Table 3-8: Actions and environmental items in the Leopold Matrix (*source:* Canter, 1977).

Actions		Environmental Items	
Category	**Description**	**Category**	**Description**
A. Modification of regime	a) Exotic fauna introduction	A. Physical & chemical characteristics	
	b) Biological controls		
	c) Modification of habitat		
	d) Alteration of ground cover	1. Earth	
	e) Alteration of groundwater hydrology		a) Mineral resources
	f) Alteration of drainage		b) Construction material
	g) River control & flow modification		c) Soils
	h) Canalization		d) Land form
	I) Irrigation		e) Force fields & background radiation
	j) Weather modification		f) Unique physical features
	k) Burning	2. Water	
	l) Surface or paving		a) Surface
	m) Noise & vibration		b) Ocean
			c) Underground
B. Land transformation & construction	a) Urbanization		d) Quality
	b) Industrial sites & buildings		e) Temperature
	c) Airports		f) Recharge
	d) Highways & bridges		g) Snow, ice & permafrost
	e) Roads & trails	3. Atmosphere	
	f) Railroads		a) Quality (gases, particulates)
	g) Cables & lifts		b) Climate (micro, macro)
	h) Transmission lines, pipelines & corridors		c) Temperature
	I) Barriers including fencing	4. Processes	
	j) Channel dredging & straightening		a) Floods
	k) Channel retaining walls		b) Erosions
	l) Canals		c) Deposition (sedimentation, precipitation)
	m) Dams & impoundments		d) Solution
	n) Piers, seawalls, marinas & sea terminals		e) Sorption (ion exchange, complexing)
	o) Offshore structures		f) Compaction & settling
	p) Recreational structures		g) Stability (slides, slumps)
	q) Blasting & drilling		h) Stress-strain (earthquakes)
	r) Cut & fill		I) Air movements
	s) Tunnels & underground structures	B. Biological conditions	
C. Resource extraction	a) Blasting and drilling	1. Flora	
	b) Surface excavation		
	c) Subsurface excavation & retorting		a) Trees
	d) Well dredging & fluid		b) Shrubs
	e) Dredging		c) Grass
	f) Clear cutting & other lumbering		d) Crops
	g) Commercial fishing & hunting		e) Micro flora
			f) Aquatic plants
D. Processing	a) Farming		g) Endangered species
	b) Ranching & grazing		h) Barriers
	c) Feed lots	2. Fauna	I) Corridors
	d) Dairying		
	e) Energy generation		a) Birds
	f) Mineral processing		b) Land animals including reptiles
	g) Metallurgical industry		c) Fish & shellfish
	h) Chemical industry		d) Benthic organisms
	I) Textile industry		e) Insects
	j) Automobile & aircraft		f) Microfauna
	k) Oil refining		g) Endangered species
	l) Food		h) Barriers
	m) Lumbering		
	n) Pulp & paper		

Actions		Environmental Items	
Category	Description	Category	Description
	o) Production storage		
E. Land alteration	a) Erosion control and terracing	C. Cultural factors	
	b) Mine sealing and waste control		
	c) Strip mining rehabilitation	1. Land use	a) Wilderness and open spaces
	d) Landscaping		b) Wetlands
	e) Harbor dredging		c) Forestry
	f) Marsh fill and drainage		d) Grazing
			e) Agriculture
F. Resource renewal	a) Reforestation		f) Residential
	b) Wildlife stocking and management		g) Commercial
	c) Groundwater recharge		h) Industry
	d) Fertilization application		I) Mining and quarrying
	e) Waste recycling		
G. Changes in traffic		2. Recreation	a) Hunting
	a) Railway		b) Fishing
	b) Automobile		c) Boating
	c) Trucking		d) Swimming
	d) Shipping		e) Camping and hiking
	e) Aircraft		f) Picnicking
	f) River and canal traffic		g) Resorts
	g) Pleasure boating		
	h) Trails	3. Aesthetic & human interest	a) Scenic views and vistas
	I) Cables and lifts		b) Wilderness qualities
	j) Communication		c) Open-space qualities
H. Waste replacement & treatment	k) Pipeline		d) Landscape design
			e) Unique physical features
	a) Ocean dumping		f) Parks and reserves
	b) Landfill		g) Monuments
	c) Emplacement of tailings, spoils and overburden		h) Rare and unique species or eco-systems
	d) Underground storage		I) Historical or archaeological sites and objects
	e) Junk disposal		j) Presence of misfits
	f) Oil well flooding		
	g) Deep well emplacement		a) Cultural patterns (lifestyle)
	h) Cooling water discharge	4. Cultural status	b) Health and safety
	I) Municipal waste discharge		c) Employment
	j) Liquid effluent discharge		d) Population density
	k) Stabilization and oxidation ponds		
	I) Septic tanks, commercial and domestic		a) Structures
	m) Stack and exhaust emission	5. Manufactured facilities and activities	b) Transportation network (movement, access)
	n) Spent lubricants		c) Utility networks
I. Chemical treatment			d) Waste disposal
	a) Fertilization		e) Barriers
	b) Chemical deicing of highways, etc.		f) Corridors
	c) Chemical stabilization of soil		
	d) Weed control		a) Salinisation of water resources
J. Accidents	e) Insect control (pesticides)		b) Eutrophication
		D. Ecological relationships	c) Disease-insect vectors
	a) Explosions		d) Food chains
	b) Spills and leaks		e) Salinisation of surficial material
K. Others	c) Operational failure		f) Brush encroachment
			g) Other
		E. Others	