

Freshwater Resources Management Project

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1. Outline of Project

1.1. Background/Objectives

In Asian Countries, continuous growth in population and economic development is predicted to exert more pressure on water resources. Furthermore, these finite resources will also face difficulties in terms of their quantity and quality. For sustainable development in the Asian region, water resources are essential and their conservation is one of the most urgent issues in this region. Considering the importance of water resource issues, IGES has officially launched the activities of the Freshwater Resources Management Project (FW) from the Third Phase. In the light of current issues pertaining to water resources in Asia, and looking at existing IGES research projects with their comparative advantages, FW set the following specific goals for research activities towards more sustainable development of water resources and management policy .

GOAL 1: To propose integrated policy designs for sustainable water resource management in urban and peri-urban areas in Asia with consideration given to the current socio-economic status and predicted changes during the next ten years.

GOAL 2: To develop knowledge platforms (databases) to support policy-making and implementation.

The activities of FW are made up two components: (1) work on “Research on Sustainable Water Management Policy (SWMP)”! and (2) a knowledge platform development programme entitled “Water Environment Partnership in Asia (WEPA)”. In principle, SWMP serves the first goal outlined above and WEPA serves the second. The interaction between SWMP and WEPA promotes effectiveness and efficiency in FW research activities – for example, research findings of SWMP can be added to the WEPA database, and information collected under WEPA can be used by SWMP.

a. SWMP

Urban and peri-urban areas in Asia are often suffering from serious water issues that need to be urgently solved such as increase in water use and degradation of water quality. Considering that finding solutions to such water management is key to the sustainable water use in the region, FW decided that our final goal would be to propose integrated policy designs for sustainable water resources management to policy makers in the water sector with consideration of the current socio-economic status and changes to this status in the next decade. FW primarily focused on groundwater use in urban areas and investigates the issues and challenges of overall water resource management from the view of groundwater use because of the following reasons:

- Groundwater plays a central role in different water resources in all stages of economic development because it can be easily developed and its quality is stable;
- Groundwater related issues such as a lowering water table, land subsidence, and seawater intrusion have been already observed in urban areas in Asia as the result of excessive exploitation;

- Precautionary measures against groundwater problems are needed because groundwater problems are often irreversible or require vast amounts of money and time to remedy.
- Information on groundwater resources and their management in Asia cannot be obtained easily or comprehensively. Not many international organisations deal with groundwater management policy issues and therefore it is worth IGES addressing the research topics.

The main expected outputs of the research were as follows;

- (i) Using case studies, identify the current situation and deficiencies in groundwater use and locate other water resources that could be used as an alternative to groundwater in urban and peri-urban areas.
- (ii) Policy options for improvement of water resource management in each case study city.
- (iii) Situational analysis of the current situation and deficiencies in water resource management in each case study city and proposals on policy recommendations for sustainable water management based on the analysis.

b. WEPA

The Water Environment Partnership in Asia (WEPA) programme is an initiative proposed by the Japanese Ministry of the Environment (MOEJ) at the 3rd World Water Forum that was held in Kyoto, 2003. WEPA aims to strengthen governance and capacity-building of water management in the Asian monsoon region. The project consist of two parts: (i) the development of an information platform for water environment conservation that consists of four databases (policy-related information, activities by NGOs and CBOs, technologies for water environment conservation, and information sources); and (ii) capacity-building in the field of water environment through the activities under WEPA. Commissioned by the MOEJ, FW takes a leading role in the implementation of the programme as the WEPA secretariat. WEPA is a five-year project operating from FY2004 to FY2008.

