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Urban and Industrial Management in Developing Countries

Lessons from Japanese Experience

Edited by

Wilfrido Cruz

Kazuhiko Takemoto

Jeremy Warford

EDI LEARNING RESOURCES SERIES

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Urban and Industrial Management in Developing Countries

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Report from a seminar organized by the
Economic Development Institute of the World Bank
and the
Foundation for Advanced Studies in International Development

Edited by

Wilfrido Cruz
Kazuhiko Takemoto
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Foreword

The conventional approach to urban and industrial environmental management emphasizes the role of environmental regulations, combined with monitoring and enforcement systems to ensure compliance. In contrast to this "command and control" approach, a second approach focuses on the need for economic instruments, such as pollution taxes and charges, to improve decisionmaking incentives to undertake environmental management.

More recently, there has been growing recognition of the need for a more comprehensive approach, which incorporates desirable features of both the regulatory and economic approaches in a system that explicitly acknowledges the institutional context of environmental decisionmaking and management. This third approach emphasizes the devolution of authority and responsibility from central to local government units, the need for public-private sector partnerships, the role of community participation, and the importance of information dissemination and environmental education.

Many elements of this comprehensive approach or paradigm are exemplified in Japan's environmental management experience, but much of this experience is unknown outside Japan. This book summarizes the key features of Japan's work to resolve the urban and industrial pollution problems stemming from its rapid post-war industrial expansion. Drawing upon views expressed by Japanese and participants from other East Asian countries in an international workshop, the book identifies the main areas in which developing countries may profit from the Japanese example. A series of sections, prepared by Japanese experts, cover a number of key issues: integration of environmental concerns into the policies of sectors such as energy and transportation; governmental decentralization; the role of industry; public participation and awareness; and environmental education. A case study of the Lake Biwa Development Project is then summarized, followed by a discussion of the crucial, strategic issue facing all developing country governments, namely the question of whether to "grow now, and clean up later."

While some of the approaches used by Japan are not generally applicable to developing countries, and others would take much time to implement, the book concludes that there are many areas in which Japanese experience is immediately relevant to developing countries. Such areas include:

- The role of the legal system
- The environmental impact assessment system
- Relationships between government and industry
- Central-local government relationships
- The role of voluntary pollution agreements
- Self-monitoring by industry
- Financial and economic incentives
- Regulatory instruments
- Training and dissemination of technologies
- Urban and industrial zoning and collective treatment
- Pricing policies for energy and water resources.

Moreover, a number of factors underlie Japan's success in urban environmental management. They are highly relevant for developing countries and are justified in their own right. These include:

- Decentralization of decisionmaking
- A strong and efficient, as well as democratic, local government system

- A technically competent labor force
- A well-educated, articulate population
- A relatively equitable distribution of income
- A free and active press.

The World Bank is grateful to Japanese and developing country participants for their contribution to the current series of workshops and seminars that focus on these factors, which are critical determinants of the success or failure of national environmental policies. While details of Japanese experience are of great interest to developing countries, the issues raised and the relevance of the comprehensive approach or paradigm to environmental management are of a generic nature. The ongoing debate generated by consideration of Japanese environmental policies involves basic issues about the relationships between environment and development that provide valuable insights for policies of both developing and industrialized countries.

Vinod Thomas, Director
Economic Development Institute

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We are grateful for the support we received from PDC and the Kitakyushu City Government. We especially thank YBhg. Dato' N.A. Mokhtar Haniff, Lim Pao Li, Evelyn Teng, S. Pubalan Shammugam, Tan Su Yin, Toh Hui Sung, Janet The, and Lee Eng Tak from PDC, and the mayor of Kitakyushu, Mr. Sueyoshi Kouichi, as well as Reiji Hitsumoto and Manabu Suzuki of the Kitakyushu City Government, for their contributions to the success of the training activity. We would also like to thank the seminar participants (listed in the annex) for the fruitful exchange of ideas among them, which ensured the achievement of our program objectives.

We also thank our partners at FASID, particularly Naomi Okada and Michiyo Kakegawa for their contribution to the preparation and delivery of the program. Among our colleagues at EDI, we are grateful to Hatsuya Azumi for his support and valuable suggestions concerning the overall design of the program, Adelaida Schwab for general assistance in managing the program and editing this publication, and Daisy L. Martinez for administrative assistance.

We gratefully acknowledge helpful comments on an earlier draft by Naoki Mori and David Williams. We have attempted to address all their comments; however, any remaining inadequacies are our responsibility.

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Part I
Introduction

1

EDI-FASID Cooperation in Environmental Management Training

W. Cruz, K. Takemoto, and J. Warford

General Objectives

Most observers perceive the image of Japanese progress in environmental management in terms of advanced technological approaches, for example, in waste disposal, water treatment, and emissions control equipment. Sophisticated technology is indeed an important contributor to Japan's remarkable success in cleaning up urban and industrial pollution. However, not generally recognized is the broad range of innovation in policy and institutional reforms that also contributed to the improvement.

Without doubt, Japan has made remarkable progress in urban and industrial environmental management, successfully addressing the massive pollution caused by its rapid post-World War II industrial expansion. Environmental protection and clean production technologies have been integrated into industrial processes effectively. This improvement has been matched by Japan's success in dealing with domestic water demand and the generation of solid wastes, both of which increase with rising living standards. While many problems remain, the lessons from Japanese experience appear to be highly relevant, if not always directly transferable, to developing countries.

For many developing countries, a critical analysis of environmental management experience in the industrialized world can be very productive. There is increasing recognition among policymakers that industrial and urban expansion will soon lead to costly environmental problems, unless more effective management interventions are instituted. In this regard, Japanese experience in urban and industrial management, especially its government-private sector partnerships and local government initiatives, is applicable to developing countries in the region.

It is in this context that the Economic Development Institute (EDI) of the World Bank and the Foundation for Advanced Studies in International Development (FASID) are cooperating in a series of international training seminars and study tours. The main theme of the activity is the application of Japan's approach to environmental management within developing countries. An important feature is determining how useful the participants from developing countries think the Japanese experience is to their own countries. Their comments on the limitations of Japanese approaches, whether due to regulatory, cultural, technical, or financial factors, are also important for Japanese development assistance programs. They help identify areas in which Japanese expertise and experience may benefit developing countries.

This exercise is part of EDI and FASID's overall program of training activities in development issues. The main purposes of training courses, especially for environmental management, can be summarized as follows:

- To train government officials and development practitioners who are engaged in overseas development assistance
- To examine the transferability of Japanese experiences and lessons in the field of environmental management and economic development
- To observe through field visits how developing countries are dealing with their environmental problems
- To identify and encourage means by which the Japanese government, development agencies, and private sector can assist developing countries in solving pollution problems and improving their environment:

Although Japan is obviously a leader in environmental technology, the emphasis of the workshops is on policy and institutional issues rather than on technological approaches. For example, presentations during the seminars on improving air and water quality and on managing solid and hazardous wastes may identify technological solutions. However, their primary aim is to emphasize the general institutional and policy setting within which technological improvement has been facilitated in Japan. The discussion of this approach includes a wide range of topics including the following:

- The role of the legal system
- The environmental impact assessment system
- Relationships between government and industry
- Central-local government relationships
- The role of voluntary pollution agreements
- Self-monitoring by industry
- Financial and economic incentives
- Regulatory instruments
- Training in and dissemination of technologies
- Urban and industrial zoning and collective waste treatment
- Pricing policies for energy and water resources.

These topics relate primarily to activities explicitly aimed at environmental improvement. However, several characteristics of Japanese society are essential to explaining Japan's success in urban environmental management. Several of these are also relevant to developing countries and are encouraged, independent of environmental considerations, by the development community. These factors include the following:

- Decentralization of decisionmaking
- A strong, efficient, and democratic local government system
- A technically competent labor force
- A well-educated, articulate population
- A relatively equitable distribution of income
- A free and active press.

Some of the lessons from Japanese experience may be transferred quickly to developing countries, particularly those relating directly to environmental objectives. However, the societal factors referred to earlier, while probably necessary to sustainable environmental management, will be long-term goals and will involve agencies other than those with strictly environmental responsibilities.

Penang-Kitakyushu Seminar

The EDI/FASID Joint Seminar on *Urban and Industrial Environmental Management in Developing Countries: Applying Lessons from Japan's Experience* was convened December 9–20, 1996, in Penang,

Malaysia, and Kitakyushu, Japan. The specific objectives of the seminar were: (a) to present Japanese experience in urban and industrial management; (b) to determine the areas in which participants from the Asia region believe Japanese experience would be of most value to their own countries; and (c) to ascertain how Japanese participants think Japanese agencies can respond to the environmental concerns of developing countries most effectively.

Penang was selected as the site of the first phase of the seminar because of the Penang Development Corporation's leadership in environmental management. Similarly, the city selected for the Japan study tour, Kitakyushu, has achieved worldwide renown for its successful efforts to overcome the massive environmental problems caused by rapid post-war industrialization (See Box 1). The seminar and Kitakyushu study tour gave the participants from China, Indonesia, Malaysia, the Philippines, Thailand, and Viet Nam the opportunity to learn about and consider the relevance of the Japanese experience. These participants presented their ideas about the actions required to improve pollution control in their own countries. In turn, Japanese participants recommended ways for Japan to assist in the solution of developing country environmental problems. In general, the participants from the six developing countries believed that the Japanese experience was much more relevant to their own than they had at first imagined, although the mechanisms actually employed in Japan were not always easily transferable.

EDI and FASID express sincere gratitude to the participants and resource persons and to the Penang Development Corporation and the Kitakyushu City Government for their support. In order to take advantage of the seminar's success and to disseminate Japanese experience more widely, EDI and FASID will publish a series of training materials based on the seminar and will conduct more training courses in other developing countries.

Structure of Report

This report draws upon the presentations made during the seminar by Japanese and other resource persons and the views expressed by developing country participants. Part II of this report contains a series of short essays by Japanese experts who were either at the workshops or involved in the planning process. These include a brief background in Japan's environmental management history, recent trends in certain Japanese environmental indicators, and summaries of key themes that emerged during the workshop. EDI/FASID staff synthesized the relevance of the Japanese experience and areas in which Japan might provide explicit support as articulated by the workshop participants in Part III.

Box 1. Kitakyushu, Then and Now

Kitakyushu City covers an area of 481.85 square kilometers and has a population of about 1.2 million. The area is rich in coal deposits and has been developed as a major industrial site, with iron and steel, chemicals, ceramics, and electrical industries represented in the city. Economic growth, rapid urbanization since the 1960s, and recent improvements in living standards, as well as changes in lifestyles, have caused serious pollution problems, especially air, water, solid wastes, and hazardous chemical substances. The case of Dokai Bay is a good example: The Bay in northern Kitakyushu, surrounded by factories, was polluted with untreated domestic and industrial wastes that contained harmful substances. Marine life disappeared completely by 1960 and Dokai Bay became known as "the Sea of Death."

Kitakyushu established environmental regulations and conservation programs to cope with pollution problems. Increased awareness has guided the public to a comfortable living environment that is in harmony with environmental protection. In 1988, Kitakyushu City set up the Kitakyushu Renaissance Plan to develop Kitakyushu into an "international technology-intensive waterfront city, with greenery."

Through strong commitment and cooperation among its citizens, local businesses, universities, and government organizations, Kitakyushu has achieved significant environmental improvements. With its accumulated experience in pollution control and technology, Kitakyushu today has assumed a leading role in promoting international environmental cooperation to help developing countries deal with their pollution problems. For its effort in resolving global environmental issues, Kitakyushu received the prestigious United Nations Environment Programme's Global 500 award in 1990 and United Nations Conference on Environment and Development (UNCED) Local Government Honours in 1992.

Source: City of Kitakyushu, *State of the Environment in Kitakyushu* (undated).

Part II

Environmental Management in Japan: Key Issues

2

Overview of Japan's Progress in Pollution Management

Kazuhiko Takemoto

Environmental Consequences of Rapid Growth

During the 1950s and 1960s, Japan engaged in post-war reconstruction and achieved high economic growth, mainly through the expansion of its heavy industry, imports of energy resources and raw materials, and exports of manufactured products. Japan's rate of economic growth was extremely rapid during that period.

The 1970s saw structural change toward lighter industries as well as a shift to slower economic growth patterns. The two world oil crises in 1973 and 1979 depressed the economy seriously, and Japan's gross domestic product (GDP) actually fell in 1974. After both oil crises, industries made major investments to save energy and increase energy efficiency.

Not only the total volume but also the structure of the Japanese economy has changed significantly over the post-war period. The share of primary industries such as agriculture, fishery, and forestry, in terms of value added, has declined, having been replaced by the services industry. Primary industry's share of GNP fell from 25 percent of total value added to less than 5 percent during the late 1980s.

