Thailand

The Environmental Fund Project (1) (L/A No. TXVIII-11)

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1. Project Profile and Japan's ODA Loan

Map of project site: Central, Southern, and Northeastern Thailand

Huakhwang wastewater collection and treatment plant

1.1 Background

Since the latter half of the 1980s, Thailand has enjoyed a period of rapid economic growth and urbanization. During that time, however, the country also experienced not only a deteriorating natural environment in the form of forest depletion and ecosystem destruction, but also urban pollution such as air and water pollution and the improper disposal of waste. Moreover, following an established policy to disperse the location of factories and plants around the country, not only famously overcrowded Bangkok but also regional cities started to suffer from urban pollution issues.

In order to address such forms of environmental deterioration, the Thai government in its Seventh National Economic and Social Development Plan (1992-1997) stated environmental protection and a higher quality of life alongside sustainable economic growth and a redistribution of incomes as one of the targets, and established comprehensive guidelines regarding the environment. Then, the government enacted the Enhancement and Conservation of National Environmental Quality Act,

B.E. 2535, in 1992, which constituted an all-out revision of the former national environmental conservation laws.

In the process, the Office of National Environmental Board, which till then had been in charge of administration regarding environmental issue, was dissolved to form National Environmental Board under the direct control of the prime minister. In addition, Ministry of Science, Technology and Environment was newly established, under which three offices were established—namely the Office of Environmental Policy and Planning, the Pollution Control Department, and the Department of Environmental Quality Promotion. By furnishing this administrative structure, the role of bureaus in charge of the environment was greatly expanded and strengthened from that of an advisory function for government authorities to one of planning and policy development, policy making, enforcement of environmental regulations, and implementation of environmental conservation projects.

Although environmental administration organs were set up in this way, the initial Minitistry of Science, Technology and Environment did not have a sufficient budget or technological capability to promote environmental conservation projects even in regions where pollution levels were severe. It is because the Public Works Department in the Ministry of Interior had undertaken planning and outfitting of wastewater systems and waste disposal sites by its own budget prior to the enactment of the Enhancement and Conservation of National Environmental Quality Act of 1992. Therefore, local governments[1] , which lied in the most closed place to the needs of local residents, were given the responsibility of preventing pollution for the region and were to plan and design appropriate environmental conservation activities, and the Ministry of Science, Technology and Environment tried to handle the issue using an decentralized environmental management method wherein the said ministry attempted to allocate the budget to the project planned and designed by the local governments. In particular, regions where pollution was already severe were designated pollution control areas, and the applicable local governments were directed to plan pollution management plans and action plans for the corresponding provinces. Based on that plans, the Ministry of Science, Technology and Environment allotted funds preferentially to such provinces relative to others for implementing environmental conservation projects. Thereafter, the Ministry of Science, Technology and Environment promoted the planning of provincial environment action plans for all of Thailand’s 75 provinces, and Environmental Fund was planned to be applied to the execution of provincial environmental action plans.

From the beginning, Environmental Fund was clearly set forth in the Enhancement and Conservation of National Environmental Quality Act of 1992. With the Thai government initiative, 4.5 billion baht in funds deriving from oil tax revenue together with 500 million baht from the government’s budget were used as capital. (Following that, in the three years from 1993 - 1995 the

[1] Local governments in Thailand were structured in a kind of double-layered system, wherein local administrations of provinces and districts under the Ministry of the Interior's jurisdiction overlap with the local municipalities of cities and old sanitary districts, which themselves have the characteristics of an autonomous institution. Further, following the enactment of laws and regulations for the decentralization of power in 1999, the self-governing nature of the regional governments was further strengthened. In this report, both kinds are referred to as "local governments."

government allocated an additional 1.25 billion baht budget to Environmental Fund. At the same time, in the subsequent fifteen years, it was estimated that it should be required 233 billion baht of budget for constructing wastewater treatment plants by all the local governments, and 43 billion baht of budget for constructing waste disposal plants. Therefore, it was considered that soft loans from foreign donors would be required for promoting the environmental conservation projects all over Thailand.

1.2 Objective

This project was to promote environmental conservation activities (mainly wastewater treatment plant and waste disposal plant projects) by local governments throughout Thailand by expanding the established Environmental Fund and providing funds through a set of grants and loans under the unified supervision of the Thai Government, thereby contributing to conservation and improvement of the environment in the Kingdom of Thailand.

1.3 Borrower/Executing Agency

Kingdom of Thailand / Ministry of Science, Technology and Environment / Office of Environmental Policy and Planning［Currently Office of Natural Resources and Environmental Policy and Planning under the Ministry of Natural Resourcs and Environment］

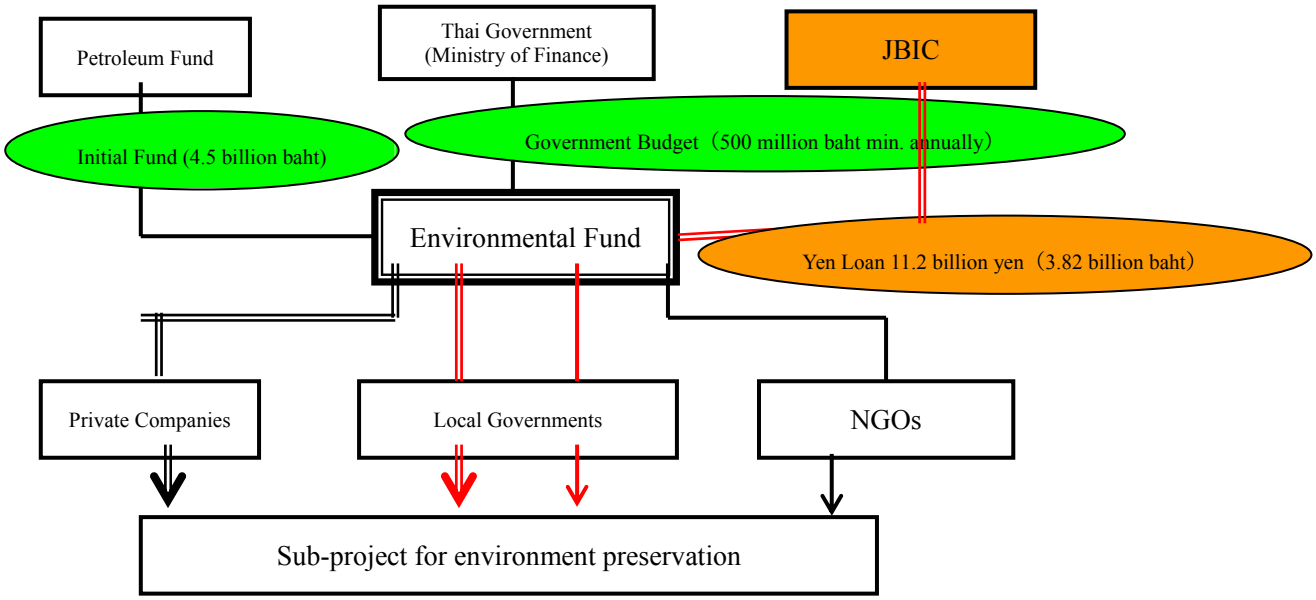
1.4 Outline of Loan Agreement

Loan Amount Disbursed Amount	11,200 million yen 2,971 million yen[2]
Exchange of Notes Loan Agreement	September 1993 September 1993
Terms and Conditions - Interest Rate - Repayment Period - Grace Period - Procurement	 3.0% p.a. 25 years 7 years General Untied
Final Disbursement Date	January 2004
Sub-loan Conditions - Interest Rate - Composition - Repayment Period	 6.8% p.a. A sub-loan, 30% (at a rate of 2.25%) of which was from Environmental Fund and 70%(at a rate of 8.75%) derived from the OECF loaned fund 10-20 years

[2] Excluding the amount of prepayment (4.888 billion yen) for the Samut Prakarn wastewater management project.

- Grace Period - Collateral	2 years None
Contractors	Krung Thon Engineers Co., Ltd. (Thailand) / Prayoonvisava Engineering Co., Ltd. (Thailand) / See Sang Karn Yotah (1979) Co., Ltd. (Thailand) / Vichitbhan Construction Co., Ltd. (Thailand) / Gateway Development Co., Ltd. (Thailand) / North West Water International Ltd. (United Kingdom) (JV)
Consulting Service	W.S. Atkins International Ltd. (United Kingdom) ・Sinclair Knight Merze Propriety Ltd. (Australia)・Macro Consultants Company Ltd. (Thailand) (JV)/ Padeco (Thailand) Ltd. (Thailand) / Tesco Ltd. (Thailand) (JV)/ ICF Consulting Group (United States)
Feasibility Study (F/S) etc.	Public Works Department
Special Assistance for Project Implementation (SAPI) etc.	SAPI Team for Overseas Economic Cooperation Fund, Japan, 1995 SAPI Team for Japan Bank for International Cooperation, 2002 SAPI Team for Japan Bank for International Cooperation, 2003

1.5 Project Scheme Chart



Note: Loans are indicated by ⇒; grants, by →.

