A study on collaborative environmental risk management : modeling to facilitate the prevention of soil contamination by local governments, businesses, and local stakeholders

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CHAPTER THREE

ENVIRONMENTAL POLICY TOOLS: BACKGROUND ON EMS AND THE SIGNIFICANCE OF SOIL CONTAMINATION

3.1 BACKGROUND ON ENVIRONMENTAL MANAGEMENT SYSTEMS (EMS)

There are many differing definitions of an EMS, but the one used in this thesis is; "An EMS is a set of management processes and procedures that allows an organization to analyze, control and reduce environmental impact of its operations and services to achieve cost savings, greater efficiency and oversight, and streamlined regulatory compliance" [1].

The idea of managing environmental issues by the national government and businesses dates back to the late 1960s, but it was not considered important enough to include an environmental policy into the management system; instead, it was an external policy issue to be given some consideration. However, in the 1970s serious health issues from air and water pollution in major cities in the United States, Germany and Japan generated a sharp rise in complaints and protests from citizens demanding a cleaner and healthier environment. The governments responded by enacting C&C measures that required companies to reduce emissions to meet national standards. In order to meet the standards, companies had to invest in expensive new pollution control technology, or relocate factories to less populated areas.

> "Environment management was treated as a necessary evil rather than as a business opportunity: a regulatory burden that was assigned to pollution control engineers responsible for end-of-pipe technological equipment, rather than new core functions that should be the shared responsibilities of managers throughout the organization" [2].

Corporations often criticized these measures as an added cost burden to their operations, but these measures proved effective in improving air and water quality. The following two cases illustrate the positive impact that C&C measures had, and the positive long-term benefits that followed.

Case 1

Soil samples taken around the United States in the early 1970s indicated there was a serious health threat from the lead contained in gasoline. Lead was a fuel additive to increase octane levels that increased the engine's power until prohibited in 1995 by new EPA regulations. Table 3.1 shows the downward trend of lead emissions began as early as 1975 with the introduction of unleaded gasoline [3]. They continued to decrease further in the 1980s when Catalytic Converters were required on new cars. From 1985 to 1997, there was an over 90 percent decrease of emissions from gasoline sources after the new law went into affect, with little extra cost to businesses because several low cost substitute additives were quickly discovered. However, companies are currently faced with a potential problem with the

most popular and efficient substitute, Methyl tertiary butyl ether better known as MTBE. Its use has recently come under scrutiny because there have been several significant cases, particularly in California, where it has leached into the groundwater from leaking Underground Storage Tanks (UST). Its potential carcinogenic properties influenced the California government to ban its use.

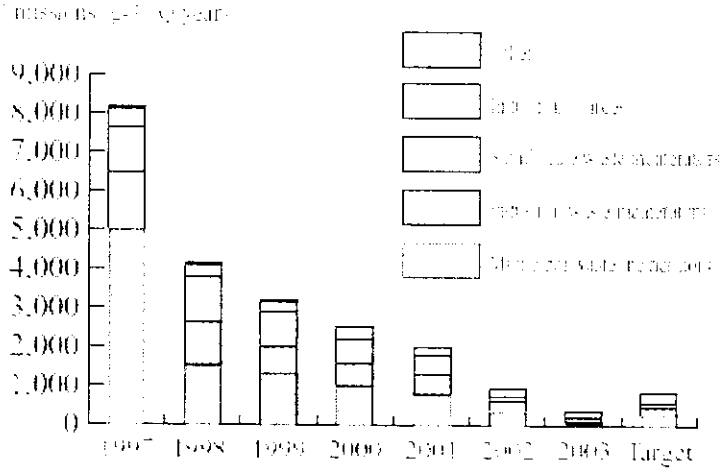
Table 3.1: Lead Emissions in the United States from 1970-1997 (1,000 tons/yr)

(U.S. EPA, National Air Pollution Emissions Trends, Update 1970-1997, EPA-454 E-98-007)

Source Category	**1970**	**1975**	**1980**	**1985**	**1990**	**1997**
Electric Utilities	327	230	129	64	64	64
Industrial Fuel Combustion	237	75	60	30	18	17
Fuel Combustion	72	27	22	10	8	7
Residential Fuel Combustion	47	16	9	11	10	8
Industrial Processes	36,355	21,380	8,018	2,931	2,874	2,651
Waste Disposal	2,200	1,595	1,210	871	804	670
Gasoline	**171,961**	**130,206**	**60,501**	**18,052**	**421**	**19**
Diesel	0	0	0	0	0	0
Subtotal:	171,961	130,206	60,501	18,052	421	19
Gasoline	8,340	5,012	3,320	229	158	7
Diesel	0	0	0	0	0	0
Subtotal:	8,340	5,012	3,320	229	158	7
Marine Vessels	1,397	1,118	885	692	619	503
Miscellaneous	0	0	0	0	0	0
Total Emissions:	**220,936**	**159,659**	**74,154**	**22,890**	**4,976**	**3,946**

Case 2

Dioxin is produced when chlorine-based chemical compounds are incinerated with hydrocarbons, or during any industrial process that uses chlorine-based chemicals, creating one of the most toxic chemicals in the world. Japan's dioxin emission levels were extremely high until early 2000s. An informed and concerned public demanded that the government implement regulations to reduce its release. In response, the government promulgated the Law Concerning Special Measures Against Dioxins (Law No. 105 of 1999) that required businesses, citizens and all public and private organizations to prevent its production and remove dioxin pollution. This law has been effective in reducing the dioxin daily intake level to even below the environmental quality standard (EQS), four picogram Toxic Equivalent per kilogram of body weight per day (4pg-TEQ/kg bw/day) set by MOE, and has decreased an estimated 95% compared to the 1997 level [4].



Reduction rate to 1997 level (%)

Base year	29.0	60.6	68.8	75.2	87.7	95.0
	51.9	62.6	68.9	75.2	88.1	95.1

Source: Ministry of the Environment

Figure 3.1: Changes in Total Emissions of Dioxins in Japan (MOE, 2005 White Paper of the Environment)

Case 3

Increased reports in the German media about their beloved forests dieing from acid rain in the early 1980s awakened the German public that it was not just a problem reserved for northern European countries. Acid rain took a prominent place on the Green Party's national agenda, which later extended to the local level as well. This local support helped to transform trade unions initial resistance to strict C&C measures to reduce SO_x and NO_x into a cooperative attitude. "In 1983, the Federation of German Unions issued a position paper on acid rain that called for the use of environmentally benign coal-burning technologies, energy conservation, the tightening of emission standards for SO_x and NO_x if technically feasible" [5]. The dramatic decline of emissions presented in table 3.2 was possible because of a new political movement, C&C regulations, and voluntary compliance brought on by trade union's acceptance of the regulations.

Table 3.2: Atmospheric Emissions by Source in Germany

(Environmental Performance Review of Germany, Copyright OECD, 2001)

		SO_X[a]	%	NO_X[a]	%	NMVOCs[a]	%	CO[a]	%
Power stations	1990	3 078.3	*57.9*	605.1	*22.3*	8.2	*0.3*	179.8	*1.6*
	1998	874.0	*67.6*	331.1	*18.6*	6.3	*0.4*	115.1	*2.1*
Industrial combustion	1990	993.8	*18.7*	355.4	*13.1*	12.2	*0.4*	827.9	*7.4*
	1998	169.4	*13.1*	220.0	*12.4*	7.9	*0.5*	630.8	*11.6*
Non-industrial combustion	1990	911.5	*17.1*	173.4	*6.4*	137.3	*4.3*	2 539.7	*22.6*
	1998	138.8	*10.7*	140.4	*7.9*	60.6	*3.6*	944.2	*17.4*
Industrial processes	1990	225.6	*4.2*	31.0	*1.1*	153.1	*4.7*	702.0	*6.3*
	1998	75.0	*5.8*	13.0	*0.7*	126.0	*7.4*	600.0	*11.1*
Mobile sources	1990	111.2	*2.1*	1 544.5	*57.0*	1 534.1	*47.6*	6 941.4	*61.9*
	1998	35.0	*2.7*	1 075.9	*60.4*	461.8	*27.1*	3 135.4	*57.8*
Miscellaneous	1990	0.0	*0.0*	0.0	*0.0*	1 379.7	*42.8*	27.2	*0.2*
	1998	0.0	*0.0*	0.0	*0.0*	1 042.0	*61.1*	0.0	*0.0*
Total	1990	5 320.5	*100.0*	2 709.4	*100.0*	3 224.5	*100.0*	11 217.8	*100.0*
	1998	1 292.3	*100.0*	1 780.4	*100.0*	1 704.6	*100.0*	5 425.5	*100.0*
% change 1998/90		*-76*		*-34*		*-47*		*-52*	

a) SO_2, NO_2, NMVOCs, CO emissions indicated in thousand tonnes (kt).
Source: OECD; IEA.

These examples supply strong evidence that regulations supported by both national and local government leadership, volunteer efforts by businesses, and support by citizens can be effective in preventing soil contamination if a system is established. Other cases presented later in this chapter and in later chapters focus on the importance of local government leadership and its effectiveness in creating successful programs.

3.1.1 ROLE OF LOCAL GOVERNMENTS

There were few researchers, and even fewer companies in the mid-seventies with the idea that pollution control regulations could increase efficiency while reducing waste. Michael Royston was one of those research pioneers [6], along with the 3M company, with its "3P" global environmental program to "Prevent pollution at its source whenever and wherever possible" [7]. It was not until after the 1992 United Nations' "Earth Summit" that businesses and governments seriously started to consider creating a standardized environmental management system. During the "Earth Summit", Agenda 21 became a comprehensive plan of action to develop a well-rounded environmental management program. It promotes environmental sustainability by encompassing all aspects of the environment and social issues related to this issue. In section 28.1 of the Agenda 21 commitment, local governments are called upon to "construct, operate and maintain economic, social and environmental infrastructure, oversee planning processes, establish local government policies and regulations, and assist in implementing national and sub national environmental policies" [8]. The reasoning behind making local governments vital to the overall success of Agenda 21 is the fact that local governments are the closest elected body to the

citizens, more directly in touch with their constituents, and are community members themselves with self-interest in a safe environment. Local governments also play an important role in the United Nations Environmental Program (UNEP) that promotes sustainability as a social force. The UNEP lists four ways that local governments can inform their constituents about environmental policy:

1) Provide information to the local mass media about environmental issues pertaining to them.
2) Prepare and distribute pamphlets, posters, and other printed materials in plain language, and post them in popular public venues like schools, shopping malls, and public transportation.
3) Hold public meetings to share information, hear the citizen's concerns or viewpoints about the local situation, and solicit citizen's support for proposed environmental action.
4) Use the Internet as a direct link for open discussions and provide real time information [9].

Local governments in the United States, Germany and Japan have limited self-governing rights that allow them to create their own laws and organization. There was a reduction of one trillion yen in funding available for local governments in Japan from fiscal year 2004-2005 from the national budget. This trend of decreasing funding has forced many local governments to amalgamate. The national government in its "decentralization" program hopes to decrease the present number of 3,110 municipalities down to 1,000 in the next few years [10]. MOE funds over the past five years have decreased annually by nine percent, and because of these cutbacks, the MOE has made annual reductions in each of its seven environmental conservation items, including a nearly ten percent reduction for conservation of the water, soil, and ground environment [11]. Federal funds allocated for EPA programs have also been decreasing over the past few years in the United States. Budget cuts in 2006 amounted to six percent, and federal support for States and Tribal grant programs was the lowest in six years [12].

Figure 3.2 shows that the number of people working on pollution abatement has been slightly decreasing since 1994 for both prefecture and municipalities in Japan, even though the overall number of officers working in the Environment Section in these local governments has increased slightly [13]. Small and medium-sized local governments (SMLGs), which are the focus of this dissertation, are facing a serious human resource shortage as illustrated in the second section of the graph. A majority of these SMLGs have zero to only one or two people working in the environment section. Monitoring and enforcing C&C measures is expensive, and requires human resources that are on the decline; consequently, collaborative volunteer pollution prevention methods have become a more common method used in conjunction with C&C regulations for pollution prevention and remediation activities in Japan, Germany, and in the United States at all levels of government. This corroborates the author's first hypothesis stated in Chapter One that SMLGs can benefit by collaboration.