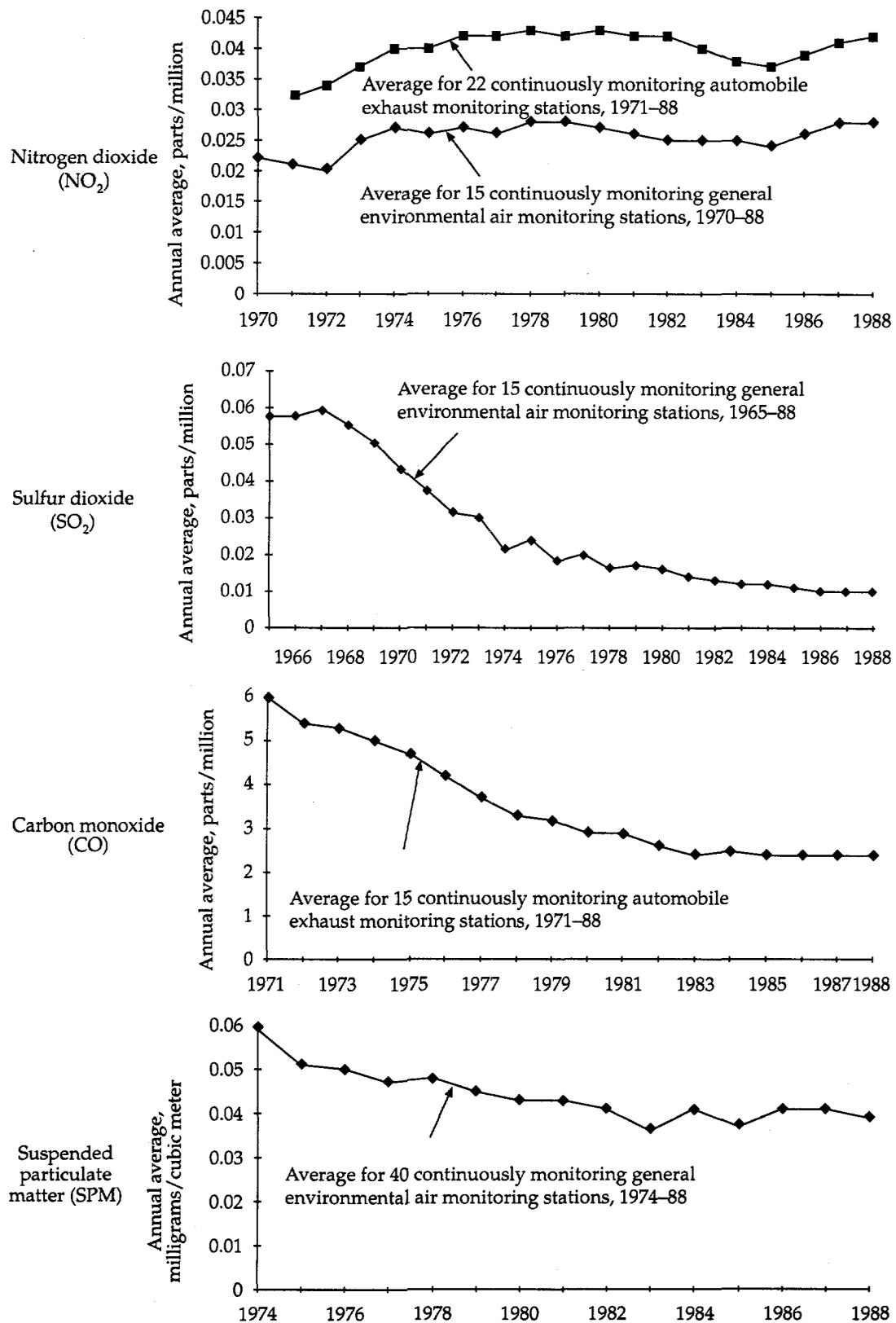
Years of disregard for the environmental consequences of certain industrial operations in Japan culminated in a series of public health disasters, stimulating national and local governments to take serious action against pollution. Cooperation of industry was induced by the results of four landmark legal cases conducted during the first half of the 1970s in which victims of industrial pollution sued the responsible industrial enterprises for damages. These four cases were related to Minamata Disease, Niigata/Minamata Disease, Itai-Itai Disease, and Yokkaichi Asthma. The courts found in favor of the plaintiffs in all four cases.

Trends in Environmental Indicators

Over many years, consistent progress has been made in the management of solid waste, air pollution, and water quality. A regular and efficient service to collect solid waste is available to virtually the whole population. Japan's policy heavily emphasizes incineration; about 75 percent of total municipal solid waste is incinerated. Use of residues for land reclamation and heat recovery reduce its costs to some extent, but incineration still remains a very high-cost alternative to landfilling. The costs are explained in part by the stringent operating standards required to maintain satisfactory levels of air quality.

Enactment of the Air Pollution Control Law in 1968 was followed by strenuous efforts to remediate emissions in the next several years, resulting in dramatic improvements in most pollution indicators. Figure 2.1 shows that consistent improvements have been achieved, except for nitrous oxides (NO_x) caused by vehicle emissions. Despite decreasing

Figure 2.1. Ambient Air Quality Indicators: National Averages



Source: Japan Environment Agency data.

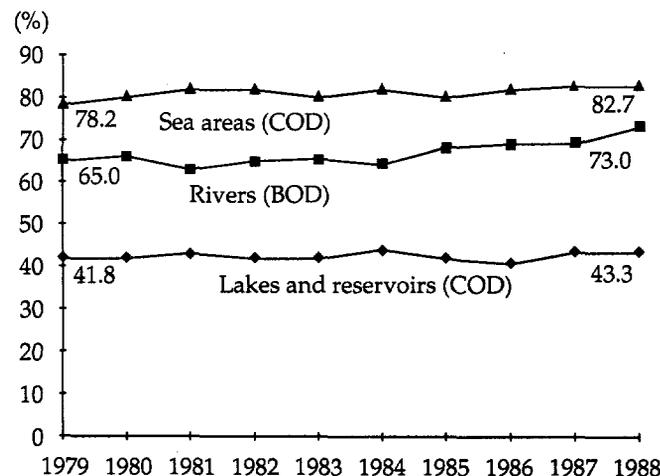
emissions on a per-vehicle basis, the growth in traffic volume has made it difficult to improve ambient air quality in this area.

Recovery in water quality is somewhat ambiguous, although the record of compliance with biological oxygen demand (BOD) and chemical oxygen demand (COD) standards has improved slightly over the last decade. Compliance for lakes and rivers remains particularly low, although some improvement has been observed in recent years. Trends in compliance with ambient water quality standards are shown in Figure 2.2. Although the quality of industrial effluent improved considerably in the 1980s, ameliorated ambient water quality has been hampered by decreased water flow in urban rivers due to growing industrial use and by delays in controlling domestic waste discharges. Indeed, general trends in environmental indicators should be assessed in light of the rapid economic growth that has taken place during the same time. Even maintaining a given standard of ambient environmental quality in such circumstances can be seen as an achievement.

Generally, the quality of urban sanitation services is very high. Access either to sewerage or a system of septic tanks is available to the whole population. However, by Organization for Economic Cooperation and Development (OECD) standards, a relatively small proportion of households is connected, either directly (via sewers) or indirectly (via septic tank collections), to wastewater treatment plants. The widespread use of septic tanks is of concern in that inadequate maintenance often threatens the quality of groundwater. Japan plans to increase the number of those served by public sewerage from about 36 percent of the population in 1990 to 70 percent by the year 2000. The expansion of sewerage systems and associated investment in sewage treatment has been an important factor in improving ambient water quality. Considerable advances in river quality have been observed in recent years in metropolitan areas, where there is extremely high access to sewerage, although indicators for coastal waters are less impressive.

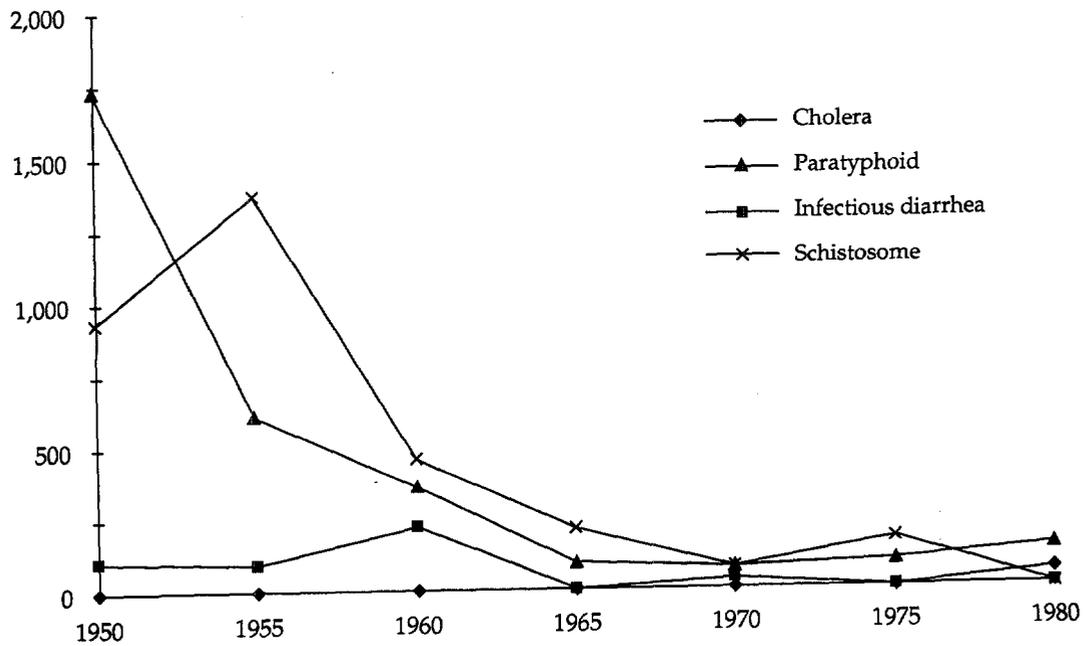
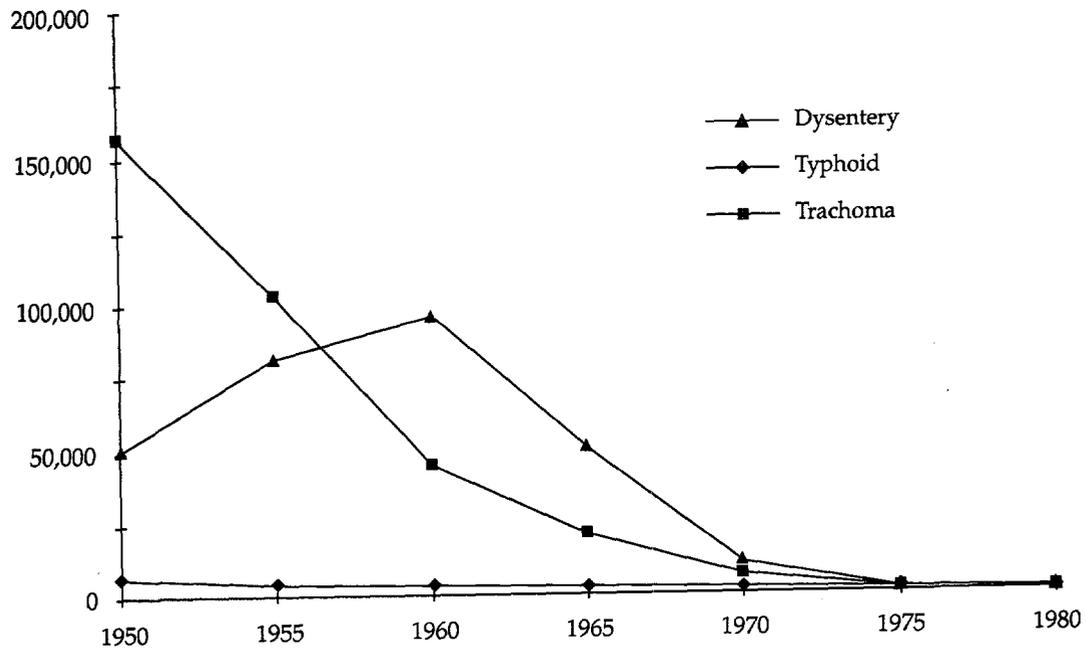
Since the ultimate objective of pollution control policy is to protect human health, a significant indicator of success is the consistent improvement of public health statistics in Japan in recent decades, with major progress taking place during the early 1970s. Figure 2.3 shows one indicator, trends in waterborne disease in Japan from 1950 to 1980. Significant reductions in the discharge of heavy metals and other pollutants influencing human health have been achieved by strengthening regulations, dredging polluted sediments, and implementing containment operations. Consequently, a level of environmental quality adequate for public health purposes has now been attained for most water bodies throughout the country.

Figure 2.2. Compliance with Ambient Water Quality Standards



Source: Japan Environment Agency data.

Figure 2.3. Trends in Waterborne Disease in Japan, 1950-80
(number of cases)



Source: Ministry of Health and Welfare data.

3

Integration of Environment into Sectoral Policies

Ryo Fujikura

The Basic Law for Pollution Control, enacted in 1967, and the legislation that superseded it, the Basic Environment Law of 1993, established the responsibility of the state for formulating and implementing fundamental and comprehensive policies on environmental conservation. These laws recognized that effluent and emission standards alone cannot clean up the environment. Since a wide range of activities affect the environment positively or negatively, integration of environmental policy into virtually all aspects of government is seen as crucial for environmental management. This integration is increasingly occurring in actual practice in Japan, although much improvement is still required. Examples of recent progress in this area are described in the following paragraphs.