1.6 Subprojects at a Glance

No.	Subproject Name	Work Planned	Target Output	Actual Output	Unit	Target Project Costs (baht)	Actual Project Costs (baht)
1	Samut Prakarn Wastewater Management Project	1) Wastewater treatment plant 525000m3/day 2) 1 Sludge treatment plant 3) 3 Pre-treatment ponds 4) Consultant for CPIE	525,000	0	m^3/day	23,927	24,232
2	OEPP Consulting Service		-	-		69	69
3	Seansuk sanitary district solid waste treatment project	1.Sanitary landfill site	236,038	148,701	m^3	94	94
4	Detailed designed of Mukdahan municipality wastewater management project		-	-		11	11
5	Sadao sanitary district solid waste disposal project	1.Sanitary landfill site	79,088	79,088	m^3	82	82
6	Samut Songklam municipality solid waste treatment project	1.Sanitary landfill site	95,113	139,364	m^3	47	47
7	Nakhon Panom municipality solid waste treatment project	1.Sanitary landfill site	730,000	730,000	m^3	79	79
8	Bang Kla sanitary district solid waste treatment project	1.Sanitary landfill site: 7 tons/day - 7 years	196,251	147,188	m^3	26	26
9	Warin Chumrab municipality solid waste treatment project	1.Sanitary landfill site	43,075	84,409	m^3	72	58
10	Buri Ram municipality solid waste treatment project	1.Sanitary landfill site	79,890	130,033	m^3	52	52
11	Taree sanitary district wastewater collection and treatment system project	1.Sanitary landfill site	2,054	1,700	m^3/day	64	64
12	Kohn Kaen municipality solid waste treatment project	1.Sanitary landfill site	1,000,000	1,000,000	m^3	46	46
13	Yasothon municipality solid waste treatment project	1.Sanitary landfill site	133,852	158,840	m^3	53	53
14	Si Sa Ket municipality solid waste treatment project	1.Sanitary landfill site	152,979	198,872	m^3	53	66
15	Sena municipality solid waste treatment project	1.Sanitary landfill site	116,565	90,000	m^3	46	46
16	Maha Sarakham municipality solid waste treatment project	1.Sanitary landfill site	720,000	720,000	m^3	32	32
17	Chumpon municipality solid waste treatment project	1.Sanitary landfill site	227,552	227,552	m^3	59	48
18	Pattaya municipality solid waste treatment project	1.Sanitary landfill site	825,000	825,000	m^3	53	53
19	Sukhothai Thani municipality solid waste treatment project	1.Sanitary landfill site	311,060	247,200	m^3	50	58
20	Taklee sanitary district solid waste treatment project	1.Sanitary landfill site	86,505	91,250	m^3	48	48
21	Chiang Yun Sanitary district solid waste treatment project	1.Sanitary landfill site	23,614	23,614	m^3	22	22

22	Bethong sanitary district solid waste treatment project	1.Sanitary landfill site	32,400	32,400	m^3	84	83
23	Pattani Municipality solid waste treatment project	1.Sanitary landfill site	247,187	255,500	m^3	72	70
24	Huakhwang Sanitary district wastewater collection and disposal system project	1. Effluent stabilization pond	1,500	600	m^3/day	22	22
25	Trat municipality solid waste treatment project	1.Sanitary landfill site	270,000	270,000	m^3	90	89
26	Klang Sanitary district solid waste treatment project	1.Sanitary landfill site	428,460	200,000	m^3	62	62
27	Yala municipality solid waste treatment project	1.Sanitary landfill site	160,000	160,000	m^3	72	80
	Total for wastewater treatment projects		528,554	2,300	m^3/day	24,024	24,330
	Total for waste treatment project		6,194,629	5,959,011	m^3	1,168	1,163

Note: Sanitary districts were the name used prior to enactment of the law for decentralization of power in 1999. Following enforcement of the decentralization plan and procedural regulations, all of the sanitary districts in this table were promoted to the city level.

2. Evaluation Result

2.1 Relevance

2.1.1 Relevance at the time of appraisal

Environmental pollution in the Kingdom of Thailand became more serious with the country's rapid economic growth and urbanization in the latter half of the 1980s and thereafter. In its Seventh National Economic Social Development Plan the Thai government stated environmental protection and improving the quality of life as one of three major targets. In 1992 the government enacted a national environmental conservation law and established three bureaus in charge of the environment problem as a way to furnish an administrative and financial system for preventing environmental problem from becoming more serious. Further, the Enhancement and Conservation of National Environmental Quality Act of 1992 clearly designated the establishment of the Environmental Fund to serve as a fund that would provide the capital which is required to promote environmental conservation projects, and the fund was in fact established. However, at the time of the appraisal, the Environmental Fund owned a capital for 5.5 billion baht, which was a mere 2% of the amount that should be required for all local governments to provide wastewater treatment sites in the following 15 years. It was clear that it would be necessary for cities across the country to have more funds for implementing environmental conservation projects, and from that perspective, this project, furnishing a concession loan system, was judged to be of high relevance.

2.1.2 Relevance of the plan during period of project implementation

At the time the loan agreement was executed, the Office of Environmental Policy and Planning told the Overseas Economic Cooperation Fund (at that time known as the OECF) that there was an

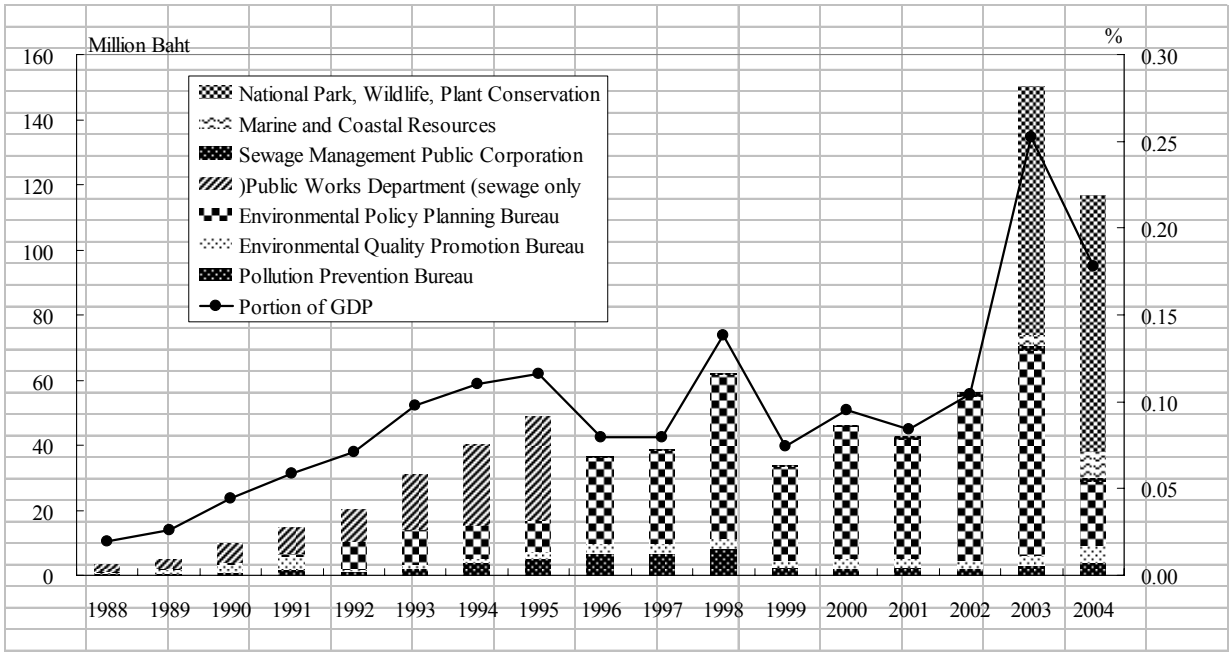
urgent need to furnish wastewater treatment sites in the nine cities of Kamphaeng Phet, Phra Indocha, Thayan, Chacheonsao, Ratchaburi, Suphanburi, Ban Phon, Samut Sakhon, Nakhon Nayok, and that in the upcoming 15 years, 2.33 billion baht would be required to provide and service wastewater treatment sites at all the provincial level. In the future, the fund was assumed to be providing funds for promoting the Provincial Environment Action Plan, which was developed in 1994 (encompassing the provision of waste disposal treatment sites in 41 cities and wastewater treatment sites in 30 cities), the environmental project for provision of waster treatment sites in Pattaya-Phuket-Hat Yai, and the environment project for the provision of waster treatment sites in Bangkok Municipal.

However, one year after the appraisal, financing from the Environmental Fund had not been provided to any sub-project. Furthermore, in fiscal year 1996, there was only one prospective sub-project for funding such as for wastewater treatment sites in Phraindocha city.

There are several reasons why implementation of the fund was not very active. The first reason was that other government institutions such as the Public Works Department and Pollution Control Department besides the Office of Environmental Policy and Planning, were independently implementing wastewater projects utilizing different channels. In 1992 the National Environment Board had approved the budget for the Pattaya – Phuket - Hat Yai Environment Project, but the Pollution Control Department was designated as the project's implementing body, and the said board decided that Pollution Control Department would be in charge for promoting the project with using a top-down approach. Moreover, despite the fact that, under the Enhancement and Conservation of National Environmental Quality Act of 1992, budget of the Public Works Department for wastewater management was supposed to be transferred to the Office of Environmental Policy and Planning, as of 1996, the said department's budget had increased since then, and in fact exceeded that of the Office of Environmental Policy and Planning (Fig 1). In addition, when the Environmental Fund and Office of Environmental Policy and Planning were initially established, the scope of environmental protection activities for which they would be responsible under their given budgets was clearly determined. Therefore, there was a large room for politicizing the decision-making process for funding distribution (Chamnie 1996). The Public Works Department repeatedly strove to obtain budgetary allocations pertaining to the environment conservation project.[3] Under this circumstance, out of the planned projects cited above, six feasibility studies implemented by the Public Works Department were conducted under that department's budget. Since the scale of other three projects was relatively small, they were given low priority by the Public Works Department and therefore, those three projects were not included in the projects planned by the Public Works Department. Moreover, since feasibility studies for two of the planned projects were not even completed, these projects were not regarded eligible to receive funds from the Environmental Fund immediately.

[3] For an example, see *Bangkok Post* (August 4, 1996).

Fig. 1 Expenditure for Environmental Projects by the Thai Central Government and Ratio Relative to GDP: 1988-2003



Note 1: Regarding Expenditure for environmental management prior to 1991, the expenditure from the Office of Environment Bureau is allocated to the related governmental department and agency in Figure 1 based on the function of environmental projects.
Note 2: Due to reorganization of the central bureaucracy in 2002, the Ministry of Natural Resources and Environment was established. The said ministry has been in charge of not only pollution control as in the past but also coastal management, wildlife conservation, mineral resources, water resources, underground water, and forest management. Budget for those activities were allocated to the Ministry of Natural Resources and Environment accordingly. In Figure 1 the expenditure for environmental projects excluding the budget of Resources Management Bureau is added up.

Data Source: National Statistical Office of Thailand's Statistical Yearbook and SAPI Team for Overseas Economic Cooperation Fund, Japan (1995).

Second, there was a deficiency in technological standards and fund-raising capabilities on the part of local governments, even though the said standards and capabilities were considered critical to realizing a decentralized environmental management system established as a goal under the Enhancement and Conservation of National Environmental Quality Act of 1992. At the time when the Public Works Department took an initiative for the environmental projects, the said departments implemented design and planning for wastewater treatment and waste disposal sites under its own responsibility and authority and raised funds for these projects in a top-down manner. In addition, in order to construct wastewater treatment sites in major cities nationwide, the said department established 72 local offices across the country and made the planning of wastewater treatment sites

for major cities nationwide in cooperation with JICA. Also, training centers were established so as to implement technical training for employees of local governments.

