Evaluation Summary

1. Outline of the Project

Country: People's Republic of China

Project Title: Water Environment Restoration Pilot Project in Taihu Lake

Issue/Sector: Environmental Management - Water Pollution

Cooperation Scheme: Technical Cooperation Project

Division in Charge: Group II (Environmental Management), Global Environment Department

Total Cost (at the time of evaluation): approx. 680 million yen

Period of Cooperation
(R/D): 15 May 2001 - 14 May 2006

Partner Country's Implementing Organization(s)
State Environmental Protection Administration (SEPA); Chinese Academy for Environmental Planning (CAEP); Jiangsu Environmental Protection Department; Jiangsu Environmental Science Research Institute; Jiangsu Environmental Monitoring Center; Environmental Protection Bureau of Wuxi City; Wuxi Environmental Monitoring Station

Supporting Organization(s) in Japan
Ministry of the Environment; Ministry of Land, Infrastructure and Transport; and others

1-1 Background to the Project

People's Republic of China has achieved remarkable economic development under its reform and open-door policy. Rapid economic growth, however, is taking its toll in the form of water pollution of rivers, lakes, and inner bays. To address this urgent problem, the State Council of China has placed strategic focus on three rivers (Huaihe, Haihe, and Liaohe), three lakes (Taihu, Chaohu, and Dianchihu), two designated control zones (the SOx control zone and the acid rain control zone), one city (Beijing), and one sea (Bohai Sea) under the so-called 33211 Program. Many lakes in China, including these three lakes, are increasingly suffering from eutrophication, polluting these water bodies as drinking water sources and natural landscapes.

Taihu Lake, one of the three designated lakes under the 33211 Program, provides a valuable water source for some 33 million people residing around the lake. It is also a valuable tourist resource. Located about 200 kilometers southwest of Nanjing, the provincial capital of Jiangsu, Taihu Lake is visited by a few million people every year. Population growth, urbanization, and economic growth in the region are increasing the flows of untreated wastewater into the lake, including industrial, agricultural, and livestock wastewater, and domestic wastewater from communities and hotels. These inflows are aggravating the water quality of Taihu Lake.

China has developed the Water Pollution Control Plan for Taihu Lake during the period of National Ninth Five-Year Plan and the 2010 Long-term Plan. The plan has achieved a measure of success. Progress has been made in controlling industrial and municipal wastewater, placing major point-sources of pollution under control. Efforts to control area sources such as decentralized domestic wastewater sources are falling behind.

In Japan, eutrophication is often addressed by advanced domestic wastewater treatment tanks as a decentralized sewage treatment system, or by the technique to take advantage of the process of natural purification with the help of aquatic vegetation. Either technique is not established in China.

These circumstances prompted China in 1998 to make a request of Japan for a technical cooperation project aimed at studying ways to control decentralized domestic wastewater sources using Taihu Lake as a model site. Japan has advanced knowledge and expertise in this field.

1-2 Project Overview

(1) Overall Goal

To reduce the inflow load of nitrogen and phosphorus into Taihu Lake by applying the technologies for restoring the lake water environment that has been developed in the Project

(2) Project Purpose

To develop and transfer technologies for the treatment of domestic wastewater from distributed pollution sources in the basin of Taihu Lake, that are suitable for the natural, social, and economic conditions of the target area; and to make them widely recognized by the people in the target area

(3) Outputs

1. Technologies for the practical use of advanced domestic wastewater treatment tanks will be developed for decentralized domestic wastewater sources.

2. Information for the application of biological wastewater treatment technologies for decentralized domestic wastewater sources will be compiled and made readily accessible.

3. Experiments on the mechanisms of water bloom occurrence and control will produce positive outcomes.

4. Practical technologies that have been developed in the Project will be widely recognized by the people in the target area.