Economic Growth with Environmental Management

Japan has had the highest rate of economic growth among the major industrialized countries during the last two decades, but in the same period, it also reduced its emission of pollutants considerably. Sulfur dioxide (SO₂) and nitrous oxide (NO_x) emissions were both about 0.5 kilograms per US\$1,000 of GDP in 1990, while on average the corresponding figures for OECD countries as a group were 3.7 kilograms and 3.1 kilograms, respectively. As noted in an OECD (1994) report on Japan's environmental performance, this low level of emissions was attained by "changes in economic structure, increased energy efficiency, and effective environmental policies."

The OECD report concluded that environmental policies and economic policies can be mutually supportive. A number of studies indicate that intensive investment in pollution abatement and energy saving for Japan did not adversely affect macroeconomic variables such as GDP, prices, employment, and trade. Indeed, investment in pollution control is actually believed to have enhanced Japan's economic performance. For example, research and development in the automobile industry during the 1970s in order to meet the world's most stringent emission standards enabled Japanese manufacturers to produce the most energy-efficient, and therefore the most competitive, cars. The value of the pollution abatement equipment industry is estimated at ¥1,623 billion (Japan Society of Industrial Machinery Manufacturers 1995). This industry is now one of the largest manufacturing industries, employing over ten thousand persons.

Japan's five-year national economic plan adopted in 1992 was entitled *Sharing a Better Quality of Life around the Globe*. It sought a domestic demand-led economic structure "in harmony with the environment." (OECD 1993). The plan established various environmental targets, some of which are shown in Table 3.1.

The Role of Land Use Planning

Japan's land area is 4.0 percent of that of the United States and 3.8 percent of that of China. Furthermore, 73 percent of the land is covered by steep mountains, volcanic land, and hills.

Table 3.1. *Environmental Targets in the Five-Year Economic Plan, 1992*

<i>Indicators</i>	<i>Situation 1990/91</i>	<i>Target 1996</i>	<i>Target 2000</i>
Percentage of population connected to sewerage and public waste water treatment plants	44%	—	over 70%
Percentage of waste disposed of by incineration, compacting, and recycling	80%	—	almost all
Area of forest located within an hour from densely inhabited districts	5.5 m ² per capita	10 m ² per capita	—
Percentage of sites around which greenery has been placed for scenic beauty and amenity	Roads: 33% Rivers: 10% Steep Slopes: 10%	Roads: 42% Rivers: 18% Steep Slopes: 16%	—

Source: OECD (1994, p. 100).

Intensive economic activities already have been carried out within the remaining habitable land, placing extreme pressure on the environment. One indicator demonstrating the severity of the need for environmental management was that, in 1970, energy consumption and the number of cars per unit of land area was seven times that of the United States. Proper land use planning was realized then to be essential.

The National Land Use Plan adopted in 1976 and revised in 1980 provides administrative guidelines for land use in Japan. According to the plan, municipalities have to establish land use plans that divide land into five categories: urban, agriculture, forest, natural parks, and nature conservation areas. These plans provide a basic framework within which a more detailed land use plan is prepared. The City Planning Law stipulates that a city plan must comply with regional pollution control programs, which include provisions for the separation of residential and industrial areas by buffer zones. This plan and mechanisms for financial support, such as tax exemption and concessional loans, encourage municipalities to relocate industries to designated commercial areas.

Based on the Comprehensive National Land Development Law, four Comprehensive National Land Development Plans (CNLDPs) have been adopted since 1962, setting development targets for the coming 10 years. These plans provide guidelines for land use, including both development and conservation objectives. The basic target established in the second CNLDP made environmental improvement a central objective. The third CNLDP, issued in 1977 with 1985 as its target year, also defined environment conservation as a highly important issue. The fourth CNLDP adopted in 1987 is intended to facilitate the process of governmental decentralization.

The Role of Energy Policy

Throughout the rapid economic growth period of the 1950s and 1960s, energy consumption in Japan increased faster than the economic growth rate. Expanded consumption of oil with high sulfur concentrations resulted in serious air pollution throughout Japan. However, the oil crisis in the 1970s brought Japan's energy and environmental policies into a new era. Increased oil prices accelerated conservation efforts in energy-intensive industries. Meanwhile, the industrial structure was moving from heavy industries to less energy-dependent industries such as electronics, computers, and communications. As a result, Japan's energy consumption per unit of GDP rapidly decreased. The increase in the price of oil was by far the most important reason Japanese industry took such extensive measures to conserve energy. Proper energy pricing is

clearly indispensable, not only for economically efficient resource use, but also for sound environmental management.

It was also fortunate that Japan was able to change its energy source from coal to oil during the 1950s and 1960s. After World War II, the government gave first priority to coal and steel production for the reconstruction of the country. Then the government changed its policy, which had relied heavily upon domestic coal, to imported oil in the interest of productive efficiency. During the 1970s industries imported oil with low-sulfur content and established oil desulfurizers under the guidance of the Ministry of International Trade and Industry (MITI). When stringent sulfur dioxide standards were enacted, each factory selected methods to reduce emissions by desulfurizing flue gas, changing to more expensive low sulfur oil, or investing in energy-saving equipment. According to a study on SO₂ emission reduction in a steel factory, 33 percent of emissions reduction was achieved by energy saving and 42 percent by converting to a fuel with lower sulfur content, while end-of-pipe measures contributed only 25 percent.

The government also encourages industries to take tax exemptions for employing energy saving measures. Investment in energy-saving equipment among manufacturing industries amounted to 6.61 percent of total plant investment during the period 1979–95, while the ratio of investment in pollution prevention was 4.08 percent (Table 3.2). In particular, the steel industry has been investing aggressively in saving energy, amounting to 18.72 percent of the total plant investment. This investment has helped preserve the competitiveness of Japan's steel industry even though wages have risen continuously.

The figures in Table 3.2 represent investment in pollution control or energy-saving equipment, the costs of which are readily identified such as end-of-pipe equipment. Costs of equipment that have been integrated into production facilities are difficult to calculate and are rarely included. Thus the real investment figures must be greater than those shown here.

The Role of Transport Policy

The most recent Five-Year Plan places its main emphasis on improving transport efficiency with respect to environmental conservation. It encourages a transport system that improves vehicle fuel efficiency, promotes more efficient freight transport, reduces the need for commuting by car, stimulates the use of public transport, and fosters smoother road traffic flow.

Use of public passenger and freight transport methods other than roads are preferable from an environmental point of view. Railways and ships have historically played an important role in transportation in Japan, although the number of cars is increasing. The relationship of public

Table 3.2. Ratio of Investment in Energy Saving and Pollution Control to Total Plant Investment in Japan, 1979–95

<i>Industry</i>	<i>Energy saving (%)</i>	<i>Pollution control (%)</i>
Manufacturing	6.61	4.08
Textile mill products	12.47	5.83
Pulp, paper, and paper products	11.36	4.22
Chemical and allied products	10.04	3.17
Oil refinery	3.35	4.00
Ceramic, stone, and clay products	9.40	2.86
Iron and steel	18.72	5.31
Nonferrous metals and products	5.42	2.58
Mining	1.08	6.55
Electricity	1.77	8.61

Source: Ministry of International Trade and Industry (1996).

transport to car traffic was 50:50 in 1990 due to the highly efficient railway system operating in and between large cities. Among public transport methods, railways have a comparatively high share of use at 35 percent. Railways in Tokyo and Osaka are used by over 80 percent of commuters, while cars are used by less than 10 percent.

The government continues to encourage transportation modal shift, resulting in less car ownership (29 private cars per 100 inhabitants, compared to 54 for other OECD countries). Measures implemented to achieve this low car-population ratio included the development of an attractive public transport system and the requirement of certificates showing proof of availability of parking spaces for car purchases.

Concluding Remarks

The decisionmaking process in Japanese central government is based on consensus to a great extent. When national level policies or laws are formulated, they must be approved by all government agencies concerned. This system often takes a long time before policies actually result. If a draft policy is very innovative, it will invariably be redrafted until compromise is achieved through negotiation. In particular, if a new environment policy is formulated, it will always require compromise with line ministries. However, once policies are approved, the relevant agencies always follow them. Similarly, when any development policy is formulated, the Environment Agency has an opportunity to introduce appropriate environmental considerations. This approach makes it possible to integrate environmental issues with other government policies.

Exchanging personnel among agencies may also facilitate coordination and consensus-building. For instance, the Ministry of Transport and the Ministry of Agriculture detail personnel to the Automobile Pollution Division and the Soil and Agricultural Chemicals Division of the Environment Agency. Staff of the Environment Agency have been seconded to other line ministries as well. This is quite common among government agencies, and the National Personnel Authority of the government is formulating a new personnel policy intended to strengthen it. Government officials will be required to accept assignment to other agencies at least twice before their promotion to a director level position.

From this discussion, it is clear that proper pricing of energy and resource use is crucial. Development of a public transport system and land use planning are other important areas into which environmental policies are integrated. Finally, in order to incorporate environmental considerations into other government policies, coordination among government agencies is indispensable.

4

Governmental Decentralization and Environmental Management

Kazuhiko Takemoto

Environmental Responsibilities at the Local Government Level

Allocation of responsibilities for the environment between national and local governments in Japan follows the conventional pattern, in which the actual implementation of pollution control is entrusted to local governments. The Basic Environmental Law requires the establishment of environmental standards at the national level but recognizes existing practice in that it gives prefectural governors the authority to engage in a wide range of activities related to local pollution control policy and practice. In fact, historically, local governments have played a critically important role in the development of Japan's environmental policy. They have taken the lead in preparing regional pollution control management plans and, as noted in the following paragraphs, introduced local effluent and emission standards that invariably were more stringent than those instituted at the national level.

Forty-seven prefectures and nearly 3,000 cities, towns, and villages are designated as local self-governing bodies. Key responsibility for the environment at the local level lies with the prefectures and their equivalent, the ordinance-designated large cities such as Tokyo, Osaka, Kitakyushu, and Yokohama. The prefectures have some organizational units that correspond to and deal with national level environment units. These include environmental protection bureaus (EPBs) who deal with matters handled by the Environment Agency and construction bureaus that correspond to the Rivers and Roads Bureau in the Construction Ministry. They also have planning adjustment bureaus that handle overall strategic planning; industrial economy bureaus that primarily deal with industrial promotion; and city planning bureaus that deal with municipal planning. The latter typically includes environmental issues. Prefectural institutions monitor industrial and urban pollution and perform regulatory functions that include establishment of local standards. They also provide technical assistance to secondary cities, towns, and villages within their jurisdiction.

It is noteworthy that local authorities are taking an increasingly proactive approach toward environmental matters. For example, in addition to actions required by national legislation, 54 prefectures or designated cities have enacted their own pollution control ordinances. At the city, town, and village level, 545 local governments have done the same. Some of these ordinances even concern global issues, such as carbon dioxide emissions (Kojima and others 1995). Prefectures and larger cities assist in the solution of technical problems and engage in training activities on behalf of small and medium-sized cities, towns, and villages. In fact, the 12 large ordinance-designated cities are given as much authority and obligation as the prefectures with regard to industrial and urban pollution. They are also directly responsible for implementation of pollution control measures. Some of the smaller cities with populations of less than one

million have also been granted these powers and duties in accordance with relevant laws such as the Air Pollution Control Law and Water Pollution Control Law.

This decentralization of responsibility has been a key feature of Japan's overall environmental policy, for local governments are on the front line when it comes to dealing with specific environmental incidents. Indeed, while formal mechanisms suggest that the national government takes the lead in the development of strategic policies, historically local governments have been in the vanguard of environmental policy reform in Japan. The success of Japan's pollution control strategy therefore rests heavily upon the competence and status of local government officials.

Local Government Leadership

Rapid economic growth in the immediate post-war period was characterized by a general lack of concern about the environment. Local governments competed actively to attract industry with little regard for the pollution that such industry caused. In the late 1940s and early 1950s various kinds of pollution control ordinances were introduced in Tokyo and prefectures such as Osaka, Kanagawa, and Fukuoka, relating primarily to air pollution, but these were rather weak measures. Developments in the 1960s, such as the Minamata outbreak and air pollution in Keihin, Hanshin, and Kitakyushu stimulated general public concern. These led to pressures upon local governments to take action to improve the quality of life of those living in the vicinity of industrial operations (Pollution-Related Health Damage Compensation and Prevention Association 1997). Some of the most effective measures that evolved were voluntary pollution control agreements with local industries establishing local emissions standards that typically exceed national norms.

These voluntary agreements are a unique characteristic of Japan's approach to environmental problems. They apply to major industrial enterprises operating, or proposing to operate or expand facilities, in a local government area. The local government negotiates with individual plants to arrive at a detailed written agreement on pollution control measures. In these agreements, quantitative emission levels are determined. Local resident groups may be involved in the agreements. These levels are not regulatory but depend on voluntary compliance by the enterprises. In fact, almost all enterprises comply with the agreed-upon emission levels. In addition, some agreements include on-the-spot inspections and compensation payments in case of accidents. About 2,500 cases of agreement are concluded annually; the number of valid agreements in effect has increased from about 2,000 in 1971 to 37,000 twenty years later (Aoyama and others 1994).

