Japanese Official Development Assistance and Industrial Environmental Management in Asia

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Japan has experienced severe pollution in the process of rapid economic growth and has developed useful tools for pollution control since the Second World War. At the same time, Japanese Official Development Assistance (ODA) has undergone a change through political pressure resulting from international environmental movement. Since environmental management is technologically, politically and economically complicated, formulating environmental ODA projects which takes advantage of Japan's experience can be achieved only through effective cooperation between related ODA agencies. Japanese government policy for international cooperation was specified in its AGENDA 21 action program. Environmental centers were established Abstract

Japan has experienced severe pollution in the process of rapid economic growth and has developed useful tools for pollution control since the Second World War. At the same time, Japanese Official Development Assistance (ODA) has undergone a change through political pressure resulting from international environmental movement. Since environmental management is technologically, politically and economically complicated, formulating environmental ODA projects which takes advantage of Japan's experience can be achieved only through effective cooperation between related ODA agencies. Japanese government policy for international cooperation was specified in its AGENDA 21 action program. Environmental centers were established through grant aid in China, Thailand and Indonesia. In addition, the Green Aid Plan, initiated by Ministry of International Trade and Industry, will provide technical assistance for environmental management in Asia. Although there are some political conflicts, these efforts are expected to work as important actors to promote proper environmental management in Asia. In order to promote environmental ODA projects, environmental technologies or management skills developed in Japan need to be effectively transferred to those who need them in developing countries. Cooperation among central and local governments as well as private industries is essential for the efficient connection between the seeds and the needs. Formulating incentives for such organizations towards one goal, however, needs to be considered further because of the different interests among them. Human resources and appropriate technology can not be effectively developed without providing proper incentives to each related group. Coordination between positive incentives and proper cooperation should be sought after through the process of ODA.through grant aid in China, Thailand and Indonesia. In addition, the Green Aid Plan, initiated by Ministry of International Trade and Industry, will provide technical assistance for environmental management in Asia. Although there are some political conflicts, these efforts are expected to work as important actors to promote proper environmental management in Asia. In order to promote environmental ODA projects, environmental technologies or management skills developed in Japan need to be effectively transferred to those who need them in developing countries. Cooperation among central and local governments as well as private industries is essential for the efficient connection between the seeds and the needs. Formulating incentives for such organizations towards one goal, however, needs to be considered further because of the different interests among them. Human resources and appropriate technology can not be effectively developed without providing proper incentives to each related group. Coordination between positive incentives and proper cooperation should be sought after through the process of ODA.

1. Introduction

Japan has experienced severe pollution in the process of rapid economic growth and has developed useful tools for pollution control since the Second World War. Industrial environmental management cooperatively implemented by central and local governments as well as private industries has been successful1. Since the 1980s, private industries have been shifting their manufacturing processes from Japan to Asian countries in order to take advantage of the strong Japanese Yen and inexpensive local production costs. At the same time, the Japanese government has been assisting Asian

countries by providing large amount of Official Development Assistance (ODA) to take up an active role in the international community.

Since the United Nations Conference on Environment and Development (UNCED) in 1992, Japanese ODA has increasingly focused on environmental issues which were specified by Japanese government in the national action program for AGENDA 21 issued at the end of 1993. Environmental centers were established through grant aid in China, Thailand and Indonesia. The Green Aid Plan was initiated by Ministry of International Trade and Industry to provide technical assistance for environmental management in Asia. Moreover, private industries associations and local governments which have experience in industrial environmental management have become interested in participating in environmental ODA projects. As a result, new organizations for environmental technology transfer (e.g. the International Center for Environmental Technology Transfer (ICETT) and Global Environmental Center (GEC)) have recently been created by local governments in Japan.

However, Japanese international cooperation for industrial environmental management is not being implemented well enough to take advantage of Japan's domestic experience in pollution control. This is due to the difficulty in formulating incentives among related organizations with different interests and fear of Japanese government's intervention into the domestic affairs of developing countries.

This paper briefly reviews Japan's experience in pollution control. Government policies in the AGENDA 21 action program by the Japanese government, environmental center projects by grant aid, the Green Aid Plan by the Ministry of International Trade and Industry and organizations of local governments for environmental technology transfer are introduced as important actors in Japanese ODA for industrial environmental management. Strategies for international cooperation in institutional framework, human resource development, research and development of appropriate technologies, environmental standards and economic incentives are then discussed.

1. Characteristics of Industrial Environmental Management in Japan

After the Second World War, Japan underwent a period of post-war reconstruction followed by a period of rapid economic growth. However, lacking a proper concern for the environment, the rapid economic growth resulted in serious pollution-related damage. This was caused mainly by the rapid growth of heavy basic industries, the concentrated economic activities in large urban area and the large scale investment in petroleum refinery. This lack of proper environmental control led to serious pollution-related diseases such as the so-called Minamata disease caused by methyl mercury compounds discharged by a chemical company into the Minamata bay, and Yokkaichi asthma caused by SO3 mist emissions from petrochemical factories. Following these well publicized incidents, Japan began implementing proper pollution control, and the environmental situation has improved for most pollutants which had previously severely damaged human health and environment.