The primary targets of the WEPA project are national policy-makers in the Asian monsoon region and experts supporting policy implementation in their respective countries. However, the databases are open to all stakeholders in the region, including civil society and NGOs. WEPA has been conducted in partnership with 10 countries in Asia - Cambodia, China, Indonesia, Lao PDR, Malaysia, Myanmar, the Philippines, the Republic of Korea, Thailand and Viet Nam. The focal points for each partner country are as follows:

- Cambodia: Ministry of the Environment;
- China: Pollution Control Department, State Environment Protection Administration (SEPA);
- Indonesia: Ministry of the Environment;
- Lao PDR: Water Resources Co-ordination Committee;
- Malaysia: National Hydraulics Research Institute;
- Myanmar: Irrigation Department, Ministry of Agriculture and Irrigation;
- Philippines: Environmental management Bureau, Department of Environment and Natural Resources;
- The Republic of Korea: National Institute of Environmental Research, Ministry of the Environment;
- Thailand: Pollution Control Department, Ministry of Natural Resources and The Environment;

- Viet Nam: Institute of Environmental Technology, Vietnamese Academy of Science and Technology

1.2. Methodology

a. SWMP

Using case studies, the research intended to analyse the current situation of and provide recommendations for water management with the main focus on groundwater in urban and peri-urban areas in Asia. Four cities were selected as the case study cities for SWMP, namely, Tianjin (China), Bandung (Indonesia), Bangkok (Thailand), and Ho Chi Minh City (Viet Nam). FW selected these cities as the case studies because groundwater-related problems had emerged there and also because FW had identified appropriate local research partners. In addition to those cities, FW studied two reference cases: one was water management in Osaka and Tokyo which provided precedents for groundwater management in relation to land subsidence control; and another was water management in Colombo and Kandy (Sri Lanka) which have different geological characteristics from the other case study cities. Not only case analysis of each city, but also situation analysis of these cities was conducted. In data collection and analysis for the case study, FW worked closely with the following research partners in their respective countries.

Tianjin (China): Institute of Environmental Science and Engineering, Nankai University;

Bandung (Indonesia): West Java Environmental Protection Agency;

Bangkok (Thailand): Asian Institute of Technologies;

Ho Chi Minh City (Viet Nam): Ho Chi Minh City University of Technology;

Colombo and Kandy (Sri Lanka): the University of Peradeniya

In order to promote the research more effectively, FW organised periodical research meetings where research partners got together to share information and discuss the research findings. FW researchers visited case study cities for individual consultation with each research partner and participated in stakeholder meetings.

In FY 2004 and 2005, FW focused on groundwater management. In FY 2006, FW studied other water resources that were identified in each case study city as an important water source that could take the place of groundwater (see below) and examined overall the water management in the case study cities.

Tianjin: Use of reclaimed water, especially for agricultural use

Bangkok: Industrial use of piped water, which comes from surface water

Bandung: Surface water availability and possibility of recycling of industrial waste water

Ho Chi Minh City: Surface water use

The flow of SWMP research is shown in Figure 1. First, data and relevant information on the specific research topics were collected and then deficiencies in management were identified. After doing comparative analysis of the collected facts and identifying deficiencies in current management, general and specific policy recommendations were formulated and the validity of the draft was discussed in the stakeholder meetings. Finally, policy recommendations were further developed incorporating the comments from the stakeholders and research partners, and were then finalised. Table 1 shows the meeting and field surveys conducted under SWMP.