Industrial enterprises must obtain approval and cooperation of local governments and residents if their operations are to run smoothly. The environmental pollution control agreement is generally recognized as a critical element in this process. The first major agreement was between Yokohama City and the Isogo thermal power plant in 1964. In this agreement Yokohama City, although it had no legal authority to regulate pollution at that time, made the enterprise agree to take measures against pollution. The agreement, based upon sound scientific and technical data on air quality, had a specific pollution control objective and was extremely effective in practice. Yokohama City subsequently concluded agreements with other enterprises newly locating in the city, as well as with existing large-scale businesses when they invested in new facilities.

Following the Yokohama precedent, agreements on pollution control became widespread in the country. At that time it was common to conclude agreements with enterprises that had immediate plans to establish industrial complexes. However, as pollution issues became more tangible and local citizens' movements intensified, agreements with enterprises whose activities could create pollution at some future date increased. The contents of the agreements also gradually became more detailed. The agreements are decided on the basis of detailed discussions with each enterprise according to the individual situation. Local governments

and community organizations tend to be very cooperative with the enterprises. This process has been an important factor in determining the success of this mechanism as reasonable, and effective regulations result from it. The agreements are not limited to secondary industries, the major origin of industrial pollution, but now also apply to tertiary industries, mainly the service sector. For example, recreation facilities, restaurants, and the transport industry have increasingly concluded such agreements.

From the viewpoint of the local government or the population living in the vicinity of potential pollution activity, this system is useful in that the agreed-upon standards are specifically based on local geographical, natural, social, and economic conditions. From the viewpoint of the business establishments, the agreements provide a good opportunity to obtain the official sanction and support of the neighboring population as well as that of the local government for its overall business or industrial activities.

Pollution control agreements typically set out actions to be taken in case of agreement violations. Penalties for violation may be very strict and may include suspension of operation and payment of compensation for damages caused. Out of 2,187 pollution control agreements concluded between October 1987 and September 1988, 1,967 were made between local governments and enterprises, while the remaining 222 were made between residents' groups and enterprises.

Relationships with National Government

From 1960 to the mid-1970s, when anti-pollution measures by industry were at their height, collaboration between the national government and industry played an important role in establishing the nation's ambient and effluent standards. But the national government's influence via this route has become weaker as industry has started to take longer term measures and each industry deals with the environment as one of its business activities. Instead, the local governments, which have immediate and continuous involvement in environmental measures such as those relating to factory siting and expansion, have become increasingly influential, with local standards typically significantly stricter than those established at the national level. That the Environment Agency regularly exchanges opinions with the relevant bureaus in the local government, makes adjustments on measures that reflect local government opinions on ambient and effluent standards, and designates regional pollution control plans illustrates the increasing importance of local government to pollution matters.

There are, however, limits to what local governments can do to address even locally occurring environmental problems, since a number of such problems are caused by policies or events outside their jurisdictions. Thus the national government continues to have significant influence on local environment measures because it is responsible for national and regional land planning, industrial site policies, and major infrastructure improvement plans such as trunk roads, railroads, ports, and harbors. The national government is in charge of the environmental impact assessment process for such large-scale activities, and the powers of local governments are severely limited in this respect.

The national government also continues to play an important role in the effectiveness of local level operations. In addition to establishing the overall legislative and regulatory framework for all domestic policies, it provides financial assistance to local governments through its power to subsidize and issue bonds for environmental monitoring, research and development (R&D), and local public works. It also helps small and medium-scale enterprises to install pollution control facilities smoothly and assists in technology development. The mechanism of assisting local governments financially has in practice been highly effective in furthering national policy. Local administration in Japan has for many years depended heavily upon a financing system in which the national government provides funds to compensate for local variations in revenue-raising ability. Clearly, however, the national government is not immune from local pressure in a system in which Diet members lobby for and monitor administration of subsidies to benefit their own constituencies.

5

Role of Industry: Standards and Technology

Senro Imai

Although challenges remain, industrial pollution in Japan has been reduced dramatically over the last three decades. This reduction has been achieved by a combination of factors, including not only various legislative and regulatory measures and financial inducements provided by government, but also commercial self-interest on the part of industry. Some aspects of Japan's relatively successful efforts in industrial pollution control are discussed in this chapter.

Standard-Setting Process

Environmental quality standards result from hard bargaining on the part of industry, represented by their industrial associations, often with the support of the Ministry of International Trade and Industry (MITI), on the one hand, and on the other, a range of interests represented by the Environment Agency, local authorities, and citizens' groups. Scientific and academic associations also play an important role.

Although tension and conflicts among these groups dominate the bargaining process at times, in the end, cooperation among them is always necessary to arrive at a solution that defines the sharing of responsibility for pollution control. For instance, it is not unusual for industries to provide technical information to local authorities to use to determine rational emission standards, since local administration does not have enough detailed information about pollution control technologies to do so. Local authorities in turn inform area residents of the results of environmental research or experiments conducted by administrative and factory officials. Strong citizens' movements have been the critical factor that has forced industries and local authorities to take actions and address pollution concerns in their community.

Step-by-Step Approach

An important feature of Japanese pollution control has been a step-by-step approach to setting standards; this is a major reason Japan has been successful in achieving high compliance. There are many advantages of a step-by-step approach to regulation. First, it enables industry and government to prioritize environmental problems and concentrate on the most serious ones. Second, it allows time to develop efficient, manageable, and affordable technologies. Third, it enables enterprises to prepare for the next step of pollution control, that is, it gives industries time to strengthen management capacity and the operational skills of engineers. Finally, the administration can think about the next step based on assessment of the actual performance of pollution control measures and to identify, as well as rectify, any weakness of earlier control measures.

The main drawback associated with the step-by-step approach is that sometimes it is not anticipatory enough, thus making the actions too late and resulting in large remedial costs or enormous compensation for victims. Nevertheless, the step-by-step approach has in practice

enabled Japanese industries to adopt and operate pollution control technologies in a timely and manageable manner. For example, the K value emission standard for sulfur oxides (SO_x) was revised seven times from 1968 to 1976. Revisions were well planned, taking into account the increasing supply of low-sulfur oil and development of pollution control technologies within companies. This process allowed industries to adopt clean production technologies, resulting in energy and materials savings. It is also important to note that environmental expenditures have tended to be synchronized with economic growth, with little investment during the early post-war years and investment in pollution control peaking during the high growth period of the 1970s.

What Are Rational Emission Standards?

Emission standards were established under the 1967 Basic Law for Environmental Pollution Control and were set according to observed environmental conditions in local areas. For example, SO_x standards established in Japan did not copy standards in other industrialized countries. Instead, they were based on epidemiological studies conducted in several cities of Japan with serious SO_x pollution. The ambient standards thus reflect several Japanese conditions including geography (dispersion conditions), population patterns (proportions of young and aged), and interaction with other pollutants. SO_x emission standards were also based on studies of Japan's economic conditions, structure, and trend of industrial development; energy sources; technologies available now and expected to be available in the near future; as well as engineering, financial, and management capacities of enterprises.

Emission standards that are not or cannot be observed are not rational at all. This often is the case when standards imitate those in other industrialized countries. The establishment of rational emission standards requires an in-depth analysis of the capacity, which includes such things as technical know-how and managerial skills, available in a country and the desire in both administration and enterprises to mobilize or utilize their capacity. Cooperation between the government, industrial enterprises, health agencies, local authorities, and universities, for instance, has led to the establishment of rational standards for the control of SO_x emissions.

Each time that Japan established environmental quality standards, the Ministry of Health and Welfare (in charge of health protection) and the Ministry of International Trade and Industry (in charge of industrial development) engaged in extensive, often stressful, discussions. A series of scientific, technological, and economic debates between the two was always necessary to define rational environmental standards, particularly for emissions control. Involving industrial enterprises in the process of formulating emission standards helped create a spirit of responsibility among the industries in observing the standards. Consequently, once the bargaining is over, there is virtually 100 percent compliance with emission standards by industry.

Management System in Industrial Enterprises

To deal with environmental issues in industry, improvements in both technological and managerial capacity are needed. If top management is disinterested, concrete actions toward pollution control can be very limited. Special skills also are required to operate certain technologies that result in clean production processes. The success of industrial pollution control in Japan is attributable to the high level of management systems in both administration (environmental ministries and agencies) and the industry sector.

Both management and human resource factors (strong will of top management in industries, line-of-communication management style, highly capable middle management, and engineers with significant expertise) have played major roles in the actual introduction and operation of pollution control equipment and facilities. Engineers and technical consultants who are qualified in designing appropriate pollution control systems are available in Japan.

Large-scale industrial enterprises have their own groups of engineers, and they design the introduction and operation of the pollution control equipment in accordance with the entire production process. Small and medium-sized enterprises hire the services of engineering consulting companies, who assist them in designing and operating appropriate pollution control equipment and facilities.

Currently emerging new environmental criteria such as International Standards Organization (ISO) 14001 or European Union/Eco-Management and Audit Scheme (EU/EMAS) constitute the driving force for the development and establishment of new environmental management systems in enterprises. ISO 14001 and EU/EMAS call for good environmental management systems in companies. Markets (especially in OECD countries) will increasingly place strong emphasis on the environmental performance of the companies. Those companies exporting products to developed countries are forced to abide by the criteria set out in ISO 14001 and EU/EMAS. Many such companies may have strong economic and technological ties with mother companies in developed countries, and therefore it is not so difficult for them to meet the criteria. Small and medium-sized industries (SMSIs), however, often have considerable pollution impacts on the local community, but lack the technological capacity for pollution control. SMSIs do not export their products directly and therefore are not required to abide by ISO 14001 or EU/EMAS. However, some of them may have trading relations with big companies. In Japan, big companies now request their SMSI suppliers improve their environmental performance according to specified criteria similar to ISO 14001 or EU/EMAS. Large companies provide SMSIs with technical know-how and training. This type of cooperation between companies with trading ties leads to improved pollution control.

The *line-of-communication* management system was an innovative approach used by the S Steel Company to achieve energy efficiency in its production processes. S Steel was formerly a state-owned company. The most difficult hurdle it had to overcome when the company was privatized was to change the discipline of management and workers. A "do as ordered from the top" (or *line-of-command*) discipline, which strongly governed the thinking and attitude of management and workers, proved uncompetitive in a market-oriented system. S Steel took a long time and required enormous efforts in both its management and workers to rectify this thinking style. After the struggle for competitiveness, the company achieved a line-of-communication management system.

Using the line-of-communication management system to achieve energy savings, policy and action are closely connected by a cyclic flow of information from top management to workers and back, in contrast with a one-way flow such as top-down or bottom-up. In this system, the middle management bridges the gap between top management and workers. The role of workers is to convey to management energy losses in the production process. The idea behind this cyclic flow of command and information is that no company staff member knows more than workers about the process and therefore the problems to be rectified. S Steel successfully reduced its energy consumption from 6.5 million kilocalories per ton of crude steel to 5.8 million kilocalories per ton of crude steel in the early 1980s.

Clean Production Technologies

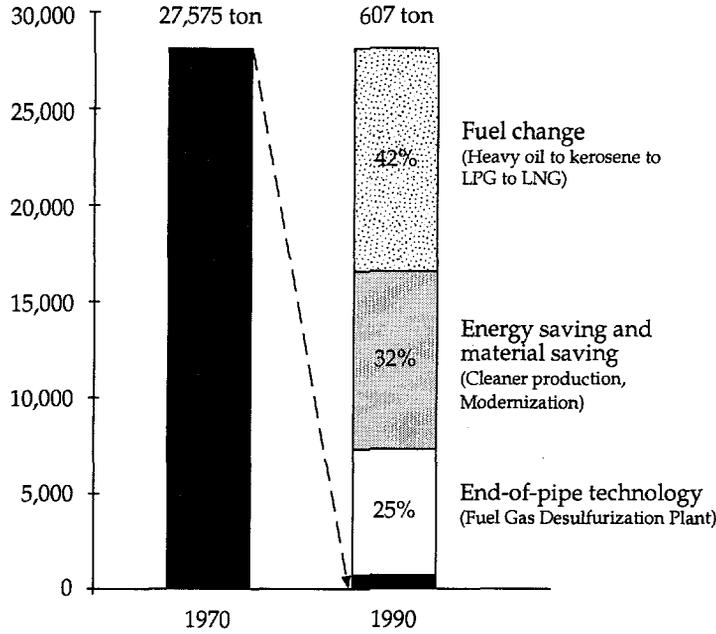
The S Steel example is an illustration of the general case that there are many opportunities for intervention in pollution control. Adoption of clean production technologies (CPT) by industrial enterprises is another important example. Different from end-of-pipe technologies (that is, flue gas desulfurization), CPT focuses on the improvement of process, efficient use of materials and energy during the process, and recycling of wastes.