There are four main characteristics of Japan's successful pollution control, 1) well made monitoring systems established by local government which enable identification of polluters and clarification of the amount of their pollution emissions, 2) environmental standards based on agreements between industries and local governments, 3) a strong attitude of polluters to halt serious pollution in their area supported by the concept of "the firm as a member of society", 4) compensation to victims based on accurate monitoring. In addition, pollution control created several tools to reduce environmental degradation such as a low interest loans to manufacturers to enable them to finance the installment of pollution abatement equipment, or pollution control managing systems which enabled local governments to monitor firms more effectively.

The Role of Local Governments

The major responsibilities of the environmental management by local governments are to monitor of the environment and the source of pollution, perform research on the relationship between pollution and its sources, combat pollution by setting goals for maintaining a healthy environment, formulate regulatory programs and provide guidance to the pollution sources. Normally, the prefectural governments in Japan sets additional control targets above and beyond national standards based on specific local conditions such as the degree of industrialization, the climate type, topographical conditions, the seriousness of atmospheric pollutant concentrations and area-wide emission control in the region. Local governments can also formulate regional programs to organize social development for pollution control avoiding political conflicts with the central government.Environmental

Standards Based on Technical Feasibility

In the areas where many factories are densely located, the environmental standards need to be set quite specifically. In Japan, local governments work to set up a so-called "total mass emission controls" which are the environmental compliance requirements based on the environmental capacity of the area. In order for polluters to comply with these requirements, the governments establish environmental standards based on agreements with polluters which shifted to more strict ones in the specific grace period. This agreement so called "pollution protection agreements" are based on technical understanding for both governments and polluters.

In the case of Yokkaichi city, for example, the local government set up environmental standards in three categories; present environmental standard, medium target, final target. The government gave the factories a grace period to develop new technologies or install sufficient treatment facilities to comply with the target standard. Typically, present standard is based on concurrently available technology, while the final target is calculated by a simulation based on environmental capacities. The medium target provides the standard which gives factories an aim to follow the final target in the limited time2. Such ways of establishing environmental standards gave polluters sufficient time to improve their productive systems and reasonable incentives to comply the standards.

Low Interest Loans by Environmental Foundation

In order to make factories comply with environmental standards, the Japan Environmental Public Corporation3 provides loans to companies intending to establish pollution control facilities. The loans are mainly for the establishment of pollution control facilities; loans are not available either as payment for operating facilities or for management costs, or for repayment of investments that have already been made. Such loans are used by individual factories or jointly by several factories. These facilities include soot and smoke treatment facilities, effluent treatment facilities, noise and vibration control facilities, and offensive odor prevention facilities.

Pollution Control Manager System

In order to enforce pollution control, the government developed a national certification system for pollution control managers. This system is intended to rapidly diffuse legal and technological information concerning pollution control among the industries. As an important feature, the industry usually adopts this system in the operation of its factories. The certified managers are authorized to make mandatory reports on the status of pollution control of the factories to the central government through the prefectural governments. The number of these certified managers in 1971 was only 36,000. By 1992 this number rose to about 230,000. 42. International Cooperation for Industrial Environmental Management by Japan

Japanese Official Development Assistance (ODA) is focused on environmental issues to protect the

environment in developing countries. Japan has suffered from serious pollution in the past and, therefore, developed many useful measures to monitor and identify polluters, and make them compensate victims and provide technical and financial support for industries. Because of that, Japanese ODA projects have large potential to support industrial environmental management in Asia.

However, Japanese international cooperation for industrial environmental management is not being well implemented to take advantage of Japan's domestic experience in pollution control. The system of Japanese ODA is bureaucratically very complicated. At present, there are two ways to formulate environmental ODA projects: 1) requests of developing countries through Japanese embassies and 2) policy dialogue between Ministry of International Trade and Industry (MITI) and the relevant government agencies of developing countries. The grant aid projects such as the establishment of the environmental centers formulated on the requests through Japanese embassies are mainly implemented by Japan international Cooperation Agency (JICA) under the coordination of Ministry of Foreign Affairs (MOFA), Japan Environment Agency (JEA) and MITI. Since MITI has many affiliated JETRO offices located in 56 countries all over the world, it can formulate ODA projects without the requests through the embassies. The environmental projects formulated by policy dialogue between MITI and developing countries are called the "Green Aid Plan" which started in 1992. It is now becoming to be a major part of the industrial environmental ODA projects by MITI.