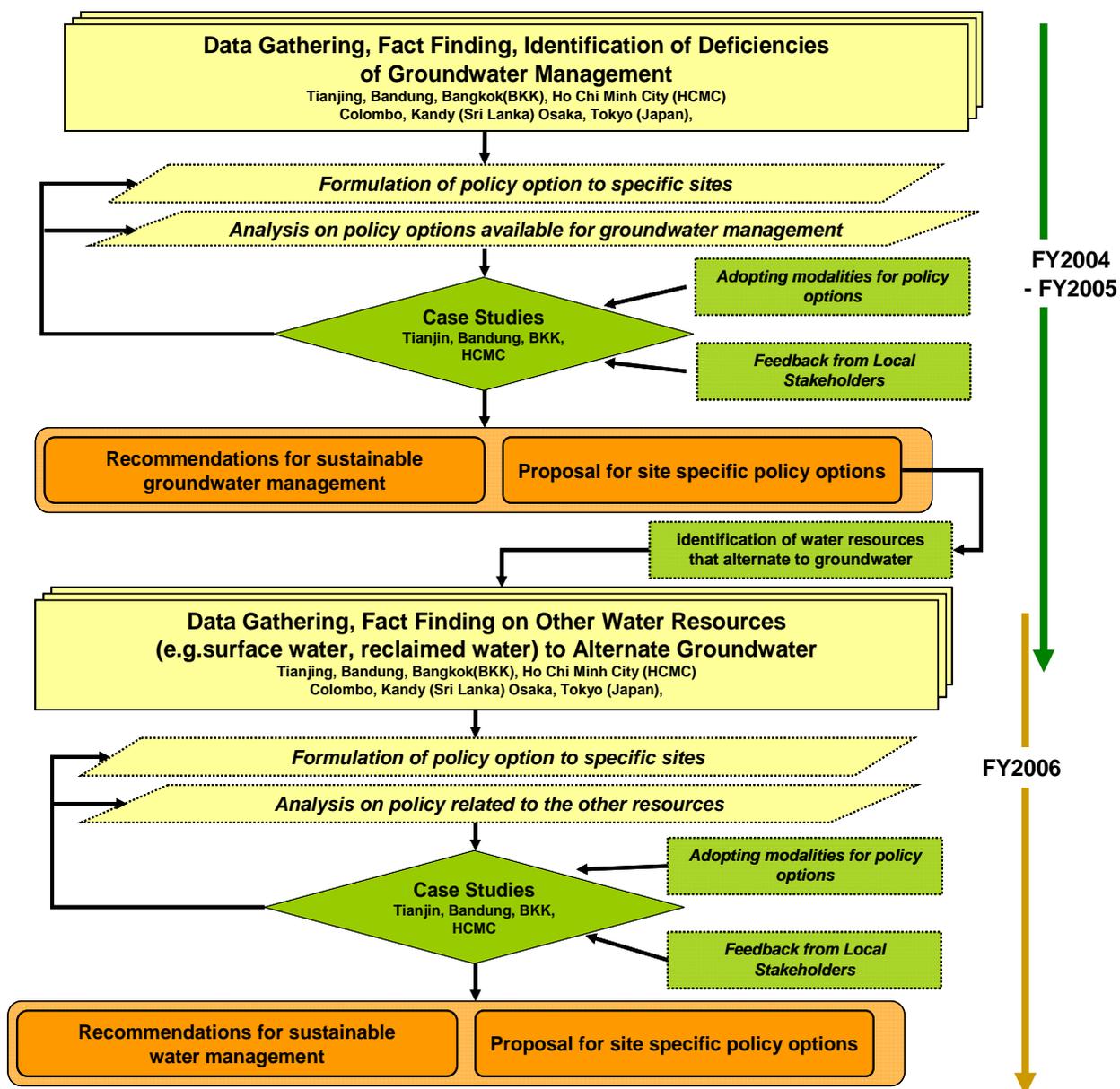


Figure 1. Flow of SWMP

Table 1. Meeting and Field Survey for SWMP

FY	Name of Meeting/ Place of Field Survey	Date	Place	Agenda/Activity
2004	FW Inception Workshop (SMWP 1 st Research Meeting)	12-June 2004	Hayama	① Discussion of framework of collaboration with research partners
	Field Survey (Bangkok, Bandung, Ho Chi Minh City)	July 2004	Bangkok, Bandung, Ho Chi Minh City	① Individual consultation with research partner, interviews with institutions which are responsible for groundwater and environmental protection