While many people believed that Japan's pollution control efforts were centered on the development of highly sophisticated end-of-pipe technologies (EPT), this is only partially true. Japan has in fact developed clean production technologies before and even after the introduction of

expensive end-of-pipe technologies. Figure 5.1 illustrates the major role that CPT played in the reduction of pollutants. In the case of SO_x, S Steel in Kitakyushu City attained more than 30 percent of total SO_x reduction from 1970 to 1990 through energy and materials savings and over 40 percent from the use of clean fuel (that is, converting from heavy oil to liquefied petroleum gas to

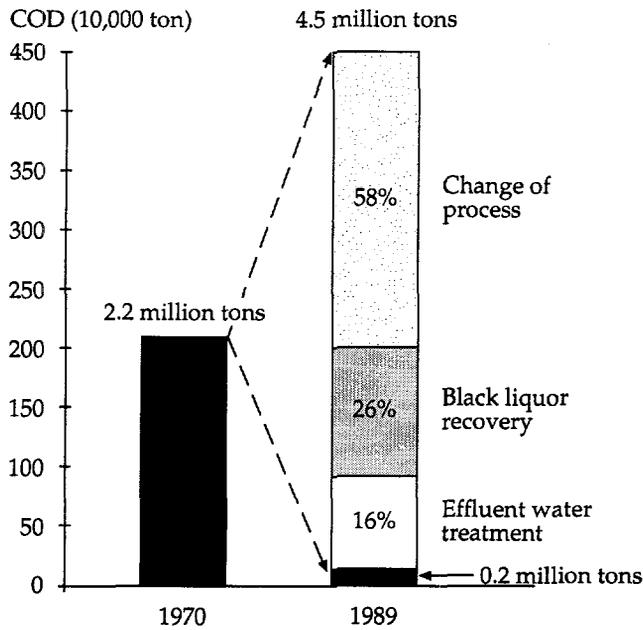
Figure 5.1. Role of CPT in Reducing Pollutants, Selected Years

(A) SO_x Reduction, S Steel, Kitakyushu



Source: Imai (undated).

(B) COD Discharges, Pulp and Paper Industry, Japan



Source: INTEP Newsletter, No. 2, June 1993.

liquid natural gas); the corresponding share of EPT is 25 percent. In the case of Japan's paper and pulp industry, COD discharges fell from 2.2 million tons in 1970 to 0.2 million tons in 1989. CPT accounts for 84 percent of total COD reduction, that is, 58 percent from a change of process that consumed less water and 26 percent from re-use of black liquor as fuel.

Industrial Self-Monitoring

Since 1972 industrial enterprises have been required by law to establish a self-contained system for pollution prevention. The Law for Establishment of Organization for Pollution Control in Specialized Factories requires that factories over a certain size appoint a pollution control supervisor and a pollution control manager, who are both formally trained in pollution control. Pollution control managers are required by law to pass national examinations in order to acquire credentials (Aoyama and others 1994, p. 66).

Today, over 65 percent of Japanese enterprises have a pollution control department. There are at present about 23,000 pollution control supervisors employed in Japan and 40,000 pollution control managers. Pollution control supervisors and managers are personally responsible for in-plant control. They have a strong motivation to comply with discharge standards set by relevant laws or voluntary agreements. In case of serious or deliberate environmental noncompliance, pollution control supervisors and managers can be relieved of their posts by the order of the prefectural governor, while company owners may face the risk of fines or imprisonment.

Therefore, industry has been required to assume formal responsibility for ensuring the environmental soundness of its operations. It has an obligation to keep records of management operations and pollution load discharges from specified facilities. Pollution control managers are required to carry out a number of tasks; for instance, with regard to air pollution, they are responsible for checking fuel and raw materials; inspection and repair of facilities emitting soot and smoke; maintenance of measurement instruments; and reducing emissions of soot and smoke in emergency situations. Meanwhile, the Air Pollution Control Act and the Water Pollution Control Act both require strict recordkeeping of industrial effluents, so that the local authority has a complete understanding of the actual and potential sources of pollution in their area. Planned changes in plant operation must be reported in advance. This information is checked by frequent onsite inspection.

Incentives and Compliance

Economic instruments such as emission charges have so far played little role in Japanese environmental policy (OECD 1993). In the past two decades, the government has relied mainly on command and control (especially emission standards) to achieve environmental quality objectives, granting financial assistance to private enterprises to meet these standards. Financial assistance includes environment-related research and development expenditures and low-interest loans and tax incentives for investment in pollution control equipment and replacement of older, polluting technologies. Local governments also subsidize environmental infrastructure, such as sewerage, to improve industrial (and domestic) waste treatment and disposal.

One form of government assistance that has been particularly effective in improving the environmental performance of SMSIs in Japan has been the relocation of polluting industry and establishment of industrial parks. SMSIs had faced great resentment from area residents because their pollution control efforts were generally limited due to their small size. While the government has a financial facility that grants low-interest loans for pollution control investments, in the case of SMSIs a pollution control facility for individual small firms is not considered rational based on the merits of scale. This was the case of the electroplating industries in Tokyo. Consequently, the Tokyo metropolitan government invited the

electroplating companies to relocate to an industrial park and assisted them to build a wastewater treatment facility for their joint use.

Relocation to an industrial park offered an opportunity for small and medium-sized electroplating industries to modernize operations and improve competitiveness. In fact, improvements in operational efficiency have been impressive. Monthly savings realized through efficient water use were substantial (¥5.2 million per month) and could almost entirely finance the operating costs of the joint treatment facility (¥6.4 million per month, including a depreciation cost of ¥3.5 million). There were also savings associated with materials recovery. Furthermore, sales tripled in ten years. This improvement occurred because (a) electroplating companies without good wastewater treatment could not compete well due to regulatory measures imposed by the Tokyo government, and (b) electroplating companies with a bad environmental image did not receive orders from clients.

In addition to economic and regulatory incentives introduced by the government, companies have often found reducing the amount of pollution they generate to be in their commercial self-interest. As a result, private industry often agrees to levels of emission standards that are stricter than those actually required by national legislation, as illustrated by the prevalence of local voluntary agreements to accept standards that exceed those mandated at the national level.

As noted earlier, enterprises that undertake pollution control measures and observe emission standards received financial assistance from the government as well as technical consultation services. However, those enterprises that do not comply with emission standards have tended to suffer because of bad publicity. An enterprise's public image is very important in Japan. Having a steady program for pollution control, a track record of pollution prevention, and the willingness to establish a dialogue with the community to discuss environmental concerns all contribute to an enterprise's good public image.

The linkage between good public image and marketing success is also critically important. In order to retain the patronage of customers, the perception of a clean production record is extremely important. Moreover, there is, as noted earlier, increasing requirements to adhere to objective technical standards for production processes such as ISO 14001 or EU/EMAS, particularly for international markets. Moreover, enterprises with a sound environmental record have a better chance of recruiting qualified labor because people are generally more willing to work for companies that have a good public image.

Finally, the results of the highly publicized court cases on pollution-related diseases have influenced industrial behavior in two ways. The first is the liability for direct financial costs that now are faced in compensating those who suffer from environmental damage, the second being the adverse publicity itself.

6

Role of Communities: Public Participation and Awareness

Ryo Fujikura

Need for Public Participation

Victims of environmental degradation are typically politically vulnerable people. This is particularly clear in the case of pollution. Industries, which are usually politically and economically influential, benefit through discharging pollutants into the environment, while others bear the cost of the damage they cause. Factory executives or senior employees can move to cleaner places when the environment around their factories becomes unacceptable. By contrast, the poor cannot escape and have to suffer in the polluted surroundings, since they are often not sufficiently influential to make the authorities enforce adequate environmental policy.

Such a situation was the case in Japan until the 1970s. The victims of serious air pollution were mostly poor people, such as factory workers. Owners and senior employees built their houses in cleaner areas and commuted to their factories. For example, the victims of Minamata Disease were mostly fishermen and their families. They often consumed one to three kilograms of polluted fish a day because fish was cheaper than rice; they could not afford more rice. On the other hand, employees of Nippon Chisso Company, which discharged mercury compounds into the environment, could afford to buy rice, and very few victims of Minamata Disease were found among them. Such examples were commonplace in Japan until relatively recently. They illustrate the fact that the opinions of disadvantaged people are indispensable for proper environmental management and must be reflected in the policymaking process.

Democracy

The basic requirement for public participation is democracy. This is exemplified by the pollution problems that occurred during the undemocratic Great Japan Empire (1868–1945). The Ashio Mine located 100 kilometers north of Tokyo was one of the major copper mines of Japan. Copper used to be important to Japan for the acquisition of foreign currency. The mining company was supported by the government and was politically very influential. Downstream of the mine, river water was heavily polluted by heavy metals, which reduced rice production. Forests around the mine were destroyed by sulfur oxides, and the river was often flooded due to the deforestation. The flood transported sludge generated at the mine into the paddy fields. It was reported that 100,000 hectares of paddy were contaminated, and thousands of farmers suffered. Farmers demonstrated against the pollution, and newspapers reported it. However, the government suppressed the movement, and the case was concluded by the forced displacement of farmers from the polluted area. Newspapers, which were at the beginning sympathetic

to farmers, did not pay much attention to them after their relocation. When Japan was winning the Japan-Russian war during 1904–05, the media did not report such a local issue; military victories convinced media that the “rich country and strong army policy” of the government was justified and that economic development had priority over pollution control.

Public Awareness

Environment cannot be managed without proper public awareness, even if the country becomes democratic. After World War II, Japan became a democratic country. However, industrial pollution was regarded as an inevitable consequence of industrialization and even as evidence of economic prosperity.

In December 1961, the Cabinet of Prime Minister Mr. Ikeda announced an Economic Plan that promised the public to double GNP in the coming ten years. Actually, the average annual GNP growth rate for the period was 10 percent, greater than the planned 7.8 percent. National income and industrial production increased fourfold; black-and-white televisions, washing machines, and refrigerators came to be regarded as symbols of a prosperous life. The percentage of households owning these items in 1960 was 60, 50, and 20 percent respectively. By 1970, the figure was in excess of 80 percent for all three items.

People realized that the country had become a member of the developed world and that their lives were being improved. It was reasonable for the people at the time to believe that pollution was evidence of economic prosperity. In fact, citizens of Yahata City, now Kitakyushu, were proud of the “rainbow-colored smoke” emitted from stacks (Aoyoma and others 1996, p. 10).

On the other hand, industrial pollution had begun to affect human health. Pollution-related disease, such as Minamata, Yokkaichi Asthma, and Itai-Itai were reported during the 1960s. However, little was known about the cause. Common people and engineers in factories were quite unconcerned at first. Chemical factories near Yokkaichi City did not hesitate to discharge wastewater containing phenol into Ise Bay, believing it to be harmless because the wastewater was colorless and would be infinitely diluted in the sea.

The first people to protest were fishermen. Fish catches near industrial complexes declined significantly. In 1959, fishermen working in Tokyo Bay requested that a paper factory, which was discharging polluted effluent into the bay, take pollution abatement measures. Feeling that sufficient measures had not been taken, they burst into the factory and destroyed part of the buildings. This incident was widely reported. As the number of victims increased, medical doctors and the staff of public health stations began to suspect the relationship between pollution and disease. People became increasingly aware of the problem as this issue was taken up by the media.

Civil Movement

Although Japan became a democratic country in 1945, public participation in policy formulation remained very limited. Policies are established by the Parliament whose members are elected by the public, but very few Parliament members were concerned about pollution, because it was a local problem and victims were often poor and not influential. The anti-pollution movement at the beginning only consisted of demonstrations in restricted areas or civil suits for compensation. However, stimulated by the media, the anti-pollution movement became active throughout Japan.

The first large-scale civil movement was seen in Shizuoka Prefecture in the late 1960s. When the government planned to introduce a large thermal power plant and a petrochemical complex in Mishima and Numazu cities, the city assembly of Numazu initially welcomed it and integrated it into the city’s basic development plan. However, the population at large feared that it would cause the same kind of problems as those that had occurred in Yokkaichi. They

did not regard "rainbow-colored smoke" as a symbol of a prosperous life. Over 20,000 people participated in a meeting to protest against the project. This action finally changed the decision of the assembly, and the city abandoned the project.

During this period, a Socialist Party candidate was elected Mayor of Yokohama City. He promised more stringent control of pollution in the newly reclaimed industrial area. The measures taken by his administration played a major role in developing environmental policy at the local, and subsequently at the national, level. While the national Parliament had been dominated by the conservative Liberal Democratic Party (LDP), many candidates of or supported by the Socialist and Communist parties were elected as governors and mayors in urban areas at this time. This became one of the factors that changed the attitude of the national government and the ruling LDP toward pollution control.

Another important factor was the attitude of the courts. It had previously been almost impossible for victims of pollution-related diseases to win lawsuits and to obtain compensation. It was the plaintiffs' responsibility to prove the relationship between their diseases and pollution, but the cause-and-effect relationship was not yet scientifically proven. In 1970, the Supreme Court presented to the lower courts a new guideline that stated the conventional interpretation was no longer adequate in the case of pollution. The new interpretation placed responsibility on the defendant to prove that the defendant had no fault if the cause-and-effect relationship was substantially demonstrated. When the relationship was epidemiologically identified, the relationship was deemed to be proven. Following this new interpretation, plaintiffs won all the cases during the early 1970s on Itai-Itai, Yokkaichi Asthma, and Minamata Disease.