JEA and MITI are the main agencies for industrial environmental ODA project implementation. However, there is sometimes competition in identifying appropriate projects. JEA initiated two environmental center projects in Thailand and Indonesia. In China, the center project was established by both JEA and MITI with much larger grant aid because the project was based on a diplomatic agreement made on the 20th anniversary of the Peace and Friendship Treaty between Japan and China. The scope of environmental centers in Indonesia and Thailand include monitoring related research and training because they are in the jurisdiction of JEA, while the center in China includes development of pollution control technologies which are MITI's jurisdiction. This double standard way of project identification causes difficulty in project coordination. Since environmental centers were already established in Indonesia and Thailand, MITI can not establish such centers for development of appropriate technologies by grant aid projects. Proper cooperation between MITI and JEA for the implementation of environmental ODA projects is needed.

JICA has been working on the issue of technology to developing countries for 20 years. Technologies and management skill required for the projects are diversified and, moreover, the projects are related to many kinds of activities throughout the country. Therefore, it is rather difficult to implement the projects only in the response to the requests of developing countries. MOFA hesitates to formulate some industrial environmental projects by consulting teams which are specialized in one field. In addition, some management skills are based on local experiences in environmental policies initiated by local governments (central government actually opposed some of the management skills). Local governments who suffered from serious pollution in their history established organizations for environmental technology transfer with private industries. The interests of local governments in revitalizing and internationalizing the region does fit with the environmental movement. The government promoted such organizations by enacting a law 5to allocate focal points in rural areas in order to realize appropriate land use.

Since local governments have limited funds, proper use of the ODA funds is essential. These organizations should take advantage of the ODA capital flows. Kitakyushu International Training Association (KITA) and the International Center for Environmental Technology Transfer (ICETT) work for technology transfer by bilateral cooperation, while the newly established Global Environmental Center (GEC) in Osaka and International Lake Environmental Committee (ILEC) in Shiga are planning to support UNEP Environmental Center through local governments. In the case

of multilateral cooperation, UNEP Environmental Center needs to use technologies not only from Japan but also from other developed nations, while other organizations working with bilateral cooperation can work for technology transfer through Japanese firms.

2.1 Environmental ODA policy of Japanese Government

During the "Environmental Summit" in Paris in July 1989, Japan announced that it would provide 300 billion yen (US$ 3 billion) in aid in the environmental field from 1989 to 1991. By 1991, it had provided more than 407.5 billion yen (US$ 4.075 billion), far exceeding its original goal.

At the UNCED, held in Brazil in June 1992, Japan indicated it would boost its aid in the environmental areas from 0.9 to 1.0 trillion yen (US$ 9 to 10 billion) over a five-year period. Moreover, in its underlying philosophy, the ODA Charter adopted by the Cabinet in June 1992 identified environmental conservation as a task for all humankind and to be dealt with jointly by industrialized and developing countries. In addition to declaring development with conservation as a basic principle of Japan's aid, the Charter prioritized support for efforts by developing countries to deal with environmental issues. The Charter also indicates that Japan should employ its technology and know-how on the basis of its past environmental experience to ensure effective implementation of its aid program.

In order to realize the promised environmental cooperation on the governmental level, the Agenda 21 action program was established by the Japanese Government in December 1993. According to the program, Japan is going to work cooperatively with developing countries to identify appropriate environmental projects through policy dialogue.

According to the program, in order to support the environmental technology transfer, Japan is going to focus on following items.1) Strength of expert dispatches, training programs, investigation surveys, research and development and model projects in developing countries by increasing the fund and number of related countries of the Green Aid Plan (See 2.3); 2) Establish an information network for useful technology for environmental protection in developing countries, and investigate technology needs in developing countries and technology seeds in Japan;3) Establish a proper institutional framework for promoting technology transfer by private firms;4) Promote sewage systems by establishing strategies to formulate master plans for a sewage infrastructure;5) Support monitoring systems for climate change in developing countries by establishing a climate change network in Asia Pacific;6) support geographical surveys to decrease the damages in heavily populated areas influenced by serious natural disasters such as earthquakes, volcanic explosions;7) Increase the fund provided for Ozone layer protection.

2.2 Environmental Center Projects by Grant Aid Program

Three environmental centers in Thailand, Indonesia and China were established through the grant aid program of the Japanese government in order to support industrial environmental management in these areas. These projects usually finance the buildings and equipment by grant aid programs and are then followed by project-type technical cooperation 6 .

The environmental centers in Thailand and Indonesia were initiated by JEA. Therefore, their function is mainly to transfer and research in the jurisdiction of JEA such as monitoring. However, the center in China, which was initiated by both JEA and MITI, is going to work for not only for improved monitoring but also in MITI related fields such as development of appropriate technologies. The centers are going to work as information centers for technical assistance projects. The grant aid provided for each center is indicated in Table 1.

