figure solely indicate the existence and position of a potentially contaminated site. However, the figure is slightly misleading, because the size of the dots is invariant and does not reflect the real dimensions of each contaminated site. The location of Bonfol was added by the authors)



Supplementary investigations then led to assessment of the gravity of the pollution in each site. At the time we write these lines (January 2014), 20 % of these investigations have been conducted, and one third of the sites (about 11,400) are considered as partially contaminated, of which 4,000 are in need of definitive remediation (FOEN, 2013).

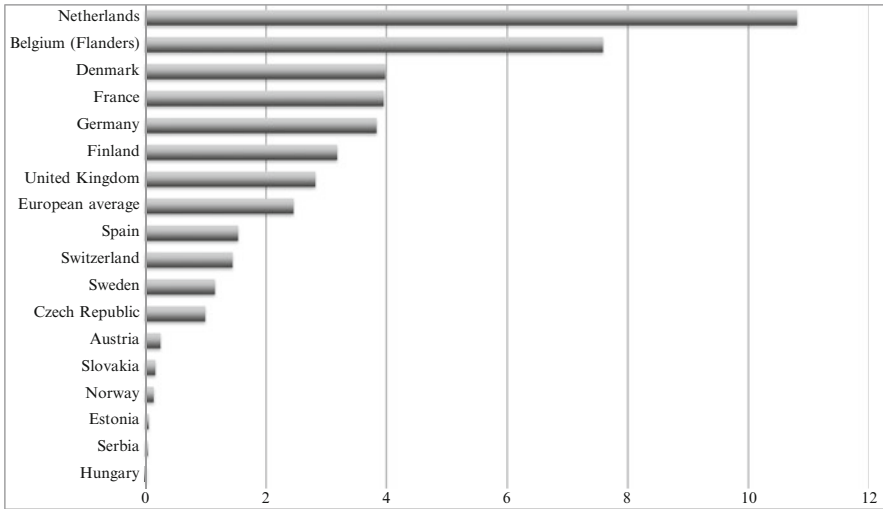
Behind these raw numbers, it is actually difficult to evaluate the true extent of the problem that contaminated sites pose to the health of humans and ecosystems in Switzerland. As in the case of most European countries, there is presently a lack of data and indicators that could track and evaluate the full range of adverse impacts that relate to contaminated sites. Furthermore, it is also uncertain whether all contaminated places in Switzerland were identified by the public authorities. The definition of contaminated sites that is used in Switzerland only includes the pollutions caused by waste in solid or liquid forms. Therefore, the agricultural and wine-making areas of Switzerland that are loaded with contaminants, notably persistent organic pollutants such as HCB, and heavy metals (FOEN, 2007) were not considered as potentially contaminated sites, and left out of the investigations.

It is also difficult to compare the acuity of the situation of Switzerland with regards to contaminated sites with that of other countries in Europe. That is mainly because the definition and the ecological thresholds used to determinate what is a contamination largely differ between countries, which renders cross-country comparisons difficult.<sup>1</sup> However, according to the data we presently dispose of, the amount of contaminated sites per capita would be lower in Switzerland (1.4 sites/1,000 inhabitant) than the European average (2.46/1,000 inhabitant). Among the countries with a similar level of GDP, only Sweden, Norway, and the neighboring country Austria perform better than Switzerland (see Fig. 3.3).

Two hypotheses can be advanced in order to explain the better-than-average record of Switzerland. On the one hand, the economic structure of Switzerland was oriented very early towards the tertiary sector, which produces high value-added goods and services without generating much pollution compared to the many European countries that based their growth on the secondary sector, and pollution-intensive industries such as metallurgy. On the other hand, environmental management in Switzerland may have been more successful than the average in reducing contamination risks due to the performance of its institutional regimes for natural resources protection (see Sect. 2.4). The latter assumption is notably supported by the fact that the cost of contaminated sites remediation in Switzerland is comparatively high, which indicates the strong ambitiousness of the environmental standards that are being applied in remediation (see Chap.1). The federal administration of Switzerland often demands the excavation of toxic materials from the ground, which is a very effective but costly way to definitively suppress pollutions sources.

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<sup>1</sup>For instance, the definition of polluted sites used in Switzerland differs from that of the European Environmental Agency. Furthermore, European countries are more or less advanced with respect to the process of identifying potentially contaminated sites. Therefore, the current figures on the number and location of contaminated sites might profoundly change in the future.



**Fig. 3.3** Identified potentially contaminated sites per 1,000 inhabitants in Switzerland and other European countries (Data from Panagos, Van Liedekerke, Yigini, and Montanarella (2013))

The total cost of contaminated sites remediation in Switzerland is thus estimated at 4.1 billion euros, and at 131 million euros annually (actual prices), for an annual cost per capita of 16.6 €, against an average of 10.7€ in Europe (Panagos et al., 2013). Figure 3.4 furthermore demonstrates that “cheap” remediation (<5,000 €) is virtually inexistent in Switzerland (0.20 %), while costly remediation that falls within the third (50,000–500,000 €), fourth (500,000–5 million €), and last sextile (>50 million €) of the cost distribution are overrepresented.<sup>2</sup>

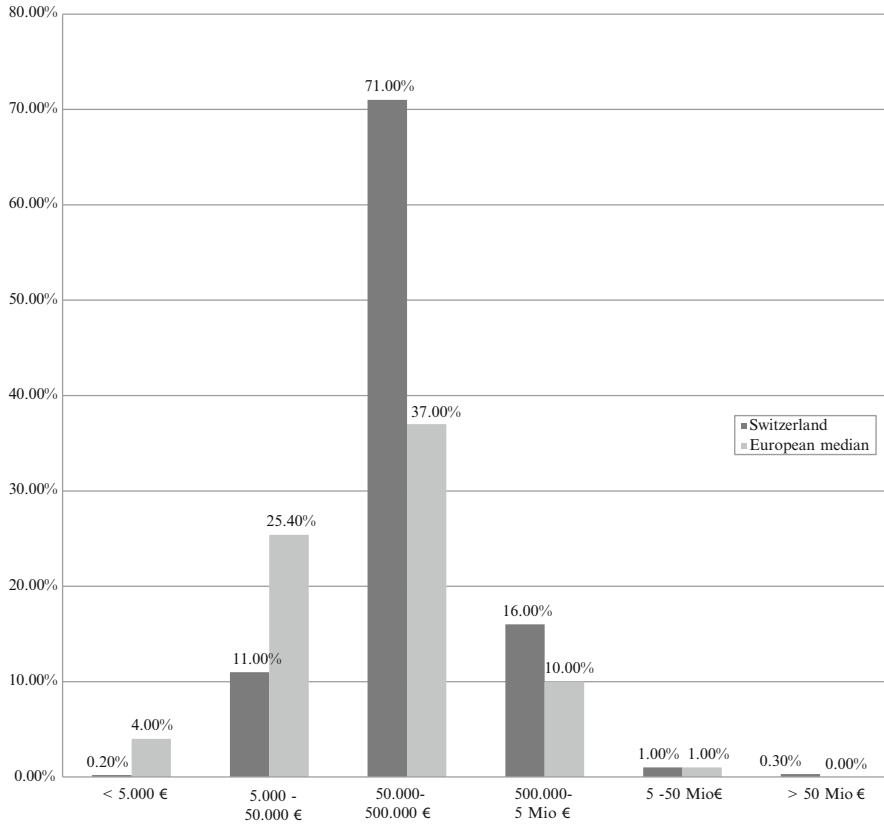
We explore further below this idea that the institutional regime of Switzerland could relate to the better-than-average performance in contaminated sites management.

### 3.2 Institutional Regimes and Environmental Management in Switzerland

In the second chapter of this book, we mentioned that institutional regimes are constituted of two main types of rules: substantive rules (regulations), and the procedural rules that make precise the modes of participation and interaction of decision actors in environmental management. Below we briefly describe some of the distinctive features of institutional regimes for natural resources protection in

<sup>2</sup> It should also be noted that 40 % of the total cost of contaminated sites management in Switzerland is financed by the public sector (European average=42 %), whereas the private sector supports 60 % of these costs.





**Fig. 3.4** Distribution of contaminated sites remediation in Switzerland and in Europe according to costs (Data from Panagos et al. (2013))

Switzerland, in order for the reader to better understand “the Swiss way” in environmental management.

### 3.2.1 General Features of Public Environmental Regulations<sup>3</sup>

The development pathway of environmental regulations in Switzerland has broadly followed the same pattern as in the rest of Europe. Before the 1980s, environmental regulations were attempting to make people accommodate or adapt to pollution sources, for instance, by means of techniques aiming at diluting the concentration of pollutants in contaminated waters, or through the building of high chimneys in

<sup>3</sup>Private law regulations will be exposed in the empirical chapters of this book (see Chaps. 5, 6, 7, and 8).

factories for evacuating far away the atmospheric pollutants that would otherwise create local contaminations (Knoepfel, 2007; Knoepfel, Nahrath, Varone, Savary, & en collaboration avec Johann Dupuis, 2010, pp. 161–168). The 1980s fortunately witnessed a paradigmatic shift in environmental regulations towards the objective of suppressing or at least reducing the sources of pollution, with the introduction of mitigation or abatement policies that required the ban of certain toxic substances, imposed pollution control or the use of cleaner technologies by industry (for instance the Montreal protocol on substances that depleted the ozone layer of 1987).<sup>4</sup> Concomitant with this shift, was also the attempt of anticipating and preventing pollution disasters rather than reacting to the occurrence of pollution issues, which is sometimes referred to as integrated risk management (DETEC, 2008).

In the early 1990s, the environmental policies of Switzerland were deemed as extremely successful, and Switzerland was considered as an environmental leader (OECD, 1998, pp. 20–21). By comparison with the rest of Europe, the strictness and extent and the coherence of environmental regulations in Switzerland was considered as extremely high. It was even frequent to view the potential adhesion of Switzerland to the European Economic Area (EEA) as something that would disadvantage Swiss industry, because of the concurrence with the European industries that could produce goods at lower cost due to the less stringent environmental regulations (Schwager, Knoepfel, & Weidner, 1988, pp. 66–69, 91–111). However, in relation to the governance paradigm, the situation started to change in the 1990s. Switzerland progressively left the role of environmental leader and adopted a more conservative attitude by simply following and adopting the environmental regulations of the European Union. Thus, Liefferink et al. have measured that in 2000, the scope and strictness of the environmental regulation of Switzerland that was comparatively strong in 1990, was yet in retreat compared to the new environmental pioneers such as Germany or the Netherlands (Liefferink, Arts, Kamstra, & Ooijevaar, 2009). The remaining question is whether the same trend has also affected the institutional regime of contaminated sites management and with what impacts on environmental performance. However, there is to our knowledge no studies that deal with this question and we will hence tackle this task in the empirical chapters of this book (see Chaps. 5, 6, 7, and 8).

### ***3.2.2 The Procedural Rules to Participation and Interaction in Environmental Management Processes***

The famous political scientist Arend Lijphart considered Switzerland as the prime example of an ideal type of democracy, which he would call: “the consensus democracy”, that is associated with better environmental records (Lijphart, 1999, pp. 33,

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<sup>4</sup>To this respect, the emergence of adaptation policies to deal with the issue of climate change can be considered as a regress compared to the development pathway taken by regulation in other environmental domains (Knoepfel, 2013).

295–296). In a nutshell, the consensus democracy is the institutional setting that is produced by the necessity to deal with fragmented and complex societies that are divided by multiple cleavages such as language, culture or religion (Kriesi, 1998, pp. 339–350; Lehmbuch, 1993). This particular type of democracy is characterized by institutional procedures that favor concertation and cooperation between the heterogeneous groups of actors that compose a fragmented society. More concretely, the procedural rules to decision-making in consensus democracies should imply highly inclusive and decentralized decision processes characterized by collaborative interactions between decision actors seeking to reach consensus rather than imposing decisions (Armingeon, 2002). With respect to the specific case of Switzerland, Lijphart added that the usual mode of participation and interaction in decision making was prototypical of the liberal corporatist model, in which the State collaborates closely with strong business associations in the steering of social issues, whereas trade unions and civil society representatives play a much weaker role (1999, pp. 37–38).<sup>5</sup>

Lijphart’s analysis, which is now called pejoratively “the old-institutionalism” (Selznick, 1996), should be tempered. The increased polarized and conflictual relationships that are observable in the decision processes of modern Switzerland contrast with the picture of the gentle and collaborative style of decision-making Lijphart was drawing 10 years ago (Vatter, 2008). More fundamentally, the procedural rules to decision-making vary extensively across time, and in-between the area of regulations (Radaelli, Dente, & Dossi, 2012). Therefore, the concepts of consensus democracy, or of liberal corporatism, are too broad and not circumscribed enough to understand modern environmental decision-making in Switzerland. Alternatively, we present below the main procedural rules that pertain to environmental decision-making, which have been identified as pivotal in the course of previous researches (see Knoepfel et al., 2010, pp. 177–221).

### 3.2.2.1 Intergovernmental Relations: Executive Federalism and Polycentrism

The relations between public authorities in the management of environmental issues are subsequent to the federal structure of the country. Switzerland is often described together with the USA and Canada as one of the world’s three classic federal States (Vatter, 2005). In principle, the decision-making process in Switzerland is extremely decentralized. A double principle of *subsidiarity* is hence applied. First, the subsidiarity to the private sector: “public intervention and public help should only occur in situations where private means would not suffice to achieve goals” (Linder, 1994,

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<sup>5</sup>The liberal corporatist model is said to be specific to decision-making processes in Belgium and Switzerland. Other corporatist countries such as Sweden or Austria are considered to be representatives of the *social corporatism model*, in which trade unions or other civil society organisms play a much stronger role in interactions with States and business representatives in decision-making (Lijphart, 1999, pp. 37–38).

p. 56). The subsidiarity of the public to the private management of collective issues notably explain the importance of self-regulation in the private sector (see also Sect. 3.2.2.2), and the longevity of inherited institutions such as the local users associations that manage certain common pool resources (Nahrath, Gerber, Knoepfel, & Bréthaut, 2012). The second dimension of the subsidiarity principle, on which we concentrate here, concerns the relationships between the central State and the federated States, namely the Swiss cantons. Article 3 of the first Constitution of 1848 assigns to the Swiss cantons the exercise of all rights that are not explicitly attributed to the central State. Therefore, in the early years of the Swiss Confederation, the competence of regulating environmental issues was mostly in the hand of the Cantons. However, during the twentieth century, and particularly in relation to environmental-related issues, the central State has progressively and constantly carved out the attributions of lower level governments, increasing the extent of its prerogatives by enacting numerous national environmental laws and policies that (in theory) must be respected and enforced by the Swiss cantons. Therefore, Swiss federalism is often described as an *executive federalism* (Kissling-Naef & Wälti, 2006) that is, a specific division of competencies, in which the Central state enacts the environmental laws, ordinances and policies of high generality that the Cantons clarify and implement, sometimes by formulating canton-specific regulations, in order to adapt highly general regulations to local realities.

However such a clear-cut division of roles and competences does not exist in reality. For instance, even if the Swiss cantons are formally constrained by national-level laws and policies, they also contribute to the design of the central State regulations. This occurs by three means. First, Switzerland has a strong bicameral system, and consultation procedures by which Cantons directly participate in the process of formulating and assenting national laws and policies. Second, the Cantonal initiative allows the federal States to submit written legislative proposals to the national parliament. Third, any legislative proposals that give the national State a power that was previously held by the Cantons is subject to the voting and acceptance of the latter. Furthermore, even if Cantonal authorities should be the principal public actor involved in policy implementation, it is not rare to also see the Confederation intervening more or less directly in the actor game that is environmental management.

Therefore, environmental management in Switzerland actually takes place in a complex web of intergovernmental relations characterized by mutual dependence (Vatter, 2005). To some extent, a parallel can be made between the model of Swiss executive federalism based on the subsidiarity principle, and the *polycentric governance system*, which Ostrom believed to be better apt to manage natural resources (2005, pp. 281–287). In the words of Ostrom, polycentricism is a system in which natural resources are managed by multiple governing authorities at different scales (from local organizations to the central government), that have considerable independence, but which are nested through common rules, and competencies. The advantage of polycentrism is, according to Ostrom, that it allows governing of natural resources based on local knowledge and local ecological conditions, while the control by the higher level governments would contribute to avoiding the problems of local tyrannies, and inequity in resources sharing (Ostrom, 2005, p. 283).

In the empirical part of this book, we will see however that polycentricity as such is far from being a sufficient condition to assure environmental performance, which also depends on the degree of involvement of the central State, and on the battle of will between actors with diverging power, values and interests.

### 3.2.2.2 Public-Private Relations I: The Cooperation Principle

The close collaboration of public and private actors in the steering of collective issues of Switzerland (liberal corporatism) is far from being new, and is deeply entrenched in the administrative culture that developed subsequently to the Nation-State building process in Switzerland. Since the early years of the Swiss Confederation (1848), at a time when the central State and its administration were still extremely weak, the public authorities were financially dependent of powerful peak business associations for implementing the nation-wide development policies of that period such as the railway network construction (Humair, Guex, Mach, & Eichenberger, 2012). At that time, the relationships between the public authorities and private actors were mostly informal in nature, but private actors were nevertheless quite influential in the legislative process. Private interest groups had direct physical access to the parliament and were well represented among the elected members (Jentges, Brändli, Donges, & Jarren, 2013; Liebert, 1995). Furthermore, business associations were often consulted before the enactment of any important piece of legislation, a process that became systematized in the 1930s, and which was then institutionalized by Article 32 (3) of the Constitution of 1947 (Sciarini, 2006). Similar ties have existed between corporations and the public administration (Humair et al., 2012). The practice by which high-level entrepreneurs of a defined sector would get influential positions in the administration in charge of that sector was frequent (Lehbruch, 1993), thereby blurring the frontiers between the roles of principal and agent which characterize the traditional/legal model of decision-making.

The proximity and the collaboration between public and private actors in the steering of collective issues have not only lived on throughout the twentieth century (David & Mach, 2006), but took a particular dimension in the regulation of environmental problems. Hence, the article 41a of the Federal act on the Protection of the Environment of 1983 (EPA, status 21 December 1995) gave statutory existence to the cooperation principle by stating that:

1. The Confederation and, within the scope of their responsibilities, the cantons shall cooperate with private sector organisations in enforcing this Act.
2. They may promote sectoral agreements by setting quantitative targets and deadlines for meeting them.
3. Before enacting implementing regulations, they must examine voluntary private sector measures. Wherever possible and necessary, they shall incorporate sectoral agreements into the implementing regulations in whole or in part.

Thus, the EPA gave force of law to the previously rather informal principle of the subsidiarity of the public to the private, and the administrative practice of closely collaborating and interacting with the private sector in dealing with environmental issues. It must be underlined that the collaboration principle is the source of a paradox, which lies in the fact that the public authorities have partially delegated to the concerned industries the competency of formulating and implementing the environmental regulations aimed at limiting the pollution problems that the industries are causing themselves. As the literature on neo-corporatism emphasizes, collaboration substantially increases the likelihood of acceptance of and compliance to the legal norms that might be otherwise contested and resisted by the private sector. However, this also creates a governance structure that profoundly lacks democratic legitimacy and transparency to the public. This is because the private sector representatives that participate in environmental decision-making are not elected through democratic procedures and cannot be held accountable for their choices and actions with regards to public or common-pool natural resources. Furthermore, public-private collaboration must be based on trust and mutual consent in order to succeed. Information about sensitive issues such as pollution occurrences or deficit in environmental management tend not be disclosed to the public, as this could raise the public pressure on the process, adversely impact the reputation of the firms, and hence hinder the possibility of reaching a consensus through the gentle and collaborative style of agreement that is much sought in the Swiss liberal corporatist model. It must be underlined that the principle of collaboration in environmental management processes strictly concerns the relationship between public and private actors. Environmental NGOs, citizens or civil society representatives are not even mentioned in laws as possible partners for implementing environmental regulations (Knoepfel et al., 2010, p. 178). The private sector has hence strongly opposed the Aarhus Convention and the attempt to institutionalize modes of participation and interaction that are closer to the network model, by full disclosure of information about pollution events and better including civil society representatives (FOEN, 2014b; Tanquerel, 2007). Consequently, the participation of civil society actors occurs by others institutional means, as we will describe in Sect. 3.2.2.4.

### **3.2.2.3 Public-Private Relations II: The Causality Principle and the Liability for Environmental Harm**

Collaboration is however not the only procedural rule that pertains to public-private interactions in the steering of environmental issues. If the collaboration principle fosters the establishment of cozy relationships between the public authorities and the private actors, the institutional rules regarding the liability for environmental harm force the public authorities to sometimes trade “the carrot for the stick”. Until the 1970s environmental liability was solely codified by the civil code (private law),

and based on the right of ownership: the owner of the land or the thing that was believed to be the most immediate source of the pollution, was considered responsible for any damage caused to the property of a third party individual, regardless of whether the behavior of the owner was the actual cause of the pollution. This led in the 1960s and in the early 1970s to problematic situations such as when a municipality would be held responsible for the water pollution caused by the spillage of toxic liquids by a factory, due to the municipal ownership of the sewage network to which the factory was connected (the sewage network being a more immediate cause of pollution than the factory). Furthermore, this private liability regime would only protect the private property of the owner, given that he would lodge a complaint in order to seek compensation. There were hence no forms of liability for harm to the wider environment, and to natural resources that have common pool, or public good attributes. Against this backdrop, “the causality principle” progressively developed in public law in the 1970s and 1980s as an alternative rule to liability based on ownership. The theoretical idea behind the causality principle is that the person whose behavior causes damages to the environment (literally the polluter, rather than the owner), must be primarily held liable for environmental harms, including the harm to the parts of the environment that are not possessed privately. However, as we will see in detail in the empirical chapters of this book, the idea behind the principle of causality has never been fully implemented, due notably to the difficulty of conciliating public and private laws in institutional regimes, and the opposition of the private sector to do so (see also: Faeh, 2007; Knoepfel et al., 2010, pp. 180–195; Widmer & Wessner, 1999).<sup>6</sup>

Nevertheless the principle of causality partially conflicts with the collaboration principle, because it crystallizes public authorities and polluters in diametrically opposed positions, and induces the hierarchic and top-down vertical relations that characterize the legal/traditional mode of participation and interaction. The causality principle hence had the effect of involving the polluters more clearly for their behavior in the role of the main “target” of environmental regulations carried out by the public authorities. Public authorities are supposed to seek the persons responsible for environmental degradations, and to request the funding of any necessary interventions to repair the damages. This form of “polluter must pay principle” is even extended in the case of the institutional regime of contaminated sites; polluters should not only finance remediation measures, but also carry them out rather than leave them to the public collectivities which previously had to support these burdens. Therefore, as we will discover in the later chapters of this book, the causality principle when strictly applied, somehow precludes the cozy relationships between public and private actors that constitute the core of the historically much pregnant liberal corporatist model.

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<sup>6</sup>This problem of conflicting rules to liability between the public and the private law regime does not only exist in Switzerland, but also in the many European countries that experiment with difficulties in implementing the EU Environmental Liability Directive (Anstee-Wedderburn, 2007).

### 3.2.2.4 Public-Civil Society Relations: Semi-direct Democracy and Civil Society Rights to Participate in Environmental Decision-Making

The picture of the procedural rules that shape actors' mode of participation and interaction in environmental decision-making would be incomplete if we were not to mention the increasing involvement of civil society representatives in these processes. Extended participation of civil society in environmental decision-making has been pushed internationally since the early 1990s, in order to compensate for the closeness and the lack of transparency of environmental decision processes in many countries. Hence, the Rio declaration on environment and development of 1992 states that:

#### **Principle 10**

Environmental issues are best handled with participation of all concerned citizens, at the relevant level. At the national level, each individual shall have appropriate access to information concerning the environment that is held by public authorities, including information on hazardous materials and activities in their communities, and the opportunity to participate in decision-making processes. States shall facilitate and encourage public awareness and participation by making information widely available. Effective access to judicial and administrative proceedings, including redress and remedy, shall be provided.

At the European level, the principle of the civil society's inalienable right to directly participate in environmental decision making has been given a more binding character by the Aarhus Convention of 1998, which emphasized the rights of citizens to access to information, justice, and decision-making in environmental matters.<sup>7</sup> The Aarhus Convention has been implemented in the European community since 2005 and has become the principle tool for introducing the ideal of the network model in environmental decision-making. Switzerland has not yet ratified the convention due to the opposition of the private sector but also on the ground that many of the dispositions introduced by the Aarhus Convention already exist in the semi-direct democratic system of Switzerland (Conseil Fédéral, 2012, pp. 4028–4029).

Indeed, Switzerland is often pictured as a special case (“Sonderfall”) with regards to the extent of the right to participate in decision making that is conferred to citizens in its semi-direct democratic system. Several procedural rules allow the civil society to weigh in environmental decision processes. First, the right of popular

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<sup>7</sup> See: Regulation (EC) No 1367/2006 of the European Parliament and of the Council of 6 September 2006 on the application of the provisions of the Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters to Community institutions and bodies.



initiative gives citizens the possibility to set environmental issues on the policy agenda, and to propose new environmental regulations. This democratic mechanism is being increasingly used by the green party and the civil society associations. For the year 2012, out of the 47 popular initiatives that were submitted to the federal administration, about 1/4th concerned the consolidation of environmental regulations (Federal Administration, 2014). Thus, many of the most important regulatory changes of these last decades with regards to environmental protection have been the direct or indirect results of popular initiatives. This was the case for instance of the paradigmatic shift toward ecological production in agricultural policy (Conseil Fédéral, 1992), the restoration and revitalization of water streams policy (Conseil Fédéral, 2008), the strengthening of the climate change policy (Conseil Fédéral, 2009) and the much contested recent ecologization of the spatial planning policy (Conseil Fédéral, 2010).

Moreover, environmental interest groups also can intervene during the legislative process. For instance, environmental NGOs are consulted before any new environmental regulation is enacted, pretty much as business associations are. NGOs are also capable of lobbying in the parliament, and environmental interests have come to be better represented in the legislative process due to the institutionalization, and the growth of the green and green liberal parties in the last decade. It must be noted however, that due to the difference in resources and political power, civil society associations are far from having the same influence on the legislative process as the private sector.

It must be underlined that the extensive rights of civil society representatives to participate in decision-making in Switzerland are restricted to the formulation of environmental regulations. With regards to how environmental policies are implemented, and natural resources concretely managed, the democratic system of Switzerland hardly gives the civil society actors any right to intervene. This is because the right to participate in environmental management in Switzerland depends formally on ownership: except for the public authorities, only those who dispose of some forms of property rights in relation to the natural resource are entitled to decision-making. Environmental NGOs have the specific right to appeal certain public decisions that affect the environment.<sup>8</sup> However, this right is quite limited, and more restricted than in Sweden, France, and the USA according to Flueckiger, Morand, and Tanquerel (2000, p. 83). Only the environmental NGOs of national importance (and not the regional or the local) can appeal the decisions that are subject to formal environmental impact assessment, which generally relates to the construction of infrastructures. Numerous management decisions that affect the environment, for instance with what techniques a contaminated site should be remediated, are not subject to the right to appeal. There is hence with regards to environmental NGOs a lack of institutional equivalent to the collaboration principle that fosters cooperation with the private sector. The sole exception to this voluntary omission is Article 4 of the National spatial planning policy of the Federal Office for

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<sup>8</sup> See Article 55 of the Federal Act on the Protection of the Environment (EPA), and Article 12 and 12a of the Federal Act on the Protection of the Nature and Cultural Heritage (NCHA).

Spatial Development (ARE), which has required citizen participation in planning procedures since 1979.<sup>9</sup> There is actually no movement to extend this provision for public participation to other environmental domains, for instance, contaminated sites, although the federal administration is aware that the lack of transparency that surrounds corporatist practices with regards to environmental management in several Cantons does not conform to the spirit of the Aarhus Convention (FOEN, 2014b). Moreover, the absence of ways to participate in environmental management, other than the right to appeal, restricts NGOs to a role of contestation and opposition that might actually reinforce the latent conflicts in environmental management, rather than contributing to the participatory ideal that has driven the Rio process and the Aarhus Convention.

### 3.3 Conclusion: The “Swiss Model” of Environmental Management

This brief examination of some of the most salient features and trends of environmental management and of the issue of contaminated sites in Switzerland, led us to the following considerations:

- first, environmental management in Switzerland is shaped by institutional regimes that provide environmental regulations of strong extent, coherence and strictness. However, the comparative decline of these features in the last decades raises the question of the impacts on contaminated sites management;
- second, certain procedural rules that span institutional regimes are essential to understand the mode of participation and interaction in environmental management. Executive federalism and the cooperation principle are the core rules of the historical decentralized, and corporatist, style of management in environmental issues. However the later-introduced causality principle, and the right of civil society participation are the institutional basis of alternative modes of organization that could challenge the customary practices in environmental management.

There is currently a lack of data and of relevant studies in order to examine how the changes in the substance and in the procedures of institutional regimes might have impacted the environmental performance of contaminated sites management in the long run. We argue that in order to understand the reasons behind the present state of contamination in Switzerland, it is necessary to adopt the long-term perspective, by conducting in-depth longitudinal case studies that would allow assessment of how the changing, and sometimes conflicting rules provided by the institutional regime have influenced contaminated sites management in Switzerland. The next chapter is hence devoted to demonstrating why the case of Bonfol Chemical landfill can be considered as crucial to this endeavor.

