

14) Cost Estimation and budgetary scheduling

To prepare overall cost estimate and budgetary schedules based on preliminary design, estimates and implementation schedule.

15) Economic evaluation

To perform economic and financial evaluation of individual projects

16) Environmental impact assessment

To conduct environmental impact assessment for the prioritized projects. The likely major adverse effects of the plan as a whole should be identified and actions to mitigate these effects should be proposed, particularly on i) resettlement of project affected families; ii) loss of agricultural and ancestral lands due to plan implementation; iii) impacts on flora and fauna; and iv) changes in river morphology.

17) Report Preparation

To prepare inception report, interim report and final report for the Project

Part B : Feasibility Study for the Prioritized Projects and Verification Study

To conduct feasibility study for the prioritized projects based on the established integrated watershed management plan. For the 5-year investment program, the preliminary design and cost estimates, implementation schedule and arrangements, budgetary scheduling, viability evaluation, environmental impact assessment (EIA), and resettlement action plan (RAP) will be prepared/conducted.

Prior to commencement of the Feasibility Study, it should undergo a stakeholders' consultation process. A report on the methodology used, the participants and a summary of major comments made during consultations should be made part of the plan.

The verification study for the following issues will be conducted for further implementation stage in the following order of priority:

- (1) Verification study on existing flood facilities for rehabilitation and flood fighting for awareness creation
- (2) Verification study on existing irrigation water facilities for rehabilitation and users association for reinforcement
- (3) Verification study on existing water supply facilities (Level 1 and 2) for rehabilitation and organization for improvement together with local governments and people

v) Overall Goal of the Project/Study:

The goal of the Study is to prepare a plan for watershed management of the Basin, and a feasibility study for the investments to be undertaken. The plan will

comprise of a strategy and institutional framework for sustainable development and management of water resources in the Basin; a long-term (15 years) investment program, to be financed by the private sector, Government and external agencies; and financial and institutional arrangements for operation and maintenance of facilities financed by the public sector. The feasibility study will present a 5 years' slice of the overall investment program to be financed by funding agencies, and the implementation arrangements, economic evaluation, environmental and social impact assessment, monitoring and evaluation arrangements, and O & M arrangements.

vi) Purpose of the Project/Study

The Project is expected to perform two tasks: the formulation of the Integrated Watershed Management Plan (IWMP) for the Nyando River Basin, and preparation of the feasibility study for the prioritized projected selected from the IWMP. The IWMP will provide strategic directions for developing and managing the basin's water resources for the next 15 years and beyond. Since river basin planning cannot be a "stand alone" process, it would need to be harmonized with the existing plans of the local governments.

vii) Prospective Beneficiaries of the Project/Study

By implementing strategic works in the hydraulic infrastructure, the proposed program will increase the availability of water, mitigate the effects of the flood damages and enhance the reliability of water supply to the metropolitan areas and to the poor population in the interior of the basin. The actions to be taken in the institutional field focus on the integrated and efficient management of the water resources and on the implementation of sustainable operation and maintenance systems for the hydraulic infrastructure.

viii) The Project Priority in the National Development Plan/Public Investment of the Philippine Government.

The effective and efficient implementation of the integrated watershed management has always being among the top priority undertaking of the Government.

(6) Desirable Commencement Date for the Study: Month January, Year 2005

(7) Expected Funding Source for the Resulting Capital Project After the Study is completed

Grand Aid by the Japan International Cooperation Agency (JICA)

(8) Other relevant projects, if any. Not applicable.

II. Terms of Reference of the Proposed Study

(Please respond to items (1) and (2) taking into consideration the following:

In case that a study has been previously conducted in the same field, please justify the current request, the present status of the previous projects, and the status of technology transfer that resulted from the previous projects. Whether or not there are existing studies regarding this request study. Is this request being coordinated with other economic and technical cooperation from Japan.

(1) Necessity/Justification for the Study:

The Government of Kenya has decided to pursue an integrated water resources management and development program based on hydrological boundaries of river basins. These approaches have been initiated by the Ministry of Water Resources Management and Development.

The Nyando River Basin is located in the Nyando District of the Nyanza Region, western part of the Republic of Kenya with a drainage area of 2,606 km². The lower river basin occupies the Kano Plain which is one of the important food supply area in the country. Food supply to meet the future demand for a high population growth rate of about 5% per annum is key issue in the country so that the irrigation development in the Kano Plain is urgently required. However, due to habitual flooding, the Basin is seriously affected by flood damages not only to agricultural crops but also to inhabitants, household properties, public facilities, transportation, telecommunication, public health, etc.

The Nyando River Basin is under-developed due to unfavorable climate and hydrological conditions. Population in the Basin is mainly dependent on agriculture. The limited industry in the Basin is for processing of agricultural products, fish, and livestock. Precipitation is very heavy during rainy season, which results in inundation and damaging crops in the Kano Plain. Saline intrusion and tidal back cause also problems in the Plain, which aggravate flooding and irrigation water use and potable water supply. Increasing pollution has resulted in significant water pollution due to untreated sewerage water mainly from urban centers and industrial wastes, which affect on fishery development. Accordingly, there is a need to improve urban and rural drinking water supply and sanitation to address high incidence of water-borne diseases.

There are several protected forest reserve areas in the upper Nyando River Basin, however, the areas have been degraded, causing poor productivity and damage to infrastructure every year. Therefore, these areas have to be protected by reforestation.

Within the agricultural lands (approximately 2,900 ha; or 11% of the basin area), there are number of irrigation systems. Majority of these area are under paddy, maize, sugarcane, sorghum, pulses, groundnuts and vegetables cultivation. Most

of these schemes have been deteriorated over time. Additional lands could be irrigated by extending canal network, provided that water would be available.