(4) Inputs (until the time of evaluation)

Japanese side:
Long-term Experts: 7 person-assignments Equipment: approx. 350 million yen in total
Short-term Experts: 37 persons Local cost: approx. 74.5 million yen in total

Trainees received: 23 persons Dispatch of Project Consultation Teams: 4 times by the Mid-term Evaluation

Chinese side:
A research site and laboratory (with the necessary power capacity); offices for Japanese experts; an office for the Project; meeting rooms; counterparts or C/P (11 persons from CAEP, 16 from the Environmental Protection Bureau of Wuxi City, and 12 from the Jiangsu Environmental Protection Department); interpreters; and others
Local cost: approx. 6.62 yuan in total (or about 92.7 million yen at the exchange rate of 14 yen to the yuan)

2. Joint Evaluation Team

Members of Evaluation Team (Role/responsibility: Name Position)

Japanese members:
Leader Kiyoshi MASUMOTO Director, Group II, Global Environment Department
Decentralized Advanced Treatment Technology Tetsuya KUSUDA Professor, Department of Urban and Environmental Engineering, Graduate School of Engineering, Kyushu University
Local Application and Dissemination/extension Senro IMAI JICA Senior Advisor
Water Environmental Management Hideho TANAKA Assistant engineer in environmental industry, material-recycling division, Office of recycling-based society, Department of Environment, Agriculture, Forestry and Fisheries, Osaka Prefectural Government
Evaluation Analysis Kotaro MATSUNAWA Consultants Department, Overseas Merchandise Inspection Co., Ltd
Cooperation Planning Naoki KAKIOKA Environmental Management Team II, Group II, Global Environment Department, JICA

Chinese members:
Leader Ouyang Ne Sino-Japan Friendship Center for Environmental Protection
Member Li Dewen Deputy-director, Jiangsu Association of Environmental Protection Industry (JAEPI)
Member Jiang Hao Process engineer, Wuxi Environmental Monitoring Station

Period of Evaluation:
20 November – 10 December
2005

3. Results of Evaluation

3-1 Achievement Level

(1) Activities

The project activities temporarily stagnated with the prevalence of the severe acute respiratory syndrome (SARS) in spring 2003. They have been almost back to normal due in large part to the efforts by the stakeholders.

(2) Outputs

Output1: Technologies for the practical use of advanced domestic wastewater treatment tanks will be developed for decentralized domestic wastewater sources.

The Project Team has installed two wastewater treatment tanks each of six types that are most commonly used in the demonstration site on the shore of Taihu Lake for comparison.

Under the guidance of the Japanese experts, the counterparts at the Jiangsu Environmental Science Research Institute are compiling guidelines each on the structure and maintenance of advanced domestic wastewater treatment tanks. Both set of guidelines are due to be completed by April 2006. Toward localization, the Project Team has made and tested a few prototypes of advanced domestic wastewater treatment tanks that are more suitable for China in terms of ease of maintenance and economic efficiency.

On June 24, 2005, Japan and China signed a memorandum of consultation on performance evaluation testing equipment for advanced domestic wastewater treatment tanks. In accordance with this memorandum, Japan is making arrangements to procure such equipment, while China is constructing a building (laboratory) to accommodate the testing equipment.

Output 2: Information for the application of biological wastewater treatment technologies for decentralized domestic wastewater sources will be compiled and made readily accessible.

The counterparts at CAEP took advantage of what they learned in training in Japan in a number of activities, including gathering basic research materials on biological wastewater treatment technologies, compiling it into video CDs (VCDs) in Chinese, inventorying vegetation-assisted wastewater treatment technologies, and preparing technical materials on these related technologies. These kinds of information were presented in a joint symposium in September 2005 for information sharing.

Output 3: Experiments on the mechanisms of water bloom occurrence and control will produce positive outcomes.

The Project Team conducted microcosm experiments using an eutrophication simulator. Two counterparts wrote a paper each based on the findings of this testing.

Output 4: Practical technologies that have been developed in the Project will be widely recognized by the people in the target area.

The Project Team has tried to raise the awareness of the academics and the public at large about the need for eutrophication control technologies.

The counterparts at the Jiangsu Environmental Protection Department and others have played a central role in disseminating practical technologies that have been developed and proved effective in this Project. Specifically, they organized a regional seminar (once a year from 2001), produced and distributed a VCD-based educational material for the public, and issued

and distributed newsletters that introduced project activities. They have also put up the project summary on their website.

The model plan was completed in early November 2005 under the guidance of a short-term expert from JICA, after its outline was prepared by some counterparts while they were in Japan for training in August of the same year.

3-2 Summary of Evaluation Results

(1) Relevance

1) Consistency with the development policy of China

The National Tenth Five-Year Plan for 2001-2005 of the Chinese government includes environmental targets of reducing environmental pollution and mitigating ecological deterioration by 2005 and of improving the environment in focus cities and regions. The Project is relevant in that the Project Purpose and the Overall Goal are in line with the environmental policy of China.