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<sup>9</sup>Loi fédérale sur l'aménagement du territoire (LAT).

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# Chapter 4

## The Case Study of Bonfol Chemical Landfill: Logic of Selection, Data and Methods

**Abstract** This chapter is devoted to describing why waste the Bonfol chemical landfill can be considered as a crucial case for studying environmental management of contaminated sites, and the methods and data used for carrying the case study analysis. First, the history of the Bonfol site begins in the 1960s, spans more than 50 years, and lends itself very well to the objective of analyzing the links between institutional regime changes and environmental management processes. The case of Bonfol is highly representative of the decentralized and liberal corporatist model of environmental management that is typical of Switzerland, and which has however progressively come under the pressure of increasingly strong and centralized environmental regulations. Second, the case of the Bonfol contamination is exceptional in term of the mass of toxic material gathered in the site, and the extremely high cost of the remediation. But more importantly, the case of Bonfol illustrates the conditions under which a remediation process can produce optimal environmental outcomes, despite the extreme power asymmetry between the polluters, and the local public authorities responsible for enforcing environmental laws.

### 4.1 The Case of Bonfol Chemical Landfill: Main Features and Logic of Selection

In the theoretical chapter of this book, we discussed the fact that contaminated sites management is a decision process that involves potentially conflictual relations between actors with diverging interests with regards to the environmental merits of the goals and instruments that should be engaged for regulating pollutions sources (see Chap. 2). We presented the research hypothesis that strong institutional regimes could be associated with better environmental performance, and we also examined contrasting arguments about whether liberal corporatist mode of participation and interaction or the network model would more likely succeed in producing optimal outcomes for the environment (see Sect. 2.4). Then we examined the general features of the Swiss model of environmental management (see Sects. 3.2 and 3.3) and concluded that it features strong but comparatively declining institutional regimes, and a deeply entrenched liberal corporatist tradition in decision-making that has however come under the pressure of alternative modes of participation and interaction.

No studies or data currently exist on whether and how the Swiss model, and the changes it has undergone are actually linked to the environmental performance of contaminated sites management. In attempting to fill this gap, we opted for designing a research accordingly to the crucial-case study methodology proposed by Eckstein (2000, p. 118), that is based on the selection and the in-depth exploration of a case that either seems to perfectly fit or refute the theoretical assumptions proposed. The case in point is that of the Bonfol Chemical landfill, which represents, on first impression, an extreme example of how strong regimes and liberal corporatist management of a contaminated site leads to environmental outcomes that are deemed as highly satisfactory.

Indeed, the Bonfol Chemical landfill was established in 1961, as the result of intensive development and concentration of the chemical industry in the region of Basel. A consortium called *Basler Chemische Industrie* (BCI),<sup>1</sup> which regrouped the then biggest chemical companies of Switzerland CIBA, Geigy, Sandoz, Roche, Duran, Huguenin, Rohner and Henkel,<sup>2</sup> managed almost autonomously a landfill in the region of Bonfol (Jura), in order to dispose of the waste resulting from chemical production processes. The landfill of Bonfol is only one of the several that the chemical industry contributed to create in Switzerland, but also in the neighboring countries France and Germany. For several reasons however, the Bonfol Chemical landfill stands out from other industrial landfills in the country. First, with its 175,000 tons of hazardous waste (Klein, 2013), Bonfol Chemical landfill is Switzerland's second biggest contaminated site in terms of toxic waste quantity after the 475,000 tons of the K lliken landfill (SMDK, 2014). Second, the remediation of Bonfol Chemical Landfill is at the present time the most expensive ever conducted in Switzerland in terms of the estimated costs of remediation per cubic meter of treated material (about 2,400 <sup>3</sup>), whereas the European average cost for a similar technique of remediation is estimated at 885 /m<sup>3</sup> (Summersgill, 2005). In terms of global expenditures, the remediation of Bonfol Chemical landfill will cost about 310 millions of euros, and is among the top 2 % most expensive remediation in Europe (Panagos, Van Liedekerke, Yigini, & Montanarella, 2013).

However, the reasons why the Bonfol Chemical landfill can be considered as a crucial case do not only pertain to the size and the extent of the contamination or the cost of the remediation per se, but the particular and changing institutional setting in which the landfill was created, managed and finally remediated. Between 1961 and 1998 the modes of interaction and participation between the public authorities and the private actors who managed the landfill remained typical of the Swiss model of decentralized and liberal corporatist management: the Bonfol landfill was almost completely self-regulated by the chemical industries. During that time,

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<sup>1</sup>Literally: the chemical companies of the region of Basel.

<sup>2</sup>Today, following the various mergers, bankruptcies and other far reaching changes in the corporate governance the BCI is now composed of the multinational companies BASF Schweiz AG., Clariant, Novartis, Syngenta, Roche, Rohner, CABB AB, and Henkel.

<sup>3</sup>Based on the estimation that the Bonfol landfill contains 130,000 m<sup>3</sup> of waste and that the total cost of remediation equals 380 million Swiss Francs (Jubin, 2010; Klein, 2013).

several episodes of pollution occurred, the management of which varied in terms of environmental quality. In 1998, after several progressive changes in environmental regulations, a paradigmatic shift occurred, which strongly impacted the norms of desirable conduct with regard to contaminated sites, and the mode of interaction and participation in the management of the Bonfol site. This regime shift ultimately led to the full remediation of the site by the chemical companies through a very conflicting negotiation process that however resulted in outcomes that are often deemed as exemplary in terms of the environmental ambition of the remediation. The case of the Bonfol Chemical landfill hence offers a very fitting setup to explore the effects of changing institutional regimes on the environmental management of a contaminated site.

Another crucial aspect of the Bonfol case relates to the extreme power asymmetry between the actors involved in the management of the site. Between 1961 and 1998 the municipality of Bonfol, as the formal landowner, should have been the principal regulation authority of the landfill. However, Bonfol is a tiny village of about 900 habitants, which definitely did not have the resources in terms of money, organization or scientific expertise to monitor the environmental impacts of the landfill. During that time, the control of the environmental aspects of the landfill management by cantonal and federal authorities also remained loose and distant. In 1998, when the authorities of the comparatively low developed Canton of Jura finally requested the cleaning-up of the polluted site, nobody could have predicted that the remediation of the Bonfol chemical landfill would be later considered as exemplary, inasmuch as the balance of power between the Jura Canton, and the chemical multinational firms, who first resisted the injunction, was largely at the advantage of the latter. For instance, the gross annual profit of Novartis and Syngenta, two of the Basel-based companies that were involved in the pollution of the Bonfol site, has reached respectively 27 billions (Novartis, 2011) and 4.1 billions of euros (Syngenta, 2011) in 2009, which largely exceeds the gross domestic product of the Canton of Jura for the same year, which is estimated at 2.5 billion of euros<sup>4</sup> (Swiss Federal Statistical Office, 2012). Therefore, the story of the Bonfol Chemical landfill is also singular in the way powerful multinational firms with their cost-minimizing rationality could be brought to realize one of the most expensive remediation in Europe.

## 4.2 Method of Analysis: Institutional Analysis and Decision Process Tracing

In order to conduct our analysis, we have combined two methods. A legal-institutional analysis of the regime that pertains to contaminated sites through time is conducted, and linked to a process tracing methodology (Bennett, 2010; Hall,

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<sup>4</sup>These numbers are given in the market price value of 2009.



2006), in which the principal choices and actions in relation to the environmental management of the contaminate site are analyzed in the light of the legal provisions in force at the time. The history of the Bonfol Chemical landfill has been divided into four temporal sequences that correspond to the occurrence of key events in the history of the landfill that we have reconstructed for the time period 1955–2008. The description of each time sequence begins with an historical reconstruction of the institutional regime in force, in order to understand the relation between legal formal rules and concrete actions in relation to the management of the Bonfol site. The principal private law and the public laws rules provisions of the institutional regime are analyzed and differentiated, in order for the reader to understand how rules of different socio-legal nature may conflict (see Sect 2.2 and 2.3). The extent, strictness and coherence of the institutional regime are assessed (see Sect. 2.4.1), and that allows understanding the main characteristics and the evolution of the regime through time. Then, the course of action that led to key decisions in relation to the management of the landfill is retraced in the form of an analytical narrative. We dig into actor games based on historical sources (see Sect. 4.3). We looked for regulatory arrangements (see Sect. 2.4.2.3) that were concluded with regards to how the Bonfol site should be managed. Therefore, this research design enables us to interpret actors' decisions and actions in order to assess the environmental performance of the management of contaminated sites using the criteria of compliance to the regime, and diligence with respect to the best available technology for reducing pollution risks (see Sect. 2.5). Finally, we aggregate our observations on the relation between the institutional regime and the environmental management of the Bonfol chemical landfill through time, and discuss the results in the conclusion of this book.

### 4.3 Data and Sources Used

Given that the remediation of the Bonfol landfill was a particularly polemical process, we used a variety of sources to guarantee the objectivity of the research process. With respect to the legal aspects, we based our analysis on the Swiss federal acts and ordinances which constitute what we define as the institutional regime of contaminated sites between 1961 and 2008. To assist us in the interpretation of these legislative acts in their historical contexts, we relied mainly on the Federal Council<sup>5</sup> dispatches that accompanied the legislative projects in question. These dispatches are an invaluable source in that they systematically depict the context that prompts the need for legislative changes, in the view of federal authorities. Where necessary, we also included legal commentaries and decisions of the Federal Supreme Court in our analyse.

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<sup>5</sup>The Federal Council is the highest executive authority in Switzerland. It is a collegial executive composed by 7 party representatives that are designated by the national parliament.



The effects of the institutional regime in the management of the Bonfol site were analyzed on the basis of a variety of sources (see [Appendix](#) for a complete list). First, semi-structured interviews were carried out with the principal stakeholders, namely individuals from chemical companies, public authorities at the cantonal and federal levels and non-governmental organizations (NGOs). An interview was also carried out with the only researcher who had access to part of the chemical companies' archives during the period in question. His doctoral thesis, which is based on indispensable archival material, was used as a source for the description of the behavior of the actors, mostly during the period 1954–1971.<sup>6</sup> Several documents were placed at our disposal by the interviewed parties, in particular press files, documents detailing the remediation measures carried out in Bonfol, and correspondence between the different parties. Other oral sources were also consulted, in particular two older interviews carried out by another researcher (Kuenzer, 2007).

Second, we trawled the archives of the *Neuer Züricher Zeitung* (NZZ) and *Le Temps* newspapers for the period 1990–2009. We also consulted the press releases issued by the chemical companies, non-governmental organizations and the cantonal authorities and available on the Internet for the period involved. Third, we consulted all of the minutes of the *Commission d'information de la décharge industrielle de Bonfol* (Information committee for Bonfol industrial landfill) between 2001 and 2008. These minutes provided an invaluable source for the evaluation of the relationships between the main stakeholders who intervened in the decision process.

#### 4.4 Methods Used for Data Collection

We took a large number of precautions to guarantee the veracity and objectivity of the data on which we based our analysis. The interviews were carried out in a semi-structured way. We sent the questionnaires to the informants prior to meeting them. After the interview, we maintained contact with the informants by e-mail to clarify certain points that appeared ambiguous to us. The informants were interviewed in the following order: representatives of the cantonal authorities, non-governmental organizations, the federal authorities, and, finally, the consortium of private companies responsible for the remediation of the site. We adopted a triangulation approach insofar as possible: based on our written sources and the interviews already carried out, we tried to confirm the information as it emerged from other interviews or sources. The triangulation of the data enables the avoidance, to some extent, of a lack of objectivity due to the omnipresence of one single source of information. An initial draft of the study in the form of a report was submitted to the main parties involved. The aim of this consultation was to identify eventual factual errors or incorrect interpretations on the part of the authors and, in this way, enhance the

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<sup>6</sup>Forter (2000).

quality of the research. This process prompted very mixed reactions among the actors consulted which we took into account on the basis of their relevance.

## 4.5 Methodological Difficulties

The extremely political aspect of the case study dealt with was the main obstacles encountered during the process of data collection and analysis. The majority of the historical sources concerning the discharges and emissions from Bonfol landfill are held by the chemical industries which proved reluctant to reveal sometimes sensitive information. Hence, we were dependent on their good will to give us access to the data. Through the data collection and analysis process, we tried to guarantee a minimum of objectivity from our information sources. However, it is unrealistic to claim that the analysis carried out as part of any political science or implementation study is completely objective or neutral. Nonetheless, we guarantee that we exercised the diligence and rigor required by a scientific research of this nature.

## Appendix: List of Sources

### Semi-Structured Interviews Carried Out by the Authors

*Canton of Jura, Office for Water and Nature Conservation of the Canton of Jura (OEPN):*

Jean-Pierre Meusy, OEPN, Jura

François Schaffter, OEPN, Jura

*Swiss Federal Office for the Environment, FOEN:*

Christoph Wenger, Head of Soil Division, FOEN (previously Swiss Agency for Environment, Forests and Landscape, SAEFL)

Christane Wermeille, Head of the Contaminated Sites Section, FOEN

*Bonfol Collective:*

Martin Forter, former expert for the Bonfol Collective

*BCI-Betriebs AG:*

Michael Fischer, BCI-Betriebs AG

Christoph Mettler, Lexpartners (Consultant for BCI-Betrieb AG)

Bernhard Scharvogel, BCI-Betrieb AG

Interviews Carried Out By Kuenzer, [2007](#)

Jacques Babey, ex director of the Office for Water and Nature Conservation of the canton of Jura, (Office des eaux et de la protection de la nature, OEPN)

Walter Wildi, expert consultant Canton of Jura

## Correspondence

- Pierre Kohler, Minister of the Environment and Industrial Installations of the Republic and Canton of Jura to Rolf Bentz, Director of the BCI, 1 October 1998
- Pierre Kohler, Minister of the Environment and Industrial Installations of the Republic and Canton of Jura to Philippe Roch, Director of the FOEN, 11 November 1998
- Pierre Kohler, Minister of the Environment and Industrial Installations of the Republic and Canton of Jura to the management of CIBA, Clariant Schweiz AG, Novartis International AG, Hoffman-LaRoche AG, Henkel & Cie. AG and Säurefabrik Schweizerhalle AG

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#### Minutes

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- Minutes of the meeting of the information committee: project for the remediation of Bonfol industrial landfill, Vendlincourt, 2 October 2002
- Minutes of the meeting of the information committee: project for the remediation of Bonfol industrial landfill, Vendlincourt, 4 December 2002
- Minutes of the meeting of the information committee: project for the remediation of Bonfol industrial landfill, Delémont, 19 February 2004
- Minutes of the meeting of the information committee: project for the remediation of Bonfol industrial landfill, Delémont, 13 May 2004
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## Chapter 5

# Episode I: The Establishment of a Chemical Landfill in Bonfol Under the First Generation of Environmental Regulations (1955–1970)

**Abstract** Up to 1955, the Swiss Confederation's competencies with regards to the protection of the environment were extremely limited and so was the extent of the institutional regime. The rights and obligations of individuals in relation to the environment were mainly determined by highly varied cantonal practices and private law. From the mid-1950s, the federal authorities became aware that surface waters were systematically polluted by wastewater and other solid waste. While certain municipalities began to treat household waste, responsibility for the disposal of industrial waste was not clearly defined. Fly-tipping was frequent, that is the unofficial practice whereby industry would look for a natural depression in the land, in general an old quarry or pit, and deposit the waste there, leaving nature to take care of its disposal. Against this background, the federal authorities decided to increase the extent of its competence to the area of waters and enacted the first national public regulations on water protection against pollution. The water pollution legislation reduced the possibilities for burying toxic waste on land. The unexpected consequence of this was that industry and the cantonal authorities increasingly came into conflict regarding the responsibility for disposal of industrial waste. In this context, and before they were obliged to do so by the legal regime, the chemical companies of the Basel region created and managed a landfill near the village of Bonfol, in what appeared at the time as a pioneering model of integrated waste management. The first pollution problems triggered by the disposal of waste in Bonfol landfill quickly came to light, however.

## 5.1 Analysis of the Institutional Regime 1955–1970

### 5.1.1 *Private Law: The Civil Responsibility for Pollution Acts*

Since the early twentieth century, private law has regulated certain types of damage that may be caused to sites through the institution of private property. Hence, Art. 684 of the Swiss Civil Code of 1907(CC) obliges all property owners “to refrain from any excess detrimental to neighboring properties”. Art. 41 of the Code of Obligations (CO) (30 March 1911) also states that “Any person who unlawfully causes loss or damage to another, whether willfully or negligently, is obliged to provide compensation”. Hence private individuals are obliged not to damage a site insofar as it may be in the private ownership of another person who bears the burden

of proof in the event of damage. In general, the compensation to be made is monetary in nature, but it is also accompanied by the obligation to cease the activity causing the damage (art. 679 CC). This obligation may go even further, and article 707 of the CC hence stipulates that in the case of water pollution, “those affected have the right to demand that the status quo ante be restored where at all possible”. The owner of a water source could, therefore, require the polluter to restore his or her good to its natural state, and this process would partially correspond to what is understood by the term “remediation” today (see: Knoepfel, Nahrath, Varone, Savary, & en collaboration avec Johann Dupuis, 2010, pp. 180–196).

However, the duties and obligations imposed by private law failed to guarantee effective protection of the environment, primarily because private law may not be used as a basis for defending public goods (surface waters) or for protecting “nature” in itself. For an act that causes pollution to fall under the private law, the altered element of the environment had to be in private ownership. Hence, the Civil Code provides little protection to the environment in itself, but to private property that may involve an environmental object. Furthermore, the case law based on civil law is very problematic in its application to the context of pollution caused by waste. In effect, art. 679 and art. 684 of the CC assign liability for damages to the owner of the most immediate source of the pollution. This often equaled attributing the responsibility of pollution to municipalities, as they generally owned sewage systems to which private companies were connected. Hence, in two cases in which water pollution of industrial origin caused damage to fish stocks (in 1949 and 1950), the Federal Supreme Court held municipalities responsible for the damage to fishermen (Schindler, 1965). In the case of pollution of surface waters by solid waste the same principle applies; it is mainly the formal owner of the land or of the disposal facility through which contaminants lastly transited who may be held responsible, but not the producer of the waste, that is the polluter by behavior. Even when a land owner would want to institute legal proceedings against waste producers which seem to be polluting the owned property, resolution of the legal conflict might be a delicate matter. In effect, establishing a causal relationship between the accused company and the damage to the property may prove complicated either because several entities may be at the root of the pollution or because of the lack of adequate pollution tracing technology (particularly in the 1950s and 1960s). As the burden of proof lies with the victim, this proved to be in many cases an insurmountable obstacle in view of the technical and scientific resources, money and time required to carry out the investigations necessary to demonstrate responsibility for pollution. Finally, according to private law, the responsibility of the polluter vis-à-vis a victim is normally only engaged in case of a fault or a breach of the duty to exercise due care (diligence). If the action of a private person has harmful effects on the environment but this action is undertaken on the basis of a clear legal authorization (driving license, planning permission etc.), article 41 CO cannot be applied.

The environmental protection principles contained in private law have undergone very little development since the early twentieth century. Being aware of the limits of civil proceedings in dealing with the problem of pollution, and attempting to establish a regime for making the polluter responsible in the name of the public

interest, the Confederation progressively developed the public law component of the institutional regime.

### ***5.1.2 Public Policies: The Fish and Fisheries Acts and the First Legislation on Water Pollution***

Up to 1955, the Swiss Confederation's only competence in relation to protection of the environment was based on a Federal Act concerning the overall supervision of the policing of forests by the Confederation (11 October 1902), and the first and revised Federal Fishing Act (18 September 1875; 21 December 1888). The fishing act prohibited the dumping of pollutant materials into public and private surface waters if it would cause damage to crayfish or fish. This law was only intended to protect the economic interests of fishermen by forcing the companies or public bodies concerned to treat their wastewater and remediate any damage caused in the case of proven infractions. However, at the time, damage to fish and crayfish was very difficult to demonstrate scientifically. Furthermore, while the cost of construction of treatment plants could reach tens if not hundreds of thousands of Swiss francs, the fines specified by the act, between CHF 50 and 400 at the time, made the law relatively ineffective in terms of protecting fishermen and even less so with respect to water quality (Conseil Fédéral, 28 avril 1953, p. 15).<sup>1</sup>

The Confederation noticed that the private law had been unsuccessful in limiting damage to surface waters, and the little interest of Swiss cantons for protection of water quality (9 février 1954, p. 306). Direct disposal of household and industrial waste in waters, and the increase in the number of landfill sites close to waters, were causing a rapid deterioration of water quality. An international dimension was added to this issue in the case of the Rhine as the disposal of liquid and solid waste by the chemical industry in the river were a source of international tension with downstream States (Germany and the Netherlands). This prompted the Confederation to introduce the constitutional article 24quater on the protection of water against pollution (30 septembre 1953). This law article gave the Confederation the power to legislate on public and private surface waters and was hence soon followed by the first Act on the Protection of Waters against Pollution (16 mars 1955). This act prohibited all discharge into (public) surface waters of solid or liquid substances that would cause the deterioration of its quality, independently of any damage done to fish (art. 4). Moreover, it obliged the cantons to monitor the sealing of locations used for the storage of waste, henceforth referred to as controlled landfills. The establishment of landfills in the vicinity of surface waters was also prohibited thereafter. In the case of existing facilities in such locations, any leaks that could contaminate surface waters had to be eliminated (art. 4 para. 3).

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<sup>1</sup>All prices are given in historic Swiss Francs value's.

However, the law remained particularly ambiguous on many points, which would give rise to considerable difficulties in its implementation. In effect, the legislator took particular care not to define precisely what it understood by pollution and even less so by “waste”,<sup>2</sup> and this created considerable vagueness regarding the limit from which it should be considered that water had been damaged. By leaving significant flexibility in terms of the actual objectives for the protection of water, the federal legislator hoped that it would not limit development of the relevant technology and the voluntary efforts and progress being made by the cantons and private actors in the area of pollution (Conseil Fédéral, 9 février 1954, p. 307). However, the exact opposite occurred; the absence of defined regulation in relation to remediation contributed to a certain laxity on the part of the cantonal authorities in application of the law and in the limitation of pollution caused by private actors (Conseil Fédéral, 26 août 1970, pp. 433–436). With regard to the vagueness of the water protection objectives, the question as to what could legitimately be prohibited in the name of the protection of water had to be resolved by the Federal Supreme Court over the course of numerous cases (e.g., ATF 84 I 156; ATF 84 I 150). Treatment in the case of pollution by the deposit of solid waste in surface waters was also highly problematical. The water law of 1955 only prohibited the disposal of solid waste of a pollutant nature in surface waters (art. 4 para. 1), whereas “benign” solid waste was still tolerated, a clause that speaks volumes about the perception of pollution at the time (Conseil Fédéral, 9 février 1954, p. 309). With respect to landfills with leaks that posed a threat to water, complete excavation of the sources of pollution was seen as impracticable at that time (Conseil Fédéral, 9 février 1954, p. 310). Article 5, paragraph 4 stipulated that “acceptable” deadlines and exemptions may be granted by the cantons to regulate the problem of existing landfills; this freedom was widely invoked. Ultimately, however, the formal prohibition in principle of landfills posing a threat to water quality limited the possible locations for establishment of new landfills. Moreover, the obligation to ensure the sealing of existing landfills implied the implementation of some form of remediation. However, the act did not specify the ways in which non-compliant landfills should be replaced, how/where the waste should be stored thereafter, and what measures should be taken in the case of confirmed leaks from landfills. Hence there was a strong incoherence between the objectives set by the law to protect the waters against pollution and the failure to program any policy instruments to attain that.

As we mentioned above, according to private law provisions the municipalities, as owners of sewage systems, bore the primary responsibility in case of pollution caused by the wastewaters of a private factory. The water protection act of 1955 (art. 3 para. 2) offered the municipality a way out of this, by ordering the cantons to command the polluting companies to treat their wastewaters in advance of discharging it into surface waters or into the public sewage system (Conseil Fédéral, 9 février 1954, pp. 310–311). Moreover, a potestative formulation contained in article 12 of the same law even suggested that the cost of such operations may be directly attributed to the companies. The law remained however very unclear with respect to the

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<sup>2</sup>The term is actually not even mentioned in the act.

exact responsibility of industries for the disposal of their solid waste. The question of to whom fell the task of disposing of the waste produced by industry and to what extent private companies had to finance the necessary installations (controlled landfills) themselves could not be clearly resolved based on the water law of 1955 (Conseil Fédéral, 26 août 1970, pp. 453–467). Article 2, paragraph 4 of this act merely specified that public and private bodies had to be treated on an equal footing so that industry would not be forced to build extremely costly plants for industrial waste disposal while the municipalities did nothing about household waste (Conseil Fédéral, 9 février 1954, p. 308).

Finally, and despite the introduction of penal sanctions in the form of fines of up to CHF 20,000 in the case of deliberate pollution of waters, the legislator tried to avoid passing a law that would prove too strict and rigid in its application. The Confederation justified this approach by literally pleading for flexibility:

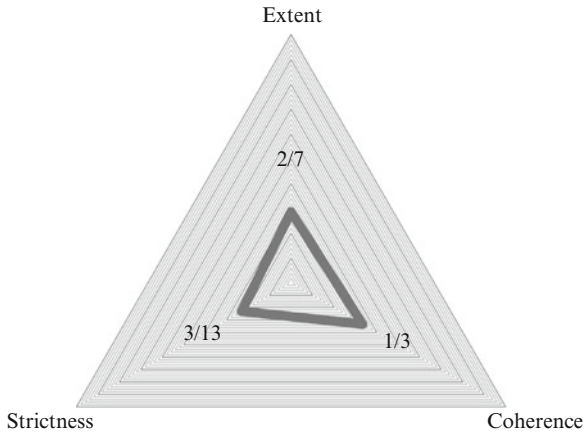
The remediation of waters as envisaged in the act is conceived in a way that the individual is persuaded of the need to ensure the protection of water. He will be far more easily won over to the cause if the extent to which he is called on to take the interests at play into account here is comprehensible and appears reasonable. The more rigorous the requirements, the more difficult it will be to enforce their observation and the greater the grounds for concern that infractions may be committed. (Conseil Fédéral, 9 février 1954, pp. 309–310)

In spite of the ambitious protection objectives stated by the act, the Federal Council appealed for restraint. Acknowledging the need to take the associated economic burdens into account (art. 2 para. 3), the Confederation created the first act on the protection of water which would provide the basis for the protection of sites against contamination risks up to enactment of the second Federal Act on the Protection of Waters against Pollution (LPEP) (8 octobre 1971), which was largely formulated in response to the failures of the 1955 act.

### ***5.1.3 Extent, Coherence and Strictness of the Institutional Regime of 1955–1970***

Figure 5.1 summarizes the characteristics of the institutional regime for the period 1955–1970. The extent is 2/7 as the regime only regulates the discharge of pollutants into surface and ground water and the storage of waste close to water resources.<sup>3</sup> In view of a lack of coordination between the general objectives formulated by the waters act and the instruments proposed, and the absence of clear rules concerning the responsibility for industrial waste disposal and pollution, the regime's coherence is considered as weak (1/3). Finally, given that the obligation for occasional controls, closure and remediation exists in theory, at least, the degree of strictness is 3/13. In reality, however, the exceptions provided for by the law made these provisions very unrestrictive as the cantons and the courts proved little inclined to apply them rigidly.

<sup>3</sup>The rating system used is described in Sect. 2.4.1.



**Fig. 5.1** Evaluation of the institutional regime 1955–1970

## 5.2 The Environmental Management Process: Establishment and Exploitation of the Bonfol Landfill 1955–1970

After the Second World War, the chemical industries in the Basel region produced significant quantities of both liquid and solid waste. Despite the toxicity of these materials they were treated in the same way as household waste: discharged directly into the Rhine or deposited in the ground. Needless to say, these acts had certain consequences. The state of the Rhine was a serious cause for concern and several episodes of fish death were directly linked with the discharge of solid or liquid waste by the chemical industry (Forster, 2000, pp. 31–39).

The Confederation, by tackling the problem of pollution of the Rhine through creation of the water pollution act of 1955, altered practices in relation to storage of chemical waste. First, the general ban on pollution of water contained in the act and the various sanctions thereafter associated with such acts increased pressure for installation of remediation systems. Second, in theory, the act prohibited disposal of solid chemical waste in the Rhine and its storage in landfills that were not sealed. Third, the requirement that existing landfills must not pollute surface waters eventually involved the closure of certain operations, and this meant a general reduction in the possibilities available to the Basel chemical industry for storage of its waste.

The tensions between companies and the cantons of Basel regarding the responsibility for the disposal of industrial waste increased. The cantons and chemical companies laid the responsibility for the disposal of industrial waste at each other's doors. The Basel chemical companies considered that waste – whether industrial or household in nature – was a matter of public responsibility and urged the authorities to provide disposal solutions for chemical waste (Forster, 2000, pp. 227–237; interview

BCI). Events were hastened following a case involving the pollution of groundwater by a landfill containing chemical waste (“Die Feldbengrube”). Based on the federal water pollution act, the Basel authorities prohibited the depositing of industrial waste throughout the canton (RRB 2702 9 August 1957) without, however, proposing any alternative storage solutions.

