STUDY ON
APPROACH FOR INTEGRATED WATER RESOURCES MANAGEMENT
-REVIEW OF THE JICA MASTER PLAN OF NATIONAL WATER RESOURCES MANAGEMENT-

Final Report

July 2011

CTI ENGINEERING INTERNATIONAL CO., LTD.

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