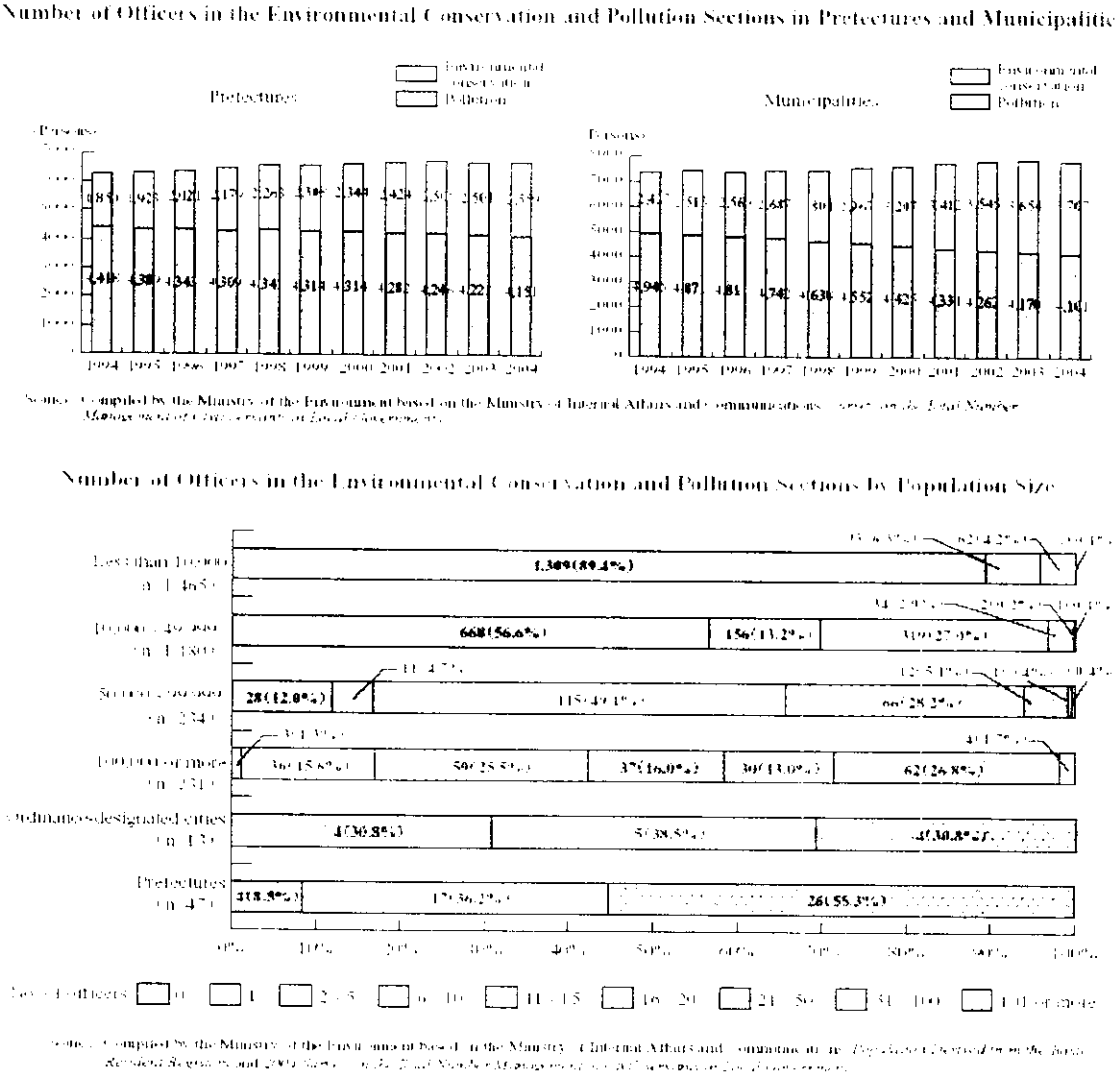


Figure 3.2: The Number of Officers in the Environment Section in Local Governments in Japan (MOE homepage: http: www.env.go.jp en)

3.1.2 EVOLUTION OF POLLUTION PROTECTION TO EMS

Figure 3.3 provides the progression from the attitude of simple pollution protection to a more holistic EMS approach from the late 1950s to present. The 1950s and 1960s saw massive industrial output in developed countries like the United States, Germany and Japan that created serious pollution forcing governments to deal with the public's demand for a cleaner environment. Governments in these countries responded by requiring companies to install new pollution filtering technology that would immediately start reducing factory emissions. However, businesses were reluctant to give up performance for a cleaner environment, so they put political pressure on government to limit the regulations to designated areas. The business friendly policy failed to sustain the national air and water quality in the three countries; therefore, the government capitulated from associating pollution control

with economic hardship to recognizing the positive economic outcomes of a cleaner environment. Consequently, as introduced in Chapter Two, several important environmental laws in the United States, Germany and Japan were promulgated during this period.

The late 1970s and 1980s brought another change in environmental policies from controlling point source pollution, to prevention measures. In the United States this change was influenced the "Love Canal" soil contamination case. In Germany, the massive release of dioxin at the Seveso accident in Italy awakened the German government and public to the dangers of cross-border pollution. The Minamata mercury, cadmium (*itai-itai*) poisoning, and the Yokkaichi Asthma cases caused by air pollution, induced changes in Japan.

Different political agendas in the 1990s and 2000s brought about a change from C&C to one where government and business have a more cooperative relationship. It became more accepted that corporate EMS's provide a more organized and transparent environmental program, and improved the relationship between the regulated and regulators. According to participants in the Third EMS Initiative for Public Entities, adoption of an EMS provided cost savings, improved environmental performance, and reduced risks [14]. The author believes that the future direction of environmental management is moving toward the precaution principle but has omitted it from Figure 3.3 because it is conjecture at this point. However, U.S. cities in California, Washington, and New York, have adopted this principle; in addition, a number of international treaties like the Framework Convention on Climate Change in 1992, the Maastricht Treaty in the same year, and more recently, the Stockholm Convention on Persistent Organic Pollutants in 2001 are based on the precautionary principle. The historical background supplied in this thesis strongly suggests that this movement will continue to spread throughout the U.S. Japan is also moving toward a more preventive approach, so it is also possible that the precautionary principle will take on more significance in future policy.

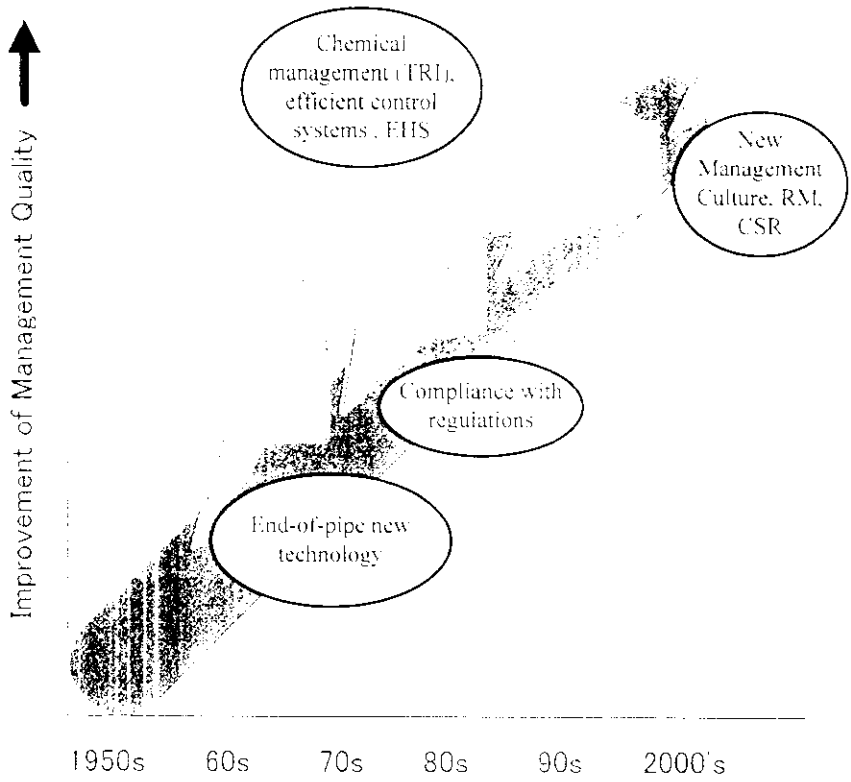


Figure 3.3: Environmental Management Trends from the late 1950s to 2000s (By Author)

3.1.3 OUTLINE OF CERTIFIED EMS IMPLEMENTATION

The following is a more detailed look at what occurs in the Deming cyclical model -plan, do, study (check), act (PDSA) [15]. Statistician Dr. W. Edwards Deming developed this simple, but widely used model. He was invited to Japan by industrial leaders after the end of World War II to transform the World's perception that Japanese goods were cheap and poor imitations of existing products to an image of high-quality and original design. Business leaders followed his advice on techniques to improve the quality of Japanese products and increase innovation, and within four years, "the transformation," as Deming called it, began to produce positive results throughout Japanese industry using his Total Quality Management (TQM) model. Through this success, he became known as the father of Japanese post-war revival. Whether a facility adopts ISO 14001 or EMAS, the basic PDSA format shown in figure 3.4 is the basis for achieving certification.

The author proposes establishing an environmental risk management (ERM) model that includes a group of participants under the leadership of the local government. In this dissertation, the three main participants that collectively work together are small and medium-sized local governments, businesses, and local stakeholders. The local government provides the leadership for the collaborative

environmental risk management (CERM) system to prevent soil contamination by following the Deming Wheel framework. Explanations on the four phases below provide a concept about the flow of the CERM program for soil contamination proposed by the author.

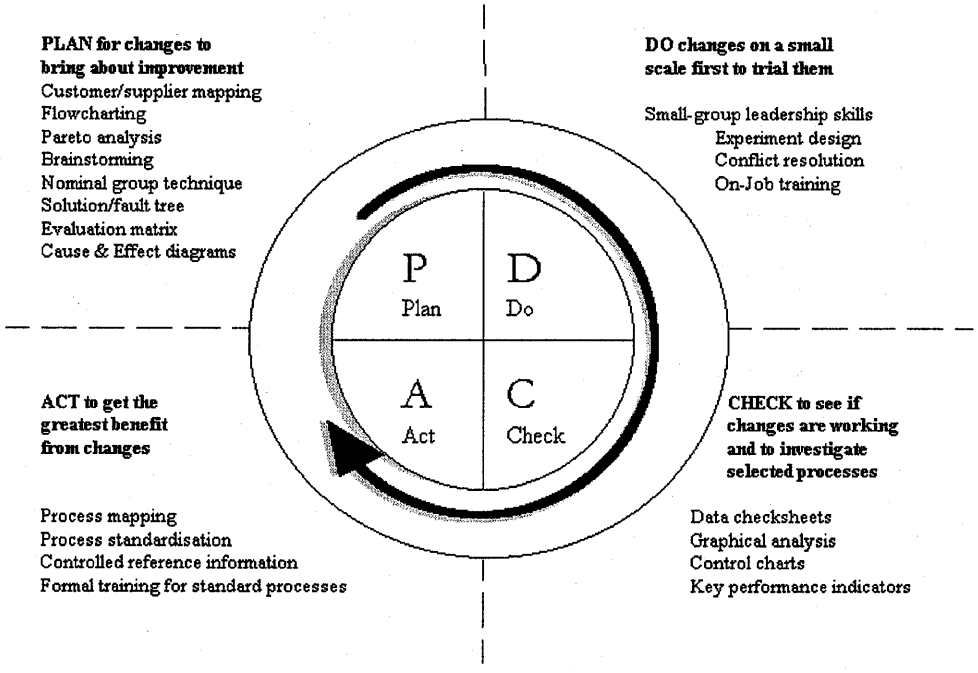


Figure 3.4: The Deming Wheel
(http://www.hci.com.au/hcisite3/toolkit/pdcacycl.htm)

Phase 1: In the first phase of the program, it is vital that the local government provide leadership and support incorporating the soil contamination prevention plan into the organization. Government-wide acceptance also raises the entire staff's awareness about the serious consequences that soil contamination can have on public health, and the benefits associated with prevention. The author proposes that a local government take the leadership role in the CERM program, with academia taking part in the core team to assist in analyzing what processes and procedures already exist, and assist in developing a framework for the program with specific guidelines. This idea is similar to the present Ministry of Education, Culture, Sports, Science and Technology (MEXT) support for Venture Business Laboratories (VBL), and its promotion of incubation facilities for regional innovation and development. Figure 3.5 illustrates the number of projects, researchers, and the type of research cooperation that has taken place since 1983. The latest data shows a very steady increase of cases from only 56 cases in the initial program year 1983 to 5,264 in 2001 [16]. The sector breakdown clearly shows an even distribution throughout the various industries, with environment related cooperation in the middle at 13.4 percent. The author's proposal differs from the VBL approach in that it is a volunteer-based program.

