

Environmental preservation

Many developing countries are facing serious water pollution because of the increase of household and industrial waste water associated with rapid economic growth as well as the concentration of population and industries in urban areas. These problems lead to adverse effects on local people's health, the pollution of lakes and the destruction of ecosystems. Improvement of water quality and promotion of adequate water use according to the entire area's water circulation are therefore required.

JICA aims to preserve the water environment by: strengthening schemes and legal systems for water quality and environmental monitoring, supplying small-scale water treatment technologies, disseminating sewerage technologies, and promoting environmental education.

■ Project to improve environmental management capacity in Nakuru area, Kenya

Nakuru, situated about 160 km northwest of Kenya's capital Nairobi, is the fourth largest city in Kenya with a population of about 360,000. Since becoming an independent nation in 1963, Kenya has been facing chronic water shortages and the pollution of water by untreated household and industrial waste water along with economic growth.

In the southern part of Nakuru City, there is a national park that includes Lake Nakuru, a famous Flamingo habitat protected under the Ramsar Convention. Because the lake is hydrologically closed and situated at the lowest elevation within the catchment area, the effect of inflow and accumulation of pollutant from Nakuru and the catchment area is a matter of concern.



By providing grant aid, Japan has assisted the development of a sewerage system in the area around Lake Nakuru. JICA is now involved in a project to improve the environmental management capacity in the Nakuru area, at the request of the Kenyan Government. The project, led by the Nakuru Municipality, focuses mainly on water-related environmental management in Nakuru City and addresses the following issues:

- **development and implementation of adequate water quality monitoring programs to obtain reliable data**
- **development and use of environmental management tools (environmental status reports, manuals, etc.) and mechanisms**
- **arrangement of a joint research and implementation scheme for water quality control in the Lake Nakuru catchment area**
- **arrangement of seminars and the creation of a collaboration platform for basin management**
- **promotion of government-business cooperation and environmental education for community based environmental management.**

Regarding the arrangement of a joint research and implementation scheme for water quality control in the catchment area, an agreement on cooperation in water quality monitoring and control was reached between Nakuru Municipality, Nakuru Water and Sanitation Services Company (NAWASSCO), and Kenya Wildlife Service (KWS). Accordingly, a scheme to control the water quality of Lake Nakuru and the catchment area through the cooperation of the main parties was established. The project also aims to heighten regional awareness of environmental issues by preparing instruction materials on environmental management at the Nakuru branch of Kenya National Library Service. Enhancement of the capacity of environmental management in the entire Nakuru area is in progress.



Integrated Water Resources Management

Establishing a legal framework and coordination mechanism

In order to solve water-related problems such as water shortages, flood damage and water contamination, it is important for stakeholders such as various sectors, local municipalities and community-based organizations, to work within an appropriate framework called Integrated Water Resources Management (IWRM).

According to the definition of IWRM, it is essential to develop a legal framework and to prepare medium to long-term master plans and project implementation plans for each river basin. It also involves capacity strengthening of river basin organizations to implement these plans using a hands-on approach. In order to ensure IWRM, it is required to develop capacities at various levels including at the individual, organization and social-institutional system levels. For that purpose, it is effective to conduct on-the-job training and to share the knowledge and experience gained from good practices in other countries.

JICA has been supporting water resources infrastructure development and the enhancement of water resources management capacity of individuals and organizations for the realization of IWRM. In addition, JICA is willing to support the enhancement of water resources management capacity of social-institutional systems.

■ Cooperation for establishing a water rights system in China

China has been facing serious water shortages because of its small per-capita water resources, unstable supply of fresh water at different times and locations, and frequent floods and droughts. Problems are becoming more and more serious; such as land subsidence due to over-pumping of groundwater, drying up due to excessive exploitation of river water, and the deterioration of water quality in rivers and lakes as a result of discharging untreated industrial and domestic wastewater.

The government of China (PRC) has recognized that the sustainable use of water resources is essential for socioeconomic development and thus has designated solving the water shortage issue as a major goal. For this aim, PRC has requested technical cooperation from the Government of Japan for establishing a water rights system as a basis for the efficient use of water resources.

JICA has provided policy recommendations for developing a basic framework of a water rights system and has assisted in reinforcing water resources management systems for three years since 2004. Policymakers, academic sectors and research institutes of both countries have participated in this process. This cooperation was aimed at efficient water use through appropriate water allocation as



well as the improvement of water quality.

The cooperation project contributed to the capacity development of water resources management in China as described below.

● Sharing good practices

Japan and China have much in common with respect to the history and culture of water use. As a result of exchanges between experts of both countries, the process of establishing a water rights system in Japan and the lessons learned were shared. Multidisciplinary and comprehensive discussions were held to establish a water rights system in China where natural conditions and traditional water use are particularly diverse.