Environmental Research and Training Center (ERTC) in Thailand7

In April 1990, the Environmental Research Training Center (ERTC) was established in Thailand to support the environmental management abilities of the Office of the National Environmental Board (ONEB) of the Thai government. The objectives of ERTC are to improve the environmental status of the nation and develop the capability of Thai researchers and engineers in conducting research and training on water and air pollution, noise, vibration, industrial waste and toxicity. The ERTC's activities include environmental training in monitoring water and air pollution, noise, vibration and toxic substances, environmental assessment and environmental education. The first project- type cooperation in the field of environment started in 1990 will continue until 1995 with dispatching 8 Japanese long-term experts to Thailand, training of Thai counterparts in Japan, and equipment installment. This center supports ASEAN Network on Environmental Monitoring (ANEM)8.

Environmental Management Center (EMC) in Indonesia

The Environmental Management Center (EMC) in Indonesia was established in 1993 with the cooperation of the government of Japan. EMC is to become the central reference laboratory by further promoting research, development of environmental management techniques, information data analysis, and training for officials and engineers in the government and industry.

The objective of EMC is to support the functions of the Environmental Agency in Indonesia (BAPPEDAL) as a reference laboratory, information data center and the training center. It will also assist the government agencies in the field of environmental policy development and its implementation. The activities of EMC include improvement of environmental quality monitoring techniques. In Indonesia, environmental monitoring is carried out at the provincial level and at environmental studies centers at national universities. Japan provided 888 million yen in 1991 and 1,799 million yen in 1992 (total 2,687 million yen) to establish the center. The project-type technical assistance is implemented from 1993 to 1997. As of 1993, the EMC is working on training newly recruited personnel by providing training courses to trainees throughout Indonesia.

Japan-China Friendship Environment Protection Center9

The Japan-China Friendship Environmental Protection Center was established in Beijing in January 1993. The objective of the center is to raise the level of environmental protection technologies and support environmental conservation in China. According to the basic design of the center in 1992, three fields are focused - 1) environmental monitoring and information system, 2) research in environmental sciences, 3) environmental training and public education. It is to open in 1995 with around 600 researchers and other employees. Seminars by long and short term experts, training of local employees in Japan and equipment installment are the main part of the first stage of the project from 1992 to August 1995 before the center opens.

In order to raise the level of environmental standards throughout China, the center plans to standardize monitoring and measuring equipment, perform research and training on new technologies for environmental monitoring and establish institutions for data collecting and statistical analysis. In technical research in pollution control, the center plans to develop practical, durable and economical pollution treatment technologies and disseminate them through demonstration and sharing with related organizations. The research topics include strategic research on environmental protection harmonized with social development and national economy, environmental countermeasures for urbanization and change in the natural environment. In order to raise the technical level through training and education, the center plans to offer training to a maximum of 24,600 trainees within five years. In addition to monitoring technical training, the center plans to support public education and communication. It seems that public education for

individual etiquette is necessary to improve environmental education in highly populated part of China. Starting in 1991, 10,256 million yen (US$ 103 million) will be provided for the center through grant aid in 4 years. In order to provide smooth communication, Japanese language courses were provided to young employees of the center in 1993 for half a year.

2.3 Green Aid Plan

The Green Aid Plan (GAP) is a technical cooperation program of the Government of Japan to developing countries on environment and energy matters. The GAP was proposed by MITI and was implemented in 1992 by MITI and its 14 related agencies including the Japan External Trade Organization (JETRO), the Association of Overseas Technical Scholarship (AOTS), the Japan Overseas Development Corporation (JODC), the International Center for Environmental Technology Transfer (ICETT), the Engineering Consulting Firms Association (ECFA) and the New Energy Development Organization (NEDO)10. The objective of GAP is to support developing countries to improve their environment. The areas covered by GAP are air and water pollution prevention, treatment of waste and recycling, energy conservation and the use of alternative energy sources. As one can see, the GAP is actually "Brown Aid". The characteristics of GAP is that these programs are implemented with policy dialogues between MITI and the governments of the recipient countries. Unlike environmental centers provided through grant aid, the GAP does not provide assistance in the form of installation and construction of pollution prevention equipment. It should be noticed that project formation is coordinated by JETRO without the requests of recipient government through Japanese embassies.

The GAP projects are implemented through the MITI related agencies and private industries under the control of MITI in order to take advantage of Japan's pollution management technologies and experience. Thailand, Indonesia, Malaysia, Philippines, and China are the priority countries of GAP. At present, MITI is considering expanding the implementation of the Green Aid Plan to other countries. The budget for GAP programs is indicated in Table 2.