On the other hand, in order to obtain funding from the Environmental Fund, it was required that local governments took responsibility to prepare feasibility studies, to obtain funds by proposing the project plans to the Office of Environmental Policy and Planning through provincial governments, and to develop the facilities under their own responsibility rather than the central government taking the initiative for environmental projects. It was indispensable that the local governments have the technical capability and expertise for project planning and design. Likewise, it was critical for the provincial governments to have the capability to prepare provincial environmental action plans by summing up the environmental projects required in the cities, towns, and villages under their jurisdiction.

However, since most of local governments did not have the authority or financial resources to implement environmental conservation activities, there were very few local governments that had the above-mentioned capabilities for environmental projects besides Bangkok. Local governments at the city, town, and village level had authority for only 26 items at maximum, and the authority of local governments regarding environmental conservation activities was limited to hygiene and solid waste disposal. Moreover, there was no need for local governments to exercise the authority for all 26 items, because when they did not have the requisite capabilities, local administrative bureau or Public Works Department in the Ministry of Interior would implement the work instead of local governments. In addition, even in cases where local governments did try to exercise authority over the environmental projects, they did not necessarily implement the work efficiently because of a lack of funding or personnel, as well as due to the fact that politicians intervened in the process of hiring employees (Suwanmala 1991). Furthermore, from a financial standpoint, except for Bangkok and Pattaya, the ratio of independent source of revenues did not reach even 10%, and they depended on government subsidiary for 40-60% of their budget (Hashimoto 1999). For that reason, most of local governments did not have the expertise or experience to implement new projects by themselves for complying with the demands of local residents, nor did they need to. Also, they were not capable of using the budget that the Office of Environmental Policy and Planning had allocated for implementing feasibility studies.

Third, the number of personnel in the Office of Environmental Policy and Planning or the Environmental Fund office was insufficient. The three newly established environmental bureaus had not been able to procure sufficient personnel for several years after their establishment. In the Environmental Fund Office 6 people left vacant against 20 of regular number of personnel, and in the Office of Environmental Policy and Planning 37 people left an opening against 271 of regular number of personnel. (SAPI Team for Overseas Economic Cooperation Fund, Japan, 1995:3-3) For that reason, there was a difficulty for the Office of Environmental Policy and Planning and Environmental Fund Office in providing technical support for local governments whose capacity for project design and making environmental action plans were insufficient. Furthermore, it was difficult to establish groups of specialists within the Environmental Fund Office.

In order to overcome this situation and make effective use of the Environmental Fund, at the time of concluding agreement, the Overseas Economic Cooperation Fund, Japan, (at that time known as the OECF) sought to strengthen the capabilities of the Office of Environmental Policy and Planning through dispatching specialists from the Japan International Cooperation Agency (JICA), and though providing consulting services. However, the plan to strengthen their capability fell way behind schedule because of delayed selection procedures due to the fact that the executing agency staff did not have enough experience in handling yen loans or hiring consultants. Moreover, selection for the various subprojects that the Office of Environmental Policy and Planning was conducting on its own was not proceeding smoothly because of a shortage of technical experts and other specialists (SAPI Team for Overseas Economic Cooperation Fund, Japan, 1995:1-3). Consequently, the Office of Environmental Policy and Planning was not able to build up the requisite technical capabilities required to strengthen the ability of local governments for project designing.

Fourth, as far as local governments were concerned, the cost associated with procuring funding from the Environmental Fund was relatively high compared to other sources of funding. As in the past when the Public Works Department took initiative for environmental projects, while there was a fixed waiting period for local governments to receive funding, so long as they provided for the site, it would not be necessary for them to provide for project costs by themselves. On the other hand, when procuring funding from the Environmental Fund, not only did the local governments have to procure part of the project costs on their own, but when procuring funds based on loans, they had to repay the loans including interest. Moreover, it took 16 months as an average for completing the funding application procedure, since the said procedures for the Environmental Fund were complicated (SAPI Team for Overseas Economic Cooperation Fund, Japan, 1995: 2-6). Therefore, it means that the funds could not necessarily be used in cases where environmental conservation activities were an urgent matter. As a result, there were few local governments that sought to implement environmental conservation activities by using funds from the Environmental Fund considering its high cost.

At that point, the Overseas Economic Cooperation Fund, Japan (OECF) conducted from 1994-1995 a Special Assistance for Project Implementation (SAPI) study for assisting in sub-project designing. Their report proposed the following seven steps as improving measures (SAPI Team for Overseas Economic Cooperation Fund, Japan, 1995: 7-1~6).

1) The Thai government should decide the roles of related governmental organizations such as the Public Works Department, Pollution Control Department, and Office of Environmental Policy and Planning.
2) The preconditions for using the Environmental Fund should be made the same as those for the subsidy from Public Works Department. For example, 100% government grants should be provided from the Environmental Fund, and the procedures through which local governments obtain budget allocations should be simplified.

3) A long-term strategy should be drafted to raise the technical capabilities of both the central and local governments. Specifically, while preparing to employ technical staff in the Office of Environmental Policy and Planning, in the meantime, strong technical groups should be secured primarily by engaging consultants and specialists in the short term. By doing so, supporting system for local governments should be constructed in top-down fashion. As for the training of employees, the Thailand Environmental Research Training Center or the Wastewater treatment Technology Center should be utilized.
4) With drafting a master plan under the guidance of the above-mentioned specialists, construction plans of the planned projects for each fiscal year should be made as soon as possible.
5) For seeking new funding demand, the advertisement on the Environmental Fund should be implemented actively to the related local governments including Bangkok for finding improvement projects for existing wastewater treatment sites in industrial parks and municipal waste disposal plant projects.
6) The Phra Intracha wastewater treatment project should be implemented as a way of realizing the concepts raised in the Enhancement and Conservation of National Environmental Quality Act of 1992.
7) Sufficient details about the Environmental Fund should be informed to the local governments.

In response to these proposals, changes were made to the usage policies for the Environmental Fund. Firstly, following 1996, it was decided that all of the funding to local governments from the Environmental Fund should be provided in the form of grants. Secondly, after deciding to fund the Samut Prakan wastewater treatment project, it was decided that possible sub-projects should be limited to solid waste disposal projects, whereas until then large-scale wastewater treatment projects had been regarded as possible project.

Furthermore, the division of roles among the various relevant governmental institutions had been clarified. To begin with, a political settlement was finally concluded regarding the division of roles between the Public Works Department and the Office of Environmental Policy and Planning.[4] As a result, the Office of Environmental Policy and Planning would be solely responsible for disbursing funds and carrying out new wastewater treatment or urban solid waste disposal projects, and the Public Works Department would not be involved in new projects. Besides, the Pollution Control Department had taken the primary lead on environmental conservation projects up to the Samut Prakan wastewater treatment project while securing funds through the National Environment Board, but would no longer directly initiate subsequent projects.

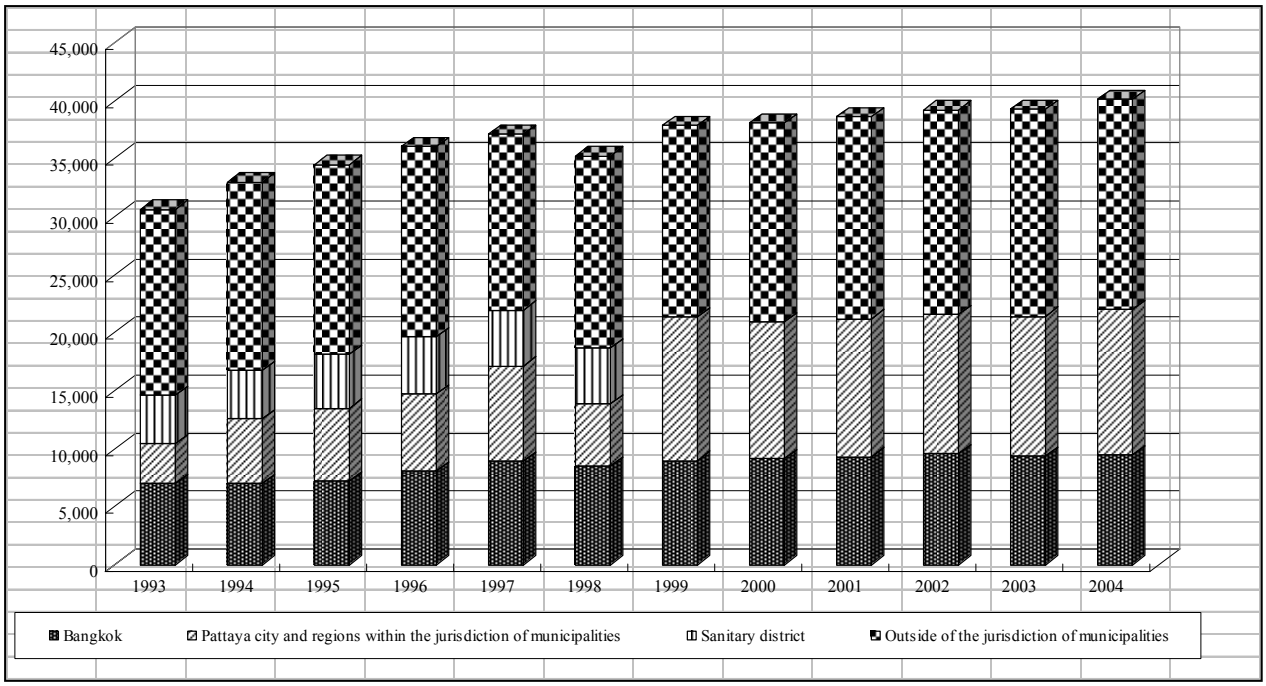
The upshot of these three changes was that demand for finance from the Environmental Fund had been drew out for promoting projects to develop solid waste disposal in sanitary landfills. As in most developing countries, Thailand's urban waste disposal primarily relies on open dumping. According to statistics for 1997, open dumping accounted for 62% of total disposal, sanitary landfill

[4] For an example, see *Bangkok Post* (March 21, 1997).