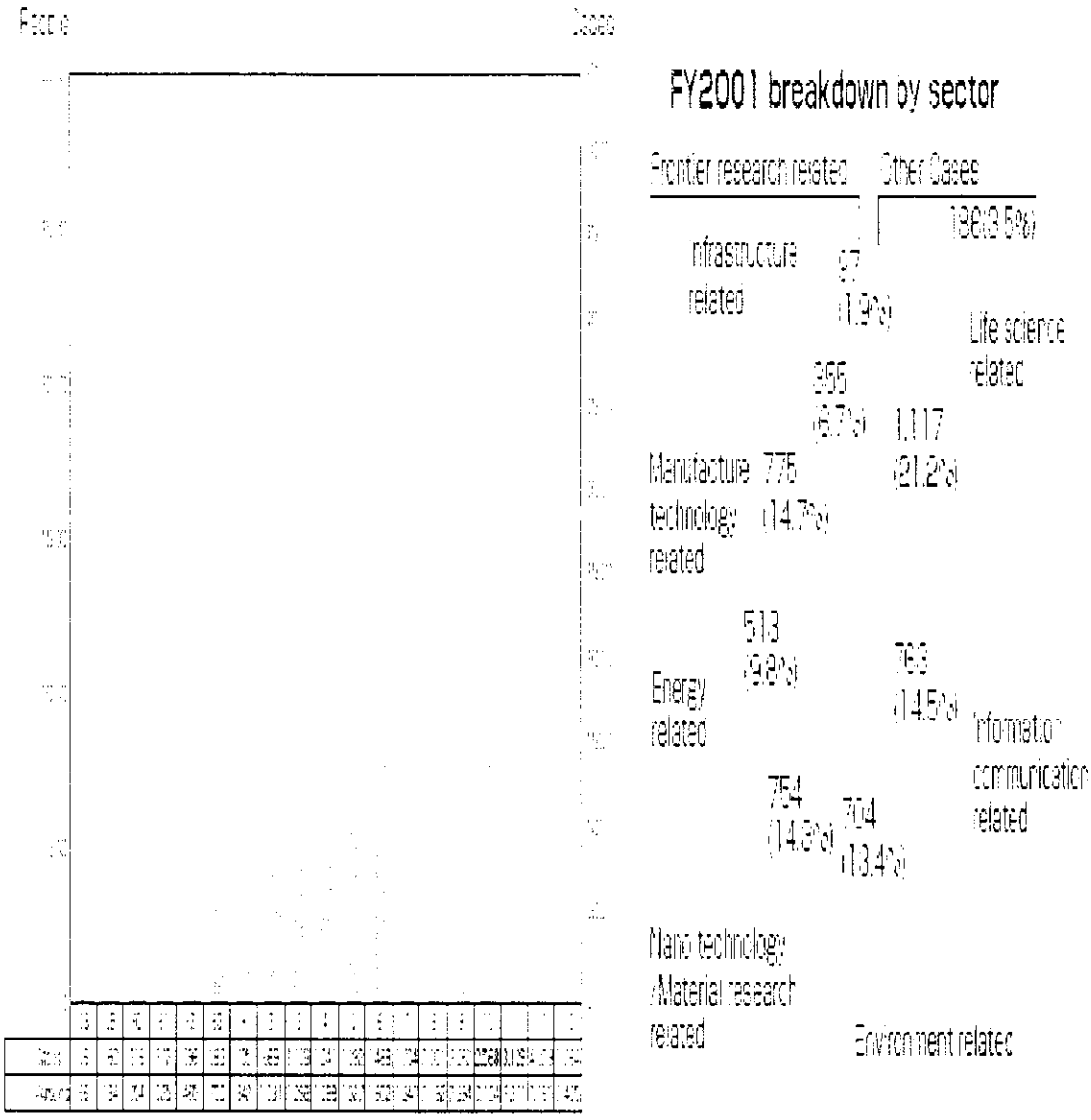


Figure 3.5: The graph lists the number of projects and people involved in university and industry partnerships from 1983 to 2001 and 2001 by sector. The graph also shows the rapid increase from 56 cases in 1983 to 5,254 in 2001 with 2,436 people involved.
(MEXT: Partnership Between University and Industry)

Phase 2: This phase focuses on developing the system, setting the objectives and targets. Once the policy, objectives and targets are determined and agreed upon, a written draft that clearly and simply communicates the policy to all involved and other stakeholders. The core team decides who will take the lead in this phase. The leader should gather members of group to create a Cause, Effect and Positive Impact (CEPI) matrix as illustrated in table 3.3. This not only helps to visualize problem areas, but also motivates members to participate by giving them decision-making power.

Table 3.3: An Example of a CEPI Matrix for Soil Contamination

(By Author)

Cause	Effect	Impact
Municipal solid waste generation	➢ Decrease in landfill area ➢ Increase of air, ground and groundwater pollution ➢ Increase of dioxin releases	➢ Conservation of natural resources ➢ Reduction of health and liability risks ➢ Decrease of dioxin
Hazardous chemical usage	➢ Increase of air, ground and groundwater pollution ➢ Increase risks to worker's health	➢ Reduction of health and liability risks ➢ Reduction of on-the-job health and physical risks.
Illegal dumping	➢ Increase of air, ground and groundwater pollution ➢ Increase risk of infectious disease from animals and insects. ➢ Increased financial risk from clean up and devalued property	➢ Reduction of health and liability risks ➢ Reduced risk from infectious disease and injury ➢ Reduction of financial risk from clean-up

Phase 3: In this phase, establishing the objectives and targets are primary. "A Trouble Shooter's Guide for Local Governments" lists the following six activities necessary to ensure the program targets and objectives can be met [17].

1) It is necessary to set up a good method for operational control and procedures and documentation of all activities.
2) Organization-wide training about the program and clearly define roles and responsibilities.
3) Establish good internal and external communication lines that flow from top-down, bottom-up, and across areas.
4) Set up a system that keep documents up-to-date, easy to access and achieved when necessary.
5) Establish measures to identify emergencies that can occur from daily operations, review and address plans to reduce potential incidents.
6) Develop the action plan that will be the driving force to meet the objectives and targets.

Phase 4: This stage involves monitoring, measuring, and management review to assess the degree of progress towards the objectives and targets. This also requires carrying out internal audits to verify and add transparency to the system, and initiating a management review cycle. The author suggests using auditors from outside the core team to promote the system's credibility through a less biased, and transparent organization. The public receives the auditor's report through the Internet or other publications and has an opportunity to offer feedback.

Certification Systems

The first certification system published was the British Standard (BS) 7750 in the same year as the 1992 Earth Summit in Rio de Janeiro. It addressed the real and potential concerns over environmental risks and damages. It was, and still is a voluntary standard for companies, as are, the Eco-Management and Audit Scheme (EMAS) and International Organization for Standardization's (ISO) 14000 series for environmental management that were developed later. The creation of the international standard ISO 14000 Series was motivated by the implementation of two important agreements: the Rio Agreement (1992) and the GATT Uruguay Round Ministerial Decision on Trade and Environment (1994) [18]. At the time of writing this dissertation, 66,070 organizations worldwide have become ISO 14001 certified [19]. The processes designed into EMAS and ISO 14001 focus on preventing pollution, improving compliance, and utilizing cleaner technology. Three main differences has made ISO 14001 a much more popular choice worldwide:

1) EMAS requires auditors to check that a facility complies with environmental regulations.
2) A facility must publish an environmental statement detailing its EMS organization. ISO 14001 only suggests publishing an environment report.
3) Under the EMAS system, a facility must initially undergo an environmental review process to identify the significant environmental impacts.

Overall, EMAS is more performance based, and according to a study by Dahlstrom and Skea, it is a more credible system that produces higher levels of environmental performance than ISO 14001 in the following areas [20]:

1) Recording and use of information
2) Knowledge and implementation of authorization requirements
3) Plant maintenance, management and training
4) Process operation

The disadvantage for firms adopting EMAS is that the stricter requirements might possibly result in penalties or legal action if a violation is uncovered during an audit, so transparent reporting might expose potentially unfavorable environmental performance information.

While there are both certified and non-certified approaches to an EMS, certified facilities are becoming the more common option. Especially in Japan where certified facilities exceed Germany and the United States by more than 9,000 and the number of certifications each year in Japan continues to increase at a rapid pace compared to other nations. Figure 3.6 illustrates just how great the difference is between Japan and other nations for ISO 14001, with Japan having over 18,000 certified organizations compared to 8,865 for China, which ranks second in the world.

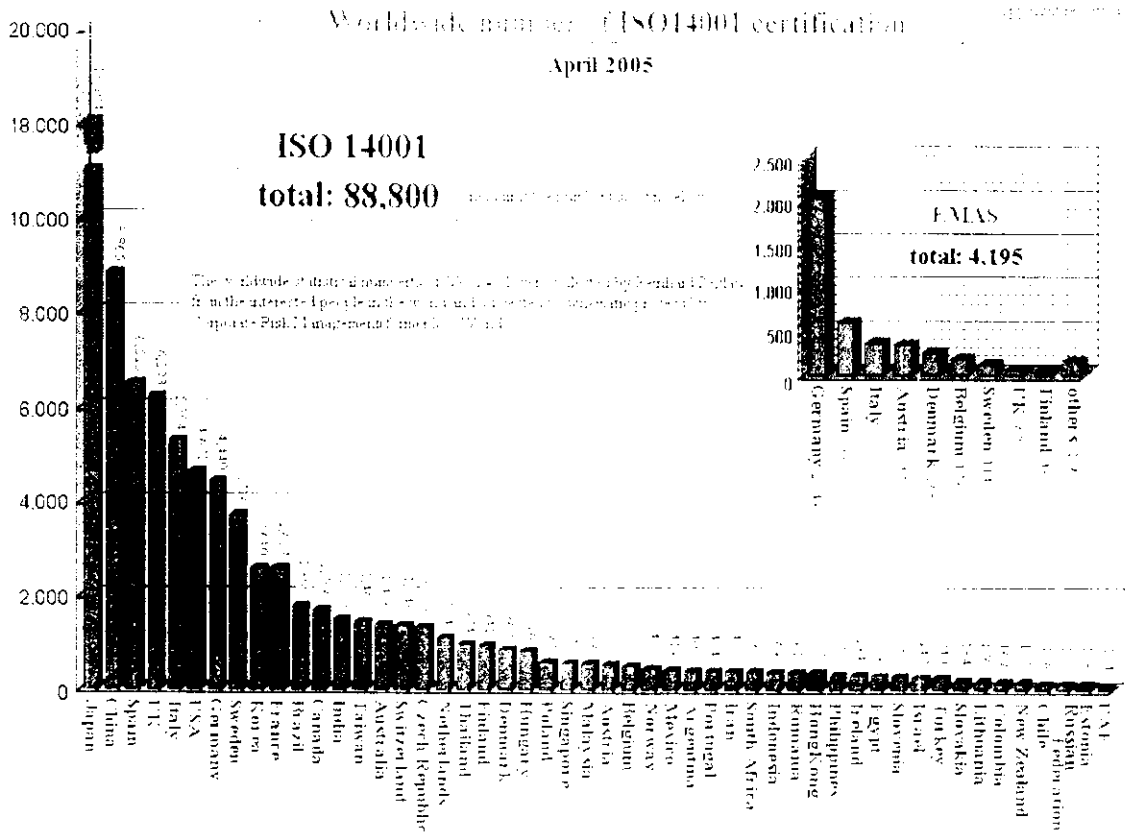


Figure 3.6: Worldwide Certified ISO 14001 and EMAS Organizations

(Copyright: Corporate Risk Management (former ISO World, data assimilated by Peglau, Reinhard)

Even though the United States lags far behind Japan at sixth, Figure 3.7 shows that there is strong growth in certification. This trend suggests a growing acceptance in the U.S. that becoming a certified ISO 14001 EMS facility provides a positive cost-benefit ratio.