Henceforth, the lack of storage space for industrial waste slowly became a thorn in the side of the Basel chemical industry. In view of the very wide-ranging problems involving pollution of waters caused by the chemical industry from the Second World War to the early 1960s, the municipalities of surrounding cantons were very reluctant to accept chemical waste. Conflict and public pressure were also mounting. Faced with the vagueness of the federal legislation, which failed to specify responsibilities for the collection and disposal of industrial waste, and a lack of willingness on the part of the cantons of Basel-Stadt and Basel-Landschaft to propose new installations after the ban, the Basel chemical industry took the initiative and began to look for its own storage solutions independently of the public authorities.

In doing this it initially looked beyond the national borders of Switzerland. Between 1957 and 1960, chemical waste was exported, in particular to Alsace, France and to Baden Württemberg, Germany (Forster, 2000, pp. 193–227). However, this questionable practice of exporting potentially harmful waste was brief in duration. In the early 1960s, Germany and France placed a ban on chemical waste originating from the Basel region (Forster, 2010, p. 102). The Basel chemical industry then commissioned a hydrogeologist to find a site for the storage of waste that would meet the principal requirement imposed by the legal regime on the storage of waste, i.e. that any eventual leaks from the landfill would not be able to pollute waters. This was the context in which a suitable site was identified in Bonfol, then situated in the Canton of Bern nearby the border to France, 50 km away from Basel (see Fig. 3.2).<sup>4</sup> The clay area nearby the village of Bonfol was exploited by potters at that time, and was believed to be completely sealable, which should have prevented any leaking of fluid into surface waters or groundwater. In many respects, the procedure for selection of the Bonfol site was exemplary in the context of practices current at the time. Bonfol was Europe’s first site for the storage of chemical waste to have been selected on the basis of geological criteria (BCI, internal document). Figure 5.2 shows that the location of the Bonfol site is in a forest area, which is close to a zone of exploitable groundwater ( $A_u$ ), but relatively distant from the more sensitive groundwater protection zones ( $S_1$ ,  $S_2$ ,  $S_3$ ). The choice of the Bonfol site would hence still appear understandable in the light of the criteria applicable under current water protection policy.<sup>5</sup>

One of the chemical companies (Geigy) assumed responsibility for negotiating a license to operate a landfill with the municipality of Bonfol, owner of the land on which the landfill were to be established. During a meeting with the municipal

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<sup>4</sup>In 1979, the municipality of Bonfol fell under the authority of the newly created canton of Jura.

<sup>5</sup>The groundwater protection sectors  $A_u$ ,  $S_1$ ,  $S_2$ , and  $S_3$  were introduced by the Waters Protection Ordinance (28 October 1998).



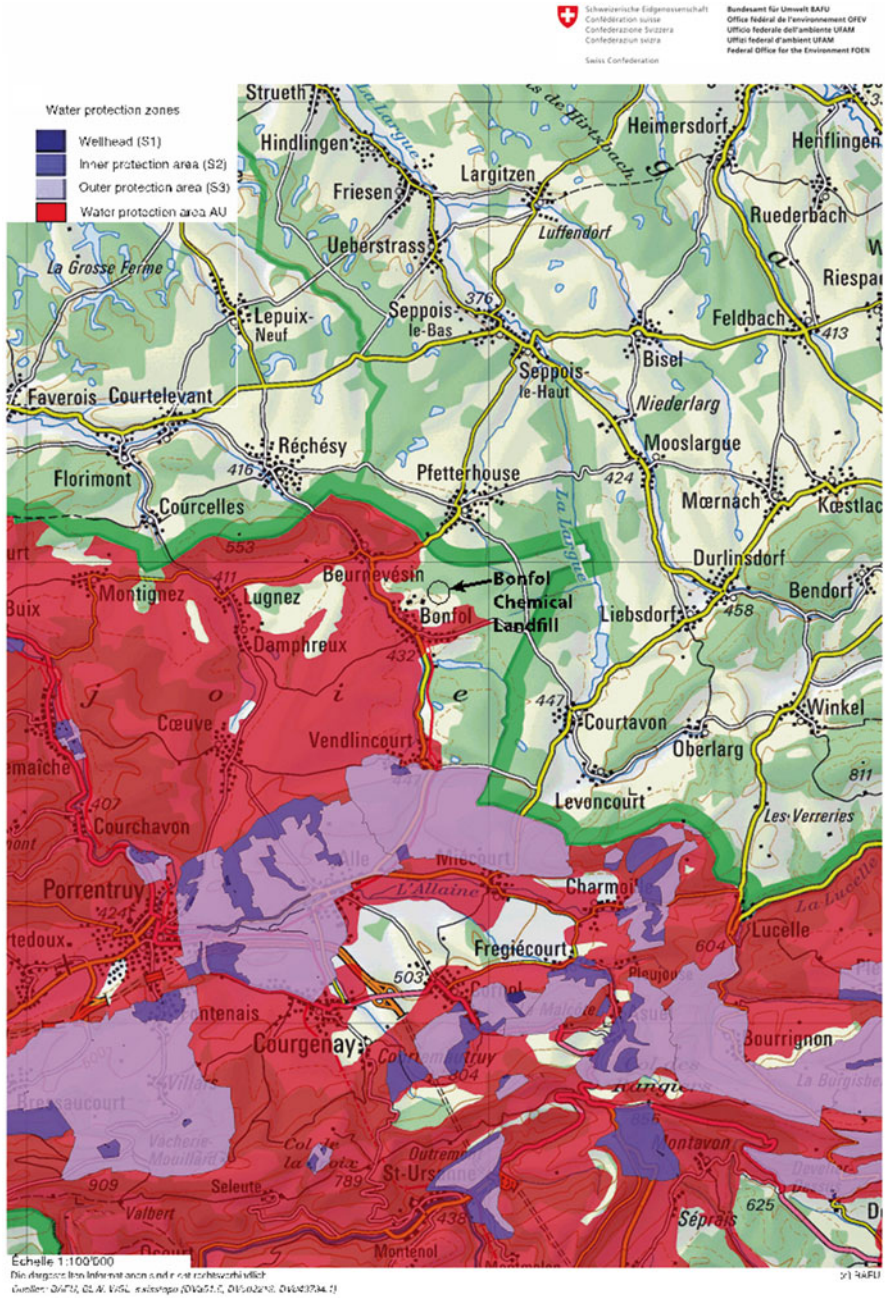
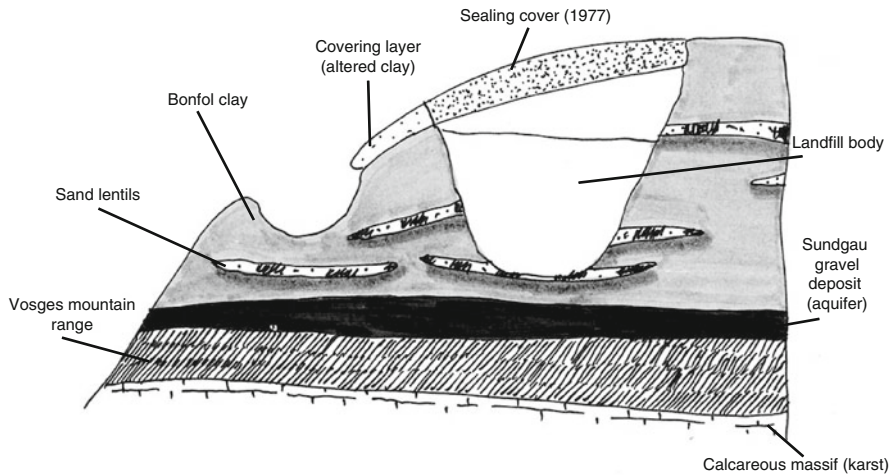


Fig. 5.2 Map of the water protection zones around the Bonfol site (Reproduced by permission of Swisstopo (BA 13115))



**Fig. 5.3** Cross-section of Bonfol landfill (This figure shows a sealed cover, which was only installed in 1977 when the operation of the landfill ceased (Data from BCI, internal document))

government, company representatives stated that the products to be stored in the landfill did not present *any threat to the environment* (Commune de Bonfol, 2000, p. 3). This statement can only be considered a matter of bad faith as the chemical industry could not possibly have ignored the potential toxicity of its production residues. However, although the Canton of Basel and other municipalities had banned or resisted the storage of chemical waste on their land due to the pollution risks, the local authorities of Bonfol granted the chemical company a license for a controlled landfill in 1961 for a fee of CHF 10 per ton of waste (Commune de Bonfol, 2000, p. 8). The canton of Bern also assented to granting the license under the conditions that a distance of at least five meters be maintained between the bottom of the landfill and the Sundgau gravel deposits which contained aquifers (see Fig. 5.3), and that a monitoring program be implemented to monitor impacts of the landfill on the groundwater in accordance with water protection legislation. Hence, Bonfol landfill, which would be operated and monitored by the Basel chemical industry on land belonging to the municipality, was given cantonal recognition and the landfill officially became a site that could accept “special”, i.e. hazardous, waste.

Although only one chemical company signed the license, the site was used by all the major chemical companies of the Basel region. A simple partnership, *Basler Chemische Industrie* (BCI),<sup>6</sup> was established for this purpose. The clear advantage

<sup>6</sup> At the time the BCI represented the companies CIBA, Geigy, Sandoz, Roche, Durand, Huguenin, Rohner and Henkel. Today, following the various mergers, bankruptcies and other far-reaching changes in corporate governance, BCI is composed of BASF Schweiz AG, Clariant, Novartis, Syngenta, Roche, Rohner, CABB AG and Henkel.

to the companies of using the acronym BCI instead of their own individual names was that, in the event of pollution or an accident, their reputation would be less directly tarnished. However, the simple partnership, according to the Code of Obligations (art. 530-551 CO), had two drawbacks; first the principle of solidarity-based responsibility inherent to a simple partnership implies that in case of the bankruptcy of one of the members, or of mergers or relocations, the liability would be transferred to the other members; and second, corporate decisions must be taken unanimously by the members, making governance of the society a complex matter.

The process adopted by the Basel chemical industry to acquire the right to use the land for stocking waste, and then to self-manage an industrial landfill, was pioneering in several respects. In effect, the Basel chemical industry voluntarily internalized the cost and responsibility of waste management, long before the law would actually require every producing-waste firm to do so beginning in 1983 (see Chap. 6). In this respect, the chemical companies can be considered as being over-compliant. The same did not apply to a large number of industries that continued to deposit their waste in public landfills at the cost of municipalities. Furthermore, when the operation of the Bonfol landfill started in 1961, there were practically no legal requirements regarding the management of such installations. For developing a management concept, the BCI relied on the scientific expertise of a hydrogeologist who advocated the installation of a drainage system to collect the leachate of the landfill, and its treatment in an adequate sewage plant, in order to minimize the risks of contamination (Schmassmann, 1961). The same expert explained to the chemical companies that the impermeable nature of the soils in Bonfol partially dispensed of the need for such installations. The expert advised instead that the compartments containing the waste be insulated and that all of the rainwater that accumulated inside these compartments be pumped out to help in avoiding accumulation of rainwater in the landfill and its contamination through contact with waste (Forster, 2000, p. 240). Hence, in the absence of a clear legal standard for managing industrial landfills, the BCI complied instead with the expert's recommendations, and the Bonfol landfill corresponded with the state-of-the-art in landfill technology at the time.

Figure 5.4 charts the network of relations between the actors involved in management of the Bonfol site during this period. The Basel chemical industry clearly was the key actor in management of the site. After having bargained with the municipality of Bonfol for the right to use the site, the BCI operated its landfill almost independently and self-regulated operations with very little interference from public authorities. The municipality lacked the necessary resources or the willingness to exert the control conferred by its status of legal owner of the site. The Canton Bern authorities, which was legally responsible for monitoring of the waters of this remote place in the countryside, delegated this competence and authority to the Basel chemical industry. Furthermore the civil society associations had no rights to participate in the decision process in relation to the landfill at that time. The role of the federal authorities was also very limited, as its competence was restricted to the few dispositions pertaining to controlling the implementation of the national water regulations by the canton. The strong concentration of competence in the hands of the BCI, and the lack of vertical steering by the public authorities hence characterized

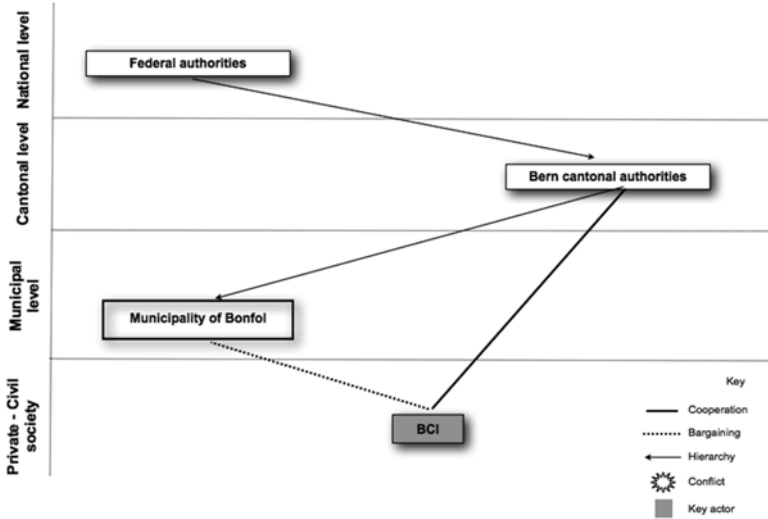


Fig. 5.4 Mode of participation and interaction in the management of the Bonfol site 1955–1970

the decentralized, and liberal corporatist model of participation and interaction of that period (see Sects. 2.4.2.4 and 3.2.2).

Between 1961 and 1976, about 175,000 tons of chemical waste, which were initially declared as innocuous, were buried in the clay of Bonfol. Because the landfill was considered as being sealed, no particular precaution was taken for depositing of the waste. The drums containing toxic matter were not sorted or secured when stored in the landfill body, and some broke open. The first documented pollution problems arose in 1965. The compartments containing the chemical waste were badly insulated. Rainwater filtered through the landfill body, carrying pollutants, and accumulating in the areas of the landfill that were not yet in use. This contaminated water was directly discharged first “by mistake” into the nearby Rosersbach stream. With the authorization of the canton of Bern, the rainwater polluted by the waste was then pumped out and disposed of in the adjacent forest (Forster, 2000, p. 241; interview BCI). This was followed by the visually arresting pollution of the Rosersbach stream, which crosses the French village of Pfetterhouse. This gave rise to a scandal, particularly because the water from the stream was used for fish-farming (interview with the mayor of Pfetterhouse in: Singh & Humbert, 2010).<sup>7</sup> Individual compensations were paid and private arrangements made with the injured parties on an ad-hoc basis with some involvement of the cantonal authorities (interview BCI).

<sup>7</sup>Habitants in the neighborhood described the pollution as visually spectacular (Singh & Humbert, 2010), but according to the tests performed at that time by the BCI the quality of the water in the Rosersbach stream was not threatened by this episode (interview BCI).

After these events, the BCI installed a drainage system to pump the rainwater that had accumulated in the landfill and sent it by truck to Basel. The accounts as to what was done with this water, which must have contained a significant number of chemicals, differ. According to the BCI the polluted water was treated (interview BCI); however the researcher Martin Forter confirms that it was discharged directly into the Rhine (Forter, 2000, p. 241). In any event, despite the new drainage system, the Rosersbach stream was visibly polluted again in 1966. Despite having the necessary legal authorizations, under pressure of the French authorities from the municipality of Pfetterhouse, the BCI decided to stop discharging the leachate in the neighboring forest (Forter, p. 242).

### 5.3 The Environmental Performance of the Bonfol Site Management 1955–1970

The management of the Bonfol landfill between 1961 and 1970 demonstrates the effects of gaps in an institutional regime, and the type of “monocentric governance” that results from the strong concentration of competencies in the hands of firms: although the management concept of the BCI was not only compliant to the law, but innovative in many regards, the weakness of public regulations led to several decisions that were far from optimal from an environmental perspective.

First, if the choice of the site in Bonfol was highly acceptable from a geological point of view, one may well ask whether the company could not have prioritized the construction of an incineration plant for eliminating its chemical waste rather than burying untreated waste in the ground. As a matter of fact, Table 5.1 shows that, in 1969, the 60 % of the waste managed by public authorities and produced by

**Table 5.1** Waste disposal in Switzerland 1969

	Number	Connected residents	Connected municipalities
Incineration plants with heat utilization	10	1,935,800	165
Incineration plants without heat utilization	12	402,300	223
Simple waste composting plants	3	89,500	6
Composting plants with incineration of screenings	1	22,700	8
Combined composting and incineration plants	10	652,400	146
Controlled landfill	7	100,900	42
<i>Total</i>	<i>43</i>	<i>3,203,600</i>	<i>590</i>

Data from Fahrni (2010)



Switzerland's 5.9 million citizens was already being incinerated instead of simply dumped in the ground.

Moreover, according to Martin Forter, the German direct concurrent firm Bayer had already installed an incineration plant for burning chemical waste by 1957, closely followed by BASF in 1960 (Forter, 2010, pp. 50–51), and this can only raise the question of why the BCI did not do the same, instead of burying its toxic waste in Bonfol. The reason is, according to the BCI, that the incineration of hazardous waste was not sufficiently tested by experiment in the early 1960s, and had to be conducted in special plants (Interview BCI). This is due to the fact that chemical waste incineration tends to corrode the chimney of plants designed for household waste incineration, and may generate emissions of noxious gases that need to be filtered. Hazardous waste would be commonly burnt using rotary-kiln incinerators first during the 1980s (Oppelt, 1987). However, Bayer first implemented this technology in 1964 (Forter, 2000, p. 51), and the Basel chemical firms took longer to do so. Sandoz waited until 1968 to build a standard incineration plant for burning hazardous waste, and CIBA operated its first small-scale rotary-kiln incinerator around 1973 (Interview BCI; Forter, 2000, p. 233; Zuppinger & Knoepfel, 1998). The lag-time in adoption of rotary-kiln technology, and the delay in construction of self-operated incinerators by the Swiss firms, relates to the long-lasting opposition of the chemical industries of Basel to assume the cost of chemical waste incineration, as they would have liked, instead, its chemical waste to be dealt with by the public incinerators of the region of Basel (Forter, 2000, pp. 227–236). Taking stock of these facts, it must be concluded that the choice of the BCI to bury chemical waste in Bonfol instead of incinerating them in special installations corresponded to the state of the art in waste management technology. However, it is also true that had the BCI constructed rotary-kiln incinerators earlier, less hazardous waste would have been stored in the Bonfol site.

Regarding the management of the landfill, although the security concept installed was compliant with the scientific recommendations of the expert, it failed to prevent pollution of the surrounding water that prompted vive reactions in neighboring France. This event could have been avoided, if a drainage system and a treatment plant had been installed from the beginning of the operations. Further evidence indicates that the hazardous waste was not treated with due diligence. The fact that the toxic wastes were not sorted, and drums insufficiently sealed, caused toxic substances to mix in the body of the landfill, creating a highly unstable brew that recently triggered a small explosion in the excavation hall used for the remediation process (BCI Betriebs-AG, 14.07.2010).

Moreover, although the BCI's remediation practices in Bonfol had all of the necessary cantonal authorizations, it is difficult to consider the discharge of contaminated water without treatment in the forest as an act that complies with the objective of the Federal Act on the Protection of Waters of 1955 to preserve water from landfill leachates or as a "model" procedure in terms of purification technology. Table 5.2 hence summarizes our assessment of the environmental performance of the management of Bonfol site throughout this period.

**Table 5.2** Environmental performance of the management 1955–1970

Decisions, actions	Compliance	Diligence
Choice of disposing of toxic waste by dumping in the ground	Yes (Authorization by the Canton, Right to use given by the Municipality)	Strong The technology to incinerate chemical waste was not available at the time the choice of disposing waste in Bonfol was made
Choice of the location of the site	Yes	Strong Innovative and exemplary approach of choosing the site according to its geological properties
Way of operating the site	Yes (Absence of clear rules)	Weak A drainage system and treatment plant could have been installed as a matter of course Stocking was problematic as barrels containing chemicals were leaking in the landfill and waste were not sorted systematically
Management of the pollution events of 1965 and 1966	Yes Although the water protection act clearly states that landfill leachates in waters are forbidden, Cantonal authorizations were granted for the disposal of the contaminated water	Weak The contaminated water could have been treated instead of being directly discharged and spread into neighboring surface waters

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## Chapter 6

# Episode II: The Closure of Bonfol Chemical Landfill, the First Remediation Project, and the Second Generation of Environmental Regulations 1971–1994

**Abstract** In the early 1970s, Swiss federal authorities displayed an awareness of the fact that environmental regulations needed to be strengthened in order to guarantee the water quality that was increasingly threatened by waste in solid and liquid forms. The pollution disaster of Schweizerhalle in November 1986 also had a profound impact on attitudes to and perceptions of the risks associated with toxic chemical substances. Between 1971 and 1991, essential pieces of the environmental legislation of Switzerland such as the Environmental Protection Act of 1983 were enacted. The procedural rules for environmental management changed as well; the principle of causality was progressively introduced, the participation of environmental decision-making widened by the right to appeal being conferred on NGOs, and the Confederation played a more active role in steering environmental issues, which induced a form of centralization. Despite these very significant shifts in the institutional regime, the management of the Bonfol site by the Basel Chemical Industry (BCI) was not dramatically impacted. The landfill seems to have been always ahead of its time and already complied to a large extent with the new legal imperatives. Once the landfill reached its maximum capacity in 1976, the operation simply ceased. However, in 1981, the BCI, which had been charged with monitoring of the site by the newly created canton of Jura, noted that the landfill was not completely sealed and that leachate was escaping from the bottom. Before the first legislations explicitly dedicated to contaminated sites management appeared, the BCI carried out a first remediation project, which was viewed as exemplary at the time, but which only postponed the risk of future pollution.

## 6.1 Analysis of the Institutional Regime 1971–1994

### 6.1.1 *Public Policies: The Second Federal Act on the Protection of Waters Against Pollution (LPEP) of 1971*

On 27 October 1967 a federal popular initiative sought to strengthen water regulations and the implication of the Federal State in water pollution management, in order to ensure the integrity of water resources (Conseil Fédéral, 26 août 1970).

This was the trigger to the second Federal Act on the Protection of Waters against Pollution, LPEP (8 octobre 1971), which was far more strict and coherent than its predecessor.

The LPEP defined exactly what was meant by the pollution of water: “any action that can cause a change in the physical, chemical or biological properties of water” (Conseil Fédéral, 26 août 1970, p. 447). With this definition of pollution, the Federal Council expressed the desire to extensively protect water against all possible types of pollution and against any action that *would risk* causing a change in the quality of water (art. 14, para. 1 LPEP). This new definition of the objectives established a kind of *precautionary principle* that would be confirmed by the Federal Supreme Court, for instance, in 1975 in a judgment that confirmed that there was no need for pollution to be demonstrated and proven for acts who jeopardize the quality of water through to be sanctioned (ATF 101 IV 419).

The provisions regarding waste management contained in the new law were also more clearly enunciated. Article 14, paragraph 1 prohibited all deposits of materials in the ground that could cause water pollution and withdrew the option of granting exceptions by the cantons. In addition, article 27, paragraph 3 obliged the cantons to close all landfills that could cause water pollution within a period of 2 years, and to define immediate measures if the need arises. Article 27, paragraph 2 assigned the responsibility for ensuring that all waste, including industrial waste, is collected and disposed of in engineered landfills to the cantons. However, the latter could delegate this task to the municipalities. The cantons had to set up a register of landfills and plan for their additional installation requirements. In reasserting the dominant role of the public authorities in the area of waste, the Federal Council provided current practice with a legal basis which involved wastewater and industrial waste being dealt with by the public authorities and managed in the same installations as those used for household waste (Conseil Fédéral, 26 août 1970, p. 443). However, article 27, paragraph 4 stipulated clearly that highly toxic waste cannot be disposed of in public installations, and must be taken care of by private parties at their own cost. Therefore, although the Confederation recognized in a general way that it was up to the public authorities to deal with waste, the producers of “special”, i.e. hazardous, could be held as completely responsible for its disposal under cantonal supervision.

The Confederation did however not specify in detail how landfills should be remediated and monitored in the LPEP. It was not until 1976 that the Swiss Federal Office for the Environment (FOEN)<sup>1</sup> developed the “directives concerning the location, preparation, operation and monitoring of engineered landfills” (FOEN, 1976). These 1976 directives defined four classes of landfills based on the level of risk they posed (presence of wastewater, and toxicity of the water leaching from the landfill), and defined the types of materials and technical conditions to be fulfilled by the landfill. Given that fly-tipping was prohibited in

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<sup>1</sup> Current name; previously known as the Swiss Agency for the Environment, Forests and Landscape (SAEFL).

principle by law, the landfills had to meet the criteria defined by the FOEN to be considered as engineered or controlled landfills and hence compliant with the requirements of the Water Pollution Act.

### **6.1.2 Public Policies: The Federal Act on the Protection of the Environment (EPA) of 1983**

The EPA (7 October 1983) considerably increased the extent of the institutional regime by dealing with uses of the environment beyond the area of water, including natural resources that were previously left to a large extent unregulated such as air or soil. Interestingly, the soil was initially not considered as part of the natural resources that should benefit from public environmental protection, and the objective of conserving soil integrity (notably against pollution by waste disposal) was introduced later during the policy-making process at the instigation of the parliament (see: Conseil Fédéral, 31 octobre 1979).

It must be underlined that the EPA also profoundly changed the way pollution was dealt with by introducing the objective of limiting polluting emissions at the source, in order to avoid trespassing concentration of pollutions in the environment that were estimated to be dangerous (*immissions*). For the first time, acceptable pollution emissions and concentration were objectified and quantified, and strict measurable limits were posed on the discharge of pollutants by installation such as factories (Knoepfel, Nahrath, Varone, Savary, & en collaboration avec Johann Dupuis, 2010, pp. 161–167). Installations that did not conform to the authorized emission values could be commanded to make mandatory improvements (art. 16 EPA). Improvement, in this instance, would solely involve the implementation of occasional measures aimed at making an installation compliant with the legislation, but not repairing the environmental damage. The owner of the installation was required to intervene at his or her own cost. Remediation in the sense in which it is understood today, that is halting of the pollution and restoration of the environment to a state of contamination acceptable to humans and living creatures, did not emerge until the revision of the EPA of 1995 (see Sect. 7.1.1).

It was through the EPA that waste began to be regulated specifically. The EPA defined waste (art. 7, para. 6) as: “any moveable material disposed of by its holder or the disposal of which is required in the public interest”. In addition, article 32 of the EPA stipulated that the Federal Council should enact regulations on the management of hazardous waste and the operation of landfills. Article 26 also prohibited companies from placing on the market substances that are potentially hazardous to the environment, so as to limit the problem of hazardous waste in the future. Finally, article 28 also stipulated that the use of all substances and their storage must comply with the rules for protection of the environment.

Perhaps more importantly, the EPA marked a switch from the approach taken by the first and the second acts on the protection of waters with regards to the question of the responsibility for industrial waste disposal, and definitively settled the conflict

between public authorities and private companies on this matter. Whereas the water acts only implied that public authorities could force private actors to treat their waste themselves, if their polluting nature hindered their management in public facilities, the EPA clearly and definitely attributed the responsibility of waste disposal to the waste producer in every instance (art. 30). From 1983 onwards, every industry was responsible for eliminating its waste. The cantons or municipalities could still, of course, take care of industrial waste, but they were encouraged not to do so. The cantons retained a monitoring and planning duty in relation to landfills and were still responsible for household waste.

Finally, the EPA introduced a key procedural innovation into Switzerland's environmental legislation. The right of appeal of environmental NGOs (art. 55), which already featured (in a restricted way) in the Federal Act on the Protection of Nature and Cultural Heritage (NCHA) (1 July 1966), was extended to all of the environmental decisions covered by EPA that required an impact assessment (art. 9). The right to appeal, conferred on the NGOs a means to intervene in the environmental management processes that were before restricted to the participation of public authorities, polluting firms, and private owners. This new provision originated from the Federal authorities' view that, in many cases, decisions that damage the environment and the public interest were too often taken because the circle of entities that could participate in decision-making was too closed, and excluded participation of the social forces that defended environmental interests. (Conseil Fédéral, 31 octobre 1979, pp. 817–818). It is unlikely that the importance of this new legal provision was understood at the time. In effect, while little use was made of the right of appeal in the early years after its establishment, today, it has become the main instrument used by NGOs to influence decisions relating to the environment. Thus, the right of appeal significantly altered the structure of the bilateral and neo-corporatist relations that had existed between industry and public authorities hitherto with regards to public decisions of an environmental relevance.

### ***6.1.3 Public Policies: The Ordinance on Soil Pollution of 1986 (Soilpo)***

The EPA was a framework law that needed to be clarified by domain-specific ordinances. The purpose of the Ordinance on the Pollution of Soil (SoilPO) (9 June 1986) was hence to give concrete expression to the generic objective of guaranteeing the fertility of soils as mentioned in the EPA. This ordinance defined indicative values for soils which, if exceeded, meant that their fertility was under threat. To verify the state of soils, it was planned that the Confederation would establish a system for observing the damage already done to soils (Swiss Soil Monitoring Network, NABO); the cantons would bear the operative responsibility for this system.