On-going activities conducted by the local governments include conservation, management and development of the Nyando River Basin. Kisumu Municipality, which is the center of administration, commercial and industry of the western region of Kenya, is ranked at the fourth largest urban center in Kenya. The municipality including vicinity urban centers has been facing chronological shortage of safe water supply, hampering economic development activities and deteriorating hygienic condition of inhabitants. Therefore, the municipal administration as well as vicinity local governments are keen to augment safe water supply in the urban centers in the Basin.

The Study on the National Water Master Plan (NWMP) was completed in 1992 under technical cooperation by the Japan International Cooperation Agency (JICA). It recommends that a comprehensive water resources development plan be formulated to utilize the precious lands and water resources of the Kano Plain effectively and rationally among the various sectors and urgently realize the flood control of the rivers in the Kano Plain in order to enhance the economic activities and secure the lives of inhabitants. In 1995, Infrastructure Development Institute (IDI) under former Ministry of Construction (MOC), Japan conducted preliminary study and project promotion for the Nyando River Basin Integrated Water Resources Development Project, however, it was not materialized for implementation.

This Project serves as one of the first trials within the Republic of Kenya for central organizing point for water as a cross-cutting issue. It addresses water as a resource in its many dimensions, serves to assess and disseminate emerging lessons and shared experiences, to publicize policies and guidelines, facilitate cooperation on water issues and to address issues of knowledge generation, management, and enhancing skills. It also serves an opportunity for the Ministry to focus on its expanded mandate and address all of them from integrated point of view bring out the intelinkages between them.

(2) Necessity/Justification for Japanese Technical Cooperation

Water Resources Development studies in various parts of the country as well as in other countries have been conducted with assistance and funding mainly from JICA, which is known for its technical expertise in studies of this nature. In view of the necessity to complete the study at the shortest time possible, it is being proposed for GOJ financing since they have the technical expertise and financial capacity to assist the Government of Kenya in this undertaking.

(3) Objectives of the Study

(Describe the objectives of the study in detail. Please indicate who will benefit from the study and to the extent possible quantify the beneficial effect of the project).

(a) General Objective

The Project will increase a sustainable water supply for multiple uses and improve the efficiency of the Nyando River Basins' integrated watershed management system, thus decreasing the vulnerability of poor populations against water supply shortages and flood damages. It will further promote watershed management in upper basin, to enhance water conservation, in turn, maximizing groundwater supply for potable water and minimizing flood occurrence. Natural water storage mechanisms will be maximized, through adequate management of critical micro-basins, and groundwater resources.

General objective of the Project are as follows:

- 1) Management practices, to improve institutional, legal, and administrative frameworks, emphasizing participatory management mechanisms. This includes construction of hydraulic infrastructures for an integrated management of river-basins, through a sustainable cost recovery development.
- 2) Increase in integration of river basins, and, rehabilitation of existing hydraulic infrastructure, which includes construction works, and projects, to mitigate environmental impacts, and environmental policies will be integrated with water management policies, to increase the volume of water supplied by the State's water management company.
- 3) The natural resource management component, will foster a micro watershed management pilot, and, a groundwater management study.

(b) Specific Objectives

The goal of the Study is to prepare a plan for watershed management of the Basin, and a feasibility study for the investments to be undertaken. The plan will comprise of a strategy and institutional framework for sustainable development and management of water resources in the Basin; a long-term (15 years) investment program, to be financed by the private sector, Government and external agencies; and financial and institutional arrangements for operation and maintenance of facilities financed by the public sector. The feasibility study will present a 5 years' slice of the overall investment program to be financed by funding agencies, and the implementation arrangements. economic evaluation, environmental and social impact assessment, monitoring and evaluation arrangements, and O & M arrangements.

- (4) Area to be covered by the Study (Please attach a map that clearly shows the project site. (Mark the site in red).

Nyando River Basin (*See Attachment I*)

- (5) Scope of the Study
(Please itemized the scope of Study)

In accordance with the above, the following outline is proposed to be implemented:

Part A : Preparation of Integrated Watershed Management Plan for the Nyando River Basin

1) Review of present conditions in the basin

To review the present condition of the Nyando River Basin in terms of river morphology and integrated water resources management view points.

2) Socio-economic survey

To collect basic socio-economic data in the Project area, and assess the socio-economic condition. Moreover, the survey should include various economic activities in the area, assessment of current development problems, and should recommend an integrated watershed management from socio-economic point of view. Furthermore, economic and social criteria to be used for prioritization of investments should be considered.

3) Hydrologic and hydraulic survey

To collect and review the hydrologic and hydraulic data, such as rainfall, water level and discharge data, and assess the hydrological condition of the River Basins. Surveys will include salinity intrusion survey (24-hour continuous survey including the highest tide predicted within dry-season month). Inventory of existing hydraulic infrastructure should also be conducted.

The data collected and reviewed will be used to develop hydrological models, which will serve as important planning tools in the formulation and future updating of basin plans. The models should describe the main hydrological and hydrogeological features of the study area, including precipitation, evaporation, base-flow, seasonal flow, inflow and outflow at representative control points of the main river and tributaries. Furthermore, an analysis of the flow pattern using the data collected taking into account the flow diversion by the existing irrigation schemes and other users at the confluence of all major streams where significant demands are currently met and the remaining potential could be exploited. Sedimentation study for the basin should also be conducted. Details on the development of annual water balance and flood hydrographs should be provided.

4) Hydro-geological survey

To conduct geological sampling and assess especially the groundwater potentials in the study area.

5) Flood damage survey

To conduct flood damage survey of past floods and assess the magnitude of past flood damages in conjunction with hydrological analysis. After the assessment of the frequency and duration of flood and the extent of flood damage in the study