came to 27%, and the rate of reuse or recycling including composting did not exceed 10%. On the other hand, following the rapid increase in plastic garbage due to rapid urbanization, in the 1990s total amount of solid waste generation in urban area had risen continually 3% - 5% per year, with 13.5 million tons as total amount of solid waste in 1997. And while the rate of increase did decline thereafter, in 2003 the figure reached 14.40 million tons (Figure 2). This is over 1 kg per person per day, meaning that the amount of solid waste generation was quantitatively equal to the one in developed country. For that reason, in cities, towns, and villages that were not able to secure sufficient budget allocations for strengthening solid waste collection and disposal systems, waste produced but not collected on the same day might end up being discarded on the roadside as daily happening. Moreover, even local governments that established collection systems, they had used up the capacity of existing sanitary landfill sites in the outskirts of urban areas, and some of local governments had become necessary to secure new large-scale reclaimed land sites. However, the local governments did not necessarily have sufficient financial resources to secure the sites they needed, and also did not have sufficient management skills for the task. For that reason, it was not possible to sweep away residents' concerns regarding surrounding environmental pollution and health hazards such as infectious diseases carried by flies and mosquitoes in landfill disposal sites, groundwater pollution, foul odors, and unpleasant scenery.[5] Thereupon, just as in the case of Chiang Mai, it was no longer possible to secure landfill disposal sites, and it was appeared that there were some of local governments which had no choice but to leave wastes on the road.[6] Under these circumstances, in 1997 the Pollution Control Department drafted the 1997-2001 National Solid Waste Management Plan. Under the plan, goals by 2001 was stated as follows; recycling rate should be raised to over 10%; the amount of waste disposal generation should be kept to below 1 kg per person per day; the uncollected rate of solid waste in municipality should be kept to under 10%, and the said rate in sanitary districts should be reduced to less than 20%. At the same time, it was suggested that waste disposal sites be secured in accordance with health and safety guidelines, with developing master plans for each province. As a result, the Draft of Community Waste Disposal Guidelines, Standards, and Procedures was established, and it showed the guidelines to be followed when local governments acquired land (Sukram 2000).

[5] In addition, lack of transparency in the land acquisition together with the pursuit of profit in waste disposal projects further bolstered the opposition movement of local residents and made it much more difficult to resolve the dispute.
[6] According to Sukran (2000; 2001) , Maha Sarakan, Korat, Mae Hong Son, Rop Buri, Samut Sakhon, Pattaya, and Nan Phorn district in Kohn Kaen Province have developed serious disputes regarding waste disposal.

Fig. 2 Changes of the Waste Discharge Volume in Local Government (tons/day)



Note: Sanitary districts were raised to the status of autonomous governing bodies during the decentralization policy in 1999.
Source: Pollution Control Department "Thai Pollution Conditions" yearly edition (originally in Thai).

Such improvements to the design and use of the Environmental Fund along with the urgency of resolving the urban waste issue heightened the demand for funds from the Environmental Fund. As a result, in addition to three wastewater treatment projects, funding was also provided for 22 projects of sanitary landfill disposal sites, starting with the provision of funding for the Seansuk sanitary district in 1998 to that for the Yala city project in 2003. Except for the Samut Prakan wastewater treatment project for which the first contract of funding provision had been concluded, these 25 projects were implemented according to a decentralized procedure wherein the projects were formed by local governments while receiving support from the Regional Environmental Office or Provincial Environmental Office, with applying financial support for the central government and realizing the project implementation.

2.1.3 Relevance of the plan at the time of evaluation

As Thailand's 1997 Constitution specified that decentralization should be promoted as one of the government's fundamental policies, the Imposition of Plans and Steps for Distribution of Power to Local Administrative Organizations Act was enacted for the purpose of promoting decentralization in 1999. These laws specified that by fiscal year 2010 the delegation of authority was to be

completed, and that the percentage of public expenditure from local governments relative to the entire government budget was to rise above 20% by 2001, and above 35% by 2006. Subsequently, a National Decentralization Committee was to be established and formed from central government representatives, local government representatives, and other academic experts. The said committee was planned to be in charge of implementation and adjustment of plan in detail, and the evaluation of result of projects. As a result, the way of financial support from central government to local governments had changed from specific subsidies distributed from various ministries in the central government for promoting projects to lump-sum grants of an unspecified purpose dispersed through the National Decentralization Committee as in the financial transition for local government. In the transition from subsidiary aid to lump-sum grants, even the subsidiary aid formerly distributed from the Office of Environmental Policy and Planning to local governments for environmental conservation activities such as wastewater treatment facilities and waste management facilities in particular were gradually integrated into lump-sum grants. The upshot of this transition was that by fiscal year 2004 the budget of the Office of Environmental Policy and Planning had shrunk significantly (Figure 1). As a result, the Environmental Fund has been reexamined recently as a fund support measure to promote environmental conservation activities by local governments.

In addition, appropriate management of solid waste outside of the jurisdiction of municipalities has continued to remain a problem as in the past. The volume of solid waste output outside of the jurisdiction of municipalities in *tambon* municipalities or regional municipalities is not necessarily that large. However, as can be seen in Figure 2, overall the said volume has been greater compared to regions within the jurisdiction of municipalities. In addition, since most of the waste in the said regions was disposed in the way of open dumping or illegal dumping, it has caused a lot of disputes in various regions as well as the ones in the jurisdiction of municipalities. Given shortage of funds, the Pollution Control Department hammered out a cluster policy wherein a central municipality in the region had developed a sanitary landfill disposal sites rather than developing sanitary landfill sites for each municipality, and solid waste from nearby areas outside the municipal jurisdiction was disposed in the central sanitary landfill. A policy was then established to distribute funds preferentially to local government projects to take on solid waste from nearby out-of-jurisdiction municipalities. Then, the Regional Environmental Office took on the specific responsibility of arranging the grouping of local governments based on the said cluster policy. Meanwhile, on account of spatial constraint, regional central municipalities for the most part could not construct sanitary landfill sites within their own jurisdiction. For that reason, they were forced to develop sanitary landfill disposal sites by purchasing land in surrounding tambon municipalities. In order to obtain the approval of surrounding tambon municipalities, the central municipalities were required to construct sanitary landfill sites and accept waste disposed in routing line from the central municipalities to the site. For that reason, given the need to take on solid waste from surrounding municipalities outside of their jurisdiction, it was necessary to secure vast tracts of land for the sanitary landfills, and it caused project costs to become considerable. As a way to obtain the necessary funding, the Regional Environmental Office frequently recommended that funds be

procured from the Environmental Fund.

At the same time, as a policy to resolve the insufficient capabilities of local governments and the frequent strife regarding the securing of land for waste disposal sites, the Pollution Control Department proposed privatization of waste disposal operation. And in order to make sure that the waste was being disposed properly, the department also developed a certification system for private disposal businesses together with a system to disclose information, and tried to strengthen the degree of supervision by citizen. Since a cluster policy leads to promote the efficient disposal of waste that is widely dispersed, it caused private waste disposal companies to make it easier for installing technologies such as anaerobic fermentation and incineration and making disposal cost effective. However, as the Environmental Fund has had few experiences to contribute funding to such project by private company, the progress of privatization could be a factor in lowering the demand for the Environmental Fund in the future.

2.2 Efficiency

2.2.1 Outputs

At the time the loan agreement was concluded, it was assumed that funds would be provided for wastewater treatment facility projects in 9 cities. When these projects had all been completed, the expected output would be a set of wastewater treatment plants that secures capacity of 252,000m^3/day as sum total. This figure broke down into 76,000m^3/day handled by stabilization ponds, 24,5000m^3/day by aerated lagoons, 36,7000m^3/day by oxidation ditches, and 115,000m^3/day by activated sludge processing.

However, as stated in Section 2.1, these subprojects were modified drastically. As a result, 3 projects for construction of wastewater treatment facilities and 22 projects for construction of sanitary landfills to dispose urban waste were formed. Upon completion, the facilities were capable of 528,554m^3 of wastewater treatment per day (stabilization ponds accounting for 2,300m^3/day and activated sludge treatment accounting for 525,000m^3/day), together with a sanitary landfill capacity of 6,194,629m^3. Moreover, consulting service was planned to be provided to the Office of Environmental Policy and Planning, and the detailed plans for a wastewater management project had also been completed.

The actual realized output consisted of the following: wastewater treatment capacity of 2,300m^3/day; sanitary landfill disposal areas amounting to 5,819,614m^3; one detailed plan for a wastewater management project; and consulting services provided to the Office of Environmental Policy and Planning. If we compare these figures to planned values that were addressed in the re-composition of subprojects, actual output of wastewater treatment capacity reached 0.4% of planned values while waste disposal site capacity was 94% of planned. The reason that the figures for wastewater treatment capacity was secured far from the planned values is that the Samut Prakan wastewater treatment project has yet to be completed. The Samut Prakan wastewater treatment project faced opposition from NGOs and area residents on account of concerns that the environment might be contaminated, and in addition, there were suspicions of corruption regarding the said

project.[7] Accordingly, on July 31, 2003, the Thai government revoked financing for this project and made a voluntary prepayment to JBIC. Meanwhile, as for the discrepancy in the waste disposal site capacity, despite the fact that actual output of certain projects such as in Warin Chumrab and Buriram reached 150% of planned values, there were also several projects whose actual outputs did not reach the planeed, as was the case for Klang city (47%), Seansuk city (63%), and Bankura city (75%).

2.2.2 Project period

Overall project period of this Environmental Fund Support Project was supposed to run from September 1993 to September 1999, or a total of 72 months. However, because the demand for funds had been low, and because of the insufficient capabilities of the Office of Environmental Policy and Planning, and part of the local governments, the formation of appropriate subprojects had been delayed. Accordingly, the loan disbursement period as stipulated in the loan agreement was extended by 40 months to January 2003. In addition, on account of delays of solid waste disposal project in Yala city, Samut Prakan wastewater treatment project, and Mukdahan wastewater treatment detailed plan, the extended period was further extended to January 2004. As a consequence, the duration of Environmental Fund Project ended up 124 months, or 172% of the initially planned.

In respect of the individual subprojects, out of 26 projects excluding consulting services, only 11 projects (42.3%) were completed within the planned timeframe, an additional 12 projects(46.2%) were spent less than 150% of planned duration, and another 3 projects(11.5%) were over 150% of their planned. Confronting this situation, the Office of Environmental Policy and Planning worked out a policy designed to minimize project delays whereby a commitment fee was levied against local governments in the amount of 1% of the expenditure that remained unpaid by the Environmental Fund.