It is important to understand MITI's vision of environmental problems. MITI strongly believes that energy matters are one of the main factors of the problems. According to MITI, the global environmental problems are divided into industrial and domestic problems and natural ecosystem related problems. Moreover, industrial and domestic problems are divided into energy problems such as global warming, acid rain, non-energy problems such as ozone layer depletion, waste movement over borders and oceanic pollution, and other pollution problems.

Two kinds of technical assistance, energy and environment technical cooperation and technical demonstration, are included in GAP. Energy and environmental cooperation are facilitated by energy and environment technical centers, human resource developments, investigation surveys, research and development. Energy and Environment Technical Centers were established in Thailand, China and Indonesia to be able to smoothly promote GAP programs by stationing the coordination liaison staff at JETRO offices. Human resource development, training courses and the dispatching of experts have been implemented by ICETT, AOTS and JODC. Research on the development of appropriate technologies such as simple desulfurization systems for coal boilers, simple purification systems for industrial waste water, biodiversity conservation and its sustainable use, laser radar for environmental monitoring, treatment system of coal mine waste water by biological processes have been studied.

In the process of project implementation of GAP, NEDO was legally authorized by Japanese parliament in April 1992 by changing energy saving laws and laws on alternative energy for petroleum11. According to these laws, NEDO is expected to develop regional energy efficient supply systems and desulfurizing systems for coal boilers and energy saving technologies in the Asia

Pacific. Actually in GAP, NEDO formulates technical demonstration in energy saving technologies and clean coal technologies which reduce SOx emissions in the coal boiling process. In order to formulate GAP programs, NEDO makes agreement in two steps: agreement with national planning agencies for the overall concepts of NEDO's cooperation and agreements with each governmental agency and national planning agency for each project. NEDO makes contracts with Japanese private firms to work for the demonstration, while the government agency make contracts with private firms in recipient countries. The technical demonstrations have been implemented in China, Indonesia and the Philippines12.

2.4 Environmental Technology Transfer by Local Governments

Environmental technology transfer to developing countries by Japanese local governments has implemented by those who have suffered from serious pollution in their history. Several organizations have been established for environmental technology transfer especially since 1990. Kitakyushu International Training Association (KITA) was established in Kitakyushu to support iron and steal related technology transfer is now working for environmental technologies. International Center for Environmental Technology Transfer (ICETT) established by Mie13 prefectural and Yokkaichi municipal governments are working for environmental technology transfer by using local experience in pollution control. The Osaka municipal government and Shiga prefectural government invited UNEP to implement technical transfers in order to internationalize and revitalize the region focusing on urban environmental technologies.

Kitakyushu International Training Association (KITA)

In 1980, the Kitakyushu International Training Association (KITA) was established to support JICA's training programs related to the iron and steel industries by the Kitakyushu municipal government, the Fukuoka provincial government and private firms in the region. Since then KITA has been working closely with JICA's Kyushu international center to implement training programs for technology transfer.

Although KITA has focused on industrial technology transfer, recently KITA has established the KITA Environmental Cooperation Center to focus more on environmental issues. KITA has been working as an organization of training programs supported by more than 200 organizations including 139 related private firms, 16 related university groups and 27 government groups. Although the funds for the activities consist only of 1,500 million yen (US$ 15 million), KITA coordinates the project with volunteers who have retired from related firms.

So far, KITA has accepted more than 152 trainees for environmental related training programs and dispatched experts to China, Korea, Indonesia, Singapore for holding environmental courses. The clients include JEA, MITI, JICA, UNEP, UNCRD and ESCAP. KITA is implementing Research and Development and investigation surveys to be able to utilize Kitakyushu's experience in industrial environmental management for developing countries. The work implemented so far include research on vehicle fuel effluent technology, the clean river program in Indonesia and case study of environmental management in Japan.

International Center for Environmental Technology Transfer (ICETT)

International Center for Environmental Technology Transfer (ICETT) was established in 1991 by the Mie prefectural government and the Yokkaichi municipal government along with private firms with funding of 4.7 billion yen (US$ 47 million) coming from the local governments and the private sector. In 1992, ICETT became an affiliate organization of MITI. The objective of the establishment of ICETT is to transfer industrial environmental technology to developing countries and to revitalize the area

by promoting an international research park. The main activities of ICETT are technical training, survey and information supply, research and development, human exchange and information dissemination. Since its establishment, ICETT has already accepted more than 400 trainees from more than 10 developing countries. Most trainees are government officials or engineers in private firms. They offer training programs in air, water, and general pollution management courses. Since its establishment, ICETT has surveyed China, Indonesia, Thailand and Poland to understand present environmental conditions in these areas and to consider possible environmental cooperation with the Japanese government. ICETT has been implementing a project called ECOPHENIX (a GAP project to formulate industrial environmental master plan of the specified region.) in Palembang, Indonesia. It chose Palembang for the project because of the similar environmental conditions as Yokkaichi city which has large oil refinery. ICETT also supports research on environmental technologies such as CO2 emission, and water pollution control processes.