However, the impact values used by this monitoring system were merely indicative in nature. In cases in which they were exceeded or in which the fertility of the

soil could no longer be guaranteed, the cantons were obliged to enquire about the sources of pollution but not to take any supplementary measures. Hence, there was no obligation to remediate in the case of the heavy pollution of soil. This situation strongly contrasted with the water protection regime as the corresponding regime for soil protection lagged almost 30 years behind.

### **6.1.4 Public Policies: The Technical Ordinance on Waste of 1990 (TOW)**

In 1986 occurred the pollution disaster of “Schweizerhalle”. About 1,250 tons of chemical products went on fire in a storage depot belonging to the chemical company Sandoz between Muttentz and Pratteln in the Basel region. The fire released a cloud of smoke and the water used by the fire brigade ended up in the Rhine where it caused large-scale fish death and massive pollution (Giger, 2009).

The disaster of Schweizerhalle provoked, in part at least, the rapid adoption of two ordinances which would complement and reinforce the EPA. The first was the Technical Ordinance on Waste of 1990 (TOW) (10 December 1990), which was followed by the Ordinance on Protection Against Major Accidents (MAO) of 1991 (27 February 1991). These two texts significantly tightened the regulation of hazardous waste.

Up to enactment of the TOW, the majority of the requirements concerning waste and hazardous waste were dispersed across several legislative texts, in particular the water acts, the EPA and the specific directives enacted by the cantons and the FOEN. The TOW of 1990 unified these legislations, required significantly increased monitoring of controlled landfills and provided far greater detail on the framework conditions stipulated by the FOEN’s directive of 1976. In addition, the TOW strictly and definitely prohibited the creation of hazardous waste landfills like the one of Bonfol in Switzerland.

The TOW defines three categories of landfills based on their degree of dangerousness: landfills for inert materials, landfills for stabilized residues and bioactive landfills, whose instability could render them dangerous. The Water Pollution Act of 1972 and article 10 of the EPA already restricted the options for establishing landfills in areas in which their sealing could not be guaranteed, and in the vicinity of watercourses or catchments. The TOW provides more detail on the modes of operation, sealing, water evacuation, degasification and the measures to be implemented to ensure the definitive closure of the three types of landfills (Appendix 2 TOW).

The TOW also requires the cantons to create a register of abandoned and operative landfills. The inventory had to indicate in particular the types and quantities of waste stored and the measures taken to seal the landfill and evacuate the water. Article 28 of the TOW stipulates that the cantonal authority must monitor closed-down landfills at least twice yearly until it deemed that it was “unlikely that the controlled landfill could still cause harmful or disturbing environmental impacts”. This monitoring had to be carried out for at least 15 years after the date of closure of a bioactive landfill like Bonfol. Following the closure of a landfill, in accordance

with the EPA, the cantonal authority had to ensure that the layer of soil with which the abandoned landfills are usually covered is fertile. If the authority confirmed that a controlled landfill does not fulfill the TOW criteria, it had to order the owner to carry out the necessary remedial measures by a specified deadline. In urgent cases, the authority can act or delegate the necessary work at the cost of the operator of the landfill (polluter must pay principle).

Therefore, while the TOW mainly specifies the minimum technical measures to be implemented by the operators of bioactive landfills, it also imposed a significant task on the cantons in relation to the duty of monitoring. However, the TOW did not enforce environmental remediation in case of leakages, but was limited to provisions on how to control hazardous landfills.

### ***6.1.5 Public Policies vs. Private Laws: The Reform of the Civil Responsibility Towards New Forms of Liability for Environmental Harm***

One of the most important changes in the institutional regime of this period (1971–1994) pertains to the attempt to introduce new forms of environmental liability in the public law. Taking note of the difficulty to sanction polluters based on the private law (see 5.1.1), the Federal authorities introduced *a causal responsibility for all damage to water* through the LPEP 1971 (for a critical commentary see: Widmer & Wessner, 1999). Article 36 of the LPEP hence stated that: “persons whose companies or installations pollute water or who pollute it through their actions or omissions are responsible for the resulting damage”. Article 36 attributed the responsibility for damage caused to water by priority to the person who causes the pollution through his action (*perturbateur par comportement*, “*disturber through behavior*”) instead of to the owner of an installation (*perturbateur par situation*, “*disturber through situation*”). This turnaround compared to the private law provisions was also accompanied by a large increase in the extent of the responsibility. In contrast for instance to article 41 of the CO (see Sect. 5.1.1) an individual must not necessarily have broken the law or failed to comply with the duty of care and diligence (art. 13) to be held responsible for eventual damages to waters arising from his actions (Conseil Fédéral, 26 août 1970, p. 476). The result of the behavior, namely the state of pollution, was hence sufficient to consider the individual liable for any damage. This extended liability for harms to the waters did not apply solely to high-risk installations but to every individual and to the public authorities (art. 36 para. 4). In contrast to civil law procedures, the burden of proof in this case was on the polluter. Hence, a man could only be exonerated from his responsibility if he succeeded in demonstrating that the damage was due to *force majeure* or a serious error on the part of the injured part or a third party (art. 36, para. 2). The LPEP 1971 also increased sanctions and fines and introduced criminal prosecution that could lead to the imprisonment of “voluntary” polluters (art. 37 LPEP).

Surprisingly, the EPA of 1983 marked a step backwards in relation to the strong liability established by the LPEP, and did not translate the causal responsibility for damages to waters to other environmental areas. The meaning of the causality principle introduced by the LPEP was also changed. Article 2 of the EPA hence states that: “Anyone who causes measures to be taken under this Act must bear the costs”. Further on, in the procedural section, article 59 stipulates that “The cost of measures taken by the authorities to prevent imminent pollution of the environment, to establish its existence, or to remedy it are charged to the person responsible for the pollution”. Article 2 and 59 of the EPA hence restricted the principle of causality to a formulation which concerned foremost public authorities who could (but did not have to) apply the “polluter must pay” principle by assigning the cost of any public action for preventing or remediating pollution to the polluter. The reason for this backwards step was simple. In the name of the public interest, the causal responsibility for damages to water introduced by the LPEP strongly conflicted with the civil responsibility as defined in the private law provisions. The severity of the liability regime implied by the LPEP resulted in the fact that it could not be implemented and no decision of the Federal Supreme Court applied it strictly for the 20 years that it was in force (Conseil Fédéral, 29 avril 1987, pp. 1183–1187). The EPA of 1983 hence failed to establish a form of civil responsibility that would go beyond the limitation of the private law, for instance, by covering harm to the wider environment or introducing liability for lawful pollution acts (see Sects. 3.2.2.3 and 5.1.1). It must be underlined that even nowadays, the Federal authorities have failed to introduce causal responsibility for environmental harm through a reform of the civil responsibility provisions, due notably to the opposition of economic interest groups (Office fédéral de la justice, 2004, p. 183, 2009).

The EPA of 1983 found, however, an alternative way of strengthening the liability for pollution acts by establishing new form of liabilities linked to specific installations or assets that put the environment at risk (Faeh, 2007). The owners or operators of installations which were deemed as posing a special threat to the environment and the population were responsible for guaranteeing the safety and conformity of their installations, namely the so-called *responsibility for environmental risk creation* (art. 10 LPE). The law cited, in particular, the obligation to monitor the installation, to organize an alerting system and to take the measures necessary to avoid all problematical situations. The EPA of 1983, which was formulated before the Schweizerhalle accident of 1986, did however not specify the scope of the liability and the extent to which the operator of a risky installation must assume all of the social and ecological costs in case of disaster occurrence.

These gaps were partially filled by the new Federal Act on the Protection of Waters (WPA) (24 January 1991), which definitively revoked the LPEP and its strong liability regime. Article 69 of the WPA stipulates therefore that: “The owner of an establishment or fixed or mobile installation that may pose a particular threat to water is responsible for any damage done to it”. In cases in which a company or installation,



e.g. landfill, posed a particular threat to water, irrespective of the presence of a fault, it was sufficient for the risk to materialize for the operator to be held responsible (Conseil Fédéral, 1987, pp. 1183–1187). Hence, in reality, what was involved here was a causal responsibility for damage to the waters—alike to the one proposed in the Water Pollution Act of 1971 – which, however, only applied to a limited number of prone-to-risk installations.

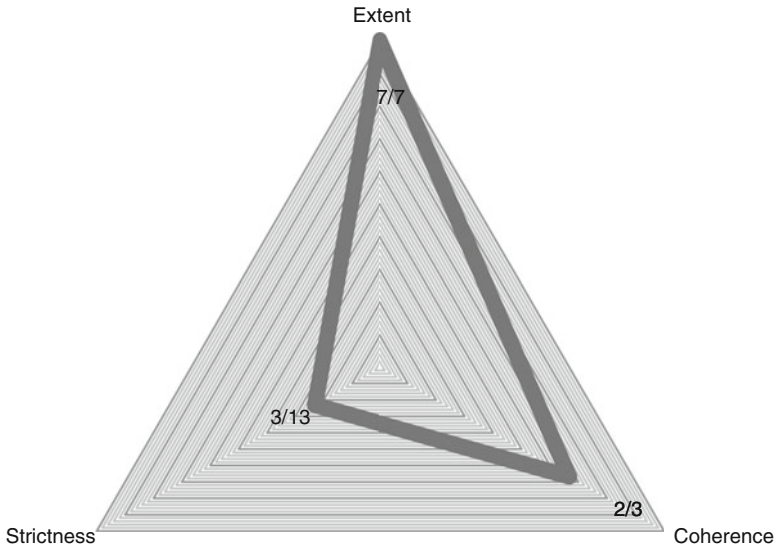
The Ordinance on the Protection against Major Accidents (MAO) completed (27 February 1991) by requiring the remediation of damage to the wider environment in these provisions cases in which a major accident was caused by an installation at risk (art. 11, para. c). However, it involved an obligation in principle without any concrete requirements being imposed as yet with regard to the means and ambitions of environmental remediations. Hence, the question of the each extent of the liability for harms to the wider environment in the case of risky installations such as controlled landfills would only be settled by the revised EPA of 1995 (see Sect. 7.1.2).

The implementation of these liability principles remained difficult throughout this period. In effect, in the many cases in which environmental pollution was caused not by one but several actors (diffuse pollution), or in cases in which the authors of the pollution could not be clearly identified (amalgamations, bankruptcies, relocation), the State continued to bear the costs. In reality, the implementation of the principle of causal responsibility or the polluter pay principle relied on the good will of the cantonal authorities. Moreover the good will of implementing liability principles also depended on the nature of the natural resources involved. The principle of causal responsibility, for instance, was generally more strictly applied in the case of water management than in the cases of soil or air protection.

### ***6.1.6 Extent, Coherence and Strictness of the Institutional Regime of 1971–1994***

Figure 6.1 summarizes our assessment of the institutional regime for the period between 1971 and 1994. After the entry in force of the EPA of 1983, all of the uses that may contribute to contamination became regulated (extent of 7 out of 7). For instance, formal provisions yet existed on: the production of waste (art. EPA 26); the discharge of wastewaters in the soil or in the water (art. 15 LPEP 197); the storage of solid waste (art. 30-32 EPA); the emission of atmospheric pollutants (Ordinance on Air Pollution Control, 16 December 1985); the harm to the biodiversity, (LChP, 20 juin 1986); and finally the risk of future damage, which is taken into account by the Major Accidents Ordinance (MAO) and the Federal Act on the Protection of Waters (WPA) of 1991. Of course, the sole presence of a regulatory act does not guarantee that the regulation will be effective, and coherence of the institutional regime is indeed average (2/3) as considerable imbalances can be observed in the way in which the different natural resources are taken into account. Hence, although the qualitative protection of soil was supposed to be one of the Confederation's





**Fig. 6.1** Evaluation of the institutional regime 1971–1994

objectives at that point, no instrument was planned for intervention in this area. Furthermore, the different interpretations of the causal responsibility principle included in the Water Pollution Act of 1971 and in the private law weakened the applicability of the regime. The regime is as strict as the previous one (3/13). The prohibitions are obviously defined in more severe terms: deadlines were defined for the closure of landfills that leak pollution into surface water and groundwater, a number of exceptions were eliminated, and custodial sentences were introduced in the case of serious and voluntary pollution. However, the low score is due to the absence of provisions pertaining to environment remediation (see Fig. 2.2). Pollution prevention is still understood as making installations compliant with emission/impact threshold values through occasional measures. The need to guarantee the integrity of the environment through the definitive remediation of polluted areas did thus not emerge until 1998 and the enactment of the Ordinance on the Remediation of Contaminated Sites (CSO) (26 August 1998).

## 6.2 The Environmental Management Process: The Closure of the Landfill and the First Remediation Project 1971–1994

In 1976, the last consignments of waste were deposited in Bonfol landfill and operations there ceased. The reason for the halting of operation was simple: the landfill was completely full. In accordance with the regulations of that time, the landfill was

covered with a 1.5 to 2.5-m-thick layer of soil, on which trees were planted. The aim of covering the landfill was, first, to limit the infiltration of rainwater and, therefore, the exfiltration of leachate that could pose a threat to nearby waters, and, second, to prevent people coming into direct contact with the toxic waste. Hence, the closure of the landfill was compliant with the FOEN's directives of 1976. The BCI also implemented a program for monitoring the landfill under the supervision of the newly created (since 1979) Canton of Jura.<sup>2</sup>

However, the soil cover was not completely impermeable and the clay pit filled with rainwater through infiltration. In 1981, the monitoring program of the BCI reported that exfiltrations of water were being produced (BCI, internal document). These leachate leaks were, of course, likely to cause the pollution of surface waters near the landfill and the groundwater below it. Moreover, the overflow of water posed a risk to the stability of the landfill which was sliding in the direction of the nearby rail track (Forster, 2000, p. 242). Soil quality measurements revealed that the soil in the vicinity of the landfill was badly contaminated. Despite the leachate leaks, the BCI stated that no pollution could be detected in the groundwater flowing below the landfill (BCI, internal document). In accordance with the Water Pollution Act of 1971 (art. 36), the BCI could have been sanctioned for the risk that its activities posed to water even though it had demonstrated a certain due diligence in management of the landfill. Moreover, according to Federal Supreme Court case law (ATF 101 IV 419), it was not necessary for the pollution of groundwater to be scientifically proven for the polluter to be held responsible in accordance with the law. The WPA of 1971 clearly stipulated that landfills must not leak into waters; hence the BCI could have been sanctioned on this basis by the cantonal authorities. To our knowledge, however, this did not occur, which demonstrates the lack of control of the landfill by the cantonal authorities in those days, and the failure to strictly implement the LPEP.

The BCI reacted quickly to the pollution caused by its landfill. As an emergency measure and to avoid any further exfiltration, the BCI reduced the level of water in the landfill by pumping the infiltrated water and transporting it to the water treatment plant which had been available to the Basel chemical industry since 1982. Between 1982 and 1988, 17,000 cubic meters of contaminated water were repatriated to Basel (Forster, 2000, p. 242). In a second phase, several possible variants were examined for conducting this first environment remediation of a chemical waste landfill in Switzerland. Remediation solutions involving the excavation and incineration of the waste were rapidly excluded because the public incineration plants did not have the capacity necessary to deal with the 175,000 tons of special and potentially hazardous waste contained in the landfill. Moreover, hazardous waste had never before been excavated from a landfill in Switzerland, and, above all, cantonal authorities had never ordered a private actor to carry out and finance such a costly measure in Switzerland. With the agreement of the authorities of the Canton of Jura, it was decided, therefore, that the BCI would implement the concept already proposed by the scientific expert in 1961 for ensuring the safety of

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<sup>2</sup>The Bonfol region was previously under the jurisdiction of the Canton Bern (see Chap. 5).

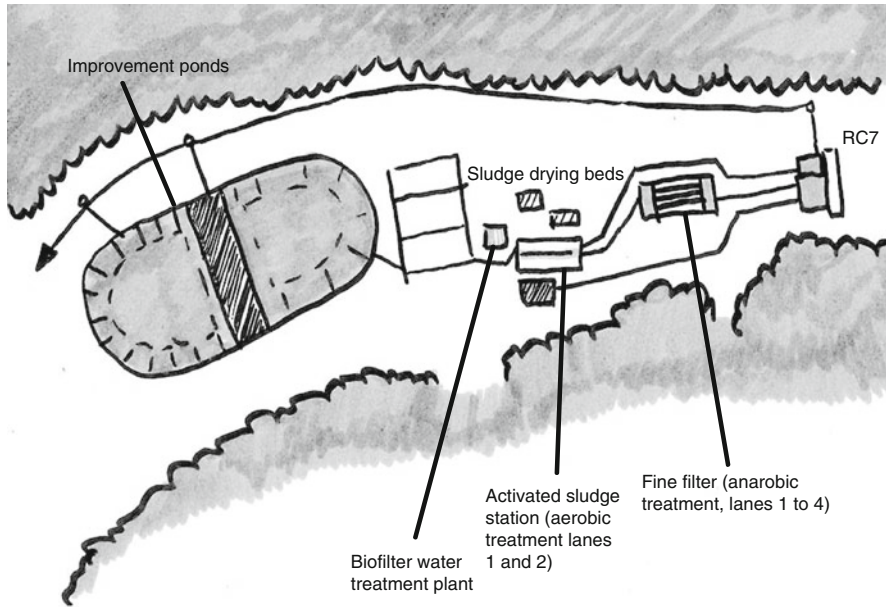


Fig. 6.2 Bonfol water treatment plant (Data from BCI, internal document)

landfills (see Sect. 5.2). Between 1985 and 1995 the BCI invested CHF 28 million and installed systems for draining and confining the leachate plus a water treatment plant (see Fig. 6.2) for the in-situ treatment of the contaminated water (the so-called pump and treat system). The sealing of the landfill was also improved by adding a multi-layered cover on top of the landfill body, which was believed to diminish the risk of such pollution events occurring again. A new concept for safety and the more extensive monitoring of leaks were also implemented in accordance with the cantonal authorities. One hundred measurement points were established around the landfill and treatment installations. The BCI carried out the monitoring independently and had to submit a complete report on the state of the site to the cantonal authority annually.

Hence, the BCI ensured that the risk posed by the landfill to the environment and the population had been stabilized. A slow infiltration of rainwater into the landfill was however inevitable, but the landfill leachate was now pumped and treated directly on site. According to the BCI, after final treatment in the improvement ponds the highly contaminated water was clean enough for fish life to develop there, and it complied with the standards relating to the quality of water discharged into surface waters stipulated in the Ordinance on the Application of the Water Protection Act (19 juin 1972; BCI, internal document). The landfill necessitated permanent control measures, monitoring of the environment and treatment of the exfiltration water. Furthermore, the site in this state would be only fit for use as a forest area (fitness-for use approach). Changes of the land use towards agricultural production

or the exploitation of groundwater resources would be clearly problematical due to the risks posed by the landfill. However, according to the FOEN, the remediation measures carried out in Bonfol in the second half of the 1980s corresponded to international standards for the remediation of contaminated sites (Wenger, 2009). Once again the landfill management qualified as a pioneer model, as the BCI carried an environmental remediation before the enactment of the legislation dedicated to how polluted sites should be remediated.

In compensation for the inconvenience caused to the area in the vicinity of the landfill, chemical companies resorted to private arrangements with the victims. The BCI made a donation of CHF 40,000 to the municipality of Bonfol for a sports complex. In addition, the BCI has paid an annual sum of CHF 50,000 per year since 1986 by way of compensation for the inconvenience associated with the establishment of the landfill on municipal lands (Commune de Bonfol, 2000, p. 9). This implicit compensation of the landowner for the environmental damage caused contribute to explain why the municipality of Bonfol did not initiate a case under private law against the BCI.

As the operator of the landfill, the BCI acknowledged its responsibility for financing and carrying out the remediation measures and again was the main actor involved in the management process for the site during that period. The model of participation and interaction remained liberal neo-corporatist in nature during this period (see Fig. 6.3). The major changes that occurred were purely institutional, namely the creation of the Canton of Jura in 1979 which, in accordance with the law, would assume responsibility for control of the closed-down landfills and for application of environmental regulations. The canton of Jura, as the Canton of Bern did in the past, largely delegated its competence of control and monitoring to the

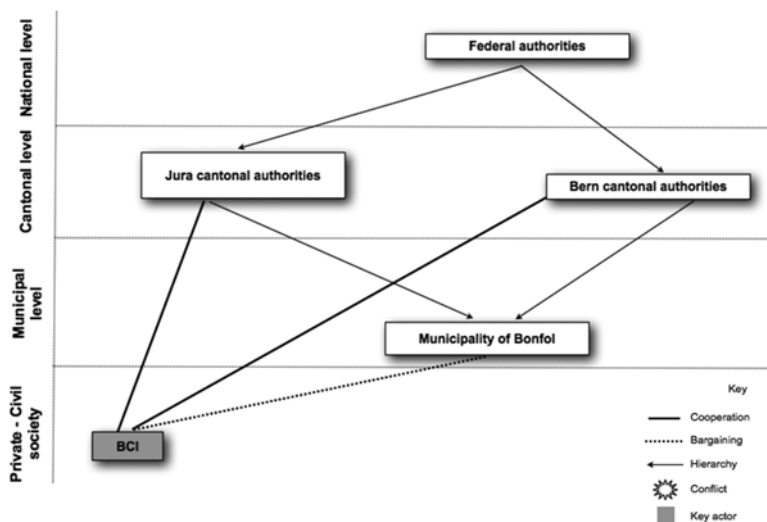


Fig. 6.3 Mode of participation and interaction in the management of the Bonfol site 1971–1994

BCI, and merely agreed to the decisions taken by the chemical companies. The use of hierarchical steering from the authority was limited to the very distant monitoring of the site and the BCI's practices. Acting under "the shadow of hierarchy" (Scharpf, 1997), the BCI avoided being restricted by the institutional regime by demonstrating the capacity to manage the site on its own. The BCI did not wait for the cantonal authorities to order the remediation of the Bonfol site, but anticipated this potential loss of autonomy by reacting quickly to the pollution episode. The BCI enjoyed very extensive autonomy, and in the absence of legislation on environmental remediation self-decided the remediation techniques and objectives that should apply. The public authorities of the newly created Canton of Jura also preferred to maintain their cooperation with the chemical companies rather than use their coercive power. Hence, they did not condemn the fact that water had been placed at risk by the plant, despite that they would have been justified in doing so under the 1971 LPEP.

Although the negative externalities caused by the landfill were controlled by the BCI, the remediation measures implemented were not definitive. It would always have been necessary to treat the landfill water and, with time, the soil cover and water treatment plant would have to be replaced. However, the BCI believed that no further major intervention would be required from that point. The story might have ended there were it not for revision of the EPA (24 March 1995) and enactment of the Ordinance on the Remediation of Contaminated Sites (CSO) that followed in 1998 which further increased the exigencies of environmental regulations.

### **6.3 The Environmental Performance of the Bonfol Site Management 1971–1994**

Apart from the objectives and strict requirements of the Federal Act on the Protection of Waters against Pollution (WPA) of 1971, which explain in part why the Basel chemical industry reacted so quickly to the detection of leaks from its landfill in 1981, the legislative changes introduced during this period only had a minor influence on the management of the site. In effect, the BCI anticipated by far the legal requirements for its landfill. For instance, the entry into force of the EPA in 1986, which attributed the responsibility of waste elimination to waste producers, had absolutely no influence on the management of the landfill, as the BCI already bore full responsibility for the disposal of its waste in Bonfol.

The remediation measures implemented in Bonfol again reflected the gaps in the regime and the liberal corporatist mode of interaction. In accordance with the EPA of 1983, the remediation exclusively concerned an installation that was problematic with respect to the volumes of emissions it generated and not the restoration of the environment. Moreover, the entire remediation concept implemented in Bonfol was focused on water management. The fumes that may have been emitted into the air and, more generally, the contamination of the soil in the areas surrounding the landfill did not appear to cause any concern to either the BCI or the cantonal authorities. However, based on the Novartis archives, Martin Forter suggests that

the emissions released into the air from the landfill exceeded the limits authorized by the cantonal legislation on construction (Forter, 2000, p. 242).

Regarding the practices of the time, the remediation model used was relatively pioneering in the context of Switzerland (responsibility and financing by the polluter, confinement and treatment of the waste posing a threat to waters in a water treatment plant). However, three reservations should be noted here. First, it is surprising that it was necessary to wait 20 years for the landfill safety measures recommended by the scientific expert (drainage and water treatment) to be implemented in Bonfol.<sup>3</sup>

Second, irrespective of the fact that confinement was the most common practice used in the management of contaminated sites at the time, it is legitimate to ask why the waste contained in the landfill could not be excavated and incinerated when this first remediation project was carried out. If the then capacity of public incineration plants did not enable the processing of extra waste originating from the old landfill in Bonfol, the chemical industry in Basel probably could have built or contributed to the construction of an incinerator suitable for the incineration of hazardous waste. Forter suggests that Basel chemical industry's reason for not opting for this solution was the cost. In comparison, in the Lekkerkerk case in Holland, in which a large landfill containing chemical waste was discovered under a village, the waste was excavated from the ground in the early 1980s and incinerated (Kingsbury & Bingham, 1992; Veenman, 2006). Hence, the BCI did not excavate and incinerate its waste because it was technically impossible, but because this was not standard practice in Switzerland at that time, and was not required by any legal provisions. However, the environmental technology for carrying out such remediation measures was already available. Only the cost of such process, and the risks of excavating that were due to the fact that the BCI problematically ignored what sort of chemical waste were mixed in its landfill explain why excavation was not considered at all.

Finally, the remediation measures implemented in Bonfol did not completely eliminate the risk of water being contaminated. In effect, even if most of the leachate from the landfill was pumped through the drainage system, exfiltration continued to be produced in the direction of groundwaters. Although, according to the BCI, the volume of this exfiltration was not significant (it did not pose a serious threat to the groundwater resources in the area), this "controlled" situation would appear to have been rather unsatisfactory in the light of the ambitious objectives of the Water Pollution Act of 1971, which totally forbid leaks from landfills in the water. The canton of Jura was informed of the existence of these leaks through the BCI's monitoring reports. However, although the objective situation of the landfill and its exfiltration was known to the authorities, it was only with the entry into force of the future CSO in 1998 that the waste from the landfill and the risks it posed to future generations were no longer deemed as acceptable. Table 6.1 summarizes our assessment of the environmental management of the landfill for this period (1971–1974).

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<sup>3</sup>It is true that the expert himself initially believed that these precautionary measures were not necessarily required in Bonfol due to the natural impermeability of the soil, which was thought to provide a sufficient protection against polluting leakages.

**Table 6.1** Environmental performance of the management 1971–1994

Decisions, actions	Compliance	Diligence
Closure of the landfill	Yes	Average
	Complied with the later 1976 FOEN directive	Installation of a clay cover and replanting of trees on the cover. However, the cover was insufficiently sealed which is why rainwater infiltrated.
Decision to remediate	Yes	Strong
	Based on the imperative stated by the LPEP of 1971 that leakages must not pollute waters	One of the first cases in Switzerland involving large-scale remediation implemented and financed by private actors
Management of the pollution event	Yes	Average
	Because everything was done under Cantonal authorization. However, seepages from the landfill were unlawful according to the LPEP of 1971.	Even after the remediation, continuing presence of low-level seepage into the waters

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## Chapter 7

# Episode III: The Birth of a Contaminated Sites Policy and the Struggle Over the Definitive Remediation of the Bonfol Site (1995–2000)

**Abstract** After the establishment of a register of abandoned landfills as required by the Technical Ordinance on Waste (TOW) (10 December 1990), the Swiss Cantons realized the gruesome legacy of past waste management practices, and requested the help of the Confederation to deal with the problem of contaminated areas. A shift in the institutional regime was initiated through a revision of the Environmental Protection act (EPA) in 1995, which integrated the first law basis of contaminated sites management. The Confederation focused on providing a flexible legal framework that enabled case-by-case regulation, limited the production of legal procedures, and encouraged cooperation between public and private actors involved in contaminated sites management. These changes in the institutional regime had a major impact on the management of the Bonfol site. For the first time since the decision of the Basel chemical industry (BCI) to operate its own landfill in Bonfol in 1961, the legislator's requirements exceeded the BCI's current practices and obliged it to carry a new and complete remediation of the site. However, the newly created institutional regime was still ambiguous on numerous points, which gave rise to conflictual negotiations between the canton of Jura, and the BCI about the remediation of the Bonfol site. Initially reluctant to give in to the canton's demands to fully remediate the site at its own cost, the BCI ended up agreeing, thanks to the joint and additional pressure of the Confederation and environmental NGOs, which invited themselves to the negotiating table while lending a very high media profile to the affair.

## 7.1 Analysis of the Institutional Regime 1995–2000

### 7.1.1 Public Policies: The Revision of The EPA of 1995

Since the end of the 1980s, the awareness of the problem constituted by waste disposal and subsequent contamination grew. The political pressure on establishing a stronger institutional regime for dealing with sites contamination increased accordingly. Several cantons, and political parties put pressure on the Federal Council for the enactment of new legal rules on the matter (Conseil Fédéral, 1993, pp. 1379–1380). Against this backdrop, a new version of the Environmental

Protection Act (EPA) (24 March 1995) was proposed and founded the nowadays basis of the legal obligation to remediate contaminated sites in Switzerland.