2.2.3 Project cost

At the time that the loan agreement was concluded, the costs of total project for which the Environmental Fund was supposed to extend the loan and/or grant were forecasted to amount to 15.086 billion yen, of which 11.2 billion yen was to be supported by the yen loan. However, following the re-composition of subprojects, because one of the subprojects, namely the Samut Prakan wastewater treatment project, was carried out with loans from the Asia Development Bank together with the financial support from the Thai government budget, project costs greatly exceeded their initial planned costs and came to 25.578 billion baht (approx. 75.0 billion yen). In this regard, however, even including the Samut Prakan wastewater treatment project, disbursed amount from the yen loan came to 7.762 billion yen or 69.3% of the estimate. In the end, as the disbursed amount for Samut Prakan wastewater treatment project was voluntarily prepaid, the project costs came to

[7] Regarding this point, see Fukuda (2002, 2003) and Mori (2006).

1.346 billion baht, of which 1 billion baht (2.971 billion yen) or 74.3% of total project costs or 26.5% of the initial planned yen loan was disbursed.

With regard to the costs of individual subprojects, actual costs for all of the 27 subprojects had not exceeded planned budget of 125% or more. The fund disbursed on each subproject from the yen loan was sufficient, except for the Samut Prakan wastewater project, for which 94% of the estimated amount was disbursed.

2.3 Effectiveness

2.3.1 Urban wastewater treatment

Two wastewater treatment projects—one in Tarae city and the other in Huakhwang city— was implemented and a total of 1,300m^3/day of wastewater treatment in stabilization ponds was realized. In addition, Biochemical oxygen demand (BOD) and suspended solids (SS) were reduced by 9 tons and 8 tons per year, respectively. This amounts to 56.5% of the treatment capacity of 2,300m^3/day as planned values, corresponding to 0.2% of the 528,554m^3/day wastewater treatment capacity as planned values after the re-composition of subprojects.

These facilities are not operating at 100% capacity after the completion of subproject. In the case of Tarae city, because of a difficulty in procuring the loans for construction facilities, there has not been enough wastewater pipe constructed, and not being collected from important emitters such as gas stations and markets. In the case of Huakhwang city, wastewater pipes have yet to be connected in all of the initially planned area. As a result, wastewater pipes constructed by using the funds from the Environmental Fund only cover 42% of the urban area of Tarae and 60% of the one in Huakhwang.

2.3.2 Urban waste disposal amount in sanitary landfills

In the 22 cities where waste disposal subprojects were conducted, before the implementation of projects wastes collected from urban area had been disposed mainly by open dumping, and there was no local governments who disposed those wastes in sanitary landfills. It was expected that after the completion of subprojects urban waste formerly disposed of illegally or through open dumping would be properly disposed of in sanitary landfills. When the subprojects were in their planning stage, the capacity of sanitary landfills wherein urban waste would be disposed of was expected to come to a total of 1,108 tons/day for the 22 subprojects.

At the time of the evaluation, urban waste disposed of in sanitary landfills was 115% of planned values, or 1,271 tons/day. This stems from the fact that, whereas sanitary landfills initially targeted the proper disposal of urban waste only from within the municipality's jurisdiction, in the process of promoting the said cluster policy, these sites came to accept urban waste from surrounding tambon municipalities or provincial municipalities, sometimes even from the private waste collection companies. As a result, four projects were disposing of solid waste in landfills at levels exceeding 200% of target, namely Seansuk (400%), Warin Chumrab (217%), Yasothon (200%), and last but

not least Chiang Yun (710%). Two projects were operating in excess of 125% of target. For this reason, although there were 3 projects wherein the amount of waste disposition in sanitary landfills was below target, overall, target figures were being exceeded.

On the other hand, there is one subproject where—despite the fact that the already completed sites had already been completely filled with wastes—work was currently not being carried out because it is not possible to build a new disposal site. This subproject had begun operations in 2000, but by August 2002 its capacity had been used up. Although construction of a second sanitary landfill disposal site was planned, because of fierce objections from surrounding residents, it was not possible to obtain approval for construction by the council of the tambon municipality where the landfill site was located. The reason for the objection from nearby residents was that during the period that the subproject was being implemented, because wastes were frequently not covered with soil, the problem of foul odors and large numbers of flies were occurred. In addition, untreated seepage water was spilling out into neighboring areas, resulting in a negative effect on agricultural produce and drinking water. In order to break the deadlock, the relevant local government built facilities to treat the seepage water and took steps to solve the issue of soil cover, but the tambon municipalities at the disposal site felt that the response was inadequate and thus did not approve a second phase of construction. Thereupon, the local governments changed a policy wherein disposition of urban waste by entrusting the transport and burying to private companies, and they gave up on disposing of waste by building a sanitary landfill disposal site using the Environmental Fund.[8] Therefore, the operation rate of this subproject was 0% at the time of evaluation.

2.4 Impact

2.4.1 Benefited population of proper disposal services for urban wastewater and waste

At the time the loan agreement was concluded, it was expected that funding would be provided from the Environmental Fund for the projects stipulated in provincial environment action plans (construction of wastewater treatment facilities in 30 cities and waste disposal facilities in 41 cities), environmental projects in Pattaya, Phuket, and Hat Yai (construction of wastewater treatment facilities), and an environmental project in Bangkok (construction of wastewater treatment facilities). As a result of the implementation of the subprojects, the number of benefited people from wastewater treatment services in 34 cities was expected to increase by 2.32 million people, and the one from the disposal of wastes in sanitary landfills in 41 cities was expected to increase by 1.10 million people. Following that, the subproject was re-composed and changed to three wastewater treatment projects and 22 waste disposal projects. After the sub-project completion, benefited

[8] Out of the 72 solid waste sanitary landfill waste disposal sites and incinerator facilities that were built using government funding given by the Environmental Policy Planning Bureau to local governments, 10 of the facilities, including that at Samut Songklam are either being managed improperly or are not being used. The reason why this situation was happened is as following; during the monsoon season, water seepage from the disposal site infiltrates the areas containing water resources; some facilities lack the funds to cover the waste with soil or operate incinerator facilities; and the plastic sheets used to prevent water seepage have been broken. But regardless of the local government in question, the lack of cooperation with residents is inducing their distrust. (*Bangkok Post,* January 25, 2003).

population from wastewater treatment services was expected to increase by 618,284 people, and the one from the disposal of waste in sanitary landfills was expected to increase by 1,040,773 people.

In fact, the increase in the number of beneficiaries from wastewater disposal services came to 9,370 people or 0.4% of target. The reason for the discrepancy between the actual figure and target was that the funds to the Samut Prakan wastewater treatment project were revoked and voluntarily prepaid, as well as the fact that in the other two subprojects, wastewater was collected from only 42% (Tarae city) and 60% (Huakhwang city) of the total urban areas. Meanwhile, the number of beneficiaries from the services of urban waste disposition in sanitary landfills increased by roughly 970,000 people in 22 city areas, or 93.4% of target. Moreover, following the promotion of the said cluster policy by the central government, service was being provided additionally to residents of tambon municipalities by the surrounding areas of many local governments. Considering this point, it is estimated that a maximum of roughly 1.99 million people, or 192% of target, had come to enjoy solid waste disposition in sanitary landfill.

2.4.2 Improvement in river water quality and environmental hygiene in urban area

(1) Improvement in river water quality

It was expected that once wastewater treatment subprojects had been completed and plant operations begun, the quality of the water in rivers flowing through cities (in the case of the Samut Prakan wastewater treatment project, the Chao Phraya river basin) would improve. In the case of Huakhwang city, because the former wastewater treatment lagoon and the inlet to their source of drinking water were adjacent to each other, upon completion of the subproject, it was expected that the quality of the city's drinking water source would improve.

According to the results of beneficiary survey in the community, overall, beneficiaries acknowledges that wastewater treatment subprojects helped improve management of wastewater treatment and mitigate water pollution issues (Table 1). (In the survey, 325 people living in one of seven cities or districts in project regions (like Warin Chumrab city) were given a questionnaire and collected the answer was collected.) The beneficiaries acknowledged that based on the result of the related sub-projects the environment in areas surrounding wastewater treatment sites was improved, and improvements in residents' health were also secured (Table 2). This findings were seen significantly in communities undertaking environmental improvement activities and among residents living near wastewater treatment sites in the said community.

However, benefits did not necessarily extend to urban residents as a whole. While there was the statistically-meaningful number of urban residents who appear to have recognized the improvements to the environment, there was not statistically-meaningful number of residents who experienced anything beyond that.

As a backdrop to this situation, it has been pointed out that the improvements to water quality and the environment were limited to specific regions where wastewater was collected or areas surrounding wastewater treatment sites. Moreover, because the ratio of treated wastewater to river water volume is small, improvements are not so significant as to indicate remarkable improvements

in water quality in regular monitoring. Moreover, as wastewater treatment facilities were not functioning well enough, portions of the wastewater were being discharged without treatment, and it made river water contaminated partially (Sukran 2003). Furthermore, because there was only stabilized disposal as the technique of wastewater treatment, it was not possible to sufficiently treat eutrophied wastewater, and algae was therefore blooming in stabilization ponds, thus making it difficult to properly and sufficiently treat the wastewater.

In order to respond to these problems, Huakhwang city and Tarae city contracted a private wastewater operation and management company (WoMC) that was under the umbrella of a public wastewater treatment company to handle their wastewater for a period of four years starting in 2005. It caused to improve the design of the wastewater treatment plant and implement the operation and maintenance properly. However, in the case of two specific local governments, they did not respond to the fundamental problem with emission sources. No standards had been set for the how wastewater should be received from emitters, nor did they even have the legal authority to regulate the quality of received wastewater. As a result, the local governments were in no position to request that major emitters engage in certain pre-treating of wastewater so that it could be properly handled at the wastewater treatment plant.

Table 1: Benefits of Environmental Pollution Mitigation by Group (Wastewater treatment Projects)

	Residents near the disposal site	Residents engaged in pollution improvement activities	General city residents	All residents
Improvement to water quality and pollution issue	1.43	5.37 **	1.73	5.87 **
Improvement to management of water quality	2.63 *	2.32 *	1.07	7.03 **

Note 1: A questionnaire survey was given to beneficiaries asking them to evaluate conditions before and after project execution using scores of 2 for "good," 1 for "average," and 0 for "poor." The results were checked for statistical significance. Generally speaking, if the grade was higher than 2 one can consider the difference to be significant, meaning that the degree to which the beneficiaries felt that conditions changed were significant.

Note 2: * Test results significant at a = 5%; ** Test results significant at a = 1%. The same applies in the table below.