	Field Survey(Tianjin)	Sept. 2004	Tianjin	Ⓒ Individual consultation with research partner, interviews with institutions which are responsible for groundwater and environmental protection, site-visiting of water resource/ groundwater facilities
	SWMP 2 nd Research Meeting	31 Jan. to 2 Feb. 2005	Bandung	Ⓒ Report on progress of each case study, discussion on storyline for the research including methodology of each case study Ⓒ Holding stakeholder meeting on groundwater management policy in Bandung
2005	Field Survey (Sri Lanka)	April to May 2005	Kandy, Colombo	Ⓒ Individual consultation with research partner, interviews with institutions which are responsible for groundwater and environmental protection, site-visiting of water resource/ groundwater facilities, data collection
	Field Survey (Ho Chi Minh City, Bangkok, Bandung)	July to August 2005	Ho Chi Minh City, Bangkok, Bandung	Ⓒ Individual consultation with research partner, interviews with institutions which are responsible for groundwater and environmental protection, site-visiting of water resource/ groundwater facilities, data collection
	Bangkok Stakeholder Meeting	26 July 2005	Bangkok	Ⓒ Information sharing on research findings of SWMP with stakeholders local policy makers Ⓒ Exchange of opinions on local policy on groundwater management
	Bandung Stakeholder Meeting	25 August 2005	Bandung	
	Tianjin Stakeholder Meeting	10 September 2005	Tianjin,	
	Bandung Legislator Meeting	26 September 2005	Bandung,	
	Ho Chi Minh City Stakeholder Meeting	28 September 2005	Ho Chi Minh City	
	Field Survey (Sri Lanka)	September 2005	Kandy, Colombo	
	SWMP 3 rd Research Meeting	20 to 21 October 2005	Tianjin	

2006	Stakeholder Meeting (Bangkok)	April 2006	Bangkok	⑤ Information sharing on research findings of SWMP with stakeholders local policy makers, exchange of opinions on local policy on groundwater management, data collection
	SWMP 4 th Research Meeting	15 to 16 May 2006	Hayama	⑤ Discussion on storyline for final outputs of each case study
	SWMP 5 th Research Meeting	27 to 28 November 2006	Ho Chi Minh City	⑤ Report on progress of each case study, discussion on storyline for the research including methodology of each case study ⑤ Holding stakeholder meeting on groundwater management policy in HCMC
	Water Recycling Meeting in Bandung	11 January 2007	Bandung	⑤ Sharing the experience of water recycling practices among industries in Bandung ⑤ Survey on the perception of industries for the water recycling
	Tianjin Stakeholder Meeting	24 January 2007	Tianjin	⑤ Sharing the research findings and recommendations of the case study in Tianjin with local policy makers
	Bandung Stakeholder Meeting	24 January 2007	Bandung	⑤ Sharing the research findings and recommendations of the case study in Bandung with relevant local stakeholders.
	Ho Chi Minh City Stakeholder Meeting	26 January 2007	Ho Chi Minh City	
	Sri Lanaka Stakeholder Meeting	15 February 2007	Negambo	
	Bangkok Stakeholder Meeting	20 February 2007	Bangkok	
	SWMP Final (6 th) Research Meeting)	19 to 20 March 2007	Bangkok	⑤ Report of the SWMP study findings; Elaboration of by draft recommendations among not only research partners but also invited policy makers in respective case study cities.

b. Water Environment Partnership in Asia (WEPA)

(1) Implementation action planning by advisory committee

Under the instructions of MOEJ, implementation of WEPA programme followed advice from the advisory committee of WEPA, composed of Japanese water experts (Chair: Dr. Mitsumasa Okada, Executive Vice-President of Hiroshima University).

(2) International Workshop for WEPA

The international workshop, with the participation of representatives from focal points in partner countries and members of the advisory committee, was held once a year to promote WEPA to

consolidate partnerships among partner countries. The participants discussed the progress of the programme, sharing information on water environment governance and administrative issues relating to water environment management,

(3) Visiting partner countries

FW members visited partner countries and conducted hearings with relevant persons engaged in water environment management, including those from focal points, to collect information necessary for database content development and to carry out consultations on the methods of data collection.

(4) Development of the contents for the database

(4-1) The database on policy-related information, the database on activities by NGOs and CBOs

(i) Development of contents by individual partner countries

In principle, the collection and arrangement of contents for the WEPA database were conducted by focal points from respective partner countries with the cooperation of MOEJ and FW. FW provided necessary budgetary assistances to several partner countries. In addition, FW staff visited partner countries (Viet Nam, Cambodia, Lao PDR, Thailand, Indonesia, Myanmar) for individual consultation about the process of and concerns over data collection. In addition, MOEJ and IGES organised meetings specifically for the policy-related information database and for technology information. The meetings were attended by those in charge of data collection, and participants discussed how to develop the databases and also how to improve the contents.