The public mission of guaranteeing the integrity of the soil, (see the Ordinance on the Pollution of Soil, SoilPO (1 July 1998)), the air (Ordinance on Air Pollution Control, OAPC (Conseil Fédéral, 16 December 1985)), and the surface and ground waters (Federal Act on the Protection of Waters, WPA (24 January 1991)) forms the basis of the concept of environmental remediation in Switzerland. However, contaminated sites management in Switzerland falls mostly within the framework of waste policy. Article 32c of the EPA hence requires that a site be remediated if the presence of waste “*leads to harmful effects or nuisances or if there is a concrete risk that such effects may arise*”. Remediation, as so defined, must eliminate the current nuisances and the reemergence of any such risk in the future in relation to waste in solid or liquid forms. Heavy pollutions of the water or the soil in sites that result from other things than waste, for instance, contaminations following overuse of pesticides or fertilizers are not part of what the public authorities consider as contamination, which actually limits the scope of application of the institutional regime for contaminated sites.

### ***7.1.2 Private Law vs. Public Policies: The Liability for Environmental Harm in the EPA of 1995***

To what concerns the responsibility of the remediation of contaminated sites, the Article 32d of the EPA of 1995 reiterates the principle of the polluter-pays: “The person responsible bears the costs of the measures required to (...) remediate polluted sites”. It should be stressed however that article 32d goes beyond the traditional application of the polluter-pays principle under the previous EPA of 1983. It no longer involves a discretionary solution which enables the cantonal authorities to assign the cost of prevention and remediation measures to the responsible persons, but constitutes instead a legal obligation that forces the Cantons to seek the responsible persons which must pay for and carry the remediation.

Paragraph 2 stipulates that if the pollution is caused by more than one person, they must assume the costs “according to their shares of the responsibility”. The public authority concerned may decide on the allocation of these costs (par. 3). However, this is if the person responsible for the remediation requests it: a private contract between the parties concerned regarding the burden sharing is sufficient in accordance with the law. Eventually, the public law decision on the allocation of costs could come into conflict with existing private arrangements regarding the sharing of remediation costs, a situation that would appear to be legally problematic (CEATE, 2002, p. 4554; Romy, 2010).

Paragraph 2 also confirms the supremacy of the causal responsibility of the polluter by behavior over the responsibility of the owner which prevailed in the private law. It stipulates that the person who causes the remediation through his behavior (landfill operator or producers of waste) shall assume the main proportion of the costs.

The owner of the site shall also participate in the cost, but may be exempted if he fulfills three conditions:

1. Even by exercising due diligence, he could not have had any knowledge of the pollution.
2. He did not gain any benefit from the pollution.
3. He shall not gain any benefit from the remediation.

However, these clauses dealing with exclusion of the responsibility of site owners were ambiguous and unsatisfactory as the owner will benefit from the remediation by definition (CEATE, 2002). This ambiguity in the definition of responsibilities generated conflicts between the actors involved in remediation projects who were trying to minimize their share of the cost, as the extent to which the owner could be made to contribute was unclear.<sup>1</sup>

If the owner or operator of a landfill cannot be identified or remains insolvent despite all necessary precautions, article 32d stipulates that the cantons must assume the remediation costs. Hence, to ensure that the cantons do not refrain from remediating sites for cost reasons, article 32e, introduced a form of insurance that would cover the cost of remediation assigned to public entities. This public insurance takes the form of federal subsidies that are financed by a tax on the owners of controlled landfills. These federal subsidies may only be paid if “the person responsible cannot be identified, is unable to pay or a significant proportion of the waste deposited on the site is domestic (*public*) waste”<sup>2</sup> (Paragraph 3c). The details regarding the implementation of these requirements would be provided in the Ordinance on the Charge for the Remediation of Contaminated Sites (OCRCS) (5 April 2000) (see Sect. 8.1.1).

The question of the extent of the liability for environmental harms in case of recognized contaminations caused by risky installations such as controlled landfills is dealt with by article 59a. While, article 59a held the polluter liable even in the absence of a clear fault, it is worthwhile to note that article 59a initially excluded the pure “damage to the environment”.<sup>3</sup> Article 59a suggested that the polluter would only be responsible for damage to the environment to the extent that it poses a threat to the interests of private persons or the public interest (e.g. fertility of productive soil). This limitation of the scope of the responsibility arose because the Federal Council feared the political opposition of business circles and certain cantons. Moreover, the Federal Council would have liked the question of the

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<sup>1</sup>This question would largely be clarified by case law and by the expert report by Professor Tschannen which was commissioned by the FOEN (Tschannen & Frick, 2002).

<sup>2</sup>Italic added by the authors.

<sup>3</sup>It is again interesting to see that the EPA of 1995 was again less strict with regards to the liability for environmental harm compared to the WPA of 1991:

Art. 59a EPA of 1995: “The owner of an establishment or an installation that represents a special threat to the environment is liable for the loss or damage arising from effects that occur when this threat becomes a reality. Actual damage to the environment is excepted.” (italic by the authors). Whereas, the art. 69 WPA of 1991 stated;

“The owner of a fixed or mobile installation that may pose a particular threat to waters is liable for all damage caused to them.”

responsibility for harms to the wider environment to be regulated by private law through reform of the Swiss Civil Code (Conseil Fédéral, 1993, pp. 1444–1448), which however failed (see Sect. 6.1.5). Although the formulation of article 59a was unsatisfactory, even in the eyes of the legislator, the idea of the strict liability of the polluter for environmental damage was put aside. This had clear consequences for the ways environmental remediation would be carried out: except for waters, which were protected by a strong liability regime (see Sect. 6.1.5), the civil responsibility of the polluter to remediate the polluted environment was limited to the parts of the environment that were under a formal private or a public property regime, excluding for instance biodiversity (Conseil Fédéral, 1993, p. 1447) and more generally, the ecosystem services provided by nature that are not covered by property rights (see: Knoepfel & de Buren, 2011). Also a fundamental incoherence was left between the liability provisions that covered waters, and other natural resources such as the underground or the air on which existing property rights, and hence the liability provisions, were far less secured.

### ***7.1.3 Public Policies: The Ordinance on the Remediation of Contaminated Sites (CSO) 1998***

The CSO (26 August 1998) specifies the procedures through which contaminated sites must be remediated, the criteria for the selection of these sites and the objectives of remediation. According to the CSO, the remediation process should proceed as follows: first, each canton must compile a register of polluted sites by 31 December 2003, at the latest.<sup>4</sup> Before a site is included in the register, the canton must notify its owner and make a declaratory ruling that may be contested. The register must specify, in particular, the location of the site, the type and quantity of the waste deposited there, the environmental protection measures already taken, the damage already confirmed and potential future threats (art. 5 and 6). Based on this information, the cantons must then classify the sites in two categories, the first involving those from which no damage or nuisance is expected that would justify remediation, and the second for those which require additional investigations. For sites in the second category, the cantons must request the completion of a historical investigation by the polluter, which would enable the identification of the probable causes of the pollution, and a technical investigation with a view to identifying the monitoring and remediation needs (art. 7).

The Canton then determines whether remediation is necessary on the basis of these investigations. This is decided in terms of the objectives of protecting the groundwater, surface waters, air quality and the soil (art. 9–12). The CSO defines the concentration limits for each of these natural resources and specifies one

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<sup>4</sup>In reality, at the time we are writing these lines (Janvier 2014) the Cantons have still not finalized these registers (FOEN, 2013).

level from which monitoring is necessary and another from which immediate remediation is obligatory:

- In the case of groundwater, (art. 9) remediation is required when the sole presence of substances originating from the site is confirmed in groundwater intended for *consumption*.
- If the site is not located in an area in which groundwater is used as drinking water ( $A_{II}$  protection zone), remediation is mandatory if “the concentration of substances leaking from the site exceeds downstream, in the vicinity of the site, half of the concentration value specified in Appendix 1”.
- With regard to surface waters (art. 10), remediation is necessary if the concentration of substances originating from the site exceeds ten times the concentration value specified in Appendix 1.
- In relation to the protection of the air (art. 11), remediation is necessary if the interstitial air exceeds the concentration value specified in Appendix 2 or if the emissions reach populated areas.
- For the protection of soil (art. 12), when a substance contained in the soil exceeds the concentration value specified in Appendix 3.
- Cantonal authorities can order the remediation of a site even if the various concentration values quoted in the appendixes of the CSO are not exceeded if the site “presents a concrete risk of pollution” (art. 9, para. 2d and art. 10, para. 2b).

The impact values referred to and described in the appendixes to the CSO were calculated on the basis of toxicity to humans. In the case of groundwater for instance, the calculation for determining the acceptable impact values is based on the health impact of the consumption by an average-sized human being of two liters per day of water containing the substance in question over a period of 20 years. Hence, the CSO defines environmental impact values for a large number of substances, making it, in this regard, one of the most stringent regulations of its kind in international comparison (interview FOEN).

Nevertheless, the evaluation of contaminated sites in accordance with the CSO criteria has proven more difficult than expected. The ordinance does not specify the term “vicinity”, namely the distance from the installation at which the values should be measured. The impact of this factor on the concentration of the measured values is, of course, huge. Second, Appendix 1 of the CSO specifies that the person responsible for the remediation is only obliged to measure the substances that may be expected to be found based on the historical investigation. Given that in reality these historical investigations were not always carried out, the list of substances measured by the polluter should be approached with caution. Environmental organizations repeatedly accuse the companies responsible for the remediation of only measuring what suits them and this gives rise to certain difficulties in the implementation process (interview Bonfol Collective).

Once the canton has decided that remediation is necessary, the goals and measures are defined site-specifically in the form of a remediation plan which is developed by the entity responsible for the remediation, and which must describe the monitoring system, the measures to be carried out, and the environmental risks that

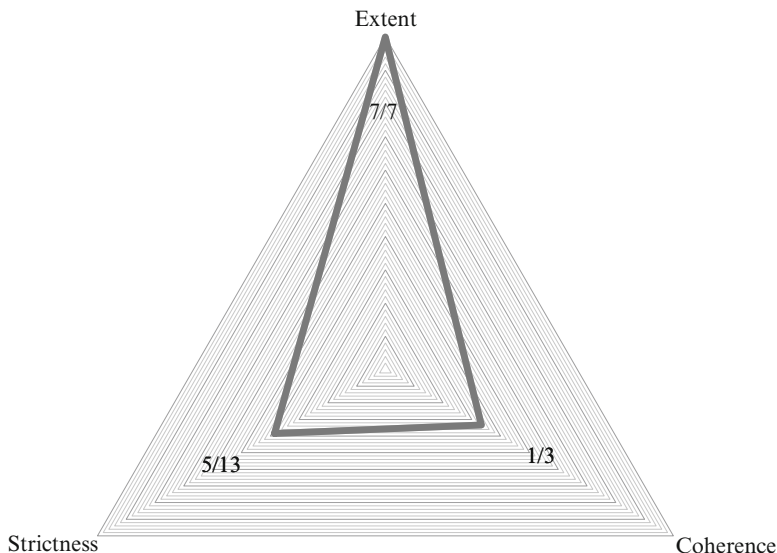
may still subsist after the completion of the project and (art. 17). The measures adopted must enable the elimination of the substances that pose a danger to the environment and the prevention of the spread of the dangerous substances (confinement) (art 16). The canton must evaluate the plan and impose any necessary modifications. The site operator follows and monitors the implementation of the measures and is obliged to keep the canton informed of the progress made. It must be stressed that the CSO does not define any of the remediation methods to be used; this choice is left to the cantons and the person responsible for the remediation.

The general objective and actual scope of the remediation is stated in article 15: “the aim of the remediation is to eliminate the damage or the concrete danger of the emergence of such damage which give rise to the need for the remediation”. This formulation, which may seem tautological, simply decrees that the symptoms quoted in articles 9–12, which create the need for remediation, must be eliminated. In other words, following remediation, it is sufficient that the site present symptoms of pollution inferior to the conditions specified in article 9–12. Article 15, paragraph 2 dilutes this objective, however, in specifying a series of reasons for which the objective of the remediation could be less ambitious, in particular “if that enables the avoidance of disproportionate costs”. The possibility of departing from the object of the remediation opens the door to the definition of a final objective that is the product of the negotiation between the actors involved in the remediation rather than an objective based on purely ecological or toxicological criteria. Moreover, article 15 does not really impose any obligation to remove all traces of pollution or to restore the site to its original state prior to the establishment of the problematical installation. The CSO is to this regards less ambitious than the then remediation policies of Austria, Denmark and Holland, for which, from an *eco-centric* perspective (the multi-functional approach, see Chap. 1), the remediation must be able to guarantee that the site be suitable for all other uses, including those requiring a completely intact environment (Christie & Teeuw, 1998). It can be argued that the approach prioritized by the CSO is *anthropocentric* in the sense that the polluter is not held liable for the restoration of the wider environment as a complex system with an intrinsic value (see Sect. 7.1.2). The CSO merely requests a reduction of the risks associated with certain specific uses of the environment (fitness-for-use approach, see Chap. 1). This choice corresponds to a balancing of interests by the federal authorities between political feasibility and environmental integrity for the some three billion Swiss francs that would have to be demanded of private actors for the remediation of contaminated sites (OFEFP, 2003, Interview FOEN). In practice, this political choice remains difficult to understand for those who defend the environment as a good to be protected in itself and who demand, moreover, based on ethical arguments linked to the concept of sustainability, that those who have contributed to reducing the environmental quality of a site should be obliged to *restore it to the state in which they found it*. Hence, one could ask whether the remediation objective as stipulated in the CSO is coherent with the recent orientation of the latest generation of environmental policies and, in particular, water policies, which aim to establish integrated natural resources management that includes the ecosystem services instead of adopting a protection logic based on the sole human uses of the resource.

Despite its status as an ordinance, and the clarity and strictness of certain provisions of the regulation, article 23 of the CSO paves the way for more informal ways of dealing with contaminated sites. Article 23 paragraph 1 hence reasserts the subsidiarity principle by stating that measures voluntarily consented by the private sector can serve as a way to implement the ordinance. A close collaboration with the private sector is demanded by paragraph 2 of article 23, which declares that public authorities must consult the private sector for designing any remediation measures. Even more interestingly, paragraph 3 states that the public authority “may dispense with issuing rulings if carrying out the required investigation, monitoring and remediation measures is guaranteed by other (private) means”. Hence, the canton can abandon all procedures and decisions that it should order according to the ordinance (historical investigation, monitoring), if the companies responsible for the remediation freely consent to measures producing similar results. Article 23 hence creates the basis of a very flexible approach to contaminated sites management, which favors the conclusion of regulatory arrangements between private and public actors based on private law contracts (see Sects. 2.3 and 2.4). Article 23 offers significant scope for maneuver to the private actors that could potentially play the role of designers, implementers, but also targets of the public decisions stemming from the legal need to manage contaminated sites. The choice of the Federal authorities to design the CSO this way was based, in particular, on observation of the difficulties encountered by the Superfund policy of the USA (see Chap. 1). In the USA, half of the public funds intended for remediation projects were swallowed up by the resolution of legal conflicts between the authorities and target groups (Interview FOEN). A close collaboration with the private sector was hence considered as a solution to the frequent conflicts and juridical procedures that plague the implementation of contaminated sites policy.

### ***7.1.4 Extent, Coherence and Strictness of the Institutional Regime of 1995–2000***

Figure 7.1 summarizes our assessment of the institutional regime for the period between 1995 and 2000. The extent scores 7 out of 7 here as all of the uses applicable to the protection of sites are yet regulated. The regime established by the EPA of 1995 and the CSO of 1998 caused an increase in strictness (5/13) for the polluter who was now obliged to remediate the environment under certain conditions. Despite this important shift, the regime remained however quite flexible due to the cooperative approach that was favored which opened up the path of negotiation between private and public actors about the concrete implementation of the remediation. The coherence of the regime is considered weak (1/3) because the new provisions on remediation obligations lead to contradictory interpretations which might cause conflictual implementation. The lack of a definition of “vicinity” in particular is problematical as the risks caused by the abandoned waste are difficult to evaluate and can be contested by private companies. Moreover, in reality, the concept of the “concrete



**Fig. 7.1** Evaluation of the institutional regime 1995–2000

risk of pollution” (see Sect. 7.1.3) which allowed the canton to require the remediation of a site in accordance with the principle of prevention and in anticipation of a future risk is vague. Due to these incoherencies, the Basel chemical industries would, for instance, always deny the contaminated nature of the Bonfol site. Furthermore, the desire to establish a flexible regime in order to increase the scope for maneuver available to private companies had certain downsides. For instance, the fact that under certain conditions, residual pollution after the remediation would be allowed may be seen as conflicting with the new orientation of environmental policies towards the integrated management of all the ecosystem functions of natural resources (Gerber & Knoepfel, 2008). Finally the lack of clarity in the formulation of article 32d generated doubts about the extent of the responsibilities of the owner of the site that were only clarified years later (Tschannen & Frick, 2002).

## 7.2 The Environmental Management Process: The Struggle to Definitely Remediate the Bonfol Site 1995–2000

The first remediation of the Bonfol landfill, which was carried out independently by the BCI in 1981, concluded definitively with the installation of a new cover on top of the landfill in 1994. On that occasion, a scientific publication commissioned by the BCI to monitor the site, detailed the level of risk represented by the landfill (Leuenberger & Grunder, 1994). This scientific paper revealed that since its closure, the landfill had released 430 tons of material – which corresponds to an annual load of 30 tons – into



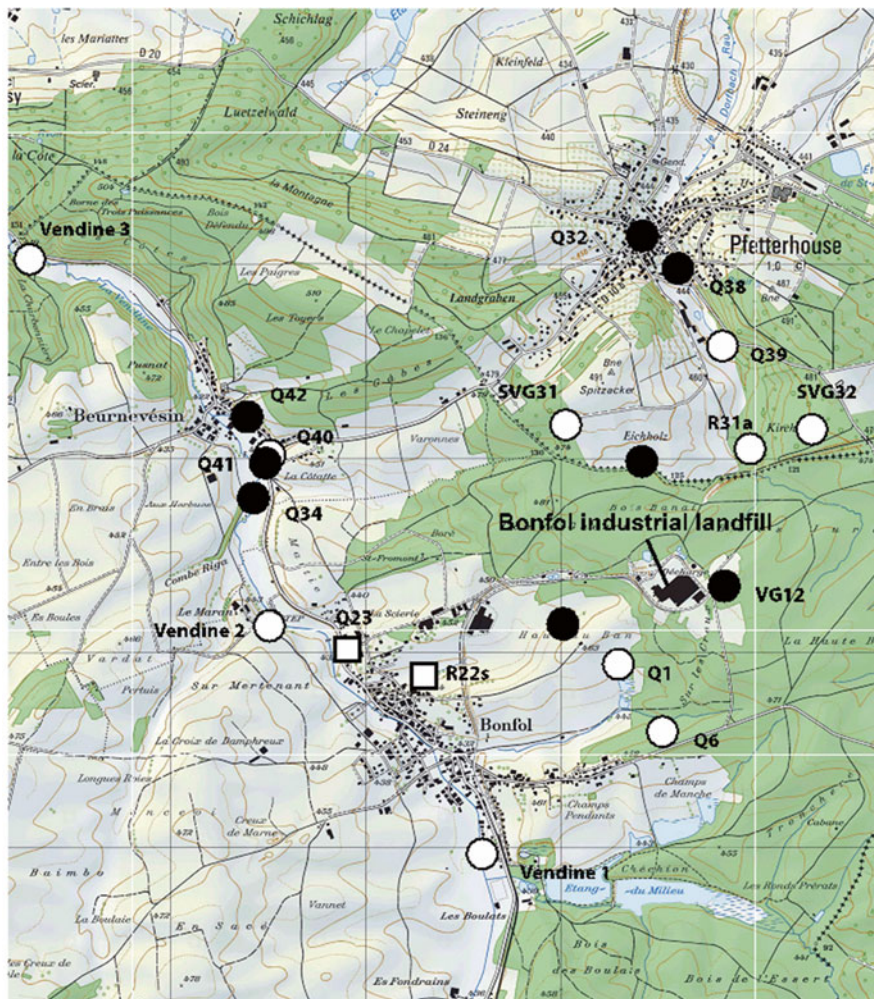
the environment through leachate. The concentration of pollutants in this leachate was depicted as weak. However, considerable concentrations of pollutants could be observed in the immediate proximity of the landfill, in waters situated in the clay of Bonfol in the north of the landfill (see Fig. 7.2 and piezometers AG13, CP129, AP25\_1). Furthermore, the groundwater contained in the Sundgau gravel deposits below the landfill seemed not very affected (Leuenberger & Grunder, 1994, p. 64). Figure 7.2 shows that traces of contamination were found in bores SG19 and SG18, probably in relation with the pollution event of 1981 (see Sect. 6.2). Bore SG38 also revealed a contamination, which was believed to have been caused by the spilling of contaminated water in the forest during the 1960s, but that had very low risk of spreading further (CSD Ingénieurs et Géologues SA & Mireco, 2001, p. 36; see Sect. 5.2).

The 1994 publication did not mention leaks from the landfill into the surface waters. However, Fig. 7.3 shows that traces of pollution were measured in several neighboring waters and in the sources in the vicinity of which the water treatment plant returns the treated water from the landfill. However the concentrations measured were significantly lower than the limit values that would be prescribed in the future CSO (CSD Ingénieurs et Géologues SA & Mireco, 2001).

Despite the mixed evidence about the impacts of the landfill on the environment, the BCI considered that it did not pose a risk to nearby waters. According to the BCI-appointed experts, the measures taken during the first remediation project



**Fig. 7.2** Impacts of the Bonfol landfill on the nearby groundwater as measured in 2001 (Satellite image of the site (2007) reproduced by permission of Swisstopo (DV084371). Data from (CSD Ingénieurs et Géologues SA & Mireco, 2001). Please note that the image shows the site as it is now, notably with an excavation hall which did not exist in 1994. For a picture that better reflects the state of the site around this time please consult (CSD Ingénieurs et Géologues SA & Mireco, 2002))



- No concentration above the detection threshold
- Traces of compounds measured
- Measurement points influenced by the effluent from the water treatment plant

Fig. 7.3 Influence of the landfill on the waters around Bonfol as measured in 2002 (Map reproduced by permission of Swisstopo (BA13115), data from (CSD Ingénieurs et Géologues SA & Mireco))

successfully reduced exfiltration. The current impact of the landfill on humans was estimated “very weak” and the level of risk posed by the landfill “normal”. The risk of an accident was known to increase with time however (Leuenberger & Grunder, 1994, p. 69). Also, up to 2000, the BCI’s position on its old landfill was very clear: it was definitely secure. The contamination around the landfill was localized and had been dealt with thanks to remediation measures of 1981. Therefore, the BCI estimated that the remediation values of the CSO were only exceeded in the soil located at less than 50 m from the landfill, and in the groundwater that was not used for consumption at a distance of a few meters from the landfill (interview BCI). Hence according to the BCI, the Bonfol site was still compliant to the law despite the introduction of the revised EPA of 1995 and the CSO of 1998.

The impetus for requiring a new remediation of the site came from the authorities of the canton of Jura. Up to the mid-1990s, the Jura Ministry of the Environment<sup>5</sup> trusted the BCI and its monitoring concept and did not really assume its supervisory role in relation to the Bonfol site. The canton did not appear to have been unduly concerned about the landfill before the mid-1990s. In 1996, restructuring within the Basel chemical industry and the amalgamation between Sandoz and Ciba-Geigy resulted in the establishment of a giant multinational corporation: Novartis. The changes in the corporate governance of the Basel chemical companies worried the then director of the Office for Water and Nature Conservation of the canton of Jura.<sup>6</sup> He feared that the Basel companies would delocalize and would escape covering the risks and costs associated with the old Bonfol landfill (interview FOEN).

In 1998, the Director of the BCI<sup>7</sup> was interviewed by the Basler Zeitung newspaper (Forster, 1998). The Director of the BCI did not dare to declare that the safety of the landfill was guaranteed in the long term and he stated that in the long run, the security of the site was depending on the capacity of the pump and treat system in place at the time to retain the exfiltration of the landfill in the future. He also mentioned that excavation of Bonfol landfill would be feasible (Forster, 2010, p. 105).

Quoting this interview and using the political window of opportunity opened up by the coming into force of the CSO on 1 October 1998, the Jura canton’s Minister of the Environment invited the director of the BCI to discuss the future of Bonfol landfill. This meeting took place on 4 November 1998.<sup>8</sup> The representatives of the BCI stated at the meeting that the new CSO did not require any more than the monitoring plan already in place. The cantonal minister insisted on the need to empty the site which, according to him, arose from the CSO, and stated, moreover,

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<sup>5</sup>The Minister of the Environment at that time was Pierre Kohler.

<sup>6</sup>Jacques Babey.

<sup>7</sup>Rolf Bentz.

<sup>8</sup>Present at the meeting: Rolf Bentz, Director of the BCI; Bernhard Matter and Michael Fischer from the company CSD (engineering practice commissioned by the BCI), Jacques Babey, Pierre Kohler and Marco Buser, geologists and experts consulted by the canton of Jura. Minutes of the meeting between the BCI and the canton of Jura about the remediation of Bonfol landfill, Delémont, 4 November 1998.

that completely remediating the site by excavating the waste would be desirable irrespective of the entry in force of the new legal regime. In a reflection of the balance of power between the canton of Jura, which was at that time one of Switzerland's least affluent in term of gross income, and the representatives of the leading chemical multinational companies, the director of the BCI "*burst out laughing [...] and made fun of me*".<sup>9</sup> The BCI reaffirmed strongly its position that based on the state-of-the-art, the current practice involving the in-situ confinement of the waste and treatment of the seepage was the most suitable. The canton of Jura and the BCI ended up by agreeing on the fact that it would eventually be necessary to completely remediate the site which merely provided an intermediary storage solution. However, no schedule was agreed upon and the Basel chemical industry did not appear to be interested in precipitating the complete excavation of the waste from the site, the cost of which was estimated at around CHF 200 million at the time.

The cantonal minister, who was well aware that he did not have the necessary political resources to make the BCI accept the idea of a new remediation project in the short term, left the matter to the national authorities. On 11 November 1998, the cantonal Minister of the Environment wrote to the then Director of the Federal Office for the Environment (FOEN).<sup>10</sup> The latter was of the view that the Bonfol landfill did not comply with the standards defined in the CSO: the complete treatment of the percolation water from the landfill could easily take centuries. Moreover, in his opinion, the actual effectiveness of the system implemented by the BCI was being overstated. The opinion of the head of the FOEN that another remediation of the Bonfol site was actually necessary was not exactly based on the law itself, but on the interpretation by the FOEN of the law which emphasized the criterion of *inter-generational sustainability*. The federal administration considered that the analysis of the risks pertaining to a contaminated site should extend "to a minimum period of one generation (approximately 25 years)." (Hauri, Rickli, Schenk, & Wenger, 1994). Hence, if the need to remediate the Bonfol site, in which the risk of pollution leakages was relatively controlled was difficult to assess according to the formulation of the article 32c of the LPE of 1995 (see Sect. 7.1.1), or the conditions provided by the CSO (art. 9–12), the criterion that emerge from the practice of the federal administration was much clearer: the Bonfol site had to be remediated because in its current state, it would still constitute a risk for the next generation.<sup>11</sup>

In late January 1999, representatives of the FOEN, the canton of Jura and the BCI visited the Bonfol site. The representatives of the FOEN stated that the site was no longer compliant with the new CSO and that they expected the BCI to present definitive remediation proposals. On 11 January 2000, fortified by the support of the Federal authorities, the cantonal Minister of the Environment decided to use the hierarchical and vertical authority conferred on him by the law. He wrote to all of

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<sup>9</sup>Pierre Kohler, interviewed for the documentary: Singh, V., & Humbert, D. (Writer) (2010). *C'est arrivé près de chez nous*. In Commission d'information Bonfol (Producer). Switzerland.

<sup>10</sup>Philippe Roch.

<sup>11</sup>It should be noted that if this durability criterion can be considered as an operationalization of the relatively vague article 32c of the EPA of 1995, it has not exactly a highly secured legal force.



the member companies of the BCI and officially ordered the definitive remediation of the site. For the first time since the commencement of operation of the Bonfol landfill in 1961, the BCI was considered as not complying with the law, and the cantonal authorities attempted to have the national legislation applied through a top-down, hierarchical (legal/traditional) mode of governance.

The Basel chemical industry was surprised by the alacrity of the canton and the federal administration and their attempt to steer the corporate practices more directly. The BCI repeated several times in the media that, while it acknowledged the position of the authorities, in its view there was absolutely no urgency to remediate (Jubin, 2000a; Maise, 2000). Moreover, the BCI argued that the necessary remediation technologies were not yet fully developed. The Minister of the Environment of the canton of Jura hence established an independent working group which comprised experts, representatives of the Confederation, the canton and the municipality. The working group was assigned the task of re-assessing the danger posed by the landfill and the feasibility of its complete remediation (Kuenzer, 2007). The proximity of the Bonfol landfill to France and the initial refusal of the BCI to remediate in the immediate future also alarmed French public opinion and resulted in a visit of the French Minister of the Environment to his Swiss counterpart in February 2000. The municipality of Bonfol which had remained silent up to then established its own working group and added its voice to the canton's demands.