2) Consistency with the Japanese government's Economic Cooperation Program for China

In accordance with the Japanese government's Economic Cooperation Program for China, JICA focuses on (i) cooperation towards resolving environmental and other global issues; (ii) assistance for reform and open-door policy; (iii) promotion of mutual understanding; and (iv) assistance for poverty alleviation. This Project comes under the first focus area/issue. The Project is relevant in that the Project Purpose and the Overall Goal are in line with one of the focus areas/issues for JICA's assistance toward China.

3) Relevance to the needs of the beneficiaries

Population growth, urbanization, and economic growth in the region are increasing the flows of untreated wastewater into the lake, including industrial, agricultural, and livestock wastewater, and domestic wastewater from communities and hotels. These inflows are aggravating the water quality of Taihu Lake. Although progress has already been made in developing intensive sewage treatment plants and treating industrial effluent, efforts to control decentralized domestic wastewater sources are falling behind. The Project is relevant to local needs in that it focuses on these area sources of pollution and aims to reduce eutrophication in Taihu Lake.

4) Relevance of the project design with regard to the interrelationships among the Overall Goal, the Project Purpose, the Outputs, and the Inputs

The Overall Goal and the Project Purpose are consistent with each other and therefore relevant. A clearer course of action from the Project Purpose to the Overall Goal would have made the implementation plan more specific. There is a causal relationship between the Outputs and the Project Purpose. Nevertheless, the implementation plan was partly inadequate judging from some factors, including the complex structure for project implementation, the overoptimistic estimation of the local cost, and the sluggish process of providing large-scale equipment.

(2) Effectiveness

The Project Purpose will likely be achieved by the completion of the Project as long as the ongoing efforts are maintained.

In relation to Output 1, the domestic wastewater treatment technology based on advanced domestic wastewater treatment tanks provides an effective option for reducing the inflow loads of nitrogen and phosphorus into the lake. The technology contributes greatly to the achievement of the Project Purpose. The performance evaluation testing equipment for advanced domestic wastewater treatment tanks is helpful in promoting these tanks, through the establishment of standards for the analysis and evaluation of the tanks.

With regard to Output 2, the Project Team gathered basic research materials on biological wastewater treatment technologies, compiled it into video CDs (VCDs) in Chinese, inventoried vegetation-assisted wastewater treatment technologies, and prepared technical materials on these related technologies. These kinds of information were presented in a joint symposium for sharing information. These activities contribute to the attainment of the Project Purpose.

As for Output 3, microcosm experiments are part of basic research for developing treatment technologies and indirectly contribute to the achievement of the Project Purpose.

Regarding Output 4, an accumulation of activities to disseminate the wastewater treatment technologies, including organizing symposia, will provide a momentum to the process of achieving the Project Purpose.

(3) Efficiency

The Project temporarily stagnated in the first half of the project period. In the second half, however, the Project was efficient. The project activities were carried out almost according to plan due to the ardent effort by the stakeholders.

The cost of equipment as an input was limited to a minimum, making the Project highly efficient. For example, the cost of the 12 advanced domestic wastewater treatment tanks (that came in six types) would have been more than ten times as high in Japan. The equipment provided by Japan has been largely put to good use and operated sufficiently.

The counterparts have developed their capacity by virtue of technical guidance in China and training in Japan and have contributed to the progress in the project process.

On the other hand, the following factors have reduced the efficiency of the Project

(i) It took a long time for the stakeholders to decide whether the advanced domestic wastewater treatment tanks should be installed semi-underground or underground, or in other words, whether demonstration effects should come before technical considerations. The work to install the treatment tanks fell behind schedule due to delays in developing infrastructure and leveling the ground at the pilot site.

(ii) The construction of an artificial lagoon using biological wastewater treatment technologies was cancelled in the face of the opposition by the Chinese side. The activity concerning vegetated waterways was changed when the plan to construct such a waterway was abandoned because the Chinese side was conducting technical research on its own.

(iii) Due to budgetary constraints, the Project Team used ordinary steel instead of stainless steel to build laboratory tanks for microcosm experiments, causing rust and the elution of iron.

(iv) As for the performance evaluation testing equipment for advanced domestic wastewater treatment tanks, it took a long time to formulate the research plan and obtain the assurance that it would be used effectively after being transferred to the Chinese side.

Although the factors (i), (ii), and (iv) pushed up the project cost, they were necessary processes for appropriate assistance that accommodated the needs of the Chinese side. In that sense, they were also contributing factors for effective assistance.