(ii) Collecting relevant information at symposiums and forums

IGES held the Symposium on Community Activities for the Conservation of Water Environment in Bangkok, Thailand as a side event of the 4th International Symposium on the Southeast Asian Water Environment, organised by the Research Centre for Water Environment Technology, School of Engineering, the University of Tokyo, among others. The symposium aimed to further the extensive data collection for the WEPA database from relevant water experts and also to promote the wider dissemination of activities of the WEPA programme. FW also organised an international forum, "Environmental Governance in Asia", in Bangkok, Thailand in March 2007 for the same purpose. We invited representatives of good practices related to the topics of the WEPA database contents and selected practices were presented and shared at the meeting. The information of the presented practices were included in the WEPA database.

(iii) Public participation for information collection

FW sought information on water environmental management from Japan and other partner countries through the web-site. Some of this information was included in the WEPA database. Information (practices) useful for partner countries was shared among wider audiences at the forum and symposium mentioned above.

(4-2) Development of the database on technologies for water environmental conservation

IGES outsourced the data collection for the database on technologies for water environmental conservation for FY2004 and FY2005 to the Overseas Environmental Cooperation Center (OECC) in Japan, and OECC conducted the data collection according to the following methods:

- FY 2004: conducted data collection for cases of wastewater treatment plants in Japan and Thailand in cooperation with experts from Thailand and Japan.
- FY 2005: organised working meetings for technology information (in Tokyo in June, and Bangkok in December), and collected cases of technical application of wastewater treatment from other partner countries.

In FY2006, examples of simple methods of wastewater treatment and monitoring technology were presented at a session at the international forum "Water Environmental Governance in Asia" mentioned in 4-(1)(ii), and the essence of the presentation was organised in the WEPA database.

(5) Maintenance of the Database

IGES conducted other relevant work, such as the development of the structure of the database, and the maintenance of the web server for the database. Meanwhile, IGES outsourced the arrangement of information for the development of database and contents related to the technology database.

Table 2. Meetings related to WEPA project

Meeting	Date	Place	Main Agenda
The 1 st Working Meeting for policy-related Information Database (WEPA)	13-14 December 2004	Tokyo	<ul style="list-style-type: none"> ● introduction of the prototype of policy-related information database ● discussion for the improvement of contents for the database
The 1 st International Workshop	24-25 January 2005	Tokyo	<ul style="list-style-type: none"> ● contents and structure of the database on policy-related information ● Contents and structure of the database on activities by NGOs and communities. ● contents and structure of the database on technologies for water environmental conservation
The 1 st Working Group of WEPA Technical Information Database	16-17 January 2005	Tokyo	<ul style="list-style-type: none"> ● objectives and development of WEPA technologies for water environment conservation database
The 2 nd Working Meeting for policy-related information database (WEPA)	12-13 October 2005	Tokyo	<ul style="list-style-type: none"> ● report on the progress of the database development and discuss the contents for the improvement ● informal consultation meeting with individual partner countries
The 2 nd Working Group of WEPA Technical Information Database	8-9 December 2005	Bangkok	<ul style="list-style-type: none"> ● report the progress of the database development and discuss the contents for the improvement
International Symposium on Community Activities for the Conservation of Water Environment- Lessons Learned from Community Activities	8 December 2006	Bangkok	<ul style="list-style-type: none"> ● report on community activities for water environment conservation
International forum on Water Environmental Governance in Asia	14-15 March 2007	Bangkok	<ul style="list-style-type: none"> ● forum on sharing information for useful and innovative institutional arrangements/ endeavours, actions ,and technologies for promoting water environmental governance in the Asian monsoon region
The 2 nd International Workshop	16 March 2007	Bangkok	<ul style="list-style-type: none"> ● sharing the progress of WEPA project ● consultation of future activities

2. Outcome

2.1. SWMP

a. Analysis of the current situation and policy proposals on groundwater management