UNEP Environmental Technology Center

In 1992, the UNEP decided to establish an international environmental technology center branch in Osaka and Shiga to promote environmental technology transfer to developing countries. The Osaka center is to transfer technologies related to urban environment and energy saving, while the Shiga center, which has the largest lake in Japan, is geared toward transfer technologies related to lake management and watershed management. The Global Environmental Center (GEC) was established in Osaka in 1993 to support the UNEP Center while in Shiga, International Lake Environment Committee (ILEC), which has been working toward improved international lake management since 1986, expanded its function to support the UNEP center. Since the UNEP has an Industrial Environmental Office in Paris focused on urban environmental policies, the UNEP headquarters put the general condition that the center in Japan should work toward the transfer of technologies from third countries as well as technologies from Japan.

3. Strategies for International Cooperation in Environmental Management

3.1 Institutional Framework

Due to the diversity of environmental problems, environmental management is technologically, politically and economically complicated. In many cases environmental problems are also site specific. Furthermore, local governments developed management skills and private industries developed environmental technologies. Therefore, cooperation among central and local governments as well as private industries is essential to connect seeds which have sufficient technologies or management skills to those who need them. According to the AGENDA 21 action program, Japan is in a process of establishing an information network to connect the seeds developed in Japan's experience and needs in developing countries. The way to connect the seeds and the needs should be elaborated in the process of ODA. Ideally, partnerships in several levels need to be developed. Central government agencies The environmental project formation process requires cooperation between central government agencies. In general, industrial environmental management is undertaken by several government agencies with different status. In the case of ODA project implementation, it is sometimes difficult to specify one agency in the central government for the counterpart of the project. Central government agencies are usually protective of their political territories. The consensus-building for environmental management can be promoted in the process of ODA project formation. The debate on environmental policies among the government agencies is promoted by policy dialogues.

For instance, in the Philippines, the Green Aid Plan is implemented through the Department of Trade and Industry (DTI) with cooperation of the other agencies including the Department of Environment and Natural Resources (DENR), the National Economic Development Agency (NEDA), the

Department of Energy (DOE), and the Department of Science and Technology (DOST). Although DTI is the first counterpart of the GAP program, MITI needs to work with other agencies due to the difference in administrative scope of work between MITI and DTI. MITI's jurisdiction which includes industrial location policy, technology development is far beyond that of DTI. In order to enable the formulation of GAP programs in MITI's jurisdiction, cooperation with other agencies is essential.

MITI needs to discuss with these agencies which have different political interests. DENR monitors and identifies polluters, but it does not generally support industry. DTI's emphasis on industrial development without sufficient consideration of aid to industry for pollution control. The discussion encouraged the debate among these agencies.

Central and local governments

Partnerships between central and local governments should formulate proper environmental ODA projects which use local experience, human resources and facilities. Since some measures for environmental management were historically established through local experience rather than through central governments, local experience needs to be extracted in the process of ODA and properly applied to developing countries.

In Japan, local organizations established by local governments and private industries such as ICETT and KITA have strong potential for both extracting the experience of local governments and technologies of private industries and applying them to developing countries with the ODA process. In particular, the environmental centers established by grant aid need to extract environmental technologies owned by private firms. These organizations can support these centers by connecting them with private firms. In reality, however, different interests of these three types of organizations make their activities difficult to coordinate. The appropriate incentives for these organizations need to be considered to enable them to work for the proper objective in environmental technology transfer. Governments and private industries Partnership between the governments and private industries is important to formulate projects with and technologies developed by private industries. In Japan, the government and private industries have cooperatively formulated environmental standards based on technical feasibility and promoted the compliance in environmental standards with sufficient and fair, technical and financial support.

The role of the NGOs is important in connecting government policies to private industries. In some developing countries, environmental agencies are monitoring polluters to enforce compliance to environmental standards. However, in some cases no government agency exists to support industries with technical assistance for pollution abatement due to their strong interest in rapid industrial development. In such case, NGOs play the important role to support the industries. For example, in the Philippines, while no government agency supports industries with technical assistance for pollution abatement, one non-governmental organization - the Pollution Control Association of the Philippines Inc. (PCAPI) - is actively working with the industrial sector to reduce pollution. This association provides training seminars on environmental management as well as certifying pollution control officers (PCO) 15. In order to support such activities by ODA, PCO system needs to be more forcefully controlled by a government agency. International cooperation between such NGOs is needed for establishing information network regarding this system.

3.2. Human Resource Development

The government plays the most important role in building local training capacity. Government officials and environmental managers from private industry need proper training in environmental management in the first place. Building the capability of training organizations is not achieved through private sector technology transfer. Therefore, ODA should focus primarily on providing

training programs to government officials and local organizations which can provide training courses to environmental managers of private firms.