Table 2: Benefits of Environmental Pollution Mitigation by Group and Item (Wastewater treatment Project)

	Residents near the disposal site	Residents engaged in pollution improvement activities	General city residents	All residents
Economic impact	0.38	3.56 **	-	6.54 **
Environmental impact	12.65 **	21.03 **	3.24 **	11.64 **
Impact on health	3.41 **	5.43 **	1.87	3.27 **
Total impact	8.38 **	21.03 **	3.24 **	12.51 **

Note: See Note 1 in Table 1.

(2) Improvements to urban environmental hygiene

In projects to build sanitary landfill disposal sites for solid waste, after the subprojects had been completed and actual work begun, it was expected that there would be a reduction in illegal and open dumping, an improvement in the collection rate for urban waste thanks to the securing of a landfill disposal site, and an improvement in environmental hygiene in urban areas and areas surrounding the disposal site. In addition, because the manner of disposal would change from open dumping to sanitary landfill, seepage water would be properly managed, and frequent cover soil would prevent foul odors or the proliferation of disease-bearing in insects, it was expected it would become easier to provide and manage landfill disposal sites for urban waste where friction with surrounding residents had been a problem.

According to the results of a survey of beneficiaries in communities, overall, it was recognized that the management of solid waste through the construction of sanitary landfill disposal sites had improved, and the solid waste issue had been improved (Table 3). In addition to environmental improvements, boosting of recycling activities led to further economic benefits, and so an improvement in environmental conditions was observed (Table 4).

However, these results differed by the group of beneficiaries. The people who tended to recognize environmental benefits such as better management of solid waste or reductions in associated problems were mainly general residents in cities and communities where recycling activities were being proactively conducted. By contrast, residents near the disposal sites did not necessarily sense that disposal management had improved. Moreover, whereas there did exist people who recognized economic benefits from scavenging, not a few residents experienced a worsening in health or environmental hygiene. In particular, many residents were bothered by an onslaught of foul odors and flies, farmlands were frequently overrun with seepage water, and farm produce or drinking water were adversely affected. In the case of Pattaya, though disposal sites themselves were not criticized, foul odors from adjacent incineration facilities established for medical waste led to serious complaints about the air pollution.

Table 3: Benefits of Environmental Pollution Mitigation by Group (Waste Disposal Project)

	Residents near the disposal site	Residents engaged in recycling activities		General city residents		All residents	
Improvement in waste disposal situation	-1.09	15.92	**	2.89	**	4.96	**
Improvement in waste disposal management	1.64	16.57	**	3.55	**	6.49	**

Note: See Note 1 in Table 1.

Table 4: Benefits of Environmental Pollution Mitigation by Group and Item (Waste Disposal Project)

	Residents near the disposal site	Residents engaged in recycling activities	General city residents	All residents

Economic impact	5.20	**	9.29	**	1.01		6.76	**
Environmental impact	0.14		25.67	**	4.92	**	7.28	**
Impact on health	-3.57	**	11.43	**	2.42	*	1.22	
Total impact	0.93		27.44	**	5.25	**	8.55	**

Note: See Note 1 in Table 1.

2.4.3 Inter-bureau cooperation and sense of responsibility for properly treatment and disposing of wastewater and waste among local governments

Even before the subprojects began, local governments fully recognized their own responsibility for appropriate treatment and disposing of wastewater and waste. A beneficiary survey for local government employees was conducted (The survey involved 225 staffs (local government employees) in 7 cities and regions of the project sites (including Seansuk city), and in the questionnaire, multiple answers were permitted.). According to the results of survey, overall, prior to subproject implementation, it was recognized that the treatment of wastewater and the disposal of solid waste should be dealt with based on shared responsibility by the local government and the central government (the Ministry of Natural Resources and Environment), and for the most part, this perception did not change following the implementation of subprojects (Table 5). However, while it was not statistically-meaningful, the number of local government employee who stated the following opinion has increased: local governments (mainly, tambon municipalities) who had their own landfill disposal site should also shoulder their responsibility regarding the disposal of wastes. This probably reflects an increase in the voicing of requests for tambon municipalities as a waste generator to take responsibility in line with the enforcement of the cluster policy.

Moreover, from the results of a beneficiary survey regarding the unity of internal departments of local governments, there was the significant difference observed between local governments that had implemented solid waste disposal projects and those that had implemented wastewater treatment projects. As for the local governments that were in charge of wastewater treatment projects, there was statistically-meaningful increase observed in political commitment, independence, inter-bureau cooperation, and management capability (Table 6). The reason for this was that the system or organization in the local government implementing wastewater treatment projects was small, and that deputy mayors and others in positions higher than the bureau level who could promote cooperation took an active role in the projects. We assume that as far as the small-scale local governments were concerned, in order to promote wastewater treatment projects, they had to address issues such as the technique of treatment and funding; therefore, unity of organizations and departments within local governments was perceived as being indispensable for promoting wastewater treatment projects.

By contrast, as for local governments that implemented solid waste disposal projects, as in the case of Kohn Kaen city and Warin Chumrab city, despite the fact that not just those in charge of the local government's hygiene bureau but even the mayor himself took an active role in forming a residents' agreement and positive efforts for waste disposal including recycling, it was

statistically-meaningful that political commitment was lowered, and local government independence was also lowered, though not statistically-meaningful (Table 7).[9] It has been suggested that the reason for this was that waste disposal projects do not require such high techniques or large sums to cover construction costs and operation and management costs as do wastewater treatment projects. In other words, waste disposal projects are relatively easy to be implemented by the specific bureaus and hygiene department.

Not all of the local governments implementing subprojects recognized the responsibility for land acquisition in accordance with the appropriate procedures or obtaining the approval of local residents. The Enhancement and Conservation of National Environmental Quality Act of 1992 clearly specified the implementation of environmental impact evaluations, and the 1997 Constitution clearly provides for citizen participation in projects having a major impact on the environment. However, local governments that secured land prior to the 1997 constitution did not recognize the need for residents to participate in the environmental impact evaluation process. For that reason, the land acquisition procedure was not always transparent, leaving room for politicians to induce benefit. In addition, because most of the local governments ended up securing landfill disposal sites outside of their jurisdiction, there are cases where the responsibility to persuade or get consent from residents and to obtain landfill disposal sites was passed on to the tambon municipality where the site was located. For example, in Pattaya city, the ward mayor of the neighboring district government published a land deed for 220,000 m^2 of a protected forest district, and with a bribe to Pattaya at play the land was sold at a high price for profit.[10] In addition, because the land was purchased prior to the official proclamation of the 1997 constitution, a landfill disposal site was constructed without any public hearing or other resident participation process. For that reason, strife among residents arose, operation startup was delayed, and surrounding residents pleaded that they had been suffering from foul odors and other problem since landfill operations started. In either case, however, it was recognized that the party responsible for responding to the situation was the tambon municipality that had the site, and Pattaya has not involved.[11] In the case of Samut Songklam city as well, private companies were contracted to transport and implement sanitary landfill, and from that time on, local governments insisted that the contracted private companies should take responsibility of handling the disposing of the waste, whereas they did not need bear responsibility.

Table 5: Governmental Organization that Should Bear Responsibility for the Treatment of Wastewater and the Dispose of Waste Categorized by Class (N = 225, multiple answers permitted)

Organization	Before Project Implementation	After Project Implementation	t-value
The Ministry of Natural Resources and Environment	212	213	0.21

[9] Based on an interview of the mayor of Warin Chumrab conducted by the evaluator on March 23, 2006.
[10] The village headman who disposed of the land was arrested and judged guilty by the Supreme Court (*Bangkok Post, May 11, 2006*).
[11] Based on an interview of the sanitation bureau of Pattaya city conducted by the evaluator on March 20, 2006.

Provincial Natural Resources and Environment Bureau	188	194	0.79
Cities	217	214	0.70
Local governments having landfill disposal sites	199	205	0.93
Communities	195	193	0.27

Note: These figures constitute the results of a questionnaire permitting multiple answers regarding which body of government should shoulder the responsibility of treatment of wastewater and dispose of solid waste. The pre- and post-project figures sum up those results. If the t-value is greater than 2, it means that the difference is significantly-meaningful. In other words, according the said results, it could be statistically assumed that local government employees felt there was a change in locus of responsibility among the various organizations.

Table 6: Changing Factors in the Unity with which Internal Departments of Local Governments for Facing Environmental Conservation (Wastewater Treatment Projects)
(strong - 2, weak = 1, no changes perceived = 0)

	Before Project Implementation	After Project Implementation	t-value
Political commitment	27	32	4.48 **
Initiative of local government	23	32	7.06 **
Cooperation among bureaus and offices	22	28	4.28 **
Status of bureau	25	27	1.79
Management capacity	23	27	3.26 **

Note: These figures constitute the results of a beneficiary survey on the status pre- and post project implementation with respect to items pertaining to relating environment conservation organizations within the local governments. If t-values are greater than 2, it means that the difference is statistically-meaningful. In other words, it could be statistically assumed that local government employees felt there was a change in the state of factors.

Table 7: Changing Factors in the Unity with which Internal Departments of Local Governments for Facing Environmental Conservation (Waste Disposal Projects)
(strong - 2, weak = 1, no changes perceived = 0)

	Before Project Implementation	After Project Implementation	t-value
Political commitment	317	284	2.34 *
Initiative of local government	282	281	0.07
Cooperation among bureaus and offices	262	264	0.14
Status of bureau	285	284	0.07
Management capacity	262	263	0.07

Note: See the note for Table 6.

2.4.4 Promotion of reuse and recycling of waste by residents

In Thailand, scavengers have carried out collecting valuable resources in landfill disposal sites.

However, with the progress of urbanization, citizens became no longer able to separate waste such as leftover food from other waste at home. At the same time, practically no laws or regulations or systems had been put in place to encourage recycling, reuse, or the reduction of waste. For that reason, out of the solid waste, although 30% - 50% of it could be recycled, by the end of the 1990s less than 10% of it was being collected separately and recycled.