SWMP produced an interim report entitled “*Sustainable Groundwater Management in Asian Cities*” that included the findings of case studies (Tianjin, Bangkok, Bandung and Ho Chi Minh City), the analysis of groundwater management (in Colombo and Kandy in Sri Lanka, and in Osaka) and the recommendations for groundwater management in urban and peri-urban areas in Asia based on the research findings. The report pointed out with reference to actual data that groundwater tends to be excessively pumped in many case study cities and reported on problems associated with over-pumping such as lowering of the water table, land subsidence, and salt water intrusion. Groundwater quality degradation through inadequate sanitary management was also reported. Based on the analysis of case studies, the report also stated that the stage of socio-economic development and the pattern of groundwater use and emerging issues are correlated. The recommendations pointed out the importance of the inclusion of groundwater management elements, such as groundwater recharge, in urban development plans as well as the necessity of controlling groundwater extraction by agriculture. FW distributed the interim report at the 4th World Water Forum (WWF4) held in March 2006 and also presented it to stakeholders interested in water management at a session of WWF4 that IGES co-organised with UNESCO and other relevant organisations. On the occasion of WWF4, IGES Policy Brief No.4 “Rationalisation of Industrial Sector Water Use is the Key to Sound Groundwater Management” was also produced and distributed. The policy brief pointed out the fact that groundwater has contributed to industrial development in many case study cities but industrial groundwater use tends to be restricted to conservation of the resources and recommended that governments’ human and financial resources should be used to rationalise water use in the industrial sector rather than to develop new water resources as alternatives to groundwater in the industrial sector.

b. Preparation of policy recommendations on water resource management in urban areas, especially on groundwater resource

The final report of SMWP is planned for the end of June 2007, and includec analysis of alternative water resources for groundwater such as surface water or reclaimed water, and policy proposals for sustainable water resource in urban and peri-urban area based on the results of analysis of the current situation and policy proposals on groundwater management. Policy recommendations could include the “necessity of changing the demand-driven and ad-hoc approach of current water policies employed in many Asian countries to an approach where existing water resources are used more efficiently, such as promotion of reclaimed water use or water saving” and “strengthening of pollution controls and enhancement of water resource management in which the aspects of quantity and quality are more integrated, to address water quality degradation of both ground and surface water that become a factor to mitigate sustainable use of water resources”.

c. The outreach activities

FW actively participated in key international conferences and made presentations to disseminate SWMP research findings. We also prepared articles or publications, aiming to not only provide research findings of SWMP to different stakeholders but also to receive feedback from them. The main international conferences in which FW participated, and papers and publications prepared by

FW are shown below. The stakeholder meetings that FW conducted in the case study cities were also useful opportunities to disseminate the SWMP research outcomes to the local stakeholders.

[Conferences]

- (i) Poster Presentation at “The Second International Symposium on Southeast Asian Water Environment” (December 2004, Hanoi, Viet Nam)
- (ii) Oral Presentation on “Challenges in Groundwater Management and Available Policy Measures for a Sustainable Water Resource in Asia” at “The Second Southeast Asia Water Forum” organised by the Southeast Asia Global Partnership (August 2005, Bali, Indonesia)
- (iii) Oral Presentation on “Sustainable Groundwater Management in Asian Cities” at the “4th World Water Forum” (March 2006, Mexico City, Mexico)
- (iv) Oral Presentation on “Sustainable Groundwater Management” at the “International Conference on Management of Water, Wastewater and Environment: Challenges for the Developing Countries”(September 2006, Katmandu, Nepal)
- (v) Oral Presentation on “Sustainable Groundwater Resources Management in Asia – from case studies of 5 Asian cities” at “the First Policy Consultation Forum of the Seoul Initiative on Green Growth” organised by United Nations Economic and Social Commission for Asia and the Pacific (September 2006, Seoul, Korea)

[Article]

- (i) Yatsuka Kataoka, Towards Sustainable Groundwater Management in Asian Cities – Lessons from Osaka, *International Review for Environmental Strategies*, vol.6. no.2 2006
- (ii) Keishiro Hara, Groundwater Contamination and Quality Management Policy in Asia, *International Review for Environmental Strategies*, vol.6. no.2 2006

[Report]