The Green Aid Plan offers training programs to government officials and environmental managers from private industry through MITI related organizations. It is rather difficult to develop proper training courses for proper trainees who actually need them. It seems that these training courses are more beneficial for the improvement of the relationship between participants in order to stimulate them to make more environmental efforts rather than obtaining directly useful knowledge at one training course. It is also expected that the three environmental centers in Thailand, Indonesia and China will contribute to capacity-building to disperse the technologies of pollution control. Pollution Control Officer Systems As one of the environmental management functions in Japan, the Pollution Control Officer (PCO) system has worked successfully toward implementing pollution control and developing human resources in each firm. Similar system can be found in other developing countries. For instance, in the Philippines, DENR sanctions PCO for PCAPI's training programs. Despite government requirements, not every firm has a PCO. The development of a PCO system should be considered as a tool of capacity-building to raise the technological level of pollution control in each firm. ODA can support this system by providing training to the organizations which organize training courses to environmental managers in private firms and provide certificates to PCOs. This system can be developed in Asian countries through a regional network.

3.3. Environmental Standards and Economic Incentives

The formulation of environmental standards is a politically sensitive issue in each country. In Asia, environmental standards are sometimes too strict considering technical and financial conditions of the region. In order to realize environmental compliance, environmental standards need to be based on technical and financial feasibility. In other words, financial support such as low interest loans for installing pollution control equipment together with technical assistance need to be implemented with sufficient and realistical enforcement of pollution control. In order to do so politically, government industrial development and environmental protection agencies need to be balanced and work together for environmental management.

As mentioned before, environmental agencies in most countries are not in a position to support production systems inside factories. On the other hand, environmental standards are determined without any representative of industrial sectors. In order to avoid unrealistic environmental standards, broad-based sectorial groups such as government officials, business leaders, citizen representative need to participate in environmental policy formation. Japan has useful experiences in formulating standards by setting target standards in the future and assisting industries to comply with technical and financial support. Standards are set through political debate involving a wide range of groups and organization including JEA, MITI, local governments, industries, and representative of residents near large plants. However, it is difficult to support harmonizing environmental standards through bilateral cooperation because it can result in the intervention in domestic affairs. Therefore, it is considerable to use multilateral cooperation to support harmonizing environmental standards.

In order to realize proper pollution controls for compliance of environmental standards in each factory, economic incentives need to be given. The penalty for polluting and financial support for the installation of pollution abatement equipment need to be well balanced. In some cases, because the penalty for polluting is only a small fine in some developing countries, companies choose to pay repeatedly rather than installing pollution abatement facilities. In this case, the government needs to raise the penalty in order to make firms comply with environmental standards instead of paying the fines repeatedly.

Waste minimization by recycling and energy saving are important measures for providing economical profit as well as pollution reduction. In order to promote clean production, production processes should be optimized to generate the least amount of pollution. These technologies, however, are rather high technologies owned by private industries, which can not be utilized without sufficient compensation. MITI is strongly working in this field in the GAP using Japan's technologies, however, their interests are in the development of new technologies in waste minimization and energy saving. It is important to disseminate already developed technologies through technical assistance to small scale industries which intend to improve their pollution control abilities.

3.4 Development of Appropriate Technologies

Appropriate technologies have several conditions including low cost, easy installation and maintenance, tolerable in the local climate. Pollution abatement technologies required in developing countries are not always high technology developed in Japan. They are rather second hand technologies which can be installed with smaller investments.

Although the demand for appropriate technologies is rather high for pollution control in developing countries, they are useful only under special conditions and are generally not profitable. Moreover, they are even difficult to obtain patents. The private firms are less interested in developing appropriate technologies. Therefore, it is important to support development of such technologies through ODA. At present, development of appropriate technologies in Japan is focusing on large scale and relatively high technology such as clean coal technologies, energy saving technologies in the GAP because of the interests of Japanese government and private industries. In case MITI subsidizes the development of appropriate technologies, they are rather financed by large industries for the purpose of developing high technologies with large costs because the half of R&D cost is paid by the firm. Consequently, the development of small scale, site specific appropriate technologies remains undeveloped even though they are not so costly. In order to develop such technologies in developing countries, integrating the ODA to the proper incentives in the country needs to be considered because the incentive exist only in the location. At present, coordination of such finance are not realized by grant aid. The promotion of clean production technology is important as well as the promotion of "end of the pipe technology" which reduces pollution effluence at the final process. It is important to promote technical assistance to enable factories to reduce waste generation increasing profitability by formulating policies to encourage clean production.