Under the circumstances, it was appeared that there were some local governments that used financing from the Environmental Fund to furnish or maintain sanitary landfill disposal sites for solid waste, and making efforts to promote community-based recycling programs. Out of 22 cities that carried out subprojects, 12 had communities that had been conducting activities pertaining to urban hygiene or waste management prior to project implementation. In another ten cities, the local communities initiated such activities either during or after project implementation. Among these, from 2001 - 2002 and again in 2003, JBIC implemented Special Assistance for Project Implementation in the cities of Si Sa Ket and Pattani with the aim of improving recycling activities and involvement of resident participation. Those two cities had, respectively, ten and five active groups, which is more than other local governments. And in Si Sa Ket city, by separating and composting waste a decrease of 0.7 tons and 29 tons respectively were achieved in landfill deposits for the year of 2005. Comparing these amounts with the total amount of waste disposal by the entire city, it is no more than 0.2%. However, if one includes the reductions due to the composting of felled trees or the use of construction material as cover soil, the annual reduction comes to 1,112 tons par year, or 6% of the landfill disposal volume.[12]

Through the accumulation of community-based activities in cities as aforementioned, the recycling rate, which was targeted to surpass 15% by 2006 according to the 1997 - 2001 National Solid Waste Management Plan, actually came to 19% (ONEP 2005).

However, the fact that these community based recycling activities thrived is not solely due to the fact that they received Special Assistance for Project Implementation by JBIC. Even in cities where JBIC did not provide the said assistance, the collecting and recycling of valuable resources was promoted through “garbage banks” established by communities and schools, and in some places, collecting wastes such as food leftover and effective microorganism activation were proactively conducted.[13] For example, Kohn Kaen city and Warin Chumrab city started to carry out various activities with technical support from Denmark.[14]

On the other hand, as in the case of Pattaya, it was also appeared that local governments that have made essentially no effort to promote recycling or the separation of waste in communities or

[12] Based on an interview of the deputy major of Si Sa Ket conducted by the evaluator on March 22, 2006.

[13] "Garbage banks" serve as collection bases or pseudo-banks for valuable resources established by schools and communities. They buy valuable resources gathered from homes and sell them to collectors so as to obtain funds. While accumulating those revenues, they provide funding for activities needed by the community or school. In addition, effective microorganisms are generated by conducting biodegradation on food waste and plants. They are said to have the effect of promoting the growth of plants by acting as a kind of organic liquid fertilizer.

[14] In addition, Phitsanulok city and Rampoon city, a German technical cooperation company named Gesellschaft für Technische Zusammenarbeit (GTZ) provided technical support for the establishment of "garbage banks," and has been supporting community based recycling activities.

commercial facilities. Moreover, even in the case of "garbage banks" established on the initiative of the community, in cases where the purpose is to expand business in the community and not to reduce the volume of waste or conduct recycling per se, if the market value of the valuable resources should fall it becomes economically difficult to sustain their activity.

2.4.5 Promotion of local government project formation and operation/management capabilities by the Office of Environmental Policy and Planning

In 1997, the Office of Environmental Policy and Planning drafted a manual entitled *Pre-Appraisal Guideline Manual for Solid Waste Management Projects: General and Technical Pre-Appraisal* to help with ex-ante evaluations of Environmental Fund-based subprojects. The Office also drafted a manual called the *Solid Waste and Nightsoil Management Manual* for the benefit of local governments. In addition, in 2000 the Pollution Control Department published the *Manual for Solid Waste Management* and a second edition of the *Regulation and Guideline of Municipal Solid Waste Management* for local governments (JBIC 2002). Then, the Office of the Environmental Fund, targeting employees of local governments for whom the funds had been provided, carried out the training programs for the construction of sanitary landfill disposal sites for solid waste and for the operation and maintenance of heavy machinery. Further, operation and maintenance manuals were produced for individual subprojects and distributed to local governments.

Unfortunately, the technical assistance described above did not necessarily succeed in strengthening the capacity of local governments to form projects or conduct operation and maintenance. Accordingly, from 2002 - 2003 JBIC implemented Special Assistance for Project Implementation, and provided technical assistance to improve existing projects or help form new wastewater treatment and solid waste management projects. In the process, picking out six of the projects as concrete examples, they conducted seminars to edify local government employees in the field or central government employees in the Office of the Environmental Fund or Pollution Control Department.

Even so, because of the way facilities had been furnished in the past, the Ministry of Interior continued to have the responsibility of conducting training for employees of local governments regarding the wastewater treatment and solid waste disposal. For example, in the case where the Environment Research and Training Center under the Department of Environmental Quality Promotion conducted training for employees of local governments regarding wastewater treatment and solid waste disposal, they were obliged to obtain permission from the Ministry of Interior, and there was not much flexibility in accommodating the needs of local governments.[15]

2.5 Sustainability

2.5.1 Revolving fund status

[15] This statement was made by an employee of the Office of Environmental Fund during the Environmental Fund Support Projects feedback seminar in Thai (held October 2, 2006).

Given the sequence as described in Section 2.1.2, all funding provided to the Environmental Fund in this project and then provided to local governments was in the form of government grant. Since the local governments did not have to return the money to the Environmental Fund, this fund did not have the function as revolving fund.

2.5.2 Executing agency

(1) Technical capacity and structure

In order to conduct a study on technical considerations for projects for which applications had been made, the Office of the Environmental Fund established a subcommittee for technical considerations for projects on construction of wastewater treatment, solid waste disposal, and air pollution treatment under the Environmental Fund Committee. They then drafted a pre-appraisal manual, and while obtaining support from consultants, conducted an ex-ante evaluation. They submitted the results of that evaluation to the Environmental Fund Committee and provided information by which to make a decision on approvals. In addition, while strengthening the monitoring and ex-post evaluation processes, they evaluated project progress and environmental improvement effects, and took steps to minimize delays.

Despite these measures, some projects were observed to have negative influences on the surrounding environment owing to poor design or improper operation following the startup. Accordingly, JBIC undertook Special Assistance for Project Implementation targeting the Office of the Environmental Fund and local governments, and conducted technical transfers regarding the proper design and operation and maintenance of projects.

(2) Financial status

Expenditures from the Environmental Fund increased rapidly in 1997 outwards, and by fiscal year 2002 they had reached 8.964 billion baht.[16] Meanwhile, revenue by fiscal year 2002 had reached 12.825 billion baht in total, which consists of 6.25 billion baht from the oil fund and government budget, 4.23 billion baht from interest receipts, 2.236 billion baht in contributions from JBIC, and 109 million baht in repayment of loans. As a result, the fiscal 2002 year-end balance was 3.861 billion baht (Table 8).

In the Short-Term Environmental Fund Management Guidelines established in 2001, the burden rate to be covered by local governments was raised from 10% to 30%-35%. If this were realized, it was expected that the total project costs which could be supported through the fund would increase. As steps to prevent the fund balance from reaching zero, the government would contribute financial support for the fund beforehand.[17]

For this reason, it is felt that the government budget will safeguard the financial sustainability of the fund.

[16] This figure includes 1.649 billion baht expenditure for the Samut Prakan wastewater treatment project.

[17] This statement was made by an employee of Office of the Environmental Fund during the feedback seminar of the Thai Environmental Fund Support Projects (held October 2, 2006).

Table 8: Financial Status of the Environmental Fund, 1992-2002 (100 million baht)

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total 1992-2002
Revenue												
Oil Fund	45.00											45.00
Budget for Environmental Development and Quality of Life	5.00											5.00
Government Subsidy		5.00	5.00	2.50								12.50
Interest from bank account	0.29	3.65	3.99	6.76	7.74	6.81	7.59	3.27	1.43	0.46	0.32	42.30
Repayment from sub-projects			0.02	0.09	0.04	0.04	0.02	0.62	0.10	0.05	0.10	1.09
JBIC						0.25	7.65	0.76	2.78	5.72	5.19	22.36
Total	50.29	8.65	9.01	9.34	7.78	7.10	15.27	4.66	4.32	6.23	5.61	128.25
Expenditure												
Subsidy for the construction and maintenance of pollution control system	0.15	0.05	4.73	0.03	2.77	2.89	29.54	9.05	11.43	10.62	6.16	77.41
Subsidy for the enhancement and conservation of environment and quality of life		0.40	0.03	0.30	0.74	6.46	1.37	0.57	0.62	0.55	0.62	11.65
Environmental Fund management		0.01	0.00	0.01	0.02	0.03	0.10	0.04	0.07	0.08	0.05	0.42
Difference of exchange rate						0.03		0.02	0.04			0.09
Fee payment to IFCT Fund manager								0.01	0.01	0.02	0.02	0.07
Total	0.15	0.46	4.76	0.33	3.53	9.41	31.01	9.69	12.18	11.27	6.85	89.64
Balance	50.13	8.18	4.25	9.01	4.25	-2.31	-15.74	-5.03	-7.86	-5.04	-1.24	38.61

Source: SAPI Team for Japan Bank for International Cooperation (2003) and Office of Environmental Fund.

2.5.3 Local governments

(1) Structure, technical capacity

The cities of Huakhwang and Tarae, which undertook wastewater treatment projects, employed a sanitary scientist who would be able to monitor the water quality from its wastewater treatment plant. However, the number of employees in charge of the wastewater treatment was small (four in Huakhwang and three in Tarae). Moreover, there were basically no employees capable of conducting operation and management of the wastewater treatment plant. To compensate for the lack of personnel, these local governments contracted WoMC, Wastewater Operation and Management Company. Simply signing a contract, however, did not necessarily mean that the local governments could properly conduct operation and maintenance after completion of the contract. In addition, even the Office of Environmental Policy and Planning did not necessarily think to have the local governments develop operation and maintenance capabilities, and instead felt that it would be sufficient to entrust the required work to a company with the technical capability. However, one must remember that it is possible that the subcontracting fees would swell in cases where local governments had neither proper pricing information nor sufficient technical knowledge pertaining

to the work consigned.

Local governments that conducted solid waste disposal projects, the number and capabilities of those in charge varied considerably. In the cities of Pattaya and Kohn Kaen, the number of employees in charge of waste disposal were, respectively, a relatively high as 82 and 93, and they also employed sanitary scientists and engineers with detailed understanding of seepage water management and sanitary landfill methods. But because the private companies contracted to collect and manage the waste did not have the required technical knowledge regarding proper disposal methods, it was not possible to implement proper disposal. In addition, many of the other local governments did not have many employees for that work in the first place, and even after new landfill disposal sites were built the number of employees did not increase substantially. For that reason, it was not possible to secure the number of employees required to properly manage disposal in the field. Moreover, most of the employees were either drivers or collectors, they were not hiring employees who have the knowledge regarding sanitary landfill methods or water seepage management.[18] This situation, along with the insufficient expenditure on the part of local governments for waste disposal, made it difficult for local governments to properly handle soil coverage and water seepage or promptly respond to the damage or design errors of seepage water collection facilities.