(4) Impact

The findings of the experiments for demonstrating advanced domestic wastewater treatment tanks will be translated into a set of guidelines by April 2006. Experiments are also underway to localize such tanks for cost reduction. It is hoped that advanced domestic wastewater treatment tanks suitable for local conditions will be developed, evaluated with the performance evaluation testing equipment, and manufactured in China in accordance with the guidelines. If appropriate policy arrangements enable the introduction of advanced domestic wastewater treatment tanks in the basin of Taihu Lake, the inflows of nitrogen and phosphorus will be reduced.

The counterparts weighed and compared different biological wastewater treatment technologies by taking advantage of training in Japan and other opportunities. The findings of this comparative study had positive effects on the projects aimed at improving lake water quality in China under the National 863 Program (the High-Tech Research and Development Program of China).

Unless properly maintained and promoted, advanced domestic wastewater treatment tanks might have negative effects, including the failure to improve the quality of treated water.

(5) Sustainability

1) At the technical level

A set of guidelines on advanced domestic wastewater treatment tanks will be compiled by the completion of the Project in May 2006, drawing on the findings of the demonstrating experiments for them. It can be hoped that the guidelines will have positive effects, including the formulation of new environmental policies, the establishment of structural standards and a maintenance system, and the joint development of advanced treatment tanks between the project implementing agencies and the treatment tank manufacturers of China. The

experiments for applying advanced treatment tanks to suit local conditions have laid the groundwork for localization.

The Project Team gathered basic research materials on biological wastewater treatment technologies, compiled it into video CDs (VCDs) in Chinese, inventoried vegetation-assisted wastewater treatment technologies, and prepared technical materials on these related technologies. It can be hoped that the information and human resources that have been developed through these processes will contribute to future projects for improving lake water quality in China.

The Chinese Academy for Environmental Planning (CAEP) installed a set of experimental equipment for microcosm. Although this equipment is huge in scale, two counterparts acquired the capacity to operate and maintain it through training in Japan and other activities. Using this equipment, CAEP will continue the research that will elucidate the mechanisms of water bloom occurrence and control in basic research projects under the 973 Program (the National Basic Research Program). The Chinese side plans to improve the experimental equipment with painting and Teflon coating on its own.

2) At the organizational level

The Project is operated and maintained by two project implementing agencies: the Chinese Academy for Environmental Planning (CAEP), and the Jiangsu Environmental Protection Department. It is supervised by the State Environmental Protection Administration. For further development, the Project needs to involve four relevant organizations: the Jiangsu Environmental Science Research Institute, the Jiangsu Environmental Monitoring Center, the Environmental Protection Bureau of Wuxi City, and the Wuxi Environmental Monitoring Station. Following the Completion of the Project, the technologies transferred, human resources developed, and the equipment provided will be used in relevant organizations in China.

3) At the institutional level

It is important that the guidelines developed through such activities as the experiments for demonstrating advanced domestic wastewater treatment tanks is put to good use and the relevant technologies is disseminated. To that end, the government policy may need to support pilot projects for advanced treatment tanks among other efforts.

3-3 Contributing Factors

A number of factors have supported the project activities. Among these factors are ardent efforts by a group of Japanese experts in the second half of the project period, four project consultation studies, requests for improvement from the Japanese side made to the Chinese side during the project of the mid-term evaluation study, and above all, sincere efforts by the two sides.

3-4 Inhibiting Factors

The project implementation structure in China is complex. The organizations to which the counterparts span are three cities or three levels of government (the central government in Beijing, the Jiangsu provincial government in Nanjing, and the municipal government in Wuxi), and three types of functions (the administrative divisions [especially the department of international cooperation], research institutions, and monitoring stations. Seven out of these organizations are involved in C/P organizations. Local organizations are independent from the central government machinery, except for administrative functions.

Wuxi City where Japanese experts are performing their duties is physically far from Beijing and Nanjing. Moreover, the counterparts at the central and provincial government levels area not stationed in the city. It is physically difficult for each other to share information, exchange views, build consensus, and make agreed decisions.

The project activities span four quite different sectors, highlighting the need for cross-sectoral coordination. Articulation among the different organizations in charge of the different sectors and functions is weak. This results in a lack of communication and difficulty in consensus building. In fact, some project activities had to be changed or reduced in scale; others fell behind schedule.