These events resulted directly from the civil anti-pollution movement, which clearly changed the attitude of government and industries.

Toward Effective Public Participation in Policymaking

Japan's experience in pollution control demonstrates that democracy, public awareness, and mechanisms to integrate people's opinion into policymaking are indispensable for adequate environmental management. In Japan, intensive pollution abatement measures taken during the 1970s were an ex-post approach. Measures were taken after local people had complained. Very few procedures for public participation had been integrated into policymaking before 1980. The first law that fully integrated this process in Japan was the Basic Environment Law, which was introduced in 1993. Public participation was one of the three basic concepts of the law. During the formulation of the bill, its proposed contents were disclosed to the public and, as a result, reflected public opinion. The same procedure was taken in developing the Environment Basic Plan of the central and local government. This approach was quite innovative for Japan. The Environment Impact Assessment Law enacted in 1997 identifies public participation as a crucial element. Public participation will be further integrated into other policymaking processes.

Public participation is not easy. It often causes delays and requires the patience of government officials. Local people tend to promote their own individual or local interests rather than those of regional or national ones. More "not in my backyard" phenomena can be anticipated in the future. Currently local people are in conflict with a number of local governments regarding nuclear power and waste treatment facilities throughout Japan. Some express concern that more public participation would delay important development projects and consequently contradict national interest. However, ignoring the voice of local people would lead to a repetition of Japan's past failures.

Concluding Remarks

Local communities in Japan traditionally have played a very important role in resource management. Since these communities have worked effectively, forest and marine resources in Japan

have been sustainably managed for hundreds of years. However, Japan still is not at all a developed country in terms of public participation in pollution control. Pollution control has been implemented mainly by governments and industries only after complaints from local people. Provision for pollution abatement is still inadequately built into the planning process. Japanese nongovernmental organizations (NGOs) are still weak in terms of capacity and membership. Many other countries have more advanced mechanisms for public participation and have more effective NGOs. Indeed, other countries may have learned from Japan's post-war experience, in which inadequate mechanisms for public participation had tragic consequences.

7

Environmental Education

Michiyo Kakegawa

Background

Growing concern among the public about the environment was initially a reaction to extreme events such as Minamata. Although important, public pressure was unsystematic and focused on immediately discernible problems rather than on the fundamental causes of environmental degradation or of longer term threats to the environment. Those concerned with the environment in Japan recognized the need to improve general awareness of environmental issues among the public. Assisted by the mass media, progress in this area has been made by the efforts of government, public interest groups, and industry.

An indicator of the success of these efforts is that a relatively high proportion of the population now recognizes the importance of the environment in their own consumption decisions. Thus, a survey conducted by the Tokyo Municipal Government in 1993 found that more than 60 percent of consumers indicated that they would devote increasing attention to environmental considerations, that is, the volume of refuse generated by a product or its environmental effects, when buying a product.

Government Role and Responsibilities

The Environment Agency plays a major role in promoting environmental education in Japan. It has undertaken several public education activities on environmental issues and in disseminating information on environmental conservation. The Environment Agency accomplishes these tasks through collaborative work with relevant ministries. Joint efforts of the Ministry of Education, Science, Sports, and Culture and the Environment Agency are particularly important in this respect. They work closely in producing television broadcasts and films on the environment, sponsoring environmental education seminars, and distributing teaching materials. Training programs for environmental conservation leaders (such as the one held in Miyazaki in 1993) are being supported through the Local Environment Conservation Funds, in order to promote environmental conservation activities by individual citizens. The Funds were established by prefectures and cities that were designated by a government ordinance to draw on various funding sources (Japan Environment Agency 1994, p. 486).

The Environment Agency and the Ministry of International Trade and Industry also collaborate to enhance public environmental awareness, specifically in promoting a national movement toward resource recycling and energy conservation. Programs are also designed to impress citizens with the importance of developing lifestyles that are in harmony with the environment. To this end, the Economic Planning Agency has undertaken the promotion of voluntary consumer action programs. In partnership with the Ministry of Health and Welfare,

the Environment Agency has suggested that local governments designate an "Action Day for Environmental Beautification." The Agency's objective is to spread environmental beautification movements across the country. Similar events such as the Eco-Life Fair exhibition and Environment Week are held to enhance people's awareness about environmental problems.

In 1986, the Environment Agency implemented the environmental protection long-term plan, which emphasized the need for environmental education and information dissemination in order to strengthen the base of environmental policy in the country. Environmental education was broadly defined within the following context: to enhance public understanding of the value of conserving natural resources; to recognize the environmental consequences of human activities; and to form social consensus on the coordination between human activities and environmental capacity.

In 1988, the Environment Agency published the *Report on Environmental Education Consultation*, which includes these major guidelines on environmental education:

- To establish a coherent environmental education system involving schools, government, and private organizations, and thus aimed at both children and adults
- To promote environmental education based on an interdisciplinary approach that covers human science, social science, and natural science
- To promote environmental education based on Japanese culture and history
- To promote international support and cooperation in environmental education.

Environmental Education in Schools

Environmental education in Japan traditionally has been conducted with courses in the social and natural sciences, physical education, and health. It is said that school teachers were among the first to recognize the importance of learning about pollution problems and the environment. They organized the Study Group on Pollution Control in Primary and Secondary Schools in Tokyo in 1964, and in 1967, at the national level, the Study Group on Pollution Control in Primary and Secondary Schools in Japan. Consequently, pollution has been a part of school curricula since the late 1960s.

Guidelines on learning for elementary and high schools were amended in 1989 to expand the information on the environment. Guidance materials for school teachers were prepared and distributed throughout Japan. Environmental education symposia and environmental research conferences were sponsored jointly by the Environment Agency and Ministry of Education and attended by teachers concerned with environmental education. Meanwhile, ten localities were chosen to participate in the Environmental Education Promotion Model Cities, Towns, or Villages program. Under this program, schools, homes, and local communities coordinated their efforts in environmental education. The objective was to enhance the quality of school guidance on environmental education. It must be noted, nonetheless, that environmental education in school curricula has remained voluntary and thus is not available everywhere (Japan Environment Agency 1994, p. 142).

At the university level, the number of environmental courses offered in Japan has increased considerably. As of 1992, over 100 courses on the environment were offered at national and public universities. Accordingly, the number of academic research papers on the environment also has increased, from about 17,000 reports in 1982 to over 24,000 in 1992.

Consumer Education

Environmental education in Japan is targeted at every segment of society. The Japanese government tried to encourage the general public and industries to regulate the discharge of toxic chemicals and to save energy in the advent of serious pollution problems in the 1960s and the

energy crisis of the early 1970s. Nonetheless, environmental education as a life study has not yet been systematically established at the national level. Environmental education for the general public is more or less conducted by local governments' Consumer Life Centers.

The general public has become concerned about environmental problems mainly as they arise in their own localities. Consumers are known to have voluntarily united to campaign against solid waste incinerators, pollution of rivers and bays, or noise pollution or to demonstrate against the building of a nuclear power generator in a nearby town or province. Meanwhile, to enhance public environmental awareness, local government entities have been instrumental in developing information dissemination networks. A database with information on environmental education activities was developed using the Local Environment Conservation Funds. In Fukui Prefecture, for example, a personal computer-based information system has been created that allows citizens to access and enter information related to environmental conservation activities. Toyama Prefecture has a database that registers 500 recycling and environmental beautification groups. Furthermore, at the national level, the Environmental Information Center, which was established with the support of private industry, collects and disseminates information on environmental technologies, with the close cooperation of relevant government ministries and research institutes. The Japan Environmental Association, created in 1977, publishes various textbooks on environmental education.

Consumer education arms citizens with the ability to choose services and goods based on their effect on the environment and in the context of society's ethics. It also seeks to develop a sense of responsibility for protecting the environment on an individual level. Both citizens' movements and industries have played a significant role in promoting environmental education. Pollution victim associations, for example, pressed for monetary compensation of victims of Minamata Disease and other ailments with considerable success. In Hyogo Prefecture recently, consumer associations combined to create programs for promoting shoppers' choice of environment-friendly products and to confer awards to environment-friendly companies. Subsequently, environmental consciousness among Japanese business firms has increased dramatically. Since 1990 many firms in the manufacturing, service, and commercial sectors have created new divisions to examine the environmental consequences of their production activities. *Corporate citizenship*, or the idea that business firms should be good citizens who live in harmony with their environment, has become quite popular.

With the rise in consumer consciousness about the environmental effects of products, manufacturers have been developing products designed to show due consideration to the environment. For example, since the mid-1990s certain kitchen detergents manufactured by major producers have been offered in the market as refill products to reduce packaging waste. These refill products have accounted for at least 50 percent of all sales of kitchen detergents. In 1989, ecomark labelling was introduced to inform consumers of products that are categorized as environment-friendly. To bear the ecomark symbol, a product should entail minimum or no pollution in its use and disposal and should contribute toward the improvement or conservation of the environment. A list of product categories and the ecomark symbol are published by the Japan Environmental Association. The number of products that have received permission to bear the ecomark has increased from 955 in 1989 to 2,599 in 1993 (Japan Environment Agency 1994, p. 95).

Finally, other environmental groups have contributed to the promotion of consumer education in Japan. Environmental NGOs, for instance, are playing an increased role in nature conservation throughout the country. Japanese NGOs have suffered from inadequate resources; however, the Regional Environmental Protection Funds were set up in 1989 to support local NGOs' environmental activities. The Global Environmental Cooperation Fund was established in 1993 to support the work of NGOs in preserving the global environment. Trade unions also have undertaken an important participatory role in advocating a sustainable environment. Unions seek pollution control agreements with management; support training of employees

and environmental experts; promote the adoption of environmental management systems, energy saving, and recycling at company sites; and favor environmental declarations by municipalities and tighter local standards. At the national level, the Japanese Trade Union Confederation drafted a policy document on the environment. Unions are represented in several national councils that advise the government and ministers. They support the adoption of environmental impact assessments in Japanese law (OECD 1993, p. 91).

Conclusion

There has undoubtedly been a substantial increase in public awareness and concern about environmental issues in Japan in the last three decades. Initially stimulated by major environmental disasters, this trend has been encouraged by government action at various levels as well as by trade unions, consumer groups, NGOs, and, more recently, by industry. However, the fundamental explanation for progress in this area is to be found in the high level of general education and a well-informed population, whose views, reflected in the mass media, are freely expressed and who are able to influence elected officials to support environmental protection measures. In order to further consolidate the base of environmental education and to make people even more concerned about the environment, room for improvement remains at government, local community, and school levels in Japan.

8

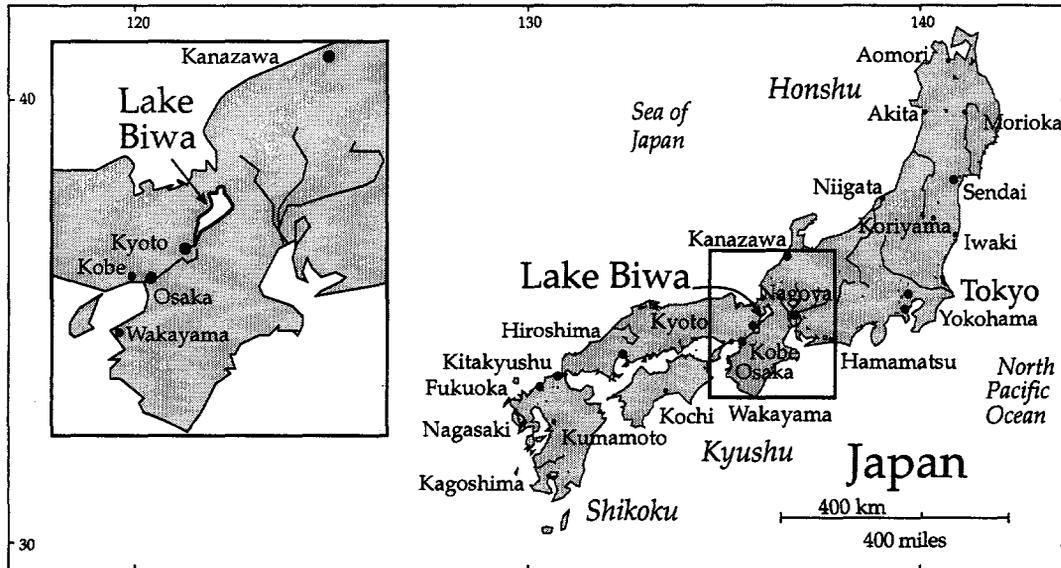
Regional Environmental Planning: The Lake Biwa Development Project

Masahisa Nakamura

Lake Biwa in Brief

Lake Biwa is one of the great lakes of the world, not only because of its size—675 square kilometers in surface area and 27.5 billion cubic meters in volume—but because of its importance as one of the oldest lakes in the world. It has many indigenous species of flora and fauna and is a great water resource, providing water to some 14 million people around it and downstream including Kyoto, Osaka, and Kobe. It is also a managed natural system, supporting extensive human activities for 1.2 million people living in its watershed. Historically the lake has provided for good fishery and productive upland paddy agriculture despite occasional flooding. The geographical location of Lake Biwa is shown in Figure 8.1.