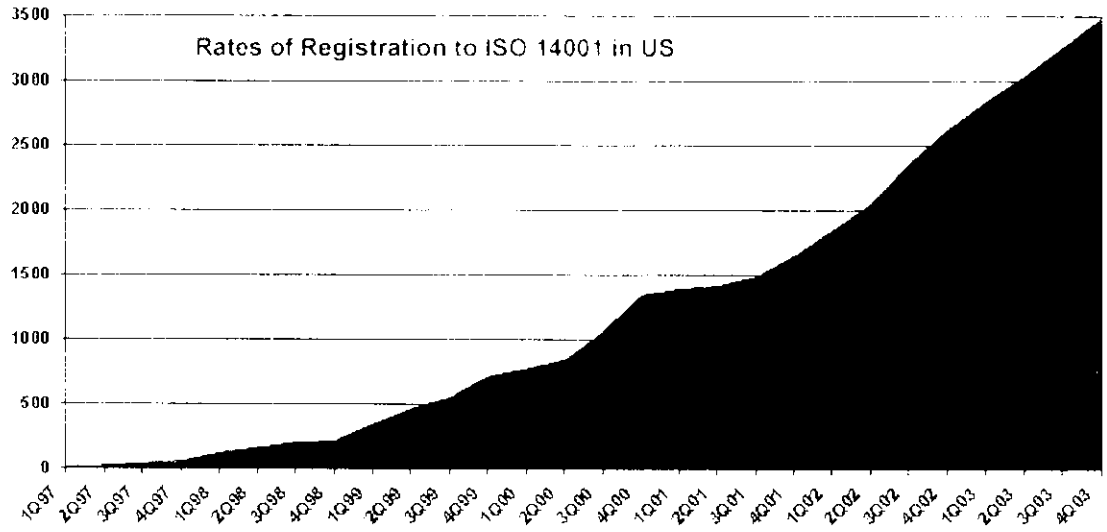


Figure 3.7 Registration Rates for ISO 14001 in the United States from 1997 to 2003 (Copyright Capaccio Environmental Engineering Inc. 2004)

There have been several studies to determine if ISO 14001 certified facilities are any more efficient than non-certified ones with respect to environmental performance, and in section 3.1.7, results from a pilot study partially funded by the EPA in the United States for public organizations will examine the environmental performance and the benefits that an EMS offers [21].

ISO 14001 certification requires organizations to adopt the following five measures [22]:

1) Adopt a written environmental policy.
2) Identify all environmental aspects and significant impacts of their activities, products, and services.
3) Set objectives and targets for continuous improvement in environmental performance.
4) Assign clear responsibilities for implementation, training, monitoring, and corrective actions.
5) Evaluate and refine implementation over time to achieve continuous improvement both in the implementation of environmental objectives and targets and in the EMS itself.

3.1.4 MOTIVATIONS AND BENEFITS FOR LOCAL GOVERNMENTS TO IMPLEMENT EMS

Table 3.4 provides the data from a recent study on ISO 14001 certified local governments in Japan. The study conducted on local governments in Japan found that environmental awareness is growing annually among local governments. They have begun to provide technical and financial assistance to small and medium-sized enterprises (SMEs) in order to establish an EMS [23]. They have also formed organizations that are accessible through the Internet and hold conferences to exchange information about technological advances, innovative management practices, regulatory information, and training.

Examples of three major worldwide organizations are:

1) International City/County Management Association (ICMA) is a nonprofit organization established in 1914 that supports local governments worldwide (http://www.icma.org)
2) Local Government Assistance Network (LGEN) works in close partnership with ICMA to allow interaction between participating local officials online. (http: www.lgean.com)
3) International Council for Local Environmental Initiatives (ICLEI) founded in 1990 includes regional local and national governments that work toward sustainability. (http://www.iclei.org)

Table 3.4: ISO 14001 Certified Japanese Local Government Organizations 2001

(ISO Management Systems May-June 2002)

Local Governments by Type	Number of Local Governments	Number of ISO 14001 Certified Organizations
Prefectures	47	26 (55%)
Cabinet Order designated cities	12	6 (50%)
Cities	659	107 (16%)
Special wards (Tokyo)	23	8 (34%)
Towns	1,987	51 (0.2%)
Villages (including the Northern Territories)	573	2 (0.03%)
Total	**3,301**	**200 (.6%)**

Motivating factors for municipal organizations to adopt an EMS

Before implementing an EMS many local governments described their goals as more focused on compliance issues, but after adopting an EMS, many began to explore methods to prevent pollution and initiate non-regulated programs such as energy efficiency. The following summarizes the main positive motivating factors before and after setting up an EMS [24].

Presumed benefits before EMS implementation

1) Useful for managing environmental issues
2) Provides compliance promotion and pollution prevention approaches
3) Increases environmental awareness and stewardship
4) Improves operational control and efficiency

Benefits after EMS implementation

1) Better operational control in areas that influence the environment
2) Better understanding of the reasons for non-compliance
3) Improved operational efficiency and financial benefits through cost reductions
4) Improvements internally and externally with stakeholders improves communication network
5) Better relationship with regulators, employees and stakeholders

In Japan; however, the benefits that a local or prefecture government may acquire are slightly different. The first four listed benefits are the same; conversely, there is a more cooperative relationship between labor and management, and it is the responsibility of local governments to enforce national laws, so there is little if any antagonistic relationship with regulators.

3.1.5 KEY PRINCIPLES FOR SUCCESSFUL IMPLEMENTATION

According to a six year, three part pilot study on the performance of EMS's in local governments [25], the participants listed seven key principles that determine a successful EMS:

1) Top management must be strongly committed to the plan.
2) Enough resources must be available to carry out the plan.
3) Have support and understanding from all employees.
4) Have a strong core team.
5) Keep it simple. Check for systems that already exist and utilize them. First, address and identify the key elements that need improving as lessons are learned.
6) Recognize it as a continual program not simply as a short-term project. This will increase its importance in the organization.
7) Keep internal and external communication lines open and expansive. Communication must be vertical as well as horizontal inside and outside the organization.

These principles provide the essential guidelines, but as a program attempts to adopt a more comprehensive and holistic environmental approach, maintaining the principles becomes more complex and more challenging to achieve in practical terms. In the interview with Sasebo City Environmental Department officials for the case studies presented in Chapter Five, one official responsible for involving local business leaders in the city's environment movement said that it is difficult to ask them to participate on a regular basis because of their busy schedules. The city has taken a holistic approach to environmental issues, which has merit, but the author proposes a more focused approach that establishes working groups or steering committees on specific issues to attract interested and knowledgeable parties rather than open-ended sessions. This can produce short-term results that translate into long-term participation.

3.1.6 BARRIERS TO SUCCESSFUL IMPLEMENTATION

In the first stage of the pilot study from 1997 to 1999, five major barriers during implementation were uncovered. The quoted comments are from autonomous leaders in the Implementation Team from the nine participating cities listed in table 3.5 [26].

Table 3.5: Participants in First EMS Local Government Pilot Program

(EPA: First EMS Pilot Study)

	Local Government Participation Entity
1)	Town of Londonderry, New Hampshire
2)	City of Lowell, Massachusetts
3)	Wayne County, Michigan
4)	City of Indianapolis, Indiana
5)	Massachusetts Department of Corrections-Norfolk
6)	City of Gaithersburg, Maryland
7)	Lansing Board of Water & Light, Michigan
8)	New York City Transit Authority
9)	City of Scottsdale, Arizona

1) Managing organizational change

There were problems getting employees to buy-in to the new program. There tends to be a natural reaction to change, especially in government organizations.

"As we develop programs that build environmental stewardship and improve how we manage our environmental obligations, we must also develop programs that manage human and organizational resistance to change."

2) Lack of top management involvement

Top management's visibility and personal involvement plays a major role in getting the staff to buy-in to the changes that need to take place, also motivate workers to be willing to spend extra time learning how to implement changes.

"Change management requires top management leadership and visibility and personal involvement, not just lip service. Management needs a better grasp/understanding of what an EMS requires of an organization and of their role in the process before deciding to implement it."

3) Organizational issues related to frequent management change, under-staffing and employee changes in the implementation team.

"Time, Time, Time! Time is an essential resource . . . it's very limited and there is an erroneous perception that the EMS is above and beyond normal work duties. Dollars are abstract but time is concrete and while management has assured us the necessary dollars they allow too little staff time. Getting first tier management buy-in and cross-functional responsibility for EMS implementation has been a challenge. EMS implementation is viewed as the Implementation Team's project."

4) Lack of public awareness, understanding and buy-in

The public sometimes assumes that an EMS should be in place and that there is no need for a budget or special organization to handle environmental issues that are already regulated by

law.

"There's a lack of awareness or understanding about the benefits that the EMS has brought to the organization and the value it will bring in the future. Local government entities can realize many more benefits than just being in compliance, and we've broadened the performance indicators we are using to measure our success. We haven't communicated this fact well to the city management or to the public, so there's little demand from our clients—the citizens—for the EMS."

5) Political uncertainty

When there is a change in political leadership, the EMS program may be viewed as something the last political party established and does not fit the direction of the new administration. In Japan, this has rarely been the case, but this possibility is increasing, as reduced budgets are becoming the standard; consequently, more townships are amalgamating to become larger municipalities. When townships combine, there have been problems in developing an efficient administration and determining new roles to fill fewer positions. In addition, support for the powerful conservative business-friendly Liberal Democratic Party (LDP), has decreased over the years on the local level.

"The EMS is not institutionalized yet. We have a new administration in the wings. We hope the EMS won't be seen as the last regime's program."

The comments reflect the difficulty in establishing a new system controlled by bureaucratic practices, and a multi-layered hierarchical organization found in government. Because of system differences between the U.S. and Japan, only the organizational barrier in this pilot study applies closely to Japanese local governments. Frequent management changes, employee changes, and understaffing are common. The firmly engrained job rotation system in Japanese government departments may interfere with communicating the positive aspects of an EMS to the public. Unlike the U.S., Japanese government employees do not usually resist programs instituted by top management, and EMS programs at the local level are being encouraged on a national level by the MOE, so the first two barriers; along with, political uncertainty in the author's opinion are insignificant. In Japan, it is essential that when employee rotation takes place, the system is easy to comprehend to ensure an effortless transition.

3.1.7 BENEFITS ACHIEVED BY ADOPTING EMS IN PUBLIC ORGANZIATONS IN THE UNITED STATES

The results summarized below are from the third in the three part pilot EMS study conducted by the EPA. The study included nine different local governments in each of the three stages of the pilot study. Table 3.6 lists the participants and the division in which the EMS was implemented, followed by the reasons, benefits, and results achieved by the participants. Six out of the nine participates in this final

study have environmental risk issues that directly relate to soil contamination.

Table 3.6: Participants in "Third EMS Initiative for Public Entities" a Pilot Study by the EPA (EPA Third EMS Initiative)

Public Entity Participant	EMS Fenceline
City of Charlottesville, VA	Parks and Recreation Division
City of Kansas City, MO	Household Hazardous Waste and Solid Waste Divisions
Clark County Department of Public Works - Vancouver, WA	Equipment Services Department
Kent County Department of Public Works - Dover, DE	Wastewater Treatment Facility
Metro Waste Authority - Des Moines, IA	Landfill and Regional Collection Center
Oakland County Drain Commissioner's Office - Waterford, MI	Wastewater Treatment Plant Complex
Orange County Convention Center - Orlando, FL	Building Services and Waste Management
Rivanna Water and Sewer Authority - Charlottesville, VA	Moores Creek Wastewater Treatment Plant
Sacramento Municipal Utility District - Sacramento, CA	Energy Supply Business Unit

Participants selected an area or operation that they planned to apply their (fenceline) EMS. Some of the reasons that they wanted to adopt an EMS reflect the motives participants gave in the first two pilot studies:

1) To improve employee participation in the organization's environmental performance.
2) To improve environmental performance.
3) It is consistent with organization's overall environmental principles.
4) An EMS is a valuable public relations tool.
5) It increases operational efficiencies and reduces operating costs.