- (i) *SWMP Interim Report “Sustainable Groundwater Management in Asian Cities”*, March 2006
IGES Policy Brief *“Rationalisation of Industrial Sector Water Use is the Key to Sound Groundwater Management”*, March 2006
- (ii) SWMP Final Report (document title to be decided), June 2007 (Scheduled)

2.2. WEPA

a. WEPA database

The main outcome of the WEPA project was the WEPA database (<http://www.wepa-db.net>) consisting of four databases- the database on policy-related information which includes policies and regulations for strengthen water environment governance, the database on activities by NGOs and CBOS which includes activities on water environment conservation done on a community-level, the database on technologies for water environment conservation which provides technical application for wastewater treatment, and the database on information sources which provides the link list for water environment management.



Figure 2. Top page :WEPA database

Table 3. Detail Information of WEPA data base

Database	Contents
Policy-related Information	<ul style="list-style-type: none"> Ⓢ!The present state of water environment in a participant country Ⓢ!An administrative structure for water environment (e.g. organisational chart, duties of each department) Ⓢ!Current policies and laws on water environment Ⓢ!Policy responses and underlying causes of water environmental problems Ⓢ!Cases of local-level activities Ⓢ!Frameworks and mechanisms to ensure effectiveness – law enforcement (e.g. environmental protection cost, water quality monitoring systems, capacity building)
Technologies for Water Environment Conservation	<p>Objects: domestic waste water treatment, wastewater treatment facility, e.g. factory</p> <ul style="list-style-type: none"> Ⓢ! Waste treatment facility identification Ⓢ! Facility overview(e.g. operating period, treatment process, process flow diagram, specification of reactors/equipment) Ⓢ! Facility operation status (daily amount of treated wastewater, annual electric consumption, annual amount of sludge generation,

	<ul style="list-style-type: none"> Ⓢ! Water Quality (inlet and effluent water quality) Ⓢ! Operation & Maintenance (chemical consumption, number of persons) Ⓢ! Other (capital cost, facility management body)
Activities by NGOs and Community Based Organisations (CBOs)	<ul style="list-style-type: none"> Ⓢ! Cases of activities for water environment conservation Ⓢ! Cases of policy for dissemination and enlightenment for water environment conservation
Information Sources	<ul style="list-style-type: none"> Ⓢ! Collection of links for information including water quality monitoring data and on policy and technology for water environment, is provided by various international/national organisations, NGOs and stakeholders.

b. Publicity activities for WEPA

(i) Outreach activities at international and other relevant meetings

Aiming at wider dissemination of the activities for the WEPA project, FW participated in international meetings and carried out publicity activities as follows:

- (i) The 12th United Nations Commission on Sustainable Development: CSD)↖ April 2004, New York, U.S.A↗
- (ii) World Water Week in Stockholm↖ August 2004, Stockholm ,Sweden↗
- (iii) The 13th United Nations Commission on Sustainable Development: CSD)↖ April 2005, New York, U.S.A↗
The WEPA project was introduced at the side event hosted by Government of Japan, “PWA’s! Challenge ‘Portfolio of Water Actions’ for Effective Monitoring from Various Perspectives for Achieving MDG”
- (iv) The Second Southeast Asia Water Forum↖ August 2005, Bali, Indonesia↗
- (v) The 4th World Water Forum↖ March 2006, Mexico City, Mexico↗
IGES co-organised the session “Water Accounting and Information Platforms”

(ii) Printed materials

FW created printed materials for the WEPA project and introduced an article and reports as follows:

[Article]

Kyoko Matsumoto, The WEPA Project: An Information Platform for the Water Environment in the Asian Monsoon Region, International Review for Environmental Strategies, vol.5. no.2 2006

[Report]

Oral Presentation Proceedings, International Symposium on Community Activities for the Conservation of Water Environment – Lessons Learned from Community Activities, December 2006

Oral Presentation Proceedings, International Forum on Water Environmental Governance in Asia – Technologies and Institutional Systems for Water Environment Governance, (upcoming) March 2007

3. Self-evaluation

We consider that we generally achieved the main goals of FW through the research on the water resource management in urban areas based on the actual information and data and the database development as a knowledge platform. Through the activities of FW, we have been developing a network of researchers and governmental officials in Asian countries, and such networks will be an important basis for the future development of IGES research on freshwater management. We also believe that we contributed to the overall activities of IGES through cooperation in the editing of the IRES special issue on groundwater and contribution of a chapter on freshwater resources to the IGES White Paper.