The Office of the Environmental Fund provided training on how to use heavy machinery and build solid waste disposal sites for employees of local governments that had conducted subprojects. However, this training did not exactly cause local governments to independently set up systems to improve the methods and technique used for waste disposal and to accumulate such technical knowledge. As a result, residents near disposal sites were dissatisfied and suspicious of local governments, and there should be concern that sustainable operation of existing sites and the construction of new sites would be more difficult in the future.

(2) Financial status

Since the establishment of the decentralization policy and procedural regulations in 1999, the amount of general grants that local governments received from the central government has increased. Despite the increase, however, the grant amounts did not reach the target levels set in 1999, and by 2006, the amount of national government spending accounted for by local government expenditure did not reach the target level of 30% or more. Moreover, given that the local governments still have few financial resources of their own, as in the past they have been relying heavily on transfers of finances from the central government for their government spending. This hints at the possibility that, despite a continuing decentralization of power, the local governments do not have the economic resources to shoulder not only land acquisition costs but also project

[18] According to Poona (2001), less than 2% of those employed at Tambon municipalities are university graduates, and most Tambon employees consist of a limited number of low-skilled technicians and grade-school educated employees. For that reason, employees transferred to the countryside from the central government worry about their welfare and lost opportunities for promotion, and as a result, the transfer program, which began in October 2002, is not going smoothly (Ampa 2002).

investment costs. In addition, because regulations on financial management have not been strengthened, in Tambon municipalities, which are newly established and small-scale, it was frequently found out that there was improper and inefficient funds usage (Hashimoto 1999). This suggests that even if their economic resources were to be bolstered, there is no guarantee that the extra resources would be put to furnishing or maintaining wastewater treatment or waste disposal facilities.

Regarding the investment expenses for trucks, the construction of transfer points, and the collection of solid waste, thanks to progress in the introduction of collection fees, a certain portion of expenses can be covered by using revenues from the fees. For instance, fee collections cover all expenses in Si Sa ket city, 80% of expenses in Klang city, and 68% in Nakhon Panom city. The average for the 22 local governments conducting subprojects is covered by 32% of collection costs and approx. 19% of yearly expenditure. Costs that cannot be covered through fee revenues are covered by the local government's own income.

As the progress of the cluster policy, when collecting solid waste taken from other local governments or private companies, more local governments are charging fees in accordance with the weight collected. As a result, there are now some local governments which can cover a portion of the construction costs for landfill disposal sites, though this does not mean that all local governments are obtaining sufficient funds to build new sites or operate and manage them correctly. Among local governments, it was found out that their budget shortfalls lead to an inability to secure enough soil to cover landfill disposal or sufficient employees and supervisors for the disposal sites, with the result that the sites are not properly managed and secured the environmental hygiene in surrounding areas.

In both of the local governments that conducted wastewater treatment projects, fee systems have not been introduced.[19] Until 2005, the entrusted wastewater operations and management company had been liable to all of the expenses regarding operations and management, but starting in 2006, the burden share of local governments will have to be increased, and by 2009 and thereafter, they are supposed to bear all of the said expenses. Both cities need to book 4.2% of their current revenue as additional wastewater treatment expenses.

3. Feedback

3.1 Lessons Learned

(1) Regarding the Environmental Fund Support projects, there was a certain logic in strengthening the environmental policies of the Thai government by backing decentralized environmental

[19] By way of background, it has been pointed out that wastewater treatment fee systems are not advancing well through the whole of Thailand. What made it possible to genuinely introduce a wastewater treatment fee system was the enactment of decentralization program in 1999 with accompanying procedural regulations. At the time of the evaluation, systems have been limited to tourist areas or major cities with serious water pollution such as Pathon city in Phuket Province, Seansuk city in Chonburi province, Pattaya city, Bangkok, and Hat Yai city.

management as promoted in the Enhancement and Conservation of National Environmental Quality Act of 1992, and in providing generous funding to environmental improvement in regions designated as pollution control areas. However, prior to 1999, when laws to promote decentralization were enacted, local governments had neither the authority nor responsibility to undertake environmental conservation, and tended to depend on the Ministry of Interior. Under such circumstances, it was extremely difficult to implement decentralized environmental management effectively by having local governments form environmental projects of their own accord and submit the proposal of the said project to the central government. At the same time, most of the environmental conservation projects conducted in areas designated as pollution control areas were already being implemented under the budgets of the Public Works Department or Pollution Control Department. Further, the Ministry of Science, Technology and Environment had not completed a development plan for wastewater treatment or solid waste disposal facilities for areas outside of those designated as pollution control areas. In view of these facts, when conducting decentralized environmental conservation projects such as this project, besides changing the system by enacting laws to promote the projects in question or by establishing relevant organizations, the project should be implemented by confirming and probing the issue of whether or not the local governments acting as executing agencies have legal responsibility for the environmental conservation, and by having development plans set up and capabilities strengthened on a national level by the presiding bureaus.

(2) From the standpoint of drawing out independence on the part of local governments, it is objectively reasonable to set up a framework whereby the Environmental Fund Support Project provides funding in the form of loans so those governments can carry out environmental conservation activities. However, before the increase in fund transfers to local governments based on the 1999 policy to promote decentralization, because local governments were economically frail, even if they received funding in the form of loans, there seemed to be no prospect for repayment. Moreover, even after the enactment of the Enhancement and Conservation of National Environmental Quality Act of 1992, by continuing to secure subsidies, the Public Works Department has essentially been able to maintain wastewater treatment and solid waste disposal projects using its own budget. Taking these facts into account, when implementing environment conservation projects with utilizing Two Step Loan scheme, one should analyze competing sources of subsidies prepared by other relevant government organizations. If the project continues to compete with other subsidies, the targets, purposes, and conditions for each subsidy should be at least clarified and make adjustment between the project and competing subsides to even out the level of burden shouldered by local governments.

(3) In this project, not only large-scale projects like the Samut Prakan wastewater treatment project but also urban solid waste disposal projects were implemented, and it is consistent with the purpose of this project as providing funds to large numbers of small-scale environmental projects. In addition, this project provided an opportunity to strengthen the project formation and design

capabilities of many local governments. Moreover, considering the situation when the Office of Environmental Policy and Planning had just been established, it was appropriate that the Environmental Fund Support Project include technical support to strengthen the capabilities of the Office of Environmental Policy and Planning, and that JBIC appraisal all of the wastewater treatment projects and some of the initial solid waste disposal projects so as to strengthen the appraisal capabilities of the Office of Environmental Policy and Planning. However, in fact, there was a delay in the provision of technical support by JBIC and it was only after 1998 that the Thai government independently established technical standards and guidelines and set up a framework to disseminate them to local governments. Considering these facts, whenever projects implementation includes a technical support component, it is required to make sure that the technical support is provided in a timely manner.

(4) By virtue of the fact that fund distributions from the Environmental Fund were not limited to pollution control areas, it was no longer possible to select subprojects with an eye to cost efficiency, namely, the degree to which environmental burdens are reduced as a function of funding amounts provided. Moreover, alternative funding distribution principles to replace cost effectiveness were not established and also the appraisal process was not necessarily transparent. For that reason, there was no other choice but to distribute funds by investigating cases individually in the order in which the applications were received. In addition local governments did not necessarily design projects taking cost efficiency into consideration. In this regards, when implementing environmental conservation projects with utilizing Two Step Loan scheme, environmental efficiency (the degree to which the environmental burdens are reduced as a function of funding amounts provided) should be considered and included as criteria of appraisal for subprojects.

3.2 Recommendations

(1) In order to increase applications by local governments and to prevent the distribution of funds for inappropriate projects, it is essential to increase fund disbursement transparency and accountability, in addition to consistency with other aid programs. In that sense, it is necessary to establish principles by which subprojects are selected. Cost-effectiveness is a possible candidate for those principles. When the process for subprojects selection and the criteria of the said selection would be established, it should be advisable that the mechanism should be strengthened wherein experts and authorized people from environment NGOs would participate and make suggestions. It would contribute to selection of more cost-effective subprojects, and at the same time heightening the transparency and relevance of the subproject selection process.

(2) Even if subprojects are funded through the Environmental Fund, if the design is inappropriate, both the natural and social environment will be adversely affected. Through cooperation between aid organizations and recipient countries, it is critical to implement an environmental impact assessment through a pre-publicized resident-participation process and, based on that, to make

changes to the designs or take steps to alleviate the adverse impact.

(3) Including recycling activities, separation of waste, and the reduction of wastewater and solid disposal as a component in Environmental Fund subprojects should heighten subproject cost-effectiveness, reduce the environmental burden, and heighten awareness of wastewater and waste generators' responsibility. It would be desirable to prescribe them as preconditions for the disbursement of funds from the Environmental Fund.

(4) As projects that can be implemented by the Environmental Fund are only a fraction of the environmental conservation projects nationwide, it would be desirable to manage and implement continuous programs that transfer capabilities to other local governments. To this end, among the government agencies in recipient country, it is essential that there be institutions that can disseminate their expertise. It is strongly hoped that steps will be taken to strengthen cooperation and unity among the central government's various bureaus.

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Comparison of Original and Actual Scope

Item	Plan (Following Subproject Recomposition)	Actual
(1) Outputs 1) Financial allowances for environmental management projects	・Construction of urban wastewater treatment plants (3 cases) ・Treatment capacity: 528,554m^3/day ・Construction of sanitary landfill waste disposal sites (22 cases) Capacity: 6,194,629m^3	・Construction of urban wastewater treatment plants (2 cases) Treatment capacity: 2,300m^3/day ・Construction of sanitary landfill waste disposal sites (22 cases) Capacity: 5,959,011m^3
2) Consulting service	Suggestions pertaining to lending procedures and operation Support for loan supervision Support to supervise execution Aid for technical appraisal Liaison and coordination between the OECF and the executing agency Support for dissemination of Environment Fund Technical advice	・SAPI Team for Overseas Economic Cooperation Fund, Japan, 1995 ・SAPI Team for Japan Bank for International Cooperation, 2002 ・SAPI Team for Japan Bank for International Cooperation, 2003
(2) Project Period Signing of loan agreement Selection of consultants Consulting services Loan Disbursement	 September 1993 September 1993-August 1997	 September 1993 September 1993-January 2003
(3) Project Cost Foreign currency Local currency Total Yen Loan Portion	 11.2 billion yen 3.886 billion yen 15.086 billion yen 11.2 billion yen	 2.971 billion yen (approx. 1.0 billion baht) 0.346 billion baht 1.346 billion baht 2.971 billion yen