● Practical study based on theory

By conducting a case study of the Taizihe river basin in Liaoning Province, a practical approach was taken based on the leading theoretical studies about water rights systems.

● Collaboration among government organizations, research institutes and universities

Key Chinese researchers at the Development Research Center of the Ministry of Water Resources, Tsinghua University, the Chinese Academy of Agricultural Sciences and other organizations conducted joint studies under the authority of the Ministry of Water Resources. As a result, these organizations have developed collaborative efforts and shared their understanding of water rights systems closer and deeper than ever.



Managing river basins



©CTII

Indonesia

JICA has developed river basin management master plans for 22 major river basins in Indonesia to support integrated water resources management (IWRM). As a result, the government of Indonesia has established water resources infrastructure in 14 river basins with the assistance of the Japanese yen loans. JICA contributed to the strengthening of organizations to operate and maintain water resources infrastructure in the Citarum River Basin, and has been successful in implementing comprehensive flood control measures suited to the environment and climate of the region.

However, in Indonesia, the issue of water resources management has become more complex because of water shortages resulting in rapid population growth and urbanization, increasing cases of flood damage due to population concentration in the lower river basins and the deterioration of river water quality caused by the discharge of urban wastewater.

These problems will undoubtedly have a negative effect on the sustainable economic development and food security of the country. Enhancement of IWRM is hence considered crucial to solve these problems.

The government of Indonesia revised their laws on managing water resources and established river basin organizations (RBOs) in major river basins to strengthen IWRM in each basin. The government also took actions to strengthen the capacity of RBOs to accumulate and disseminate knowledge and experience about water resources management throughout the country.

JICA, together with the Japan Water Agency and the government of Japan, launched a technical cooperation project in 2008 making good use of Indonesia's own technology to enhance the operational capacity of RBOs in Indonesia.



Integrated Water Resources Management

Managing river basins

Assistance in IWRM in the Brantas River Basin

The Brantas River flowing in the eastern part of Java is the second largest river on Java Island with a length of 320 km and a catchment area of 12,000 km². It has been a valuable source of water for the farmlands in the basin and to Surabaya, Indonesia's second largest city. On the contrary, the river has frequently been the cause of significant flood damage.

JICA developed and revised the river basin management master plans in 1973, 1984 and 1998. Based on the master plan, the government of Indonesia implemented projects for water resources development, river improvement, sediment control and irrigation, acquiring assistance from Japanese yen loans.

As a result, flood damage was estimated to be reduced by 13.5 billion yen annually and agricultural production increased significantly by 80%.

In addition, more than 200 MW, developed by hydroelectric generators in the basin, contributed to industrial growth and the creation of a significant number of jobs in the region.

In the process of project implementation, there were numerous cases of significant human resources development, producing experts who are expected to maintain and further develop technical skills in the country.



Support in integrated flood management in the Citarum River Basin

The Citarum River is one of the most important rivers in Indonesia, its water resources are used for hydroelectric power generation, irrigation and as the drinking water supply to Jakarta.

Bandung, the capital city of West Java Province, is located in the upper river basin, is known as an academic city and a production center for textiles.

Bandung had frequently suffered substantial flood damage in the 1980s because of (1) increased flood discharge due to rapid population growth and uncontrolled urbanization and (2) the reduction of river capacity to carry the flood discharge due to sediment inflow and (3) the illegal dumping of household waste. Urbanization is expected to continue in Bandung, and there have been concerns about increased flood damage.

Therefore, the government of Indonesia requested the government of Japan to develop flood protection plans in the upper Citarum River Basin.

JICA conducted the "Study on the Flood Control Plan of the Upper Citarum River Basin" in 1988 and prepared a river basin management master plan. It also developed a floodplain management plan, considered an urgent priority, that included an emergency river improvement project, land use control in flood risk areas and a flood forecasting and warning system.

The government of Indonesia then developed a river flow system, implemented the flood forecasting and warning system and protected headwater forests and farmland in the upper river basin using a yen loan based on the above master plan. As a result, flood damage in the region was greatly reduced.

In projects implemented in the Citarum River Basin, the following advanced measures were implemented:

● Implementation of integrated flood management combining structural and non-structural measures

Integrated flood management measures were implemented which allowed inundation in the area by increasing the width of the river channel and taking floodplain management measures such as land use management, and flood forecasting, warning and evacuation systems.

● Involvement and coordination of residents and other stakeholders

Local residents and farmers were involved in decision making regarding land use management and inundation.

● Multi-sector approach covering the entire river basin

Forests and farmlands in the upper river basin, having great influence on the flood discharge in the lower reaches of the river, were preserved to control the river flow of the entire river basin.

● Implementation of advanced methods and their application throughout the country

Policy makers involved in the project were able to acquire advanced integrated flood management methods from their experience in the Citarum River Basin and applied them as a case model to the other river basins nationwide.