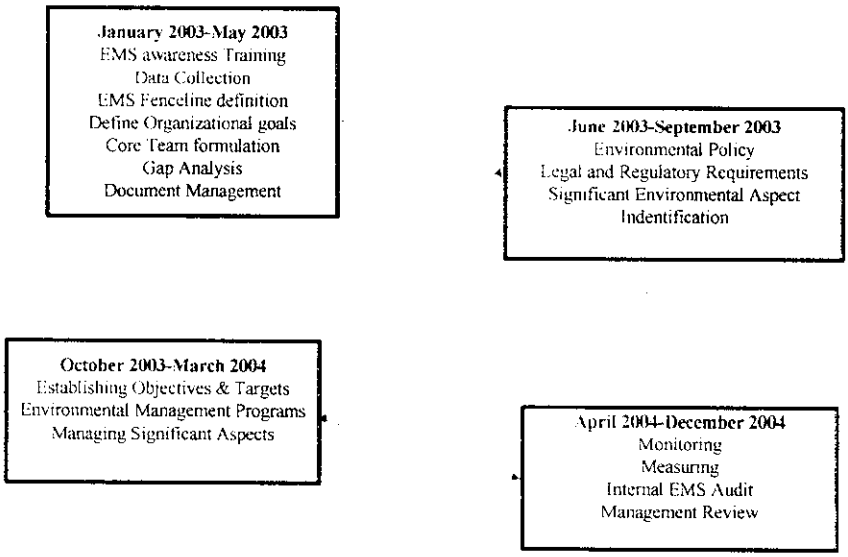


Figure 3.8: PDSA cycle timeline adopted by participants in Third EMS Initiative for Public Entities (EPA Third EMS Initiative)

The quantitative benefits gained over the two-year period were in cost savings, like the $42,000 savings from reduced tipping fees and recycling rebates, 85 percent reduction in sanitary overflows, 50 percent of solid waste recycled in one year, and 157,000 cubic yards of landfill space preserved in one year through solid waste and recycling efforts. Qualitative benefits ranged from risk reduction to legal action, awards, and improved relations with regulators and local stakeholders. The participants listed seven keys factors why the EMS programs were able to successfully reach their initial goals [27]:

1) Following the Keep It Simple rule (KISS).
2) EMS is a continual program, not a project.
3) EMS should be built into the business planning process.
4) Management visibility, commitment and sustained involvement are critical for a successful program.
5) Buy-in by the shop floor, which means individuals directly involved on the front line or on a daily basis.
6) Ongoing internal and external communication.
7) Utilizing outside technical guidance and resource support.

Many of the participants commented that following the KISS rule was one of the most important reasons that they could succeed. Wide-scale implementation is often used when attempting to introduce a new program, but it is better to customize a program that corresponds to the personnel and organization, and then build up to a more complex system as everyone becomes more familiar with execution procedures.

Top management's involvement also was an area that provided great incentive for all employees to get more involved and excited about environmental issues. In some cases, steering committees were formed and team members from different areas began to interact and exchange ideas about environmental issues.

Finally, communication was another main factor in the success because it played a vital role from the beginning phase with the defining of the EMS fenceline until phase four that included management review and the internal audit. It is important that all interested parties stay connected collectively throughout the process horizontally and vertically. This provides not only efficiency, but also an avenue for new ideas to develop. External communication helped connect the significance of the program to local stakeholders and raise their awareness. A good example of this comes from The Metro Waste Authority in Des Moines, Iowa, which participated in the pilot study, and received praise for its approach to connect with local stakeholders. It created the IMPACT logo to communicate the importance of waste reduction internally and externally [28].

Improving what we do everyday
Managing our impact on the environment
Preventing pollution
Adhering to rules and regulations
Communication performance
Training our employees effectively

3.2 BACKGROUND ON ENVIRONMENTAL RISK MANAGEMENT (ERM)

Risk management as unofficially defined by the EPA is, "The process of evaluating and selecting alternative regulatory and non-regulatory responses to risk. The selection process requires the consideration of legal, economic, and behavioral factors" [29]. A risk management system requires any organization to adopt the following widely accepted processes [30]:

1) Define the context and risk management criteria
2) Identify the risks
3) Access the significance of those risks
4) Identify, select, and implement risk treatment options
5) Perform monitoring, review, and corrective measures

In addition to the five essential processes, there are five important elements of risk management [31].

1) Process
2) Stakeholders
3) Other decision elements

4) Communication
5) Education

The process must be transparent, open and fair, and stakeholders must be a part of it from the beginning, not simply informed after the decisions have been made. In addition, all relevant stakeholders need to be included in the discussions. In this thesis stakeholder refers to the following: The company; the staff; shareholders; customers; suppliers; licensing agencies; people affected by the organization; special interest groups; and inhabitants living in vicinity of the an establishment. Other decision elements include societal perceptions, costs, and preferences, each have a considerable influence on the assessment. Communication is probably the most important area when dealing with stakeholders. Unfortunately, communication problems often arise because scientists are unable to elucidate their highly technical reports in lay terms. It is important for education to focus on the specific aspects of the problem using common scientific background information.

There are seven risk sources, and each of those contains hazards that occur naturally, or created by human actions [32].

1) The physical environment that includes natural disasters, and human made damages.
2) The economic environment influenced by the state of the economy and monetary issues.
3) The political environment stemming from legislative activity and electoral positions.
4) The social environment affected by social attitudes and preferences.
5) The legal environment that comes from regulations, court decisions and administrative acts.
6) The operational environment, which is related to the daily activities carried out within the local government.
7) The cognitive environment that affects decisions toward environmental risk and the amount of knowledge transfer.

Similar to the changes that took place with EMS's from the 1960s to the 1990s; environmental risk management is undergoing a transition from what the author calls "damage control" to the precautionary principle. The "damage control" approach focuses on reactionary methods of controlling the amount of loss; whereas, the precautionary principle utilizes proactive measures that can save money through reducing environmental risks to government and the private sector. This happens through better training programs, more transparency, and inter-organizational knowledge transfer. "Consequently, risk managers today emphasize that while a core objective of risk management is to minimize the negative impact of risk on budgets and on the human psyche, they hasten to add that risk management also supports sound analysis of risk-taking opportunities" [33]. This research however, focuses on ERM that is a more specific area within the wider range of risk management. An example of ERM for

a case of soil contamination would involve a process of gathering information to make informed decisions to minimize the health risks to people and the damage to the environment. It might also be necessary to deal with the social impacts from negative media coverage when accidents occur.

3.2.1 RISK CONTROL METHODS

The author's proposed model utilizes a combination of loss prevention, loss reduction, uncertainty reduction, and risk transfer when the cost/benefit ratio is appropriate. Accident prevention measures are imperative, but in practical terms, accidents will occur no matter how much training and preparation exists. Establishing loss reduction as part of the overall system creates a communication link between businesses and the government and increased transparency to the public. This also supplies the government with increased knowledge about new risks by utilizing the Internet as a communication tool. Insurance is recommended for government owned and operated property and facilities as a means of transfer risk. This option is limited in Japan, but it should become a more common as the risks associated with the soil contamination issue become more public. State and local governments in the United States minimize risks in the following methods.

1) Risk avoidance is most airtight approach that involves avoiding an activity or process all together. However, using this tool is often very difficult because governments have to be involved in activities that have certain risks attached, but if this option is possible, it can lead to increased risks in other areas or contexts. For example: If a local government decides not to build an incinerator as a means to reduce its municipal solid waste (MSW) that it sends to a landfill for disposal, it would either have to implement a very efficient 3R program or negotiate to transfer the waste to another location thereby increasing its costs.

2) Loss prevention is accomplished through proper training to reduce injury, a strict maintenance routine to reduce accidents due to faulty equipment, and good supervisory procedures to cut down on management errors. The citizens and other stakeholders expect intervention by the government, but with limited budgets and limited human resources, a cost-benefit analysis will determine the amount of intervention. Politics also has a hand in how far a government can intervene in this style of risk management.

3) Loss reduction differs from loss prevention in that it minimizes the impact of losses rather than preventing them. After major accidents like in Bhopal India, Chernobyl nuclear plant fire, and the recent natural disaster in New Orleans created by hurricane Katrina, it is clear that proper planning is vital to reduce losses that follow catastrophic events like these. The EPA introduced the Toxic Release Inventory Program (TRI) and in Japan, the MOE enacted

the Pollutant Release and Transfer Register (PRTR System). Both programs are good examples of this approach, because they require businesses to report the locations and quantities of chemicals stored on-site to the government in order to help communities prepare in the case chemical spills and similar emergencies occur.

4) Uncertainty reduction management recently has been gaining more influence among risk managers because the increasing power of IT management that allows managers to better understand what risks exist. This allows them to make decisions that match the organizations objectives.

5) Risk transfer transpires when another party such as a private insurance firm or NPO enters into a contract with a government organization; and it agrees to accept some or most of the potential risk. This type differs from risk avoidance, but is often confused with it because it appears that the government is trying to avoid taking on risk; but actually, projects or services in this case are undertaken. Referring back to the incinerator example, if a government decides to build an incinerator plant using a private or NPO organization, it transfers all risks to them, but the risk of dioxin contamination remains a potential risk. Before making the contractual transfer of risk, there should be a standard for preparing, reviewing, and filing. In addition, the government legal staff usually conducts a risk review to ensure the contract complies with state and local contract laws. The risk with this transfer comes if the party files for bankruptcy; thereby, leaving the government to cover the expenses.

3.2.2 RISK FINANCING

Whatever risk control method a local government uses, the past has shown that there will be losses that need to be covered. The two ways to deal with risk financing are risk retention, in which the local government assumes part or all of the loss. The other is risk transfer, in which an entity like an insurance company will cover the loss in exchange for a premium.

In the U.S., a few large insurance firms offer environmental insurance for soil contamination that covers a percentage of the remediation costs, and liabilities from court action for the government, NPOs and private organizations. The decision on the cost of the policy is through an annual review that calculates the appropriate premium and deductible depending on the amount of losses incurred for that year. According to an article in the *Environment News* [34], five major insurers offer soil contamination policies, particularly cases related to "Brownfield" real estate. The author researched insurance companies offering environmental insurance in Japan, and found one foreign owned company, AIU that offers coverage for individuals and companies worldwide, and one Japanese company, Sompo Japan

Insurance Inc., that provides soil contamination coverage for businesses.

Unplanned retention and planned retention are the two types of risk retention. It is impossible to identify all the risks that produce loss, so all organizations use some passive retention. Many local governments use planned retention, which means they employ self-insurance methods because they would rather pay for the loss than the cost of the premium and the deducible. Most local governments are unable to self-insure for all risks because of insufficient funds, so they must depend on insurance companies, or a recent trend is for SMLGs to pool their resources with other local governments to provide coverage that is more consistent (Intergovernmental pools). "Pools currently exist in all states, and it is estimated that 35 to 40 percent of all local governments in the United States participate in one or more pools" [35].

3.2.3 RISK ASSESSMENT

Risk assessment is at the heart of an environmental risk management system. Within this risk assessment core, there are Ecological Risk Assessment (ERA) and Human Health Risk Assessment (HRA). ERA as defined by the EPA as "the process that evaluates the likelihood that adverse ecological effects may occur or are occurring as a result of exposure to one or more stressors" [36]. Figure 3.9 illustrates the initial step in the ERA process.