Figure 8.1. Location of Lake Biwa



The data upon which this chapter is based came from the Shiga Prefectural Government. A more detailed treatment of this topic is in M. Nakamura, "Lake Biwa: Have Sustainable Development Objectives Been Met?", *Lakes and Reservoirs: Research and Management*, 1995 1:3-29.

The people in this region, or the current Shiga Prefecture, whose jurisdictional boundary closely coincides with that of the watershed, have fostered for centuries a strong attachment to the lake. With water shortages predicted in the late 1960s, at a time when Japan was undergoing rapid economic growth, a large-scale water resource development scheme for downstream megalopolises called the Lake Biwa Comprehensive Development Project (LBCDP) was initiated in 1972. The 25-year project, involving water resource, flood control, and regional infrastructure development was finally completed in 1997, allowing the maximum discharge of an additional 40 cubic meters per second to downstream regions at times of drought. The discharge may cause the lake level to drop by a maximum of 1.5 meters below the normal level.

In the meantime, extensive land-based activities have evolved over decades, involving urbanization, industrialization, large-scale land improvement, and irrigation in the watershed. Such changes have altered the watershed system, necessitating not only point-source pollution control such as sewerage and industrial wastewater management, but also nonpoint source runoff control including that for paddy irrigation return flows. For these and other reasons, the lake ecosystem exhibits signs of eroding integrity, which has aroused growing concern for the Shiga and downstream residents.

Water Resource Development

The basic idea of the LBCDP was to allow the discharge of 40 cubic meters of additional water at times of drought. The corresponding drawdown of the water level was set at 1.5 meters below normal. The Project comprises water resource development projects, flood control and related water management projects, and the compensatory public works projects for development of the catchment land. It was originally a ten-year project. Upon failure to complete the project by 1982, it was extended for another ten years and then for an additional five years to become a 25-year national project. The project, whose total budget eventually became 1.8 trillion yen (about 18 billion dollars), was completed in March 1997.

Upon completion of all the component projects, the lake water will be released to meet the downstream need as appropriate. The improvement of the in-flowing river system and the coastal fringe will help alleviate flooding damage. In addition, Shiga Prefecture is much better off in terms of the economic development achieved through the course of LBCDP and of its future potential, with extensive infrastructure development undertaken thanks to the financial arrangements made through the project.

Management of Land-Based Sources of Pollution

The first grave sign of deteriorating water quality in the lake suddenly appeared in the form of large-scale red tide along the eastern coastline of the Northern Basin of the lake in early 1977. The sighting of the phytoplankton, *Uroglena Americana*, was quite a shock, as the Northern Basin was, until then, believed to have been nearly pristine. Since then the red tide has been sighted almost every year. Prompted by the red tide incident, the Shiga Prefecture enacted an ordinance to ban the use and sale of phosphorous-based synthetic detergents, known as the Eutrophication Control Ordinance of 1980. Although controls of land-based sources of pollution had been in force to some extent before this ordinance, only after its enactment did the prefecture begin to mobilize resources effectively for extensive water quality management control measures. It should be noted, however, that the process leading to the enactment of the ordinance was as unique as the enactment itself. For many of the long-term Shiga residents, throughout history, Lake Biwa has been a spiritual and cultural asset. They were so alarmed by the red tide incident that, despite pressure from the detergent industry, they successfully initiated the so-called "use-soap movement" and exerted their political influence on policymakers to take necessary remedial action.

Point Sources

A wide array of control measures was introduced over decades to improve the quality of Lake Biwa. The control of industrial wastewater was among the first to reduce pollution loads flowing into the lake significantly. Already by the mid-1970s large-scale industries encountered difficulty in discharging pollutants into watercourses leading to the lake, due in part to the Water Pollution Control Law of 1970, which contained stringent punitive provisions. Wastewater from smaller industries was brought under control progressively, though many of them are yet to be fully regulated.

Household wastewater has been and still is a major polluter, the treatment of which requires various forms of sewerage systems. As of 1995, the regional public sewerage system covered more or less the entire flat-land part of the watershed; it currently serves some 30 percent of the population. The four regional treatment plants have advanced treatment for nutrient removal.

The small sewerage systems for agricultural communities and a variety of onsite sewerage systems are collectively called the "Joka-so system." Some of the systems are equipped with advanced treatment capability and are an effective form of pollution control. They serve some 27 percent of the population, with about 43 percent of the population still without access to a conventional flush toilet system with appropriate sewerage facilities. The excreta collected from these households are transported to one of the twelve night soil treatment systems, all of which are equipped with advanced treatment capability, not only for organic content but also for nutrients. Public sewerage is to be gradually extended, expecting to be available to about 70 percent of the population by the year 2000. Dairy wastes are also stringently regulated with requirements for onsite treatment.

Nonpoint Sources

The four major sources of nonpoint pollution are rainwater (acid rain); forest and field runoffs; paddy runoff; and urban runoff. Prospects for reducing lake pollution from these sources are not good at the moment. The development of a comprehensive nonpoint source control system will not only be expensive, but it will require legal and institutional measures that have not yet been designed. The financial resources required to construct and manage such facilities are enormous, and point control will continue to have priority for some time.

This is particularly so with wet weather nonpoint sources, or stormwater runoff. Control programs for nonpoint pollution from urban and agricultural sources has only just begun. Paddy runoff under dry weather flow may be managed much more effectively, by a combination of structural and non-structural methods. Current thinking is to regard individual paddy fields as point sources under dry weather conditions. Proper management of irrigation water and reduction of wasteful use of fertilizers and pesticides are the keys to successful control of dry weather runoffs. Promotion of agricultural best management practices and technology development for more efficient resource use will also help.

Environmental Component Projects in LBCDP

Although lake water quality was not originally a primary ingredient of the LBCDP, it eventually became a major aspect of the project. Upgrading water quality was included in the plan of component projects, and development projects and activities directly or indirectly related to LBCDP were assessed for their effect on lake water quality.

A significant amount of investment was budgeted for the environmental component projects in LBCDP when it was extended for ten years in 1982. Investment in sewerage and night soil treatment was increased by 26 billion yen from 1982 through 1991. New project components

such as dairy waste management, agricultural community sewerage, refuse disposal, and a surveillance and monitoring system also were added. The budgetary provisions for these LBCDP environmental projects were in addition to the existing budget for projects to be carried out by the prefecture.

The negative impacts of LBCDP were a major issue during thirteen years of litigation brought against the governments by a group of concerned citizens, who claimed their right to preserve the lake environment without the extensive alteration specified in the plan. Though the litigation ended in 1989 with the plaintiffs losing the case, it attracted a great deal of attention. Many of the concerns expressed about ecosystem integrity in the allegation turned out not only to be justified, but also correctly implied the direction of environmental policy in the post-project period. For example, the prefectural ordinance enacted in 1992 to protect the coastal reedbed, much of which had been destroyed in constructing the levy and round-the-lake tourist motorway, was a reflection of regret for the loss of valuable natural habitat.

Current State of the Lake

The process of development and conservation evolving over the past few decades around Lake Biwa is reflected in the changing trends in the quality of the lake water and lake ecosystem. Typical water quality indices such as chemical oxygen demand (COD), total phosphorous (TP), and total nitrogen (TN) show that, despite all the environmental programs, the improvement in lake water quality has not been impressive. There is even a worsening trend in COD in recent years.

What about trends in water quality over the much longer term? Water transparency at specified sites and the bottom dissolved oxygen (DO) in the Northern Lake are two available indicators of the longer term that serve to help interpret the lake water quality trend over the past several decades. They show that Lake Biwa water quality had been deteriorating slowly even before the red tide incident of 1977. In addition, there are other more subtle indicators of changes in the lake ecosystem. For example, there is some alteration in the dominant causes of phytoplankton in the lake, with blue-green blooms tending to replace red tide in recent years.

To summarize, it appears that the deteriorating trend accelerated between 1977 and the mid-1980s, and, though the rate of deterioration has slowed since, the trend itself remains negative.

Impending Issues

The management of Lake Biwa water quality is about to enter a new phase. It will accelerate point and nonpoint source control measures and introduce measures to achieve a greater degree of lake ecosystem integrity with lake quality improved in terms of parameters other than COD, TP, and TN. The emerging features of control measures characterizing the new phase include (a) realignment of protected watersheds and land uses, (b) development of ecotone areas including restoration of the once reclaimed attached lakes, and (c) the integrated management of priority watersheds.

Realignment of the protected watershed and rezoning will probably involve an extensive political process. The major issue will be to devise proper economic incentives such as compensatory payments for existing land owners, as almost every piece of watershed land is owned and engaged in some sort of productive activity. As for ecotone development, agricultural and urban sectors will have to collaborate closely on infrastructure development or redevelopment around coastal regions of the lake and numerous watercourses. The key to integrated management of priority watersheds is to redesign the watercourses hitherto independently developed by different sectors of the government.

While nobody today disputes the need for an appropriate transition from the era of water resource development with necessary environmental considerations to a new era in which

achievement of ecosystem integrity is the most important objective, this transition demands some fundamental changes in thinking and in the approach to long-range government planning. What the so-called post-LBCDP is facing today is exactly this transition.

In planning the development of infrastructure, whether for water resource development or for the improvement of basic public needs like sewerage, the approach was to set specific quantitative targets, most likely based on some sort of political decision, and then mobilize the necessary resources to realize those targets. Assessment of achievement would simply consider progress in implementation, with success in mobilizing resources and implementation the only considerations.

In planning to achieve ecosystem integrity, the approach will have to be entirely different. Not only are the targets often unclear and difficult to describe quantitatively, the process leading to achievement of the goal has to be an evolving one. In other words, the determination of how sound is sound enough for the ecosystem under consideration must reflect the sense of value of the public involved. This sense of value will have to be refreshed continually with new findings about the ecosystem that is to be conserved or restored. It is within this context that the current process of elaboration on planning for the era of post-LBCDP will be reviewed and evaluated by our descendants.

9

Grow Now, Clean Up Later? The Japanese Experience

Kazu Kato

Background

In the immediate post-World War II years in Japan, highest priority was accorded to economic recovery and industrial growth, with little regard for its environmental consequences. Assisted by the economic boom created by the Korean War, the pre-WWII level of industrial output was achieved in 1955. Japan's economic growth continued to soar in the 1950s and 1960s, reaching 12 percent per annum in the latter half of the 1960s, thus causing some observers to call it an "economic miracle." Rapid economic growth gave rise to an increasing number of episodes of pollution of the air, water, and soils across the country, particularly severe in large cities such as Tokyo, Yokohama, and Osaka. Faced with public outcry against industrial pollution, the local governments began to take steps in the early 1950s to address the severest environmental problems. Governments at both the national and local levels have continued ever since to try to reconcile the objectives of economic growth and sound environmental management.

The Japanese economy was badly hurt by the oil shocks of 1973 and 1978, but the stiff environmental regulations were maintained or even further strengthened throughout the 1970s and 1980s. This encouraged a greater emphasis than hitherto on energy and resource conservation, leading to many technological innovations in energy use and material and water recycling and thereby to cleaner production. In terms of energy consumption per capita as well as per unit of GDP, Japan today is one of the most efficient users of energy among OECD countries. Also instructive is to consider energy consumption per unit of industrial output; Figure 9.1 shows a dramatically declining trend in recent years in this important indicator.

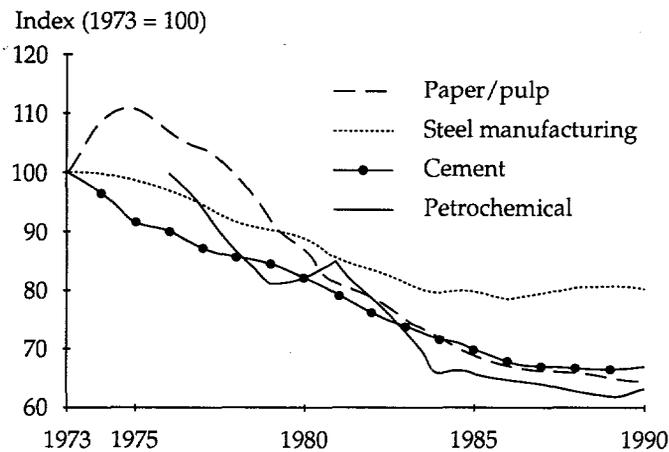
Financing Pollution Control Investments by Industry

Keeping pace with the progressive tightening of environmental regulations both at the national and at local levels, private sector investments in pollution control started to become significant in the late 1960s, peaking sharply in the mid-1970s. At its peak in 1975, investment in pollution control by large-scale industries was about 1,300 billion yen, or about 11.4 percent of total private capital investment and 0.63 percent of GNP in that year. By comparison, the figure in 1991 was about 460 billion yen, 3.1 percent of total private capital investment and 0.12 percent of GNP.

It is estimated that small and medium-sized industries (SMSIs), which employ about 80 percent of the labor force and produce 62 percent of total output in Japan, are responsible for

An earlier and expanded version of this chapter was presented at the Third World Bank Conference on Environmentally Sustainable Development, October 1995.