3-5 Conclusion

In light of the five criteria, the Project is judged to have been largely relevant to the Project Purpose: to develop and transfer technologies that are designed to treat domestic wastewater from distributed pollution sources in the basin of Taihu Lake and suitable for the natural, social, and economic conditions of the target area; and to make them widely recognized by the people there.

In their early stages, the project activities fell behind schedule due to two major factors. The first factor was the complex project implementation structure where the seven implementing agencies spanned three different levels of government and therefore three cities: Beijing, Nanjing, and Wuxi. The other was the spread of SARS in spring 2003. In the later stages, efforts by the Japanese experts and their Chinese counterparts moved the project process forward, producing many outputs in a short period of time.

It is hoped that the Overall Goal will be attained by (i) further efforts by the Japanese and Chinese sides throughout the remainder of the project period; and (ii) continued efforts by the Chinese side after the project completion to build on the project outputs toward a more conductive environment supported by government policy, further localization of transferred technology, and cost reduction.

3-6 Recommendations

(1) Promotion of advanced domestic wastewater treatment tanks

The guidelines on (the structure and maintenance of) advanced domestic wastewater treatment tanks should be completed as scheduled. This should be followed by further efforts to improve the completed guidelines based on an accumulation of subsequent demonstrating experiments.

Efforts should be made to develop advanced domestic wastewater treatment tanks that are more affordable and easier to maintain in light of local conditions. Attention should be made to the need for appropriate sludge disposal, especially since it is used more widely.

Policy arrangements to promote the application of advanced domestic wastewater treatment tanks should not only include support for cost reduction efforts, but also draw on cost-effective analysis after defining the applicable area and the promotion method.

Establishing a maintenance framework is an outstanding issue that needs to be addressed soon in order to make full use of the advanced domestic wastewater treatment tanks in the pilot site in the future.

It is hoped that after the completion of the Project, the advanced domestic wastewater treatment tanks will be used for purposes that are consistent with the Project Purpose, including the gathering data and giving demonstrations.

(2) Appropriate use of the performance evaluation testing equipment

Japan and China should strive to ensure that the performance evaluation testing equipment is installed, operated on a trial basis, and used for experiments in an effective manner. Given the existing procurement schedule for buildings and equipment, the project period should be extended to the end of March 2007 in order to provide additional inputs (including short-term experts) that are needed to ensure effective operation and maintenance of the testing equipment. As for R&D of domestic wastewater treatment tanks and performance evaluation testing methods, JICA may consider additional inputs as necessary, after confirming the research plan of China, and while monitoring the self-help efforts by the Chinese side, especially the counterparts who have been trained in Japan. The following requirements should be met for such additional inputs:

(i) Progress will be made as planned in the procurement and shipment by Japan, and customs clearance, land transportation, and installation of input equipment by China.

(ii) China will smoothly provide raw water and utilities (including electricity and water supply) as specified by the design specifications.

(iii) China will deliver its commitment to provide their portion of inputs, including domestic wastewater treatment tanks for experiments and necessary human resources, in accordance with the memorandum of consultation.

3-7 Lessons Learned

(1) Need for an appropriate structure for project implementation

In cases where more than one implementation agency is involved, adequate attention should be paid to the authority, capacity, and interrelationships among them for smooth project implementation. Strong commitment to maintain appropriate coordination among them is

essential when they are physically apart from one another. The possibility of dividing or simplifying the project should be explored as necessary.

It is necessary not only to appoint counterparts but also to create an enabling environment for them so that they can work to the best of their ability.

(2) Room for improvement in providing equipment for projects

In a technical cooperation project that entails complex equipment, JICA should examine equipment inputs from different aspects, including their plans, purposes, and operation and management by conducting a preparatory study or by other means. Based on such examinations, JICA should keep the equipment inputs to a minimum and provide them in a timely manner. It should meticulously formulate the input plan for the project as a whole. It may be necessary to divide the project into a few phases if the project will be long in duration.

(3) Need for sharing information on the local cost

Sharing a common understanding of the cost sharing is crucial, especially in the case of providing equipment that entails considerable amounts of maintenance costs. To that end, JICA should gather sufficient information beforehand, and provide full explanation to and seek support from the partner country regarding appropriate local cost sharing.

(4) Need for a clear course of action from R&D to practical application and dissemination

In a project that conducts research and development (R&D) with a view to practical application and dissemination, it is necessary to present a clear course of action to that end and make it as clear as possible. In the process, it is important to clearly define the roles of each of the project implementing agencies, including policy and institutional arrangements and additional research, and maintain close coordination among them.