Appropriate technologies of common treatment facilities in industrial estates are also important to avoid serious pollution from rapidly increasing industrial estates. In Japan, building industrial estates are an important tool for preventing pollution by promoting the removal of factories to industrial estates with common treatment facilities. This integrated approach of pollution control in developing countries needs to be implemented with an understanding of political, economic and social conditions of the country, otherwise it may cause social problems.

Conclusion

Japanese ODA has undergone the change in project formation through political pressure by international environmental movement. Formulating ODA projects taking advantage of Japan's experience in pollution control can not be realized by the original way of project formulation which responds only to the requests of developing countries for each project. Policy dialogues by MITI in the Green Aid Plan can provide a better understanding for both Japan and developing countries to formulate environmental ODA projects and may stimulate political debate among government agencies. A debate among related agencies similar to what took place in Japan in the process of formulating environmental standards needs be replicated in other countries.

According to the AGENDA 21 action program of the Japanese government, Japan will establish information network to connect the technical seeds in Japan and those who need them in developing countries. The environmental centers established by grant aid in China, Thailand and Indonesia are expected to act as major institutions to accept environmental technologies from Japan and diffuse them throughout the country. Political conflict between JEA and MITI may cause difficulty in smooth project coordination. The Green Aid Plan initiated by MITI will also provide technical assistance through human resource development and appropriate technology development in Asia.

Ideally, partnerships at several levels need to be developed to formulate environmental ODA projects. Cooperation between government agencies is promoted in the process of ODA by debate on environmental policies among government agencies. Cooperation between central and local governments should take advantage of local experience, human resources and facilities. Cooperation between the government and private industries should utilize technologies developed by private industries. NGOs can play an important role in connecting private industries and government policies. The organizations established by local governments and private industries to promote environmental technology transfer have great potential to extract proper support from industries and connect them to specific needs in the environmental projects. Formulating incentives for such agencies, however, needs to be considered further because of the different interests among central government, local governments and private industries.

Since the government plays the most important role in building local training capacity, ODA should primarily focus on providing training programs to government officials and such organizations. As one of the environmental management functions in Japan, the Pollution Control Officer (PCO) system has worked successfully on developing human resources for pollution control in each firm. The development of a PCO system should be considered as a tool for capacity-building to raise technological level of pollution control in each firm. ODA can support this system by providing training to the organizations which organize training courses and provide certificates of PCOs. Economic incentives for environmental management are important to lead polluters to improve their facilities. Unrealistical environmental standards and low penalties for violating the standards need to be changed. However, bilateral cooperation can not deal with this matter due to the possible intervention into domestic affairs. Formulating incentives for proper management is difficult through Japanese ODA because the experience stems from a homogeneous society in which incentives are often cultural-related.

Japanese ODA supports the development of appropriate technologies by the Green Aid Plan through MITI's relevant agencies. These activities, however, focus on specific large scale development. Consequently, small scale appropriate technologies remain undeveloped due to the lack of interest of the government and private industries. There is no incentives to develop these technologies in Japan. At present, Japanese ODA does not finance the development led by developing countries. In order to promote more effective ways in developing appropriate technologies, Japan should use ODA to create regional network to support the development of such technologies and seek after cooperative initiatives by providing the primary initiatives to developing countries. Japan's ODA will act as a main donor to establish capacity of Asia by providing buildings, equipment and technical assistance. The Japan's role of this region is to support industrial environmental management in the long run towards the ultimate goal of sustainable development.

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Footnotes

1. EX Corporation (1994). "Japan's Experience in Urban Environmental Management". World Bank.

2. International Center for Environmental Technology Transfer. 1994. "The history of pollution and environmental restoration in Yokkaichi, for the sake of the global environment".

3. The Japan Environment Public Corporation was established in 1965 with government funds as a non-profit organization jointly supervised by the Ministry of Health and Welfare and the Ministry of International Trade and Industry.

4 . Tamura, Shuji (1994). "Condition of Positive Industrial Response to Environmental Control in Japan". World Bank.

5.Takyoku Bunsangata Kokudo Keisei Sokushin Hou (Law for promoting decentralized land use) enacted in 1988.

6 . A type of program in which three forms of cooperation (training of overseas participants, dispatch of experts, and provision of equipment) are combined

7. Japan International Cooperation Agency (1991). Basic Design Study Report on the Project for Establishment of Environmental Center in the Republic of Indonesia. December

8 . Proposed by Thai government. The network is to collect monitoring data by using the standardized system. The ERTC works as a center of the network.

9. Mochida, Masahiko. "Japan-China International Symposium for Environmental Problems and the Environmental Friendship Center".

10. MITI. The Expansion of Dynamism in Asia. 1994.

11. Kokusai Kaihatu Janaru (International Development Journal)June. 1994.

12 . NEDO News. July. 1994.

13. Yokkaichi city is located in Mie prefecture.

14. Kitakyushu city is located in Fukuoka prefecture.

15. This system is called Pollution Control Managers in Japan.