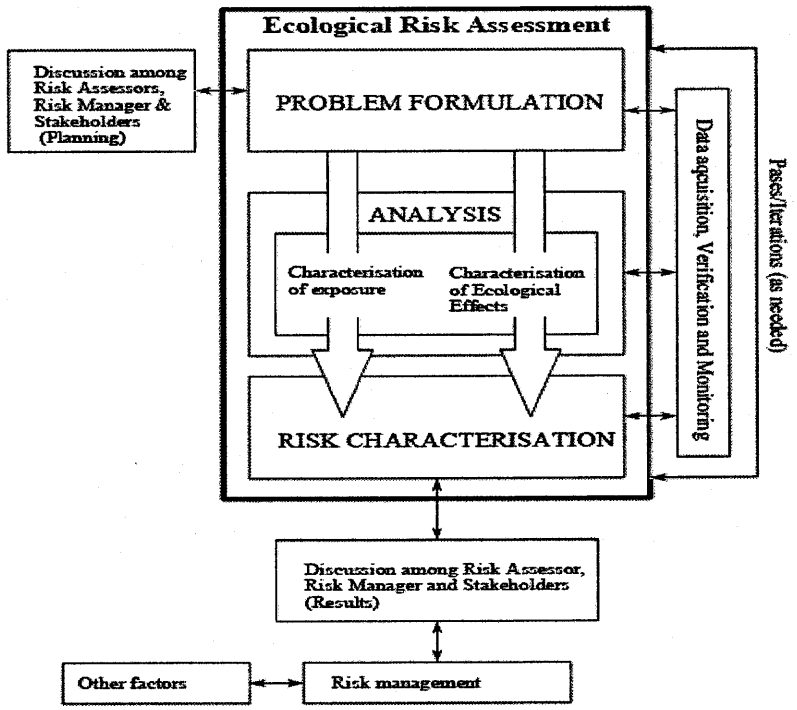


Figure 3.9: EPA Process for ERA
(EPA 1998)

The following are additional steps not illustrated in figure 3.9:

1) Agreeing on objectives
2) Formulating analysis plan
3) Analyzing information
4) Characterizing risk
5) Managing risk

Environmental Risk Assessments must provide the technical information needed by the decision maker in time to influence the decision [37]. It is vital that they do not become overcomplicated or slow down the assessment process. This is possible by producing well-written documents that clearly communicate the process and results, and concentrate on a decision-oriented reporting. Figure 3.10 summarizes the complete risk management system.

Risk management decisions by managers in local governments follow a cost-benefit analysis as introduced in figure 3.10, but these managers must be careful when making their calculations because there are six special factors that complicate analysis, especially when a prevention program is considered.

1) Time Line Factor: Prevention success or damage can take years.
2) Non-point Factor: Prevention target difficult to pinpoint because of broad effect.
3) Data doubt Factor: Credible prevention data difficult to obtain.
4) Unknown Factor: IT has increased information, but never enough.
5) Measurement Factor: Effective preventive measures mean little or nothing to measure.
6) Interdependence Factor: Strongly related risks.

After implementing the system, continuous monitoring creates financial challenges to the decreasing environmental budgets of local governments, but a more significant obstacle is that the government has no right to enter privately owned land to perform monitoring.

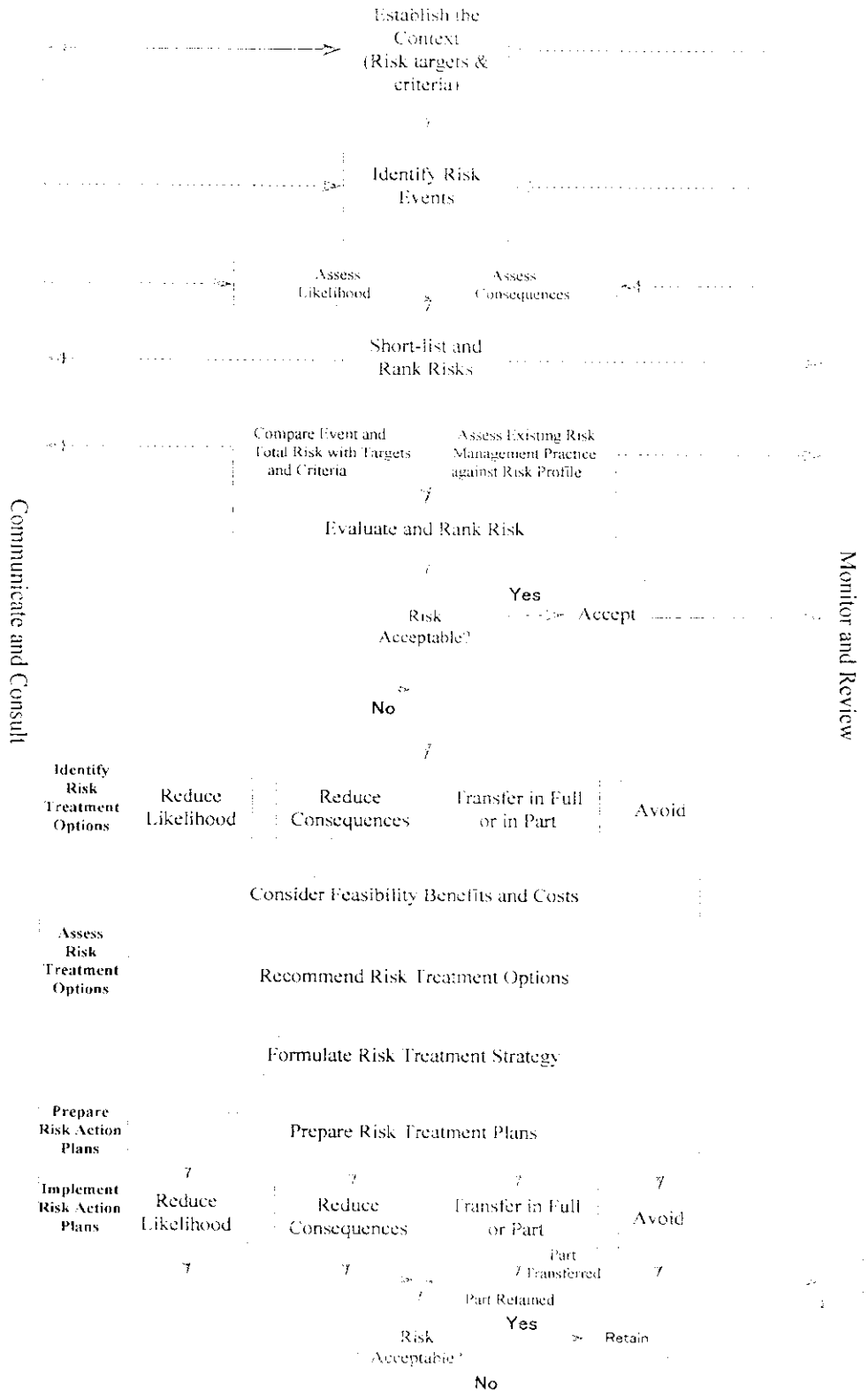


Figure 3.10: Risk Management Process Flow Chart

(Triple Bottom Line of Risk Managemen,Bowden, Adrian, Lane, Malcom, Martin, Julia))

3.3 THE IMPORTANCE OF INCLUDING SOIL CONTAMINATION MEASURES IN ENVIRONMENTAL RISK MANAGEMENT SYSTEMS BY BUSINESSES

The purpose of this section of the chapter is to consider the importance of including soil contamination measures in environmental risk management carried out by businesses, and to examine some necessary countermeasures to cope with the related problems. Case studies from Japan are introduced to add support to the author's proposal that it is essential for private and public entities to take precautionary measures to ensure that soil contamination is prevented to protect the public's health, the local governments and businesses interests.

3.3.1 ENVIRONMENTAL RISK MANAGEMENT AND THE SOIL CONTAMINATION ISSUE

When considering the definition of environmental risk management, it is important to confirm the definition of the term "risk." The established definition of risk [38] is the possibility for a substance or a situation to cause harm under a certain condition, and is a combination of the following two factors:

1) The possibility for an undesirable incident to occur;
2) The degree of probability that such an undesirable incident will occur.

The author defines environmental risk management for businesses as follows:

> Organizations such as businesses, to perceive a possibility in advance that under a certain condition a substance or a circumstance generated in their activities can produce burdens to the environment or can put human health or life in jeopardy; and to establish, based on this perception, a mechanism of systematic measures to prevent such possibilities from occurring.

Teshima Island soil contamination case attracted great attention in 1990. Teshima is a small island located in the Seto Island Sea but the serious soil contamination on the island triggered public awareness, and people feared that the soil contamination caused by illegal industrial waste dumping might seriously affect the health of residents on the island. In addition, the media reported soil contamination discovered at apartment construction sites, contaminated property discovered when selling corporate real estate holding during downsizing operations, and other incidents around Japan prompted greater public interest in this issue.

The first section presents data that shows businesses are placing greater importance on the soil contamination issue in their environmental risk management strategies than before. The next section considers the degree of significance the soil contamination issue should be given in corporate environmental risk management.

3.3.2 THE IMPORTANCE OF THE SOIL CONTAMINATION ISSUE IN ENVIRONMENTAL RISK MANAGEMENT

Environmental risk management, as can be seen by the definition above, refers to a systematic preemptive response to avoid the possibility that a substance, or a circumstance generated by corporate activities produces burdens to the environment or poses risks to human life or health. The importance of the soil contamination issue in environmental risk management is a serious issue, particularly for any enterprise that is likely to be involved in a soil contamination problem in its own corporate activities. Such a firm needs to establish some form of environmental management system in advance to avert the liabilities associated with it. Not only manufacturers who are prone to contaminate the soil in the course of their business activities, but also real estate developers who purchase and sell properties for condominiums and apartment buildings naturally need environmental risk management systems to cope with soil contamination. Thus, the following section will consider the importance of corporate responses to the soil contamination issue based on previously introduced facts.

3.3.3 THE SIGNIFICANCE OF CORPORATE RESPONSES TO THE SOIL CONTMAINATION ISSUE

In considering the importance of corporate responses to the soil contamination issue, the following five real estate transaction cases can serve as illustrations in which soil contamination problems were exposed. Over the past few years, some businesses have been aggressively restructuring their managerial resources by unloading their properties in order to improve their balance sheet as one element of their downsizing efforts. In fact, such property deals have uncovered many soil contamination problems [39].

Case 1

When Company A carried out a soil analysis prior to an attempt to sell its old factory site to the municipal government, it found arsenic and mercury contamination, apparently due to its paint manufacturing. As a result, the company employed the necessary countermeasures such as disposal of the contaminated soil, injecting over one billion yen for remediation.

Case 2

Company B remediated the mercury-contaminated soil in order to reuse the site of its closed-down chemical plant. The company decided to remove the mercury from the soil, and use it for backfilling; however, since the contaminated volume of soil reached 60,000 m^3, the remediation work cost as much as seven billion yen.

Case 3

Negotiation between a machine-assembly factory owner and an interested party took place on the seller's assumption that there should be no concern about soil contamination because the factory had no history of hazardous or toxic substances use. However, a soil analysis carried out in compliance with repeated demands from the buyer revealed contamination of the soil and the groundwater to various substances used in the past. This resulted in the termination of the sales agreement.

Case 4

A realtor planned to build a condominium on a property transferred from the municipal government, but soil samples before construction uncovered heavy metals that exceeded the Environmental Quality Standard (EQS) set by the MOE. Therefore, the realtor made an appeal to the municipality for disposal of the hazardous substances, and finally both sides agreed to a settlement, the municipality buying back the property for eight and a half billion yen.

Case 5

A realtor purchased a piece of land located on a hill in a quiet neighborhood to build a condominium; however, midway through the construction, it was revealed that industrial wastes, including high concentrations of toxic substances, were buried underground. Therefore, compelled to discontinue the construction already in process, the realtor demanded a buyback from the seller.

Next, analyzing each case individually we can determine the significant point each offers.

1) Case 1 is an example where an enterprise attempted to sell a factory site it owned. As mentioned, businesses have been enthusiastically restructuring their managerial resources in a variety of forms in recent years, unloading properties with the main aim of improving their cash flows. In order to maximize the cash-flow improvement, it is necessary to hold down the sale costs as much as possible. However, a soil contamination problem can put businesses at tremendous risk in terms of corporate management, because as in Case 1, the company could not anticipate beforehand the over one billion yen in expenses for remediation of the contaminated soil. This implies that its restructuring corporate-property methods were not as effective as assumed. In addition, the company was unaware and assumed that its former plant site was pollution free until soil analysis before the transaction proved otherwise. This false assumption undoubtedly created health concerns by factory workers and residents living near the plant when they learned about the soil contamination. The company would have to bear the risks from potential legal action and other liabilities in this respect, as well.

2) Case 2 is an example in which the company attempted to reuse land from its former chemical plant

site. Reselling the land was one of its options, but it decided to retain the land and remediate the site. The extensive contamination forced the company to invest seven billion yen in order to obtain the EQS level and be able to use it as backfill. There is no doubt that incurring a seven billion yen expense for the cleanup of the contaminated soil in order to reuse its site was a heavy liability on the company. Obviously, the company could not have anticipated such a heavy liability while the chemical plant was still in operation. If it could have predicted the possibility of soil contamination then it could have avoided the costly environmental risks that produced heavy financial losses.