The analyses carried out by the cantonal working group were published on 19 April 2000 and had the effect of a small bomb. They showed that the soil situated in the vicinity of the landfill was contaminated and that the water released by the water treatment plant exceeded the legally defined concentrations of ammonium by a factor of 220 (Merckling, 2000). Moreover this wastewater was impacting on neighboring water sources. Leaks from the landfill could be detected in the aquifers of the Sundgau gravel deposits. The working group hence recommended the complete excavation of the waste and an ex-situ treatment, in order to fully restore the environmental integrity of the site (multi-functional approach) (Kuenzer, 2007).

The effect of this information was dramatic. The canton demanded rapid intervention and the BCI was accused of not measuring all of the substances originating from the landfill and of minimizing the associated risks. The cantonal Minister of the Environment stated in the newspaper *Le Temps* (Merckling, 2000): "I am certain that the Basel chemical industry has information that has never been brought to our attention. We discovered the presence of chemical substances that had not been revealed up to now and which were easily detected. The government of Jura trusted the owners of the landfill. This trust has largely broken down". By contrast, the BCI stated that the environmental impacts of the landfill appeared to have been "rediscovered" by the cantonal authorities. In its view the results of the assessments carried out by the cantonal working group were very similar to information that had featured in the quarterly monitoring reports provided by the BCI to the cantonal authorities (interview BCI, see Figs. 7.2 and 7.3). The abnormal pollution levels measured were due to a temporary problem with the water treatment plant which had been quickly sorted out (CSD Ingénieurs et Géologues SA & Mireco, 2001, p. 58). According to the BCI, the cantonal investigation had not brought anything

new to light and it maintained that the negative impacts of the landfill on the environment had been stabilized since the early 1990s.

The case began to attract increasing interest in media and civil society circles, including environmental NGOs. While the BCI's discourse was focused on the fact that the concentrations of the pollutants originating from the landfill did not justify the complete remediation of the site, for the association Greenpeace notably, the presence of a large number of unknown and potentially interacting hazardous substances justified complete and immediate remediation in accordance with the precautionary principle. Greenpeace and other environmental associations were furthermore highly suspicious of the remediation and surveillance concept that was in place in Bonfol (interview Bonfol Collective).

The media pressure was rising. Following informal meetings with the federal and cantonal authorities, the BCI appeared to have allowed itself to be convinced that another remediation could be conceivable in the short term (interview FOEN). It planned to issue a press release on 15 May 2000 to announce this development (interview BCI), but had its thunder stolen by Greenpeace which occupied Bonfol landfill from 13 May 2000. With outstanding organization, the NGO set up a dramatic and visually arresting show: over 100 militants from the organization occupied the site dressed in bacteriological suits and gas masks. Greenpeace obtained a lot of media coverage for its action and attempted to mobilize the support of citizens through this blitz strategy.

Faced with the cumulative pressure from the cantonal, the federal authorities and the NGOs, the BCI officially ceded on the principle of complete remediation. However, it imposed certain conditions. It drew attention to the fact that *its waste* and *its landfill* were involved, and that it had not committed any management errors. Furthermore, the BCI maintained its view that the landfill had already been remediated and made safe (Jubin, 2000a). The BCI also refused to accept that excavation and ex-situ treatments were necessarily the method that should be used in Bonfol, and wanted to carry out an evaluation of the feasible techniques. It also rejected the deadline of 6 years which the canton of Jura tried to impose and spoke instead of 9–15 years, the period needed by an in-depth analysis of the safety problems. Moreover, the BCI announced that it intended to prove that the landfill was already compliant with the legal requirements so as to rid itself of the image of a polluter, which it had gained as a result of the affair. It argued that the complete remediation of Bonfol was an act that it had accepted voluntarily and that this case could not constitute a legal precedent.

The NGOs had little faith in the declarations of the BCI and requested tangible proof that the BCI would remediate the site before vacating it. Greenpeace continued to attract extensive media coverage on the topic of the Bonfol landfill. The “Bonfol Collective”, which involved the organizations Greenpeace, Pro Natura, UNIA, the WWF and the French Green Party, was established in June 2000 (Kuenzer, 2007). On 4 July, Greenpeace issued a press release in which it accused the BCI of polluting the region's drinking water. The NGO produced water quality analyses carried out by an independent laboratory. It had detected 87 substances in the Pfetterhouse spring and 34 in that of Bonfol, of which 15 had long been banned

by law. According to Greenpeace, given the nature and rarity of the substances found, they could only come from Bonfol landfill (Weber, 2000a).<sup>12</sup>

Three days later, a conciliation meeting was held between the Bonfol collective and the BCI, which was described as “constructive” by both parties (Weber, 2000b). The Bonfol collective was assured by the BCI that it would reexamine in detail the threat posed to water by the landfill in the light of the tests carried out by the NGOs. In addition, the BCI accepted the establishment of a committee for the monitoring of the remediation plan (“the information committee”), which would involve federal and cantonal actors, the BCI, the municipality, but also the NGOs as representatives of the civil society, and municipal and regional representatives from neighboring France. In return, Greenpeace agreed to cease the occupation of the site; its strategy of occupation and media coverage had proven effective.

On the 17th October 2000, all of the chemical companies belonging to the BCI signed a “framework agreement concerning the remediation of Bonfol industrial landfill” with the canton of Jura. This was the first regulatory agreement associated with the remediation that connected the parties involved. The agreement was a contract that stipulated that the BCI would remediate the site in accordance with the legal requirements and, moreover, as quickly as possible. The BCI agreed that it would complete a feasibility study on the different remediation variants within a period of 7 months. Moreover, it stated that: “it would assume operational and financial responsibility for the complete remediation operations in the framework of its responsibilities as operator of the landfill and under the supervision of the government up to the completion of the remediation operations”. Furthermore, article 8 of the agreement stipulated that “the modalities of implementation and financing of each stage of the remediation shall be the object of individual agreements based on the present framework agreement”. At that time, the canton of Jura and most of the media<sup>13</sup> interpreted these provisions as indicating that the BCI would finance all the costs of the operations without any contribution from the canton or the municipality of Bonfol. This was however a surprising concession from the BCI.<sup>14</sup> Indeed, in accordance with the article 32d of the EPA of 1995 the municipality of Bonfol, as owner of the site could be excluded from the overall financial responsibility only if it could prove he had not known, or it did not derive any benefit from the pollution.<sup>15</sup> Given the declarations made by the chemical companies in 1962 on the innocuousness of the waste (see Sect. 5.2), the municipality of Bonfol tried to deny all knowledge of the fact that the landfill was actually dangerous (Commune de Bonfol, 2000). However, because the municipality had been receiving annual compensation

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<sup>12</sup> Later, an independent study showed that the pollution of the Pfetterhouse spring was probably not originating from the Bonfol landfill (Conseil régional de Franche Comté, 2005).

<sup>13</sup> For instance: (F.S, 2000; Jubin, 2000b; Tages Anzeiger, 2000).

<sup>14</sup> Later in the process, based on this formulation, the BCI would argue from 2002 that the contract only obliged it to finance the first stage of the remediation and that the financing of the following stages would have to be negotiated separately (see Sect. 8.2).

<sup>15</sup> The third condition being if “it does not derive any benefit from the remediation”; but the difficulties associated with the understanding of this condition have already been mentioned in Sect. 7.1.2.

since the 1980s for the “disturbances” associated with the landfill, it was relatively doubtful that the municipality could have ignored the pollution and not profit from it. Hence, the situation of the Bonfol municipality with regards to the financing of the remediation was actually very sensitive (interview FOEN).

By the end of the year 2000, the mode of participation and interaction that used to characterize the management of the Bonfol site previously had changed radically (see Fig. 7.4). The monocentric governance of the site by the BCI, sustained by the liberal corporatist model had broken down, and evolved in the direction of a more legal/traditional model. The trust that had previously characterized the public-private relations based on cooperation and subsidiarity made room for conflict and verticality in the interactions. The cosy and discretionary relations between the cantonal administration and the chemical companies were replaced by a highly politicized context in which top-level political actors were involved. Still, the attempt of the cantonal authorities to command the definitive remediation of the site using its hierarchical authority conferred by the rule of law first encountered the resistance of the chemical firms, which were willing to negotiate on a horizontal basis, and to keep their freedom of acting on the Bonfol site. The tables however turned, due first to the direct involvement of the federal authorities, but also to the strong-arm tactic of Greenpeace that had the effect of putting the BCI under a strong public pressure. Greenpeace directly bargained with the BCI, and won its bet, gaining the right to be included with other civil society representatives in the future decision process.

After signing the agreement, the BCI felt that it had been made a scapegoat. While the model for the operation and subsequent remediation of its landfill was designated as exemplary up to the mid-1990s, the Basel chemical industry suddenly

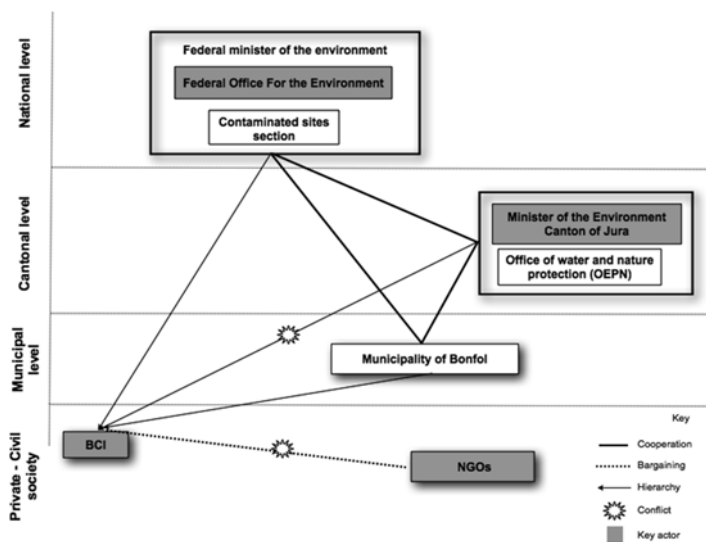


Fig. 7.4 Mode of participation and interaction in the management of the Bonfol site 1995–2000



found itself suspected of lying about the real impacts of its landfill, which was sometimes described in the press as an “environmental bomb” (Egger, 2000). The BCI, who lost at the game of negotiation, was forced to concede on the principle of a new remediation of the site that would definitely eliminate the current and future risks of pollution. However, the struggle between the actors of the decision process would soon start again over the goals and the methods of remediation (see Sect. 8.2).

### **7.3 The Environmental Performance of the Bonfol Site Management 1995–2000**

In order to understand the decision process in relation to the environmental management of the Bonfol site between 1995 and 2000, it is necessary to understand that the institutional regime of contaminated sites was extremely new and young at this point. The cantonal authorities engaged in negotiation with the BCI only one month after the CSO had entered into force. The newness of the legislative texts, and also some of their ambiguities and incoherence (see Sect. 7.1), partially explains the unexpected difficulties associated with the implementation of the law in the case of Bonfol. Thus, no less than three conflicting interpretations of the status of the Bonfol site with regards to the legal provisions emerged from the actors involved in the decision process. The BCI considered that the site was fully compliant; the federal authorities, who interpreted the law as requiring the criteria of inter-generational sustainability to be met, judged that the Bonfol landfill would not be compliant in the long term; and finally the environmental NGOs were of the opinion that the site was currently dangerous, and that the pollution risks in Bonfol were much higher than the standards allowed by the CSO.

An example of how ambiguity in the regime influenced decision-making relates to the absence of a distance value from which the pollution must be measured in order to assess whether a site is contaminated or not. This ambiguity was exploited by the BCI to argue that the Bonfol landfill was not really a contaminated site, because the values stipulated in the CSO were only exceeded in the Bonfol soil located north of the landfill and in the groundwater directly below the landfill (bores SG19 and SG18). In the view of NGOs, the sole presence of multiple hazardous substances in the landfill and the seepage proven by the monitoring system were enough to qualify the site as causing unacceptable risks to nature. These conflicting problem framings of course relate to different perceptions of the intrinsic value of nature by these actors. Should the spread of toxic leachate from chemical products in the natural environment be tolerated even if the concentrations involved are small? As far as Greenpeace is concerned the idea was highly unacceptable, and successfully managed to relay this point in the media. Another example of how ambiguities in the regime can lead to conflict in the implementation is the notion of “concrete threat to the environment” (see Sect. 7.1.3). Articles 9 and 10 of the CSO stipulate that the existence of a “concrete threat” to surface waters or groundwater is sufficient for the canton to require the remediation of a site. However, despite the “accidents”

that occurred in Bonfol in the past, the BCI only admitted to the existence of a long-term risk and not that of a “concrete threat” and based part of its argumentation that the actual state of the Bonfol site could be maintained on this idea.

Another feature of the institutional regime, namely the flexibility provided by art. 23 had the consequence that the process leading to the decision to remediate the site of Bonfol was highly different from the standard procedures defined in the CSO. According to the CSO, the canton should have based its order for remediation on a technical and historical investigation of the waste contained in the landfill. In the case of Bonfol, these investigations were never carried out, as the BCI opposed the official procedure on the grounds that it was not technically feasible. Therefore, the decision of the canton to make the BCI remediate the site could not be based on scientific evaluations of the risks based on the actual content of the landfill, but was the fruit of a strong political resolve to make the polluter remediate the site.

We emphasize that despite the conflicting interpretation of the law by decision actors, and the fact that the procedure was different of the legal standard defined by the CSO, the outcomes of the management process of the Bonfol site during the period 1995–2000 can be considered as highly satisfactory. Table 7.1 summarizes our assessment of the environmental performance of the main decisions taken. Three major outputs were produced, i.e. the initial choice of the BCI to maintain the existing surveillance and monitoring concept; the framework agreement on full remediation of the site; and finally the decision of the BCI to include civil society actors in future decision processes.

We consider the decision of the BCI to continue to manage the site using a pump and treat system that proved to lead to occasional “incidents” as incompliant with article 32c of the LPE of 1995 (see Sect. 7.1.1), which stipulates that waste must not lead to harmful effects, or that the concrete risks of harmful effects must be eliminated. The argument is furthermore strengthened by the fact that the presence of the landfill in Bonfol constituted a risk for the eventual future exploitation of groundwater resources in the area (see Fig. 5.2). Moreover, the technique that was used to secure the Bonfol site, namely an in situ-treatment based on the fitness for

**Table 7.1** Environmental performance of the management 1995–2000

Decisions, actions	Compliance	Diligence
Decision to maintain the existing monitoring and remediation concept in Bonfol	No	Weak
	Ambiguous in relation to the CSO, but clearly incompliant with regards to the criterion of inter-generational sustainability	The pump and treat system was not the best available technology with regards to the environmental impacts at the time
Framework agreement concerning the remediation of the Bonfol landfill	Yes	–
	Over compliant with regards to the liability provision	(not relevant)
Decision to include NGOs in the future decision process	Yes	–
	Over compliant with regards to the collaboration provision	(not relevant)

use approach, was no longer corresponding to the best available practices in countries such as in Austria, in which the multi-functional approach involving ex-situ techniques was already frequent (Christie & Teeuw, 1998; Ferguson, 1999).

With regards to the framework agreement, and the decision to include civil society actors, both are fully compliant with the institutional regime. One could even consider that they are in fact over compliant. Indeed the legal requirements in relation to the financing of remediation would have allowed the BCI to request the municipality's participation in the cost. The BCI renounced, at least by all appearances, this possibility, and did not include any clause on the cost participation of the municipality in the framework of the agreement, thereby assuming the liability for the Bonfol site beyond the EPA requirements. With regards to the decision of the BCI to include civil society actors in future decisions regarding the site, it went further than the collaboration rules provided by article 23 of the CSO, which only required cooperation between the cantonal authorities and the economic actors responsible for the remediation.<sup>16</sup>

Therefore, we must underline that the success of the outcomes of the management of the Bonfol during this period was obtained under very particular conditions. The management process highly resembled the model of *political implementation* theorized by Matland (1995), in which actors have clearly defined goals vis-à-vis the law, which they pursue using diverse strategies, but these goals are however totally incompatible. A conflictual battle occurs from this configuration, which outcomes *are decided by power* (Matland, 1995, p. 163). With regards to conflicting interactions about the remediation of the Bonfol site, it sharply departed from the usual decentralized and liberal corporatist model of environmental management in Switzerland, and we argue that two factors have born a significant importance on the way conflict was successfully managed. First, it is pivotal to understand that, without direct involvement of federal authorities and environmental NGOs and their respective political resources, the balance of power, and the outcomes of the confrontation between the newly founded, and comparatively lowly developed, canton of Jura and the chemical multinationals companies might have been different. Indeed, when the Canton first mandated the BCI to remediate the site of Bonfol, the chemical companies perceived that the cantonal authorities had neither the scientific expertise, nor the authority or the legal legitimacy to impose a definitive remediation, and felt initially that they were in a position of force in the negotiations. The direct involvement of federal authorities, which as we discussed in Sect. 3.2.2.1, is not exactly common in the implementation of environmental policies in Switzerland, largely changed the balance of power within the negotiation by compensating for the perceived lack of political resources of the canton of Jura (interview FOEN, interview OEPN). Furthermore, according to several testimonies (interview BCI, Interview Bonfol Collective) the strong-arm tactic of Greenpeace and the media coverage of the Bonfol events had the effect of accelerating the process by which

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<sup>16</sup>In table 7.1, we renounced to assess the diligence of the agreement framework and the decision to include NGOs. The reason is that these decisions can hardly be assessed with regards to the criterion of the best available technology at the time of operations.

the chemical firms accepted the principle of a total remediation, and signed the framework agreement. Public pressure was actually perceived so strong that the BCI avoid mentioning in the agreement that it actually intended to make the municipality of Bonfol contribute to the financing of the remediation (interview BCI). Second, the success of the political resolve to make the BCI remediate Bonfol has been highly dependent on the view taken by the federal administration that controlled landfills must meet the principle of inter-generational sustainability. The criterion that a site would need to be fully remediated, if in its current state, environmental risks would persist after one generation (25 years) was the most obvious that the landfill of Bonfol did not meet. Eventually, much of the interpretation conflicts around the necessity to remediate Bonfol could have been avoided, if the criteria of inter-generational sustainability would have been given clearer statutory coherence and a higher legal generality than its current status of a lowly secured norm applied in practice by the federal administration.

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## Chapter 8

# Episode IV: Consolidation of the Institutional Regime for Contaminated Sites, and Gambling on the Remediation Objectives, Methods and Funding of the Bonfol Site 2001–2008

**Abstract** Following enactment of an ordinance on the remediation of contaminated sites (CSO) (26 August 1998), the Confederation and the Cantons committed to a process of identifying and decontaminating polluted areas. However, implementation of the legal provisions for decontamination of such sites proved sometimes problematical: the high costs of remediation could cause conflictual processes in which firms charged with the responsibility of remediation would try to minimize their financial contribution. During that period, small changes in the institutional regime, which concerned provision of federal subsidies for carrying out remediation, opened new ways of breaking deadlocks related to the thorny problem of burden sharing. Liberal-corporatist channels of concertation between federal authorities and chemical companies also succeeded in producing a set of commonly agreed principles on how to implement the contaminated sites policy. In Bonfol, this progress had the effect of considerably easing relations between public and private actors. An agreement about the cost and environmental ambitions of the remediation was found between the Canton of Jura and the Basel chemical industries (BCI) with a view of remediating the site completely and as quickly as possible. Greenpeace slowly became isolated in its position that the remediation goals and methods were inadequate from an environmental perspective, which ultimately brought them to invoke the right of appeal, taking the decision process to the court. After a total of about 9 years of conflicting negotiations, a final agreement was reached between Greenpeace and the BCI in 2008 that met almost all of the NGO's requirements, and made the Bonfol site appear to be a model in terms of environmental management.

## 8.1 Analysis of the Institutional Regime 2001–2008

### 8.1.1 *Public Policies: The Ordinance on the Charge for the Remediation of Contaminated Sites (CSRCO)*

After the first remediation processes were engaged in Switzerland, it became relatively clear that the high cost and the frequent involvement of municipalities in the creation of landfills that contributed to the contamination of sites would cause

problems for the lowly solvable public entities whose responsibility were engaged (Conseil Fédéral, 1993, pp. 1391–1392). This problematic situation was however planned by the EPA (24 March 1995), which specified in its article 32e that a tax should be leveled on the owners of waste disposal sites that should contribute to finance the remediation of contaminated sites in which the responsibility of public entities were engaged. The Ordinance on the Charge for the Remediation of Contaminated Sites (5 April 2000) clarified this general prescription by stating in its article 9 that the Confederation shall grant subsidies based on this tax to the Cantons involved in remediation processes in cases where: the site had been contaminated by household public waste; if the owner of the site is a public entity; or when the persons responsible for the contamination could not be identified or were bankrupted. The Cantons could benefit from this federal fund, provided that (art. 9 letter e) a formal Cantonal decision on the cost repartition had been taken (see Sect. 7.1.2). If all the other conditions were met (see art. 9 and 11), the federal subsidies would then finance up to 40 % of the total remediation costs (art. 10). This new public fund would provide new means of financing contaminated sites remediation, and dangles the prospect of lowering conflicts on burden sharing. However, it also enabled polluting firms to attempt transferring remediation cost to the Confederation (see Sect. 8.2).

### ***8.1.2 Private Law vs. Public Policies: Revision of the EPA of 2005***

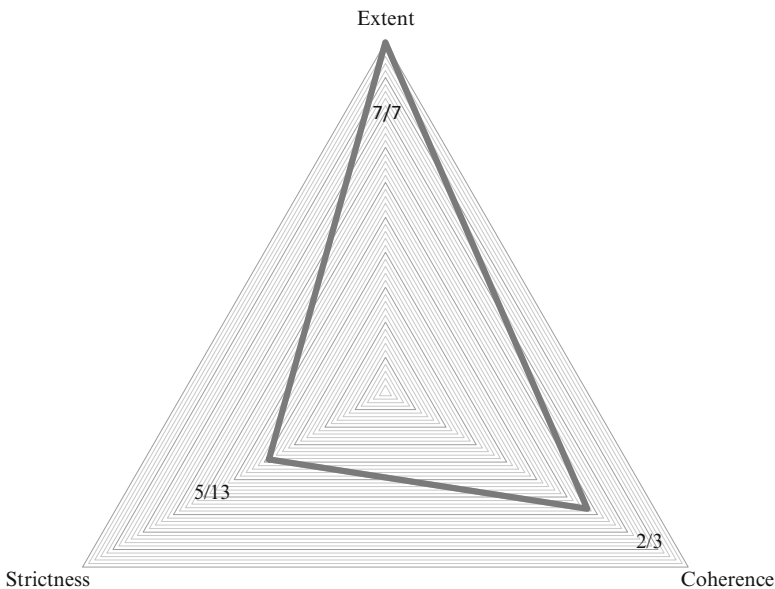
After decades of partially conflicting rules with regards to the extent of polluter liability in case of environmental harm, a new environmental protection act (EPA) (16 décembre 2005) was proposed that definitely settled and clarified this issue. Following the introduction of the Federal Act on Non-Human Gene Technology (21 march 2003), article 59a of the EPA was reformulated, and included the liability for pure environmental harm of installations that were considered at risk (Conseil Fédéral, 1er mars 2000, pp. 2304–2308). Starting from 2003, polluters could be held liable for harm to parts of the environment that are not under a strict private or public property regime, for instance biodiversity or wild animals, and hence polluters could be asked to provide remediation or compensation in case of such damages. However, this did not lead to amend accordingly the contaminated sites policy, which would still focus mostly on water protection, and polluters would rarely be asked to remediate damage to the wider environment.

Another ambiguity that was resolved by the EPA of 2005 concerned the problematic formulations of responsibility of the owner of a site in case of a contamination. From the three conditions under which the owner could be charged with the remediation cost that the EPA of 1995 enunciated, only one was kept in the 2005 revision: the proprietor of the site could only be charged with remediation costs if he could have had knowledge of the pollution by exercising the required

care (art. 32d par. 2 EPA of 2005). This clarification clearly contributed to reducing the previous ambiguities of the institutional regime with regards to burden sharing (see Sect. 7.1.2). However, in the case of the Bonfol site, as we will discover below, this new formulation would also more clearly designate the municipality as partially liable for remediation costs.

### 8.1.3 *Extent, Coherence and Strictness of the Institutional Regime of 2001–2008*

Between 2001 and 2008, the institutional regime only changed marginally. Figure 8.1 summarizes our assessment. Nonetheless, compared to the preceding period, the reformulation of article 32d improved the coherence of the regime (2/3) as it enabled the far clearer interpretation of the possibility of involving the “disturber through situation” (contaminated sites owners) in the financing of a remediation project. Furthermore, the incoherencies between the various (public and private) provisions on liability were to a large extent clarified by introduction of a unilateral and strict liability for environmental harm (including a wider environment) for risky installations such as the landfill in Bonfol. However, one could argue that a form of incoherence also remained between the goals of the contaminated sites policy which allowed some level of residual pollution to remain (art. 32c LPE of 2005; Art. 15 CSO), and the more ambitious objectives of the recent environmental policies, for instance the



**Fig. 8.1** Evaluation of the institutional regime 2001–2008



modern versions of the Federal Act on the Protection of Water (WPA) (11 décembre 2009), which aim to fully and integrally protect the living ecosystem that is water. Even though all the uses that may adversely impact sites were regulated (extent of 7/7), considerable imbalance existed furthermore, between the level of protection accorded to the waters and other natural resources such as soil, air, or biodiversity. For instance, even though strict liability for environmental harm now existed for risky installations, damages caused to biodiversity by a waste disposal site still does not suffice to invoke the legal need to remediate according to art. 9–12 of the current CSO (state 1 August 2012). Finally, the degree of strictness of the regime is still moderate, and significant scope of maneuver is left to the actors for defining case-specifically the methods and objectives of the remediation (5/13). The consequence of the regime's weak level of strictness is simple: many aspects of the remediation of the Bonfol site resulted from a negotiation game between the actors involved in the environmental management.

## **8.2 The Environmental Management Process: Bargaining of the Goal, Method, and Cost Allocation of the Bonfol Site Remediation 2001–2008**

Around 2000, a rapprochement occurred between the federal administration, representatives of the Swiss Cantons, and the major sectors of the industry involved in sites contamination. A working group was constituted, in order to draft a decision support instrument (Hammer, Wenger, & Schenker, 2001) that would help to build mutual understanding in how to carry out the remediation of contaminated sites. The chemical industry was well represented in this working group with participation of the director of the BCI,<sup>1</sup> and the deputy director of Lonza AG,<sup>2</sup> another Swiss major chemical company based in Viège (Visp), plus other representatives of the business sector, notably the Swiss aluminum group Alusuisse. This concertation between national authorities and private actors, or more precisely between the environmental regulator and the polluters, in order to make precise the modality of implementation of an environmental law is not exceptional in the liberal corporatist policymaking culture of Switzerland (see Sect. 3.2.2.2). According to the then director of the FOEN,<sup>3</sup> the stakeholders' involvement in elaboration of a decision support instrument would contribute to harmonizing the application and interpretation of the law (Hammer et al., 2001, p. 6), which proved to be one of the main reasons for conflict in the case of Bonfol (see Sect. 7.2). Interestingly however, the environmental organizations, which were very active in the issue of contaminated sites, were not invited to participate in this working group.

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<sup>2</sup>Raymond Vouillamoz.

<sup>3</sup>Philippe Roch.

This decision support tool constituted a set of mutually agreed upon norms by the public and private participants, and this regulatory arrangement (see Sect. 2.4) would structure future behavior with regards to the environmental management of contaminated sites. Several of the principles enunciated in this code of conduct related directly to the Bonfol case. First, the federal authorities managed to forge an agreement with the private actors to accept the principle of intergeneration sustainability: “Remediation must guarantee the sustainable elimination of the danger. Confinement measures, which will still require continuous monitoring after several generations, or the expensive treatment of pollutants do not meet these requirements, nor does the transfer of the problems to other sites” (Hammer et al., 2001). Hence, in the light of this principle, the federal authorities would definitely persuade that the pump and treat system of the Bonfol site was no longer sufficient. Second, interestingly, a restrictive vision of the remediation objectives was agreed upon. In relative contradiction with the objectives of the Ordinance on the Pollution of Soil (SoilPo) (1 July 1998), the value of the soil as an ecosystem is denied by the text: “The determining factor is not the contamination of the subsoil but the eventual effects of this contamination on environments to be protected” (Hammer et al., p. 18). The “environments to be protected” is understood here mainly as the waters used for consumption, thereby enshrining a vision that the legal obligations to remediate did not concern the wider environment.