Figure 9.1. *Energy Consumption Per Unit of Production (by Weight) Standard Products of Major Industries 1973*



Source: Aoyama and others (1994, p. 89).

roughly 20 percent of all private sector investment in environmental pollution control. SMSIs have often invested in pollution control when they are relocating or modernizing their production processes. Indeed, the government policy of relocating SMSIs has often been dominated by environmental concerns; the relocation itself, combined with process changes and modernization, have been powerful means of bringing about environmental improvements.

The role of direct subsidies for environmental investments by industry should also be noted. In 1963, the government began to provide loans at subsidized interest rates through the Japan Development Bank and the Small and Medium Enterprise Finance Corporation to facilitate investment in pollution control in industrial operations. In 1965, the Pollution Control Service Corporation (renamed the Japan Environment Corporation in 1992) was established specifically to provide financial and technical support for pollution control measures in private firms. These lending institutions played an important role in the provision of financial incentives for pollution control in private industry and business. However, their overall financial contribution is not as large as generally thought. Of the total amount (493 billion yen) invested by private firms in pollution control facilities in 1991, 71 percent was financed either by the firms themselves or by commercial bank loans, 24 percent was financed by governmental lending institutions, and the remaining 5 percent by prefectural or municipal governments. However, the scale of financing understates the true impact of this support: the associated technical assistance to small-scale industry from the Japan Environment Corporation has probably been as valuable as the financial support itself.

Several favorable tax incentives are available to firms investing in pollution control. Special depreciation measures have been formulated for specified facilities for pollution control at the national level. In the first year, in addition to ordinary depreciation (about 10 percent), a further 21 percent can be written off as special depreciation for pollution control. At the local level, property taxes for facilities related to pollution control may be exempt or subject to reduced rates. Firms may obtain exemption from special land holding taxes and reduced urban planning taxes and business taxes in case of extenuation and establishment of new pollution control facilities.

Public Expenditure on Environmental Management

Total public investment in environmental management has generally increased since World War II both in absolute amounts as well as in proportion to GNP and total investment in public

works. From 1986 to 1991, annual average government pollution control investment, including sewerage and sewage treatment, solid waste disposal, and night soil treatment facilities, amounted to 1,785 billion yen, or 0.74 percent of GNP. In the previous five-year period, government investment in pollution control was 7.7 percent of total public works investment. In the fiscal year 1993 budget, the government was authorized to spend 1,730 billion yen for environmental management including pollution control and nature conservation, which constituted about 1.1 percent of the total government budget. In addition, a total of 2,437 billion yen was budgeted for operation of the government's lending institutions for environmental management in both private and public sectors.

It is estimated that total government expenditure on pollution control for construction, operation, and maintenance of sewerage, solid waste, and night soil treatment facilities, in addition to management of parks, green zones, and noise prevention, is currently about 2 percent of GNP. Implementation of pollution control measures is essentially a local responsibility; therefore local government expenditure for this purpose is a much larger proportion of total expenditure than at the national level. (Local expenditure on pollution control is about three times that at the national level.) In 1992, investment in pollution control facilities by local governments was nearly 5,000 billion yen, total expenditures including operation and maintenance around 7,000 billion yen. Cost recovery from beneficiaries was about 22 percent on average. Subsidies from the national government amounted to about 20 percent of total capital costs, or about 13 percent of total costs.

Reconciling Growth and Environment

Thanks to the strong pollution control measures taken in both public and private sectors described earlier, and partly due to the slowdown and structural changes in Japan's economy, many of the pollution problems caused by conventional pollutants were brought under control successfully, and pollution levels started to decline rapidly in the mid-1970s. With this success in controlling rampant industrial pollution, the focus of attention in Japanese environmental policy shifted to other sources of pollution such as motor vehicles and households and to improving the general quality of life (so-called "urban amenities" in Japan). Many problems remain, however, especially regarding toxic chemicals, solid and hazardous waste management, and even conventional forms of pollution such as urban air pollution and noise created by the ever-increasing volume of traffic, water pollution from nonpoint sources, and eutrophication of semi-enclosed waters such as lakes and reservoirs. The OECD review of Japanese environmental policy conducted in 1976-77 stated that "Japan has won many battles against pollution, but the war with improving the quality of the environment remains to be fought and won." Sixteen years later in 1993, another report by the OECD commended Japan for having succeeded in decoupling pollution from economic growth (OECD 1993, p. 77).

Apart from public works for environmental infrastructure building and the provision of financial incentives to private firms investing in pollution control, most environmental regulations in effect today are traditional "command-and-control" regulations and tend to rely on "end-of-pipe" technologies, although front-end technologies such as fuel switching, unleaded gasoline, and fuel desulfurization are also used. Although the term *pollution prevention* was often used in environmental laws and regulations, clearly the emphasis was on ex-post pollution control, and it is only in the past seven to eight years that greater emphasis was placed on ex-ante prevention and waste minimization. In recent years also, calls for more use of economic instruments such as taxes and charges received increased attention.

Various studies have shown that the macroeconomic effects of pollution control investments on GDP growth are negligibly small and often positive. At the microeconomic level, however, the financial impact of carrying out environmental protection measures varies considerably from industry to industry. In the mid-1970s, the costs of pollution control were very high for certain

industry groups such as textile, pulp and paper, iron and steel, nonferrous metal, and electric power industries. Subsequently, however, the impact of pollution control expenditures on costs and profits is shown to have declined sharply, eventually becoming insignificant.

It has been estimated that the costs of compensation to victims of SO_x air pollution throughout Japan would be 12.6 times the cost of desulfurization and fuel conversion if these improvements had not been made. Taking the three examples of Yokkaichi Asthma, Minamata, and Itai-Itai Disease, another study conducted by the Environment Agency has estimated that the annualized cost of later remediation and paying for compensation to victims may be anywhere from 5 to 126 times higher than the cost of implementing preventive measures in the first place.

Japanese experience in many cases confirms that prevention is indeed better than cure, and the policy of placing growth before environment would be incorrect even in narrow economic or financial terms.

Taking into account all these points and the growing role of Japan in internationally concerted efforts to cope with global environmental issues such as climate change, tropical deforestation, and biodiversity, the Basic Law for Pollution Control of 1967 was completely revised in 1993 to make way for a new Basic Law on Environment whose main objective, among others, is to promote Japan's transition to a sustainable society.

Part III
Relevance for Developing Countries

10

Relevance for Developing Countries

W. Cruz, K. Takemoto, and J. Warford

Some of Japan's policies may not be relevant, or indeed suitable, for developing countries. Also, the Japanese experience reflects things not done so well, and several areas have major challenges still unresolved. A number of Japan's policies and practices depend upon uniquely Japanese cultural features and are not transferable to other countries; others are possible in Japan because of its advanced stage of economic development. Nevertheless, many lessons remain from this experience that are relevant to developing countries, some of which are directly transferable, while others may be longer term objectives.

It is interesting to note that key determinants of Japan's success in coming to terms with its domestic environmental problems depend heavily upon features that are generally accepted by the development community as requirements for sound and equitable economic development, whether the country concerned is rich or poor. These requirements include some of the aspects summarized in the following paragraphs, such as the importance of community participation, decentralization of decisionmaking, and equal opportunity to education, particularly to technical education. Without these building blocks, economic development is rarely possible; this applies equally to specific development objectives such as environmental management. In other words, policy reform in these areas typically will be justified in its own right as well as contributing to environmental improvement.

Lessons

Lessons from the Japanese experience can be summarized as follows.

"Grow Now, Clean Up Later"

This is the overriding strategic issue now being faced by many developing countries. Japan's strategy, while possibly being appropriate to that country at that time, is no longer acceptable in Japan and is certainly not a model to be followed by other countries. Indeed, Japan's experience has demonstrated the wide range of environmental actions (policies and investments) that are justified in both environmental and economic terms, that is, "win-win" opportunities for environmental protection measures abound.

Decentralization

Relationships with local authorities are a general problem in developing (and indeed, industrialized) countries, with lack of technical capacity at the local level matched by inadequate funding and capacity at the center for needed technical assistance. There is a widespread need for capacity building at the local level for project implementation, enforcement of legislation, and promotion of public awareness.

The importance of local empowerment, so that local government initiative can be encouraged, is a pervasive issue; this involves the need to develop mechanisms to mobilize community leaders effectively. Mechanisms for communicating between national agencies, as well as between national and local levels, need to be developed. Empowerment of local governments to deal with local problems, including establishment of environmental standards and negotiating with industry, combined with the high status and competence of local officials has been a primary determinant of success in addressing local environmental matters.

Resolution of many of the most important problems, however, lie outside the jurisdiction of individual local authorities, such as quality of vehicle emissions, energy policy, and ecological waste management, for which national government has the major preventive role. But in practice national policies such as subsidies for energy are a cause of the problems. Also institutional reforms are needed to resolve problems crossing local government boundaries, especially where local legislation or standards are not uniform.

Appropriate Technology

The Japanese experience illustrates the fact that appropriate technologies may be a mixture of advanced techniques and labor-intensive methods. Thus Japan's industrial clean production methods are as sophisticated as any country's. They have shown often to be both economically and financially, as well as environmentally, justified. On the other hand, the majority of homes in Japan are still not connected to main sewerage. A heavy reliance remains upon septic tanks, which are not perfect and are responsible for some groundwater pollution, and holding tanks that are emptied at regular intervals by vacuum trucks (the Joka-so system, which is highly effective). This is a lesson for developing countries. While these methods of waste disposal remain acceptable in Japan, a country with high labor costs, environmental managers in developing countries, with much lower labor costs, often insist upon central sewerage, claiming that other alternatives, using labor-intensive methods, are evidence of second-class status. Although main sewerage is the technologically preferable alternative, the experience of Japan in managing the operation of its Joka-so and septic tank systems will continue to be highly relevant for developing countries for years to come.

Technical Education

The high level of technical education in Japan facilitated the rapid development of environmental expertise when the need for such skills became apparent. Training of pollution control officers who occupy senior positions in industry appears to be a high priority in developing countries, with the Japanese model recognized as the best example available. In general, improvement in technical education is another example of a "win-win" policy in which sustainable development requires flexibility to adapt to future economic and technological challenges, whether with regard to the environment or any other sphere of activity.

Public Awareness and Participation

The participation of the public has been crucial in Japan in pressuring local officials to strengthen environmental protection measures. The effectiveness of public involvement depends in large part upon the standards of public education as well as freedom of expression by community groups and the media. Community participation is important in strengthening environmental management, where NGOs may act as a vehicle for articulating the community's needs. Ultimately, however, much of the responsibility for improving community participation lies with governments, both national and local. Operational guidelines should

be prepared for government agencies to incorporate community participation into projects and policies. Formal education as well as public awareness mass media campaigns also should be better used by national and local governments; training programs should be developed for facilitators; and government disclosure policies should be liberalized.

Pricing

Among the “win-win” policy reforms, pricing energy and water resources to reflect true economic costs has been a major reason for high end-use efficiency in Japan. In principle, Japanese policy in this regard is readily transferable, but political constraints are faced by all governments in their attempts to rationalize pricing policies. Effective public participation and education may help them to achieve this, but conflicts of interest may still be expected to pose severe obstacles.

Government-Industry Relationships

Development of institutional mechanisms to promote ongoing dialogue and constructive relationships between governmental agencies at various levels and industry has played a key role in making environmental policy acceptable and effective in Japan. Mechanisms used in Japan are highly specific to that country, but the principles involved are of general relevance. Targeted subsidies, including technical and financial assistance for pollution control measures, financial and administrative support for industrial relocation, and creation of industrial sites with common waste disposal facilities have been particularly effective, particularly for SMSIs. Also, Japan has succeeded, through mechanisms ensuring close relationships between industry and government, in addressing a common problem in developing countries, namely, the inadequacy of public-private sector communication. The private sector is often not informed of development plans for roads, telecommunications, and utilities. The establishment of regular public-private sector dialogue is required, perhaps involving committees comprising heads of relevant government departments and heads of factories. Similarly, better public information and education to advise about specific government plans as well as to create awareness about the environment is required.

Technical Assistance

Developing country participants in the Penang-Kitakyushu workshop identified a long shopping list of areas where they felt that Japanese technical assistance would be valuable. Aside from actual financial support, the need for which was articulated by all participants, areas that were consistently referenced by virtually all country groups included the following:

- Environmental training for officials, environmental staff, and the general public
- Clean production technologies
- Resource recycling and recovery
- Energy efficiency
- Traffic management
- Air and water quality monitoring
- Industrial pollution control managers: training, qualifications, responsibilities
- Collective waste treatment on industrial estates
- Regional planning and zoning
- Mechanisms for improved intergovernmental relationships, including financial and other means of achieving decentralization
- Mechanisms to achieve government-industry cooperation
- Mechanisms to improve public awareness and community participation.

It is significant that the areas of technical assistance identified by the seminar participants generally coincide with the main factors that contributed to Japan's success in mitigating environmental problems in the course of its urban and industrial expansion. This commonality broadens the scope of future cooperation between developing country environmental managers and their counterparts in Japan.

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