3) Case 3 is good example of the risks that soil contamination creates in the process of land sale negotiations, assuming that there were no concerns about soil contamination. The essential point of this case is the fact that soil analysis carried out at the insistence of the buyer revealed that the soil was contaminated. If the buyer had not demanded the seller to carry out the soil analysis the contaminated land might have infiltrated the groundwater or spread to other areas depending on how the buyer used the land, all the while, the buyer remaining unaware of the existing danger, would pose a health threat to third parties. In addition, if a soil analysis were required in the future under the SCCL, the new owner would be liable for the previous owner's contamination.

4) Both Case 4 and Case 5 provide examples of condominium construction by a realtor. In Case 4, the distribution of contaminated property was prevented by making the seller repurchase the land. In Case 5, a condominium construction project was halted while in progress after it was discovered that industrial wastes, including high concentrations of toxic substances, were buried underground. This case highlights the severe risks that exist after a land transaction and the completion of a condominium before the discovery of soil contamination. The risks incurred by the seller in this case include the buyback costs, and it is highly likely that the buyer will demand compensation for losses accrued from termination of the construction project. As for the risks incurred by the buyer, if there were any purchasers who had signed real estate sales contracts, the buyer might have to reimburse them for damages incurred. In addition, the risk common to both Case 4 and Case 5 is that construction of a condominium may get underway without a proper analysis to determine soil contamination; consequently, purchasers will unwittingly invest in contaminated properties.

These five case studies illustrate that a soil contamination problem involves not only a business and its employees, but also local residents and purchasers as well. Above all, businesses that are highly likely to cause soil contamination require preemptive measures to prevent soil contamination, so they need to establish environmental risk management systems to cope with related concerns. Furthermore, once soil contamination occurs, it inevitably creates anxiety about health among neighboring residents and purchasers. Therefore, enterprises should keep risk communication in mind, and routinely inform local

stakeholders of how they are addressing soil contamination issues as part of the management of the property they are holding. Enterprises will have to cope with the soil contamination issue in terms of such problems as discussed. Specifically, it will be vital for their environmental risk management to provide necessary information for residents living in the vicinity as well as for purchasers who are apt to become vulnerable to soil contamination damage. Likewise, disclosure of information on soil contamination with a view to averting risks imposed on both sellers and buyers in business-to-business (B2B) land transactions will be required. Therefore, the following sections examine the focus on corporate information disclosure concerning soil contamination.

3.3.4 THE IMPORTANCE OF SOIL CONTAMINATION INFORMATION—ITS IMPORTANCE FOR RESIDENTS AND PURCHASERS

The Importance for Purchasers

The reason information about soil contamination is necessary for a purchaser is that such information serves as a helpful criterion for buying property that is not contaminated. Possible tools of information disclosure in this case might be to include necessary information in real estate advertisements or in the *Juyo Jiko Setsumeisho*, the translates to "Statement of Important Matters," a document which is virtually equivalent to the Seller's Property Disclosure Statement in the U. S. Since the Statement of Important Matters is, in particular, indispensable to transactions mediated by real-estate brokers when signing a sales contract, disclosure of information in this document is important for avoiding distribution of contaminated properties to purchasers. Many real-estate brokers make land transactions as an intermediary after investigating a property for a prospective sale and report their findings in the Statement of Important Matters. It is important to make soil contamination information known to a potential purchaser in this document, including the presence or absence of contamination, whether cleanup work has been done or not, and implemented contamination prevention measures. For most general purchasers, namely private individuals, purchasing real estate is usually once-in-a-lifetime venture, and most of them buy the property for personal housing which requires a large sum of money. Therefore, it is imperative to avoid distributing properties with soil contamination to purchasers. Thus, in order to prevent the dispersal of contaminated properties, it is essential to give a full account of information about soil contamination in the Statement of Important Matters.

The Importance for Residents

Residents living near potential polluters are also important parties who need information concerning soil contamination. Since some factories and chemical plants have polluted soil in the past, if similar contamination occurs it will inevitably pose a direct anxiety about health to local stakeholders. Therefore, it will be increasingly important as a function of Corporate Social Responsibility (CSR) to provide local residents with soil contamination information. Corporate Social Responsibility is a

frequently discussed topic at present and is closely associated with corporate management. The established definition of the term CSR is to fulfill accountabilities to stakeholders such as shareholders, employees, customers, the environment, and communities, incorporating social justice, consideration of the environment, and as a consequence, to strive to improve economic, social, and environmental performance [40]. Stakeholders, as implied in the definition, are residents living near a business establishment or a plant that may cause soil contamination. Thus, it is necessary to provide residents with information on soil contamination from the standpoint of CSR.

Corporate websites, business reports, environmental reports, and green accounting are considered some possible means of disclosing information about soil contamination to residents. It would also be appropriate to include information on the overall situation regarding soil contamination countermeasures, plant sites, industrial waste disposal, cleanup costs and environmental liabilities and violations.

Table 3.7 summarizes the mechanisms of information disclosure about soil contamination for purchasers/ residents based on what has been discussed in the previous two paragraphs.

Table 3.7: Soil Contamination Information for Purchasers/ Residents

(By Author)

Mechanisms of Information Disclosure for Purchasers/ Residents		
	Media for Disclosure	Specifics
Purchasers	1) Ads for real estate 2) Statement of Important Matters	1) Absence or presence of contamination in properties to be sold 2) Previous cleanup work done or not 3) Implemented contamination countermeasures
Residents	1) Websites 2) Business reports 3) Environmental reports 4) CSR reports 5) Green accounting	Overall situation regarding: 1) Soil contamination countermeasures 2) plant sites 3) industrial waste disposal 4) cleanup costs 5) environmental liabilities

3.3.5 THE IMPORTANCE OF SOIL CONTAMINATION INFORMATION: ITS SIGNIFICANCE WITH BUSINESS TO BUSINESS (B2B) TRANSACTIONS

This section examines the importance of soil contamination information for B2B transactions, using a land transaction as an example. Selling a company held property as part of restructuring or selling an under-utilized piece of real estate can have extensive risks to the seller. In the event that the land for prospective sale is contaminated, the seller may be forced to accept the responsibility for the termination of transactions and damages incurred, and make compensation for losses. In order to avert such risks, it is necessary to carry out a soil contamination study before a sale, and if the soil is contaminated, it is vital to remediate the site before putting the land up for sale. In addition, in order to avoid later responsibility for damages and being forced to provide compensation for losses, it is highly recommended to disclose the information shown in Table 3.8 by the time the sales agreement is completed. It is also useful to disclose the information listed in Table 3.8 regarding the seller's risk management.

Table 3.8: Specific Information to be Disclosed for Averting Soil Contamination Risks in Land Transactions

(By Author)

Specific Information to be Disclosed
1) History of land use
2) Utilization period
3) Known history of contamination
4) Names of pollutants or contaminants present (e.g., benzene, dioxin)
5) Cause of contamination
6) Subsurface effects of pollutants or contaminants
7) Implemented contamination countermeasures
8) Contamination measures to be implemented in the future
9) Complete decontamination possibilities
10) Information on health effects
11) Situation concerning environmental liabilities

The reasons for a seller to employee risk communication and the disclosure of the information in Table 3.8 are also beneficial for the buyer, in the following respect: The SCCL stipulates that the current property owner must carry out necessary measures including remediation when there is no responsible party or it is impossible to identify the responsible party. Therefore, when negotiating the purchase of real estate, the buyer needs to obtain information about the history of the property to determine whether there is any likelihood of contamination, and if so, the property meets the EQS set by the MOE [41]. In this respect, the SCCL differs distinctly from the Superfund Act in the United States. The Superfund Act, enacted in 1980, stipulates a wider scope of potentially responsible parties who are required to

accept remedial obligations resulting from soil contamination, and to bear cleanup costs [42], and this is where the Superfund Act has its own unique feature. Since Japan has no such law, purchasers of land must act on a "buyer beware" basis. Consequently, from this perspective, it becomes significant whether or not the buyer has already acquired a full understanding of the details shown in Table 3.8 at the time of signing the real estate sales contract.

3.3.6 SECTION CONCLUSIONS

The importance of including soil contamination measures in corporate environmental risk management and countermeasures to be implemented in the future, mainly focusing on a question of corporate information disclosure about soil contamination were detailed in the previous section.

In order to upgrade a corporate risk management system to handle soil contamination problems, businesses must strive to establish a system, constantly taking into consideration the need to construct one designed for proactive measures instead of reactive measures. Thus, in order to accomplish such objectives, it is indispensable for businesses to support human resources capable of analyzing and responding to soil contamination risks, and to allocate sufficient financial resources to cope with the related issues. Most importantly of all, corporate executives themselves must have a thorough knowledge of the soil contamination issue.

3.4 ENVIRONMENTAL RISK MANGAMENT POLICY FOR CURRENT AND FUTURE SOIL POLLUTION PREVENTION (P2) ISSUES

In the United States and Japan from the 1960s to the 1980s C&C measures were the most utilized method to require companies to reduce harmful emissions. However, in the Europe, in particular northern Europe, governments adopted market-based instruments (MBI) and voluntary agreements in addition to C&C because they believed that they could contribute to a reduction of pollution by way of a more cooperative relationship between government and the private sector. This section details seven main areas of risk concerning soil contamination that pollution prevention (P2) measures can reduce.

1) Developed and developing countries are facing rapidly depleting landfill areas, especially in Japan, England and Germany where there is very limited land. The increase of waste not only adds to the toxic chemicals already present in the ecosystem, but it raises costs to society and businesses by inefficiently using limited natural resources. In an effort to reduce the burden on limited landfill, both Japan and Germany have become leaders in promoting recycling efforts since the 1990s. At the Sea Island Summit of Eight in June of 2004, the G8 members applauded Japan's proposal for the "3R's" (Reduce, Reuse, Recycle) initiative to play a major role in sustainable Pollution Prevention (P2) movement on a domestic and international level.

2) Even though major chemical accidents are infrequent, but when they do occur, the result is often a tragic loss of life and property, so prevention measures for chemical accidents and releases must be increased using the stringent risk assessment and risk management procedures to avoid the disastrous consequences. The Bhopal chemical accident in India in 1984 by a Union Carbide plant is an example of the immense risk to human life, and company liability that a major accident can produce. This and other serious accidents in the U.S. throughout the 1980s and 1990s led to major changes in risk management strategies in the U.S. chemical industry. Americans reasoned that if such a tragic accident could happen in India under the same management, then it is likely to happen at home. In response, the American Chemical Manufacturers Association formed the Community Awareness & Emergency Response program (CAER) in March 1985. The program's main objective was to improve emergency response planning for communities near chemical facilities. Local stakeholders from both the private and public sector worked closely with chemical companies to formulate emergency responses, coordinate training with the local authorities, share information about how they operate their facilities, and answer any questions that the local stakeholders might have about safety issues. In 1988, U.S. members of the United States Chemical Manufacturers Association adopted the Responsible Care guidelines established earlier in Canada, and mandated that members practice P2 measures, implement process safety procedures, establish safer distribution methods, train employees, and take responsibility for the full life cycle of their products. Another change stemming from the Bhopal accident was new legislation to improve safety and increase preparedness. The Emergency Planning and Community Right-to-Know Act (EPCRA) passed in 1986, requires states to formulate State Emergency Response Commissions (SERCs), as well as Local Emergency Planning Committees (LEPCs) to ensure there is a proper response to prevent unnecessary injury or deaths in case of a chemical accident. The Toxic Release Inventory (TRI) was included as a part of this statute that requires certain facilities to annually report to the EPA about their toxic chemical emissions. The Clean Air Act of 1990 further strengthen preventive measures by requiring Occupational Safety and Health Administration (OHSA) and the EPA to mandate facilities handling or producing hazardous materials to develop accident prevention and emergency response requirements. OHSA established the Process Safety Management standard (PSM), and the EPA created a program with stricter compliance requirements than PSM, called the Risk Management Program (RMP). In addition to the EPA's release of information, nonprofit organizations like the Environmental Defense Fund have set up web pages that offer any stakeholder easy-to-understand information on the state of the local environment, chemical release, and Superfund sites. "Scorecard" (figure 3.11) is another site supported by a NPO that informs stakeholders of the exact location of a chemical release, the type of chemical, and the company when a release has occurred. It also provides the location of Superfund sites throughout the U.S., and compares the

safety of a community with others according to amount of the toxic chemicals present in that environment [43].