In parallel to this process in Bonfol, the BCI and the Canton of Jura ratified a new “agreement concerning the creation of an information committee” (29 March 2001). This arrangement materialized the outcomes of the negotiation between the BCI and Greenpeace by creating a platform for exchange and dialogue that would include civil society actors along with federal, Cantonal, municipal authorities and the BCI. The information committee was entirely financed by the BCI and although it had no formal decision-making powers, the BCI had the duty to transparently inform this instance about the remediation process, and had to respond to any questions posed by the different members. Therefore, the information committee succeeded in disclosing information about the decision to make in relation to the remediation, increased the transparency of the procedures and facilitated a kind of collective learning. Due to the integration of new actors, notably civil society representatives, the structure of governance also became more complex. In contrast with preceding periods, the network of decision-making became more polycentric in the sense that a greater number of actors played a key role in the process, thereby reducing the concentration of decision-making powers in the BCI hand. Political actors went slowly in the background, whereas administrative actors increasingly took important roles in relation to the work involved by the remediation project. Rapidly, this new institution, which was not provided for under the CSO, became an arena in which the diametrically opposed visions of environmental organizations and the BCI regarding remediation objectives and methods would clash. Hence, during the period between establishment of the information committee and until the end of 2005, the mode of participation and interaction in the management of the Bonfol site for the first time evolved towards the network model (see Fig. 8.2). The environmental NGOs used the information committee in order to weigh in on

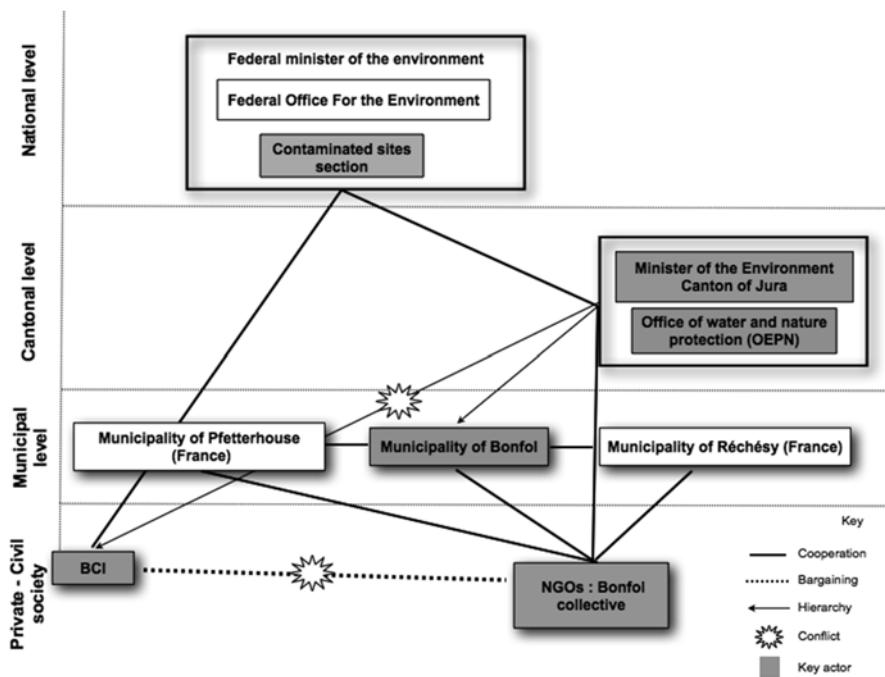


Fig. 8.2 Mode of participation and interaction in the management of the Bonfol site 2001–2005

decisions that they did not have the formal legal power to influence. The Bonfol Collective, which had its own experts, succeeded in forging cooperative links with the Cantonal authorities, which did not always have the knowledge and resources necessary to take decisions on issues of a sometimes extremely technical nature. For the Canton of Jura, the integration of the environmental NGOs into the decision process was viewed positively at the time. The expert capacities of organizations like Greenpeace and Pro Natura in environmental issues could only strengthen the position of the Canton, whose relations with the BCI were tense at the time due to the Canton demand that the complete remediation of the site be carried quickly at the sole expense of the Basel chemical industry (interview OEPN). Conflict became less generalized than when the public authorities struggled to make the BCI accept remediation of the Bonfol site (see Sect. 7.2). Through the concerted draft of the decision support instrument, the federal administration reestablished cooperation with the chemical firms. Conflict was confined to the relations between the BCI and the Canton regarding burden sharing, and between the BCI and the NGOs that had opposite objectives with respect to the environmental ambition (and hence the cost) of the remediation. The ties that existed between the NGOs and other decision actors such as the experts working for the Canton of Jura created a setting that was relatively unfavorable to the BCI, which was the constant target of suspicion on the part of the Bonfol Collective.

In this new configuration, of across and in accordance with the commitment undertaken in the framework agreement (17 October 2000), the BCI presented on 15 May 2001 a feasibility study on methods for remediating the Bonfol site. Two variants were suggested: one involving the excavation and incineration of the waste and a second involving in-situ vitrification (Oeuvray, 2001).<sup>4</sup> The FOEN initially declared itself satisfied with both the proposed solutions and the rapidity with which the proposal had been made. The Canton and municipality also expressed surprise and satisfaction at the good will shown by the BCI. However, rapidly the opinions of the actors with regards to both methods highly diverged. The BCI leaned toward vitrification as a more feasible and less costly technique (about 20 % less expensive than the excavation), but the experts of the NGOs and those engaged by the Cantons of Jura strongly opposed this choice, arguing that vitrification was perhaps less costly but also less secure, and that the definitive remediation of the site in accordance with the CSO required full excavation of the waste (Jubin, 2001a). A strong coalition rapidly formed against the vitrification technique, regrouping the municipality of Bonfol, the NGOs and the Canton, but also the federal administration. In November 2001, the Minister of the Environment<sup>5</sup> of the Canton of Jura wrote to the BCI that vitrification will not be allowed in Bonfol. The BCI had to back off, but declared itself highly dissatisfied by the way these decisions were taken rashly and unilaterally (Jubin, 2001b).

The atmosphere between the actors involved in the remediation further deteriorated, when, in the end of 2001, “a new accident” was brought to the attention of the members of the information committee. The BCI, which had always stated that contamination from the landfill into the groundwater was well confined, noted that the seepage was moving in a north-west direction and that the site was contaminated further than previously shown in monitoring reports. Figure 8.3 hence illustrates that strong traces of leachate were now detected in the groundwater up to bore SG50 (compare with Fig. 7.2). The BCI reacted promptly and the water was pumped at bore SG 19 and then treated in the water treatment plant of the site to prevent any further spread of contamination. The NGOs suspected the BCI of bad faith about the real state of contamination and the capacity of the BCI to control leachate. Doubts regarding the BCI’s transparency regarding the actual scope and extent of the pollution took root in the information committee.<sup>6</sup>

During the summer of 2002, relations between the Canton and the BCI took a turn for the worse regarding financial responsibility for the remediation. While the Canton believed that the question had been settled by the framework agreement of 2000, the Director of the BCI finally declared its intention to make the municipality

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<sup>4</sup>Vitrification is an in-situ process by which the toxic material is stabilized or solidified using thermal energy (Mulligan, Yong, & Gibbs, 2001). The obvious disadvantage of the method is that constant monitoring is necessary in order to ensure effective stabilization and the absence of leakages.

<sup>5</sup>Pierre Kohler

<sup>6</sup>Minutes of the meeting between the BCI and the Canton of Jura about the remediation of Bonfol landfill, Vendlincourt, 10 December 2001.



**Fig. 8.3** Impacts of the Bonfol landfill on the groundwater as measured in 2003 (Satellite image of the site (2007) reproduced by permission of Swisstopo (DV084371). Data from (CSD Ingénieurs et Géologues SA & Mireco, 2003))

of Bonfol financially contribute to the remediation. He declared in media: “All of the parties that used the landfill should contribute”. This declaration was supported by the FOEN head of the contaminated sites section<sup>7</sup> who stated: “The law requires that the owner also contributes, particularly if it has received royalties. Between 10 and 30 percent.” (Jubin, 2002). In October 2002, the FOEN representative stated that the question of the allocation of costs must be clarified prior to commencement of the remediation.<sup>8</sup> The Canton refused to even consider a possible cost participation of the municipality of Bonfol, which would necessarily be transferred to the Canton due to the low solvability of this tiny village. Furious, the Director of the BCI then threatened to leave the information committee. The conflict was clear and the BCI Director reiterated again its position that “there is no legal basis requiring the complete remediation of the Bonfol site”.<sup>9</sup>

At that time the BCI had already concluded internally an agreement on the cost sharing of the remediation between the firms involved in pollution of the Bonfol

<sup>7</sup>Christoph Wenger.

<sup>8</sup>Minutes of the information committee meeting: project for the remediation of Bonfol industrial landfill, Vendlincourt, 2 October 2002, pp. 3–4.

<sup>9</sup>Minutes of the information committee meeting: project for the remediation of Bonfol industrial landfill, Vendlincourt, 2 October 2002, p. 4.

site. Ciba would bear 42.54 % of the costs, Clariant 21.60 %, Novartis 12.71; Syngenta 12.71 %, Roche 3.99 %; Rohner 3.86 %, SF-Chem 1.18 % and Henkel 1.41 % (BCI, 2002). However, when the BCI transformed its governance structure from a simple partnership into a public limited company (BCI Betriebs-AG), thereafter responsible for the remediation, the distrust towards the Basel chemical multinational companies peaked again. The Cantons and the NGOs suspected that the aim of creating a public limited company was to extricate the firms from their financial responsibility.<sup>10</sup> The affair escalated to the level of the Federal Council.<sup>11</sup>

Despite the stalled and tense nature of relationships between the political authorities of the Canton of Jura and the BCI regarding responsibility for the remediation cost, the BCI pursued its work on elaboration of a first remediation plan based on the method of excavation. The remediation plan was submitted to the Canton on 27 November 2003. It proposed excavation of the waste stored on the site in an excavation hall, its treatment on-site, its loading on suitable containers and transportation to incineration plants in Switzerland or abroad; the location of incineration or the construction of a plant on-site remained to be decided on (BCI Betriebs-AG, 2003). The remediation objectives were claimed to be compliant with the provisions of the law. The general goal was to sustainably prevent pollution risks by eliminating the source of pollution (the waste), and leaving the site with an *admissible* level of residual pollution according to articles 9 and 10 of the CSO (BCI Betriebs-AG, 2003, pp. 41–49). However, the BCI excluded the air, the soil and subsoil from the goods to be protected. According to the BCI, treatment of the air polluted by the excavation and treatment halls was not necessary *a priori* (BCI Betriebs-AG, 2003, pp. 90–91). With regard to the soil, the BCI proposed to excavate and treat the strongly polluted clay surrounding the landfill. As opposed to this, treatment of the contaminated sand lentils to the north of the landfill was not planned (in between the bore AP25\_1 and AG23, see Fig. 8.3). If this proved necessary, the BCI proposed that measures could be taken to accelerate the natural biodegradation of the pollutants in the sand lentils or to increase their impermeability.

Under the provisions of the CSO, the Canton should have evaluated the remediation plan and negotiated bilaterally with the BCI (art. 18; art. 23 CSO), however the Canton submitted the plan for public consultation, allowing thereby environmental NGOs to express their view on its quality. In a report presented in March 2004, the experts appointed by the Bonfol Collective criticized the proposed standard of remediation extensively: “the remediation plan does not correspond to the current remediation technology in any respect” (Forster, 2010, p.108). Among the elements they referred to here was the fact that the conditioning of the toxic waste,

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<sup>10</sup>The simple partnership forms of society hence implies a strong solidarity-based responsibility (see Sect. 5.2).

<sup>11</sup>Interpellation by Gysin Remo. Totalsanierung und Finanzierung der Chemiemülldeponie Bonfol (Complete remediation and financing of Bonfol chemical waste landfill) N° 02. 3658, processed on 07.03.2003;

Interpellation by Graf Maya, Décharge de Bonfol quelle suite? (Bonfol landfill, what next?) N° 02.3660, processed on 07.03.2003.



some of which was to be crushed in the open air, was deemed as causing unacceptable risks for the environment but also for the workers, in case of explosion of the highly instable substances contained in the landfill. Moreover, the experts felt that refusal to treat air emissions from the sheds was also inadmissible. They accused the BCI of not respecting labor law by risking exposure of the workers in sheds with no oxygen tanks to air concentrations of benzene that would exceed the legal standards by a factor of 3'000 (Forster, 2010, pp. 108–109). In addition, the criticism that the chemical industry did not conduct historical and technical investigations on the site and did not measure all of the substances that were potentially harmful to humans was reiterated. Using strong images, Greenpeace created a media event out of the fact that the landfill contained “Seveso-like” dioxins and highly toxic furans (Wüthrich, 2005). The NGOs also estimated that the risk of vertical and horizontal seepage from the landfill in the groundwater was underestimated. The plan was also criticized by the FOEN who declared that it could be described, perhaps, as a concept but scarcely as a plan that could be judged sufficient in terms of the CSO.<sup>12</sup> On 8 September 2004, the Cantonal administration in charge of the remediation project (The Office for Water and Nature Conservation of the Canton of Jura (OEPN)), presented its position. It accepted the general remediation plan adopted by the BCI but requested 54 supplementary measures which reflected the criticisms of the NGOs concerning the weak environmental ambitions of the plan (Office des eaux et de la protection de la nature, 2005). The experts of the Bonfol Collective were highly satisfied with the additional Cantonal requirements.<sup>13</sup> They had succeeded in influencing the content of the remediation plan, which in accordance with the CSO should only have been a product of bilateral negotiations between the Canton and the BCI.

Nevertheless, 5 years after the BCI agreed to remediate the Bonfol site, the procedure appeared to have made little progress. Although the remediation plan was now to be reworked through the collaboration of the Cantonal administration (OEPN) and the BCI, the political conflict about the financing of the project continued to block the process, and the remediation plan was still not officially accepted. In May 2005, the BCI published a press release which accused the political authorities of the Canton of threatening the timetable for the remediation through their refusal to accept the remediation plan (SDA Schweiz, 2005a). The Minister of the Environment of the Canton of Jura retorted that “Neither the signature of the first specific agreement nor the advancement of the work have been hindered by the Cantonal authority. In reality, the process is currently blocked by the refusal of the Basel chemical industry to assume the costs of this remediation project which are currently estimated at CHF 280 million” (République et Canton du Jura, 2005).

None of the parties had any interest in prolonging the procedure, particularly the BCI which was covering, in the meanwhile, all of the costs of the process. The deadlock was broken when the BCI and the Canton managed to mutually consent to a new

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<sup>12</sup>Minutes of the information committee meeting: project for the remediation of Bonfol industrial landfill. 19 February 2004, p.5.

<sup>13</sup>Minutes of the information committee meeting: project for the remediation of Bonfol industrial landfill. 23 September 2004, p.5

“agreement concerning the implementation of the definitive remediation of Bonfol industrial landfill” (1 December 2005). This new contract involved a quite interesting bargain. The Canton formally accepted the BCI’s remediation plan involving excavation, and ex-situ incineration of the waste under the condition that the 54 supplementary requirements be fulfilled (art. 1). For its part, the BCI obtained the participation of the Canton in a very clever strategy of transferring part of the private remediation cost to the Confederation. Hence, in article 2 of the agreement, the BCI confirmed that it would assume all of the remediation costs *until an executive Cantonal decision on the allocation of costs is taken*. This meant that the BCI would try first to reach an informal arrangement about the costs with the entities whose responsibility is engaged in the Bonfol site (art. 4.1). If the negotiation failed, the BCI would then request that the Canton pronounce a formal Cantonal decision on the cost repartition, in order to activate the procedure for obtaining federal subsidies delivered through the CSRCO (see Sect. 8.1.1). However, because the CSRCO subsidies could in fact only be requested if a public entity is charged with remediation costs, the strategy of the BCI was to persuade the Canton to formally designate the municipality of Bonfol as one of the parties responsible for the remediation due to its ownership of the site (see Sects. 8.1.2 and 7.1.2). The municipality would hence declare itself insolvable and the conditions for obtaining the CSRCO payments (which can cover up to 40 % of the remediation costs) would be fulfilled. The goal of the strategy pursued by the BCI was hence to transfer parts of the remediation cost to the municipality of Bonfol, which financial participation would then be covered by the public CSRCO fund. Article 4.3 of the agreement formalized definitely this strategy by stipulating that: “If an agreement or definitive decision regarding the allocation of costs as defined in paragraph 4.1 above renders the municipality of Bonfol and/or the RCJU<sup>14</sup> responsible directly or through substitution for all or part of the remediation costs, the BCI undertakes to assume the said remediation costs in their entirety to the extent that they are not covered by the payments from the Confederation’s CSRCO fund”. At the time we write these lines, it is unclear whether the Canton of Jura has really designated the Municipality of Bonfol as co-responsible for the pollution and hence as liable for the costs of remediation, and if the Confederation will actually accept the funding demand, knowing that the subsidy system that has been established for helping public entities charged with remediation cost would in that case solely profit the private firms that caused the contamination.<sup>15</sup>

This new agreement, by exonerating the Canton and the municipality of any obligations to finance the remediation, resolved the conflict between the BCI and the public authorities of the Jura, and the process ran through much faster from that point in time. A select committee (*comité restreint*) comprising members of the FOEN, the municipality of Bonfol, the BCI and the Canton was created under article 3.2 of the new agreement.<sup>16</sup> The decisions taken jointly during the meetings of the select com-

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<sup>14</sup> Republic and Canton of Jura.

<sup>15</sup> In January 2014, the process was still pendent.

<sup>16</sup> The existence and powers of the select committee are detailed in a special agreement (BCI & Gouvernement de la République et Canton du Jura, 23 February 2006).



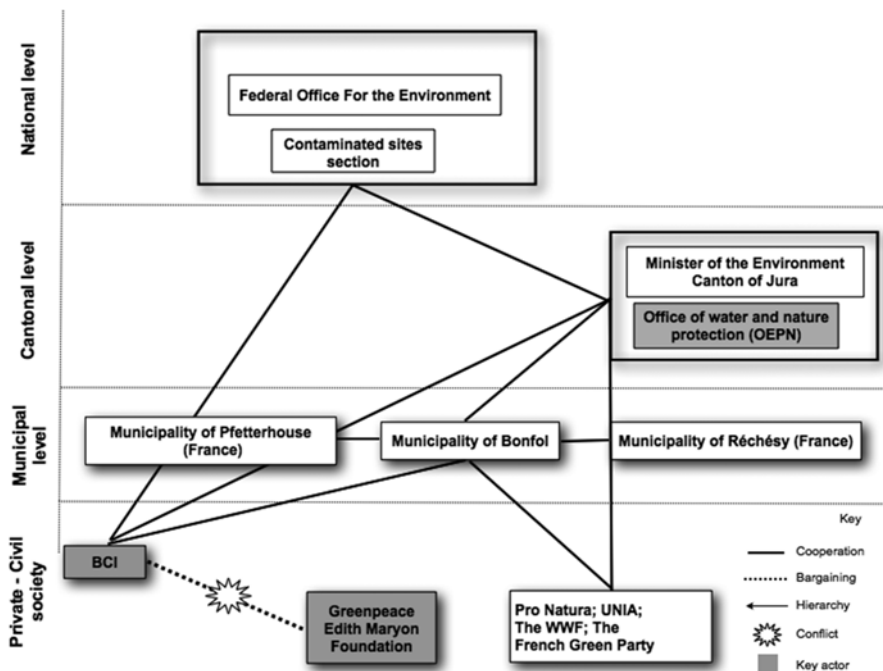


Fig. 8.4 Mode of participation and interaction in the management of the Bonfol site 2005–2008

mittee would be thereafter binding on the parties concerned (interview BCI). The establishment of the select committee hence marked a turn in the mode of participation and interaction in the management of the Bonfol site. From this point on, decisions were taken *in camera* and the information committee, within which NGOs held a strong position, would be informed of them afterwards. The influence of the civil society representatives on the Cantonal decisions was all but bypassed, a development that would benefit the restoration of liberal corporatist interactions between BCI and the Cantonal administration. Figure 8.4 summarizes the changes in the mode of participation and interaction that progressively occurred since establishment of the select committee in 2005. The BCI held the reins in the process and normalized its previously conflictual relations with the majority of the actors. Close cooperation and trust was reestablished with the Canton. The information committee relinquished its influence. Fewer actors were involved in the decision-making process at this stage. The Canton and the BCI concentrated most of the competencies to take decisions with regards to the remediation. As a result, the coalition of NGOs gathered within the Bonfol Collective slowly disunited, and Greenpeace was progressively isolated in adopting an oppositional role, as had been the case in the period 1998–2001 (see Sect. 7.2). Hence from 2005, a triadic configuration of key actors played the main roles in deciding the final outputs of the decision process.

The impacts of this change in the governance of the remediation project were not long in coming. The BCI wanted to move quickly and set the agenda; the BCI and Canton of Jura started speaking with one voice and the remediation procedure advanced very rapidly. The next stage in the process of remediating the site was a matter of spatial planning. In effect, it involved the rezoning of the site and surroundings of the landfill, which were located in a forest zone, and obtaining planning permission for the various installations required for the remediation, notably the excavation hall. The “special plan” procedure provided for under article 78 of the Cantonal spatial planning act of the Jura Canton (LCAT) (25 June 1987) was used for the first time ever, in order to attribute the Canton with the authority to manage the planning procedure instead of the municipality of Bonfol to which this competence is normally assigned (Gouvernement de la République et Canton du Jura, 8 May 2007). The special plan was in fact almost directly compiled by the BCI under the supervision of the Cantonal spatial planning service. The variant finally retained for remediating the site involved the building of an impressive airtight excavation hall in which the waste buried in the site would be dug with remote controlled grapples. The excavated waste would then be stored in a secured area, stabilized and stocked in containers that would be exported by rail to be incinerated in Germany, in installations that were equipped to deal with hazardous waste. The vitiated air from the hall would also be filtered before rejection in the atmosphere in order to avoid pollution of the surroundings. At that time, the cost of this project was estimated around 280 million Swiss francs (Betriebs-AG, 2007; Jubin, 2010). Although it had taken 5 years to get the remediation project off the ground, the Special plan was by contrast presented just 11 months after the agreement on cost repartition. The inclusion of the 54 Cantonal requirements did not change the plan significantly from its initial version of 2003. The main changes concerning protection of the environment involved the installation of charcoal filters for cleaning air emissions, installation of new piezometers to improve monitoring of groundwater quality and implementation of soil quality tests, which had already been carried out in the neighboring forests and showed that the levels of pollution there were not significant. The NGOs had the impression that the Cantonal authorities were not particularly rigorous in relation to the actual incorporation of the 54 requirements that the NGOs contributed to formulate (interview Bonfol Collective).

In accordance to the LCAT, the special plan was submitted for public consultation on 15 November 2006. Twelve objections to the special plan were lodged by farmers, local residents, the NGOs, plus a foundation (the Foundation Edith Maryon). The objections were all quickly denied by the government of Jura in May 2007, and the planning application procedure proceeded as established between the BCI and the Canton of Jura in the “Special agreement n° 1” of 23 February 2006. The nonsuit opponents to the special plan could submit an appeal to the Cantonal court which would have a suspensive effect on the project of at least six months to years. The pressure raised on the Bonfol Collective, as a strong coalition was now defending the goal of executing the remediation plan as soon as possible. Greenpeace announced its intention to appeal but the other organizations part of the Bonfol Collective refrained from doing so, partly because they did not want to be accused of slowing down remediation of the Bonfol site. Discontent

with Greenpeace resignation in contesting the remediation project brewed within the information committee. The Mayor of the French municipality Pfetterhouse declared himself highly irritated by the blocking of the process by Greenpeace's unilateral action. The NGO found itself in a very isolated position as a result.<sup>17</sup>

Sensing that the tables were turning, Greenpeace took action and rented a site right next to the Bonfol landfill (SDA Schweiz, 2005b) so as to maintain a symbolic presence at the location, and to be able to assert a right of appeal against the special Cantonal plan both as a neighbor, by virtue of the private law provisions (see Sect. 5.1.1) and based on article 48 of the Federal Act on Administrative Procedure (20 December 1968), and also as an environmental organization, as conferred by article 10 of the Federal Spatial Planning Act (LAT) (1 August 2008). Greenpeace, together with the Edith Maryon Foundation, which had a farm close to the landfill, lodged an appeal on 13 June 2007 against the special plan and requested an entire series of supplementary measures based on a report provided by two experts from the Bonfol Collective (Forster & Walther, 2007). A conciliation was organized by the Cantonal administrative court of the Jura in January 2008. After two days of hard negotiations, in order to proceed as quickly as possible with the remediation process, the BCI reluctantly conceded to most of Greenpeace's demands. A new agreement between the BCI and Greenpeace was passed by an order of the court (26 February 2008), and Greenpeace achieved the following five main concessions:

- The definition of the environmental goods to be protected would now include all of the region's watercourses and catchments which the BCI had not considered as threatened by the landfill (the Rosersbach stream, for example, affected by the pollution events of 1965 and 1966 (see Sect. 5.2)). This new provision also implied extensive testing of the residual pollution after the remediation, including the soil surrounding the landfill, all adjacent water sources, the aquifers in the Vosges and the sand lenses. If necessary, additional treatment measures must be taken.
- In order to compensate the fact that the content of the landfill remains unknown because historical and technical investigations were never carried out, the *screening method* had to be used in order to determine the full spectrum of substances present in the goods to be protected (instead of the selective sampling that was proposed by the BCI).<sup>18</sup>

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<sup>17</sup>Minutes of the meeting of the information committee: project for the remediation of Bonfol industrial landfill. 22 March 2007.

<sup>18</sup>The screening method enables the detection of all of the substances contained in the tested liquid. A second process is then required to determine the concentration of the substances which are believed could pose a risk to the environment. It is standard practice in Switzerland to measure directly the concentration of some key substances which are considered as representative and based on which the concentration of unmeasured substances is extrapolated. The FOEN generally does not impose the use of the screening method and does not make any recommendations in this regard. According to the FOEN, the additional costs associated with this method exceed the benefits derived from it as, in reality, this technique has rarely brought additional pollution to light as compared with the technique involving the measurement of key substances (interview FOEN). However, in the view of the experts from the Bonfol Collective, the use of screening was viewed as an application of the prevention principle, in the sense that little was known about the content of

- In addition to a charcoal filtering system installed to filter the air stemming out of the excavation hall, the air would also be oxidized (burned) before being released from the installation, in order to prevent the emission of toxic substances in the atmosphere. The sole cost of this additional measure required by Greenpeace was estimated to be around 8 million Swiss francs (Jubin, 2010).
- An independent expert to monitor the site in addition to the experts hired by the BCI (the company CSD) was to be appointed, in order to improve the independency of the monitoring and provide complete transparent information.
- Greenpeace must be consulted before all future significant decisions pertaining to the Bonfol site.

After this agreement had been signed, the remediation work officially started on 15 May 2008, after about 9 years of a battle of will between the actors engaged in the Bonfol site remediation for a total cost that is now estimated to be around 380 millions CHF.

### **8.3 The Environmental Performance of the Bonfol Site Management 2001–2008**

The events in relation to management process of the Bonfol site between 2001–2008 demonstrate that, even though the institutional regime of contaminated sites had been progressively reinforced by increasing extent and coherence, the high flexibility embedded in the legal provisions caused the regime to merely constitute a frame of minimum requirements (which were set quite high in that case) around which actors struggled to reach outcomes that fitted their preferences and self-interests.

In the game of negotiation on the goal, method and costs of the remediation, the mode of participation and interaction in decision-making has been a central stake. Hence, we have been able to distinguish two phases in the process. Before the agreement on the remediation cost repartition, the network model of participation and interaction benefited the Canton of Jura which could count on the support of environmental NGOs, in order to put pressure on the BCI which was perceived as willing to minimize the cost and quality of the remediation. In a second phase, after the Canton made sure not to be charged with remediation cost, new arrangements were made to restore liberal corporatist interactions by limiting the number of actors in the decision process, and to bypass the influence of the NGOs, in order to quicken the remediation and limit the opposition.

The outcomes of this highly conflictual decision process are more than satisfactory with regards to the criterion of environmental performance. The standard of the remediation finally retained for the Bonfol landfill exceed the requirements of the

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landfill in Bonfol and, as a result, it is not known which substances can be found in their leachate or even which new substances may be formed following chemical reactions originating from the mixture of wastes within the landfill (interview Bonfol Collective).

**Table 8.1** Environmental performance of the management 2001–2008

Decisions, actions	Compliance	Diligence
Canton-BCI agreement of 2005	Yes	–
Special plan of 2006	Yes	Average
		Focus on a small subset of polluting substances
		Restrictive definition of the assets to be protected and the aims of the remediation
		Little account of air protection (Partial treatment of the vitiated air)
		Little account of soil protection (No treatment of the sand lenses)
BCI-Greenpeace agreement, 2008	Yes	Strong (model of remediation at the Swiss level in terms of environmental requirements)

CSO on numerous points and may be considered as exemplary in terms of environmental quality (interview BCI, interview Canton, interview FOEN, interview Bonfol Collective). Table 8.1 shows that the three main decisions taken during 2001–2008 can be considered as compliant with the regime, and as increasingly diligent with regards to the objective of protecting the environment. The special plan of 2006 lacked provisions for guaranteeing that the quality of the soil in the vicinity of the landfill or the sand lentils would be sufficient after the remediation to meet the objectives defined in articles 9–12 of the CSO. Furthermore, the charcoal filtering system for the air emission released by the excavation hall might have been insufficient to guarantee the respect of the Ordinance on Air Pollution Control (16 December 1985) (see: Forter & Walther, 2007, pp. 26–31). The BCI-Greenpeace agreement of 2008 marked a progress with regards to the techniques involved for guaranteeing environmental protection with a systemization of the screening method, in order to be able to detect a larger spectrum of polluting substances. The sand lentils would now be treated if they revealed themselves to be too contaminated, and the air emission will be oxidized. The Canton-BCI agreement of 2005 cannot be assessed with regards to the criterion of diligence, but is fully compliant with the institutional regime with regards to burden sharing of the remediation cost. However, if remediation of the Bonfol site were to be subsidized by public subsidies, that would partially constitute a problematic twisting of the causality principle by which the polluter by behavior should assume responsibility for environmental harm (see Sect. 3.2.2.2).