We believe that the research value of SWMP lies in the identification of the tangible facts of current water management issues in urban areas in Asia focusing on groundwater resources and the production of realistic and practical recommendations based on these facts. The nature of SWMP is different from the abstract or purely theoretical analysis that we often find in existing research. Groundwater is the area where there is less existing policy research with specific data and information compared with those on surface water resources. In this regard, SWMP was appreciated due to its incorporating of actual data and information on groundwater resources and their management and for the interim report on groundwater, which was welcomed at WWF4 for the same reason. We think the research on groundwater resources could become a niche for IGES research in the field of water environment.

Issues of water resources often depend on the given local natural conditions and are therefore closely related to the nature of local specific natural and socio-economic conditions. In this regard, involvement of local research partners who know the local conditions better is important in conducting research, and how to cooperate with them becomes a key factor to determine relative merits. The method applied in SWMP is a good model of collaborative research with local researchers in research target countries. That is, IGES provided a research topic and framework and the local researchers took their initiative in conducting the respective case studies. The proactive involvement of local researchers made the information collection and analysis more efficient and effective. At the same time, such proactive involvement could contribute to capacity development of local researchers in policy researches. Stakeholder dialogues with governmental officials and NGOs enhanced the validity of the research findings and also provided opportunities to formulate local networks in which SWMP local research partners can play key roles. The stakeholder meetings held under SWMP also provided opportunities for dissemination of SWMP findings to local stakeholders.

WEPA's core component was the development of the database and it achieved its initial objectives by including the fundamental information on water environmental management, related laws and regulations, and cases of community activities. The project also succeeded in sharing the importance of further promotion of water environment conservation among partners, as well as strengthening networks among focal points through its activities. These achievements could be a good basis for enhancing the activities of WEPA for the rest of programme duration. Since the database was officially launched at the 4th World Water Forum, however, an emerging issue has been how to effectively collect information for the database so as to further develop the contents and ensure continuity after the programme has ended. To create continued incentives for the voluntary provision of information to WEPA by focal points of partner countries and other stakeholder in the region, a new approach to data collection was launched in FY2006. This is the invitation of cases of community activities and the improvement of water environment governance through open applications. It is necessary to further consider other approaches for effective collection.

Through our activities, we identified a lack of human resources more engagement in water environmental management, a necessity of further capacity-building opportunities, and infrastructure improvement for information sharing as key points in the WEPA research partner countries. For the future evolution of the programme, we need to consider the WEPA database not only in terms of “quantity of information” but also “quality of information”.

4. Conclusion

IGES officially launched research activities in the freshwater resource management field in the Third Phase, and we believe that the achievement of SWMP and WEPA in this first research phase for FW can be meaningful for further research activities at IGES in this field. In addition, the research network developed during this research phase will be a core component for promoting effective research to improve water environment management in Asian region. The research network developed in the Third Phase will also be vital for useful research for the improvement of water resource management in Asia.

Future development of IGES research into freshwater management depends on further enhancement of the network of relevant organisations, for more effective implementation and dissemination of research activities. In particular, FW must work on links with international organisations, where so far relations have not been developed fully. Water issues in Asia are closely linked with sustainable development in the region ranging from ensuring safe water access to industrial water provision for economic development. The research activities in the Third Phase identified that water management policy was still weak in promoting the effective use of water resources. Water quality control should also be strengthened, considering the insufficient integration of water quality and quantity policies as well as weak implementation of water quality management measures that have kept water quality degraded in the region for decades, This continuous deterioration has become a barrier to efficient use of water resources. Utilising expertise and the network of researchers accumulated in the Third Phase of strategic research, IGES could contribute to the improvement of water resource management and also to sustainable development of the region.