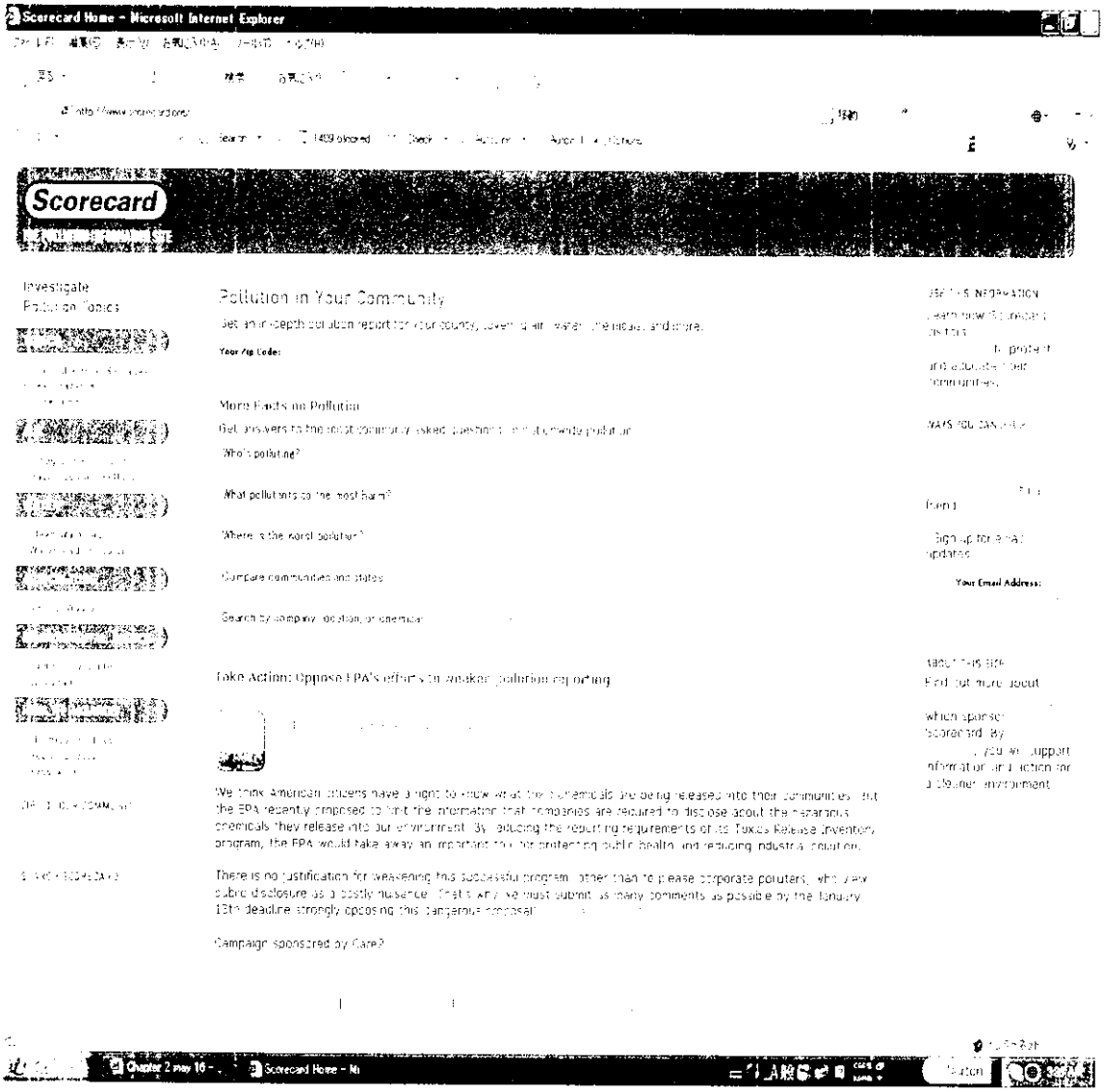


Figure 3.11: Scorecard's Pollution Information Site in the United States (Copyright: Scorecard.org)

Japan followed recommendations by the OECD when it established its PRTR system in 1996 to provide a more transparent system and increase emergency preparations to protect citizens near facilities producing or storing hazardous chemicals. Proposals by the Chemical Products Council and the Central Environment Council in 1998 also influenced the Japanese government to pass the PRTR into law in 1999. The 2005 PRTR report received data from 41,079 facilities totaling 530 kts. The amount of releases was 291 kts and transfers came to 240 kts. Even though on-site

land releases only consisted of a mere .047% of the total, and on-site landfills 5.1%, the three year trend covering the periods from 2001 to 2003 show a increasing tendency for transfers to landfills from 20,451 kts to 27,283 kts [44]. The report shows an increasing number of releases and transfers of lead, chromium compounds and mercury to landfill sites. There are an additional 342 kts of estimated releases from sources outside of notification by households, mobile sources, listed sources, and non-listed sources. Releases from outside sources complicate risk management measures passed by the government to reduce hazardous waste. Therefore, since there is no user-friendly system like Scorecard in Japan, it is recommended that such a system be established as a part of the CERM system to raise all stakeholders' awareness about the soil contamination issue.

Another barrier uncovered in research supported by an EPA study by Elliot, Kleindorfer, and their associates, concluded that there is a positive relationship between the level of indebtedness of a parent company and the accident frequency of the facilities owned by the company [45]. Considering the economy is cyclical, we can expect that accidents will decrease in times of economic prosperity, but increase in a recession. Therefore, a risk management system not affected by business cycles is preferred. The author believes that the CERM system proposed in this dissertation provides a low cost system that maintains stringent risk management even during deflationary periods.

3) Illegal dumping is an increasing problem that confronts local governments. It not only affects the soil, groundwater, air, and increases disease by insects and rodents, but also the property value of land decreases near illegal dumpsites. This problem requires large capital investment and squanders limited human resources on the national, state, and local level. It is increasing due to various factors. Profit taking by private disposal firms, cost savings by construction companies because of increasing tipping fees, recycling programs that are inconvenient or poorly supported, shortage of enforcement and prosecution of offenders, poor knowledge by local inhabitants about the dangers illegal dumping has on the environment and health, and the lack of funds to sponsor clean-ups and to educate the public. As the cost of proper disposal increases, the number of illegal dumping cases is likely to increase. Practical and effective P2 measures present a difficult challenge for governments and communities alike, community collaboration is possible solution to this escalating problem.

In the MOE's 2005 Annual report, the number of illegal dumping cases with a volume of over 10 tons dropped from 934 to 894 from 2002 to 2003, but the total volume drastically increased from 318,000 tons to 745,000 tons [46]. Some prefectures are facing more serious problems than

others are, but all prefectures must find effective measures to reduce the cases to prevent further soil contamination.

4) This issue relates to future P2 improvements on improving technology to achieve an equivalent functionality, or replace toxic chemicals with non-hazardous products. The EPA provides corporations and SMEs with technical assistance or grants on the national and state level to help develop new technology or improve management of existing facilities.
In Japan, The Ministry of Economy, Trade and Industry (METI), and MOE are promoting the introduction of practical new technology to businesses and public organizations. In the U.S., private universities collaborate with the government and businesses to introduce new technology; and in Japan, national and some private universities are beginning to do the same. In spite of this, a study conducted in Germany points out that the direct costs for substances and materials plays a significant role in the enterprise, and introducing less hazardous substances leads to increased expenses, thereby creating a significant barrier in switching to a substitute [47].

5) There is potential for previously disposed hazardous waste in public or private landfills to leak into surrounding soil and groundwater. The EPA claims that with modern landfill methods and monitoring technology that the public need not worry about any health hazards from landfills. However, the recent trend in the U.S. and Japan is for decreased spending on pollution prevention and control by the national, prefecture and local governments which increases the possibility for hazardous chemicals to leach into the surrounding soil and groundwater undetected because of under-funding for the monitoring of former and present landfill sites. Japanese prefecture governments have addressed the problem of limited landfill space by decreasing the amount of Municipal Solid Waste (MSW) transferred landfills by increasing the number of incinerators. This method of disposal involves installing expensive scrubbers to reduce dioxin emissions and increases the risk of future leaching of dioxin from the landfilled ash.

6) The wind carries and the rain deposits hazardous toxins like dioxin and Nitrogen Oxide into the soil present causing a serious non-point source of risk. Air pollution has undergone significant reduction since the heavy pollution experienced in major cities in the 1960s in Europe, the United States and Japan, but progress has leveled off, and it still posses a present and future threat to the ecosystem and human health. Dioxin levels in Japan are at low levels, but the MOE statistics for Carbon Dioxide emissions indicate a great increase from 1990 from residential (31.4 percent), commercial (36.1 percent), and transportation (19.8 percent), but very slightly from industry (0.3 percent) [48]. Nitrogen Oxide levels have also increased over the same period. At present Japan will not met its Kyoto Protocol quota for emissions without purchasing rights from Russia

or some European country that is well within the quota.

7) The last area of concern appeared after the terrorist attack on 9/11 in the United States. Before the attack, terrorism was not a significant threat to the environment, but now protecting sites that handle hazardous chemicals has become a major concern. Recent reports by the U.S. government have identified chemical and petroleum companies as possible sites of interest for attacks; consequently, some previously publicly available information concerning hazardous chemicals is now inaccessible to protect against terrorists using such information for an attack. A successful attack could cause a release that would have serious health and environmental consequences to the local communities, and any area within the fallout area.

An OECD workshop on chemical accidents brought out a significant point that helps summarize the force that can motivate and give direction to current and future P2 efforts.

> "Disasters are followed by a period in which the attention of the public and the media are at their highest point and a window of opportunity for action opens. . . Investigating and analyzing the origins and consequences of disaster can provide lessons on how to improve assessment and management of risk. . . The momentum created in society can help overcome inertia and resistance to reforms in the risk management process. Effective management is the window of opportunity that can reinforce citizen's confidence in the way risks are handled, and in all significantly reduce the chances that the same disaster occurs again in the future" [49].

3.5 CONCLUSIONS

This chapter has provided details on the different certifying organizations, factors and processes behind an environmental management system. It also addressed through case studies how an environmental risk management system is an integral part of an organization to reduce the risk associated with accidents or soil contamination that endanger human health, increase liabilities, and harm the environment.

The chronology of environmental management illustrates (figure 3.3) how EMS has evolved, and one major reason for its evolution is the rising cost of damage control and remediation. It was explained how the PDSA cycle is utilized to provide the framework for the author's CERM model for small and medium-sized local governments. However, one serious problem facing these local governments is the limited number of workers assigned to pollution prevention work because of declining government funding for the environment, and the CERM model is volunteer-based in order to meet this human resource shortfall.

The significant differences between the two major EMS certification standards for ISO 14001-certification system and EMAS system is mainly the liability consequences related to poor transparency. ISO 14001 EMS certification includes auditing as a part of the certification process, but it is for internal purposes only, unlike the EMAS process that requires an independent audit with the results released to the public. In addition, the EMAS system is performance based and requires that the certified organization show improved environmental performance through it program. This is not required for the more popular ISO standard. This chapter also provided cases with local governments in the United States and Japan that have adopted EMS programs to improve efficiency, reduce costs, and enhance their public leadership role as environmentally active for the safety of the community. The Third EMS Pilot study presented local governments that established an EMS and ERM system, which could achieve cost savings, organizational improvements, and better environmental performance.

This chapter provided evidence on the significance for private enterprises and local governments to establish an ERM system for soil contamination through cases studies of businesses and governments in Japan and in the United States. The findings reveal there are similar and different motivations for participation by corporations and public organizations, but the essential point derived from these case studies is that the long-term benefits acquired by an ERM usually outweigh the short-term costs. The case studies of five businesses and one municipal government revealed unexpected heavy financial loss due to poor or non-existent ERM systems. The high cost of remediation, the long-term burden placed on human resources, and the negative impact on local stakeholders and the environment, along with the other evidence provided in this chapter, strongly indicate a soil prevention program lead by a local government, involving businesses, and local stakeholders has practical merit. The following chapter will detail the methods required to establish a successful collaborative organization.

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