We argue that the participation of NGOs in the decision-making process played a pivotal role in order to explain the environmental performance of the Bonfol site management. The influence of the NGOs was most evident in the 54 modifications imposed on the initial remediation plan of the BCI, and in the final addenda brought to the special plan for carrying the remediation of the Bonfol landfill. The goal pursued by the NGOs can be broadly depicted as an attempt to strengthen the environmental integrity of decision process outcomes regardless of the cost factor bearing on the chemical industries. The involvement of the NGOs in the Bonfol site

is associated with several elements that would certainly not have been implemented otherwise, and which are generally not involved in other remediation processes in Switzerland, for instance:

- A strict application of the liability for environmental harm principle. The decision support instrument agreed upon by the federal administration and the private concerns consecrated a restrictive conception of the environmental goods to be considered in remediation project, focusing on the protection of waters. NGOs worked in order to extend the scope of measures to better include the soil and the air, which are environmental goods on which the public property regime is less well secured, and the responsibility to remediate less well entrenched in current environmental management practices.
- A strict application of the polluter-pays and prevention principles. The environmental NGOs systematically advocated the use of techniques that have better environmental performance and which minimizes environmental risks regardless of their cost. Some of the NGOs demands, due to their extremely high cost, were strongly opposed by the BCI. This was the case of the costly request of Greenpeace to systematize the screening method or to treat the air emissions of the excavation hall by oxidization for minimizing the risk of atmospheric pollution and major accidents that the excavated substances might cause, something the BCI estimated to be nonsense (Interview BCI).<sup>19</sup>
- The transparency of the decision process. It is the customary practice that public authorities collaborate closely with the polluting firms in remediation projects. However, with the view of minimizing the reputational cost associated with the charge for contamination, and avowing unnecessarily alarming of the population, information about pollution risks and environmental damages are not always well disclosed to the public. It is also the case that the participation of civil society actors in the decision process is restricted to an opposition role conferred by the right to appeal. In the light of these facts, the request of Greenpeace to be directly consulted in relation to decisions pertaining to remediation<sup>20</sup> constitutes a real innovation with regards to how environmental management generally proceeds in Switzerland. Furthermore, the request of Greenpeace that remediation be monitored by an independent expert also fall within the project of enhancing transparency and communication around these processes.

The openness of the decision process to the participation of NGOs was also linked to conflict. The cooperation between the NGOs and the BCI in the context of the information committee proved to be a failure in part. The hostility between rep-

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<sup>19</sup>However, the explosion that occurred on 7 July 2010 in the excavation hall due to the instable substances contained in the landfill provoked the release of black matters by the installation. It is unclear what sort of pollutants were emitted, but the event demonstrated the importance of the treatment of the air emission. Minutes of the meeting of the information committee: project for the remediation of Bonfol industrial landfill, Delémont, 16 September 2010.

<sup>20</sup>Article 64bis, par. V of the arrêté relatif à la décision du 8 mai 2007 approuvant le plan spécial cantonal “Décharge industrielle de Bonfol”. (Decision concerning the approval of the cantonal special plan “Bonfol Industrial Landfill” of the 8th of May) (26 February 2008).

representatives of the Basel chemical industry and the environmental organizations was highly counter-productive. According to the FOEN, certain legitimate demands in relation to the remediation, which could have been carried out voluntarily by the BCI, were rejected by the latter for the simple reason that they were supported by the NGOs (interview FOEN). Moreover, although the conflict between the public authorities and the private firms concerning the allocation of costs certainly was the main factor in delaying the remediation procedure, the involvement of NGOs generated additional costs in terms of both money and time. The action of the NGOs often resulted in an increase in transaction costs and a reduction of the efficiency of the procedure. This became so clear that the establishment of the select committee, under the impulse of the BCI, managed *inter alia*, to reduce these inefficiencies and the speed of the remediation process by purely ruling out the NGOs, and restoring a rather closed mode of deliberation. Interestingly, this change in the governance of the remediation project indirectly provoked something that the federal administration had specifically tried to avoid through article 23 of the CSO, that is the judicialization of the procedure which is inevitably accompanied by increased costs and duration.

Consequently, based on this analysis, we argue that the strong extent and coherence of the institutional regime is linked to the good environmental performance of the remediation, as the firms involved have proved to constantly try to comply with the legal rules. The quite flexible approach that was chosen also appears as successful because it enabled both a close collaboration between public and private entities in dealing with the pollution problems, and foremost, a step towards a network model of participation and interaction by the inclusion of environmental NGOs that weighted positively on the environmental integrity of the process. Flexibility and openness in the decision process had however the drawback of stirring up conflicts between coalitions of actors with opposite views regarding environment protection. This caused unnecessary length and cost of the remediation process, which could have been avoided, had the conflict in-between coalitions been better managed. In this regard, the establishment of an information committee as a deliberative platform may be an interesting track to think about how conflict and openness in environmental management process could be detangled.

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# Chapter 9

## Concluding Discussion: Institutional Regime and Actors' Modes of Participation and Interaction in Environmental Decision-Making

**Abstract** This concluding chapter recapitulates the findings of this study. We first summarize the main events in relation to the environmental management of the contaminated site in Bonfol. We then discuss the question of whether the strength of environmental regulations, and the type of interactions between public, private, and civil society actors, can contribute to explain environmental performance in contaminated sites management. Drawing lessons from the evidence gathered in this research, we conclude by debating the value of institutional flexibility for dealing with environmental issues such as contaminated sites. We argue that flexibility can lead to sustainable environmental management only if environmental interests are sufficiently well represented in open and deliberative decision arenas, and if public authorities fully assume the role of arbitration. Based on this, we suggest a few recommendations on how the current contaminated sites policy in Switzerland could be improved.

### 9.1 Summary of the Results: Five Decades of Environmental Management

Throughout this research, we have attempted to explore the politics of contaminated sites management by assessing how certain attributes of institutions (such as the extent, coherence and strictness of institutional regimes) and actors' mode of participation and interaction in decision processes impact environmental performance. In order to do this, we have conducted a longitudinal and in-depth case study<sup>1</sup> of a crucial case of successful contaminated sites management (the Bonfol site), in which we have investigated how rules are implemented and materialized by the actors engaged in the decision process, and the impacts on environmental outcomes.

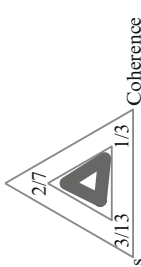
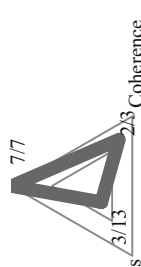
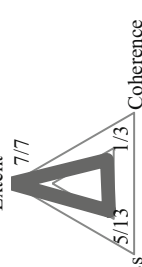

Table 9.1 summarizes our observations organized in four historical sequences that are distinguished according to the occurrence of key events and decisions in relation to the environmental management of the Bonfol landfill:

- Between 1955 and 1970, the Basel chemical industries (BCI) created and autonomously regulated a landfill nearby the village of Bonfol in a context where legal

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<sup>1</sup>Also called “thick analysis” (Adger et al., 2003).

**Table 9.1** Institutional regime characteristics, modes of participation and interaction, and environmental performance in the management of the Bonfol contaminated sites

Time	Institutional regime characteristics	Model of participation and interaction	Decisions, actions	Compliance	Diligence
1955–1971	Extent  Strictness Coherence	Liberal corporatist	Choice of disposing of toxic waste by dumping in the ground Choice of the location of the site Way of operating the site Management of the pollution event	Yes	2
1971–1994	Extent  Strictness Coherence	Liberal corporatist	Closure of the landfill Decision to remediate Management of the pollution event	Yes	2.3
1995–2000	Extent  Strictness Coherence	Legal/traditional	Decision to maintain the existing monitoring and remediation concept in Bonfol	No	1
2001–2008	Extent  Strictness Coherence	Liberal corporatist Network	Special plan of 2006 BCI-Greenpeace agreement, 2008	Yes Yes	2 3

In order to calculate the diligence score for each period, we took account of only the decisions that could be ranked according to both the compliance and the diligence indicators. The diligence score for each period was simply calculated by averaging the diligence score of each decision (weak = 1; average = 2; strong = 3) of the period. For instance the score 2.3 obtained for the period 1974–1994 was obtained by averaging the environment performance score of the decisions to close the landfill (2); to remediate (3); to manage the pollution events (2)

provisions pertaining to industrial waste and the related pollution risks were practically absent (weak institutional regime with low extent, low coherence, and low strictness). The BCI disposed at that time of a large discretionary power with regard to how the chemical waste should be dealt with, and the control by the cantonal and municipal authorities was relatively loose (liberal corporatist mode of participation and interaction). In this institutional context, the BCI took pioneering actions in relation to environmental management of chemical waste. However, the gaps in the regulatory framework and the lack of involvement of public authorities and civil society actors enabled the BCI to make decisions in relation to the conduct of operations at the site, and the management of pollution events that were not always fully diligent (2/3) with regards to environmental protection.

- From 1971 to 1994, there was a large increase in the extent and coherence of environmental regulations, which however stayed very flexible with regard to the management of sites polluted by industrial landfills (strong extent, average coherence, weak strictness). The relationships between public authorities and private actors remained neo-corporatist in nature and the cantonal authorities “monitored at a distance” the management of the landfill by the BCI. After the landfill ceased operation in 1976, the particularly severe provisions of the water protection act (8 octobre 1971) pushed the BCI to rapidly react to the discovery of polluting leaks from the landfill in 1981. A first remediation was conducted, which was considered as of a very high standard for the time, but problematic leakages from the landfill continued to exist (diligence: 2.3/3).
- Between 1995 and 2000, the first formal rules dedicated to the management of contaminated sites were enacted. The strictness of the regime increased, but these laws carried some incoherence that made their implementation ambiguous (extent: strong, coherence: weak, strictness: average). The Bonfol landfill was considered non-compliant with the law, and accordingly, the public authorities used their vertical authority to order the BCI to carry a new remediation of the site (legal / traditional mode of participation and interaction). The BCI opposed this decision, and the combined pressure of federal and canton authorities, but also of civil society was necessary to force the company to relent in its strategy of maintaining the existing remediation concept (diligence: 1).
- Between 2000 and 2008, certain incoherencies in the regime for protection of sites were corrected (extent: strong, coherence: average, strictness: average). An information committee was created, which the NGOs used to weight on the decision process, establishing thereby a network model of decision-making. After years of conflicting negotiations, an agreement was found between the canton and the chemical firms on financing of the remediation cost. The liberal corporatist channels of concertation were restored, and a definitive remediation plan was jointly proposed in 2006 by the cantonal authorities and the BCI. Using all possible institutional means, the environmental NGOs attempted to steer the decision process towards more sustainable outcomes. The NGOs bargained with the BCI and obtained the fulfillment of additional requirements which strengthened the incorporation of a precautionary principle into the remediation methods and objectives at the cost of lengthy and conflicting negotiations.

## 9.2 Discussion of the Results: Institutional Regime Strength, Modes of Participation and Interaction, and Environmental Performance

The relationship between institutions – operationalized as institutional regimes of more or less extent, coherence and strictness – and the performance of environmental management – understood as the compliance and the diligence of the decisions taken by the actors of contaminated site management – was at the core of this study. In relation to this, we have proposed two main sets of hypotheses, the relevance of which are discussed below in the form of two questions and answers (see Sect. 2.4).

### 9.2.1 *Does the Strength of Institutional Regime Relate to Environmental Performance in Contaminated Sites Management (Hypothesis H<sub>1</sub>)?*

From the evidence we gathered, it is relatively obvious that the increase through time of the extent, coherence and strictness of environmental regulations has played a positive role in the environmental management of the Bonfol site. For instance, the increase in the extent of water protection provided by the Act on the protection of waters against pollution (8 octobre 1971) clearly contributed to the diligence with which the BCI promptly reacted to the discovery of leakages from the landfill in 1981. The BCI hence introduced a remediation concept and building a water treatment plant, whereas 15 years ago, before the law entered into force, the contaminated water pumped in the landfill would simply be discharged, untreated, in the nearby forest and surface waters (see Sect. 5.2). Increasingly strong legal provisions proved effective because the chemical firms were generally willing to comply with the law (Interview BCI). The chemical firms involved in the pollution of the Bonfol site had no interest in contravening environmental law as it could lead to sanctions, more intense control by public authorities and also reputational cost. Therefore, the Bonfol case supports the finding of the policy implementation literature that environmental regulations have a deterrence effect on firms (Gray & Shimshack, 2011; Koski & May, 2006; Winter & May, 2001). When the strength of an institutional regime increases, it generally has a positive effect on environmental performance because a larger number of potentially adverse uses of the environment becomes regulated with protection objectives that firms try to comply with, provided that they are also coherent.

However, an increase in the extent of environmental regulation is not automatically related to better outcomes, precisely because the formulation of new laws or policies may decrease the regime's coherence by introducing new ambiguities or coordination conflicts with older provisions. For instance, the Ordinance on the Remediation of Contaminated Sites (26 August 1998), mandated the remediation of contaminated sites, but the conflicting provisions of public law and private law

about the liability for environmental harm, and the ambiguities in the definition of contamination, incited firms not to comply with the legal duty (see Sect. 7.2). These issues give empirical backup to the recent claim of the policy sciences that *coordination* or *integration* is the main challenge that emerges from the current development of complex institutional regimes that have a large regulatory scope which spans several domains of regulation that are often insufficiently articulated (Jochim & May, 2010; Knoepfel, 2007; May, Sapotichne, & Workman, 2006; Varone, Nahrath, Aubin, & Gerber, 2013). The top-down implementation research also shows that such *statutory incoherence* is one of the principal causes of uncertainties and non-compliance in environmental management (Mazmanian & Sabatier, 1989). That is because firms are rational actors, and incoherencies in environmental regulations will generate more resistance than clear and non-ambiguous statutes that provide legal security (Interview BCI). However, as a third generation of implementation studies have demonstrated, incoherent regimes do not necessarily lead to a deficit in environmental management processes, if the actors involved are capable of mutually agreeing on diligent and innovative solutions that go beyond the unclear legal statutes (Goggin, 1986; Matland, 1995). This is precisely what happened in the Bonfol case, as the new and partially ambiguous legal requirements vis-à-vis the definition of contamination resulted in the initial resistance of the chemical firms, which was however overcome through negotiations, with decision outcomes that can be judged as compliant and diligent.

Our study hence demonstrates that diligence in environmental management does not really depend on the coherence or extent of institutional regime. Indeed, diligence in the environmental management of the Bonfol site proved generally above average, while the extent and coherence of the institutional regime varied importantly (see Table 9.1). We actually found that diligence principally relates to regulatory strictness. In a strict regime, diligence is a function of the capacity of legal provisions to require goals and methods of management that stick to the state of the art. By contrast, flexibility in formal institutions, as we observed, had the effect that many of the important decisions in relation to environmental management were not fixed in the law, but were the results of actors' negotiations in decentralized decision-process. In flexible institutional regimes akin to the one in Switzerland, diligence hence mostly depends on the willingness of the decision process actors to implement solutions based on the best available practices, and these decisions are then crystallized and rendered binding by the formulation of private contracts, and other regulatory arrangements as shown by the numerous agreements signed between public and private actors in the case of the Bonfol site.

If certain previous researches found that flexibility in the legal approaches to pollution problems is positively related to environmental performance (Arimura, Hibiki, & Katayama, 2008; Bressers, de Bruijn, & Lulofs, 2009; Bressers, de Bruijn, Lulofs, & O'Toole, 2011; Burby, May, & Paterson, 1998), we found, in accordance with other scholars (Gunningham, Kagan, & Thornton, 2004; Kagan, Gunningham, & Thornton, 2003), that this relation is actually more complex. Considering the case of the Bonfol site, we noticed that several pollution incidents could have been avoided, had the regime been stricter and had it provided timely technical obligations

with regard to how toxic waste must be treated and sorted in landfills for instance (see Sect. 5.2). The flexibility of regulations is as such insufficient to guarantee the diligence or the compliance of the actors involved in environmental management. Institutional flexibility certainly enables firms to go beyond legal provisions, and to constantly update their practices to conform to the state of knowledge, but firms might not always do so. Because in flexible regimes, environmental management choices are the product of a decentralized decision process, the form and attributes of the actor constellations that participate in the decision-making is central to understand when diligent choices are made.

### ***9.2.2 Does the Mode of Participation and Interaction in Decision-Making Processes Relate to Environmental Performance (Hypothesis H<sub>2</sub>-H<sub>4</sub>)?***

From 1955 to 1994, management of the Bonfol site was characterized by flexibility and the liberal corporatist decision-making that is typical of Switzerland (see Sect. 3.2.2). Direct bilateral cooperation between private firms and public authorities existed with, however, little control and involvement of public actors, which resulted in a form of decentralized and monocentric governance in which firms could practically self-regulate the site of Bonfol (see Sect. 5.2). In this configuration, the chemical firms took many actions that we deem as diligent considering the low legal constraints and their extensive freedom to act. This was the case in the way the site of Bonfol was chosen according to geological criteria or the decision to carry one of the first remediations of Switzerland in 1981. However, by contrast, the chemical firms were also willing to maintain a 17 years old concept of environmental management for an indeterminate duration even when the legal regime became more strict with regard to the goals and methods of environmental management (26 August 1998), and local public actors attempted to exert their hierarchical authority.

During the confrontation that followed, the more direct participation of central (federal) authorities in the decision process, and the public pressure generated by the environmental NGOs, which resulted in a network-like model of decision-making, were pivotal in convincing the firms to modify their behavior. The involvement of central public authorities, which disposed of important resources with respect to authority, and the capacity to interpret and enforce the law, increased the capacity of the comparatively less resource-endowed local public authorities to vertically steer the decision process. Furthermore, the inclusion in the decision process of environmental NGOs that disposed of organization skills, and capable of carrying scientific investigation, contributed to the fact that the final outcomes of the decision in Bonfol can be considered as a model of successful and diligent environmental management. The NGOs role was important in emphasizing the necessity to better include a precautionary principle, for instance, in the goals and the methods of the

remediation plan initially proposed by the chemical companies in 2003 (see Sect. 8.2) or in enhancing implementation of the polluter-pays principle, by making the chemical firms accept full responsibility for the costs of remediation in 2000, despite the legal opportunity to transfer part of the cost to the local municipality (see Sect. 7.2). The inclusion of environmental NGOs and central public authorities with their respective political resources induced a form of polycentricity (Andersson & Ostrom, 2008) that reduced the resources asymmetry in previously bilateral relations between the local authorities and the firms, which ultimately enabled an increased account of environmental protection arguments in decision-making.

Therefore, our case study illustrates both the broad effectiveness of liberal corporatism as a collaborative form of governance over ecosystems, and the obvious limits of this approach. Liberal corporatism was capable of enabling diligent practices, as long as the choice of implementing the best available knowledge and technologies with regard to environmental protection was congruent with the cost-minimizing logic of the firms. Precisely because the chemical companies were aware of the huge cost required by a definitive ex-situ remediation in Bonfol, they decided to maintain the old pump and treat system which was less costly but also less satisfactory in terms of environmental protection. Our study firmly supports the argument of Gunningham that:

[...] where the private interests of polluters in maintaining profitability and the public interest in protecting the environment do not substantially coincide, then (unless there are countervailing economic or social pressures) pure voluntarism will be largely ineffective in changing behavior (Gunningham, 2009, p. 161).

Based on this evidence, we also confirm hypothesis H<sub>3</sub> (see Sect. 2.4), and we argue, along with other scholars, that in flexible regimes, the participation of civil society actors through a network mode of decision-making can contribute to enhancement of the performance of environmental management (cf. Carlsson & Sandström, 2007; Gunningham et al., 2004; Huitema et al., 2009; Kagan et al., 2003; Newig & Fritsch, 2009), provided that certain conditions are met.

These necessary conditions relate to the fact that the inclusion of civil society actors, and particularly of environmental NGOs, can increase conflict potential and hamper decision-making. In the case of the Bonfol site, this happened due to the fact that NGOs and chemical firms had extremely diverging interests and values with regards to environment protection. The BCI was willing to comply with the law, but in a cost-effective manner (see: Wise, 1995), whereas the NGOs engaged in a strategy of maximizing the environmental integrity of the remediation plan, regardless of the cost borne by the polluter. The result of the presence of conflicting coalitions in the decision process was increased transaction costs, extended duration of the procedure, and judicialization of the process (which confirms hypothesis H<sub>4</sub>). Therefore, we argue that ways must be still found to better include civil society actors in open, deliberative and polycentric networks of decision-making that can successfully cope with highly conflicting issues such as the management of contaminated sites.



### 9.3 Recommendations: Civil Society Participation and Conflict Management in Network Decision Process

As to what concerns contaminated sites management in Switzerland, the case of Bonfol suggests some ways to improve the current policy.

First, as was demonstrated in Bonfol but also in other cases, exclusion of interveners such as environmental NGOs leads to undesirable transaction costs and to judicialization of the decision process. Deficits in terms of the participation of civil society actors in decision-making encourages them to seek formal and informal alternatives to throwing their weight into the process, and mobilization of the law courts is the last resort for ensuring that environmental interest wins (Weidner, 1993, p. 31). Therefore, we argue that better ways of integrating the NGOs in decision-making while dealing with the conflict propensity are necessary.

Currently, the main institutional mean for NGOs to weigh in the environmental management of contaminated sites in Switzerland is the right to appeal the decisions delivered by public authorities (see Sect. 3.2.2.3). However, this is a sub-optimal solution, because this right can only be activated once the decision has already been made, which actually prevents a direct account of NGOs preferences. Furthermore, the use of the right to appeal systematically places the NGOs in a role of objector and protestor which creates a climate of conflict, prevents trust building, and limits the possibility of social learning between public, private and civil society actors. By excluding NGOs from a pro-active role in the environmental management process, the current institutional regime in Switzerland fosters a confrontation, which can lead to litigation, instead of the cooperative dispute resolution mechanisms that many scholars advocate (Gändara, 1995, pp. 17–25).

In order to make better use of the awareness-raising capacity, and know-how of environmental NGOs, we advocate formalization of stronger concertation and collaboration structures between the public authorities and the environmental organizations in legal statutes in a similar vein as the public-private sector cooperation principle that has been established by current environmental laws (see Sect. 3.2.2.2). The establishment of deliberative arenas, like the information committee in Bonfol, or public consultation of the remediation plan (that is currently not subject to the right of appeal under current laws (see Sect. 8.2)) can be hence considered as positive steps towards this objective. We advise that these innovative practices should be institutionalized in order to partially ensure the transparency of the decisions on contaminated sites that affect foremost the local environment and the population. The generalization of this type of “policy forum” or “deliberative arena” would not only contribute to enhance the quality and the legitimacy of environmental management, as argued in the scientific literature (Papadopoulos & Warin, 2007), but also increases the adequacy of the Swiss model to the spirit of the Aarhus Convention and the Rio declaration which emphasize civil society participation (see Sect. 3.2.2.3).

The Bonfol case however clearly demonstrates that establishing deliberative arenas as such does not suffice to deal adequately with conflicts and disputes, nor

does it always enable learning processes amongst actors in order to reach mutual consent on environmental matters (see also: Jenkins-Smith & Sabatier, 1993; Nakamura, Church, & Cooper, 1991, 1995). Cormick suggests that for these deliberative processes to work, there must be a minimal level of partnership between the parties involved, and each must have sufficient power to hinder the capacity of the others to take unilateral action (power symmetry and check and balance) (Cormick, 1980, p. 28). These conditions were clearly not entirely met in Bonfol, and it is also likely that in many other environmental areas, partnerships between private actors and environmental NGOs will be challenging to foster.

Against this backdrop, two solutions are suggested by the literature to better deal with conflict in open and deliberative models of decision-making. The first is the introduction of *environmental mediation*, which involves an independent and impartial expert who should assist the parties in reaching a mutual agreement (Weidner, 1993, pp. 20–21). This solution however relies on the premise that a mutual understanding between the conflicting parties is possible. Practice unfortunately shows that hostility and extreme divergent viewpoints often totally hamper the conciliation of business representatives and environmental NGOs interests (Knoepfel, 1995, pp. 302–320). Furthermore, the mediation model is too dependent on the capacity of one single actor, the mediator, in pacifying interactions between conflicting parties. This model places moreover very optimistic expectations on the role of experts, and their ability to neutrally and rationally mediate the decision process. Experts are rarely depoliticized beings that can evade being caught in power relations. Therefore, we suggest a second model alternative, *public arbitration*. When opposition and conflict are unavoidable and irreconcilable, public authorities endowed with democratic legitimacy must assume strong leadership. Deliberation with all the forces present must be encouraged, but public authorities should clearly settle disagreements by weighting the environmental and economic interests at stake, and steering decision process outcomes in the name of the public interest. In order to avoid the risk of state capture and counter power asymmetry, the combined resources of public authorities from various levels of governance (and particularly from the top-level) should be engaged, and advised by fully independent experts. In the case of Bonfol, we hence consider that conflict in the deliberative process could have been better managed, had the public authorities fully and openly assumed the role of arbitrator between the clashing interests of firms and environmental NGOs.

## 9.4 Conclusion: Flexibility in Environmental Management

The contaminated sites policy of Switzerland is both specific, in the sense that an explicit contaminated sites policy has emerged quite lately compared with pioneer countries such as the USA, Norway or the Netherlands (Rodrigues, Pereira, da Silva, Hursthouse, & Duarte, 2009), and classic, with regard to the emphasis on flexibility which commonly characterizes the environmental policies of the era of governance (see Chap. 1, Sects. 2.3 and 3.2.1).

Flexibility has become a much off a buzz word in the literature on environmental management and in environmental policymaking, but few studies have attempted to capture the conditions under which institutional flexibility might enable us to reach outcomes that are desirable in terms of environmental sustainability. While the theoretical advantages of flexibility are clear – possibly to formulate adaptive clauses that fit the local ecological situation (Craig, 2010; Ruhl, 2010), we find through our empirical study that flexibility has also drawbacks that can lead to problematic natural resources management.

We argue that the capacity of a flexible institutional regime to enable sustainable outcomes largely depends on the extent and coherence of legal provisions, but also on the structure and type of actors constellations involved in environmental management, and their power relations. The principal lesson that can be drawn from the case of the Bonfol contaminated site is that in flexible institutional contexts, and where the ecological management of an area is largely driven by the private sector, counterforces must be able to participate in the decision process, in order to ensure that a balance exists between the values, interests and resources that drive the decision-making process. Under the strict institutional regimes that used to characterize ecological management in the 1980s, the mechanism of check and balance between environmental protection and economical interests was ensured by formal policy goals and instruments of high generality, which were furthermore the result of a democratic legislative process. By contrast, in a flexible regime, this balance of interests must result from the structure of the participation and interactions in the decision process. Therefore, in order to guarantee a coherent system of check and balance in flexible regimes, public authorities – as representatives of the general public interest, and civil society actors – as representatives of the local people and environment interest, must be strongly involved, and therefore, the network model of decision-making preferred.

Nevertheless, we observe that even in Switzerland, famous for its semi-democratic institutions, close collaboration between public authorities and the private sector is far more usual than with civil society representatives. Yet, in combining flexibility and this kind of liberal corporatist decision structure, a risk exists of state capture that has also been documented in other contexts by scholars (May & Winter, 1999). Furthermore, and especially under the condition of strong power asymmetry in favor of private actors, a democratic and accountability deficit is created in these structures that must be overcome by the establishment of open and transparent decision arenas (Kersbergen & Waarden, 2004; Papadopoulos, 2007). Consequently, we warn that flexibilization of the institutions pertaining to environmental management may be desirable only if accompanied by democratization of the implementation structures in which environmental management takes place, which involves the right mix of public authority control, civil society participation, and accountability to the public.

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# Postface

At the end of the 1970s, contaminated sites had emerged as one of the wicked environmental issues that affect industrialized countries. This book draws the outline of this problematic, and proposes to understand the environmental management of contaminated sites as a political process in which institutions frame the interactions between strategic actors that pursue (sometimes) conflicting objectives. We focus on the case of Switzerland, whose model of collaborative environmental management is often praised in the scientific literature. We show that small and prosperous Switzerland is no exception to the pervasive problem of sites contamination, the legacy of past practices in waste management having left about 38,000 contaminated sites throughout the country. From there, we ask the question of what contributes to the sustainable management of these contaminated areas? We investigate the case of the Bonfol industrial landfill management in Switzerland, which has been the source of a notorious environmental controversy that involved leading multinational chemical companies, public authorities at all levels of governance, and environmental NGOs. We demonstrate how increasingly stronger environmental regulations positively impacted the environmental management of the polluted site, and the limits of a collaborative approach between the public and the private sector. Furthermore, we show evidence that open and polycentric environmental decision-making that includes civil society actors is valuable. Although based on a single crucial case, the lessons drawn from this book are of interest for environmental policy in general, as the characteristics of governance processes that enable environmentally sustainable outcomes is more than ever an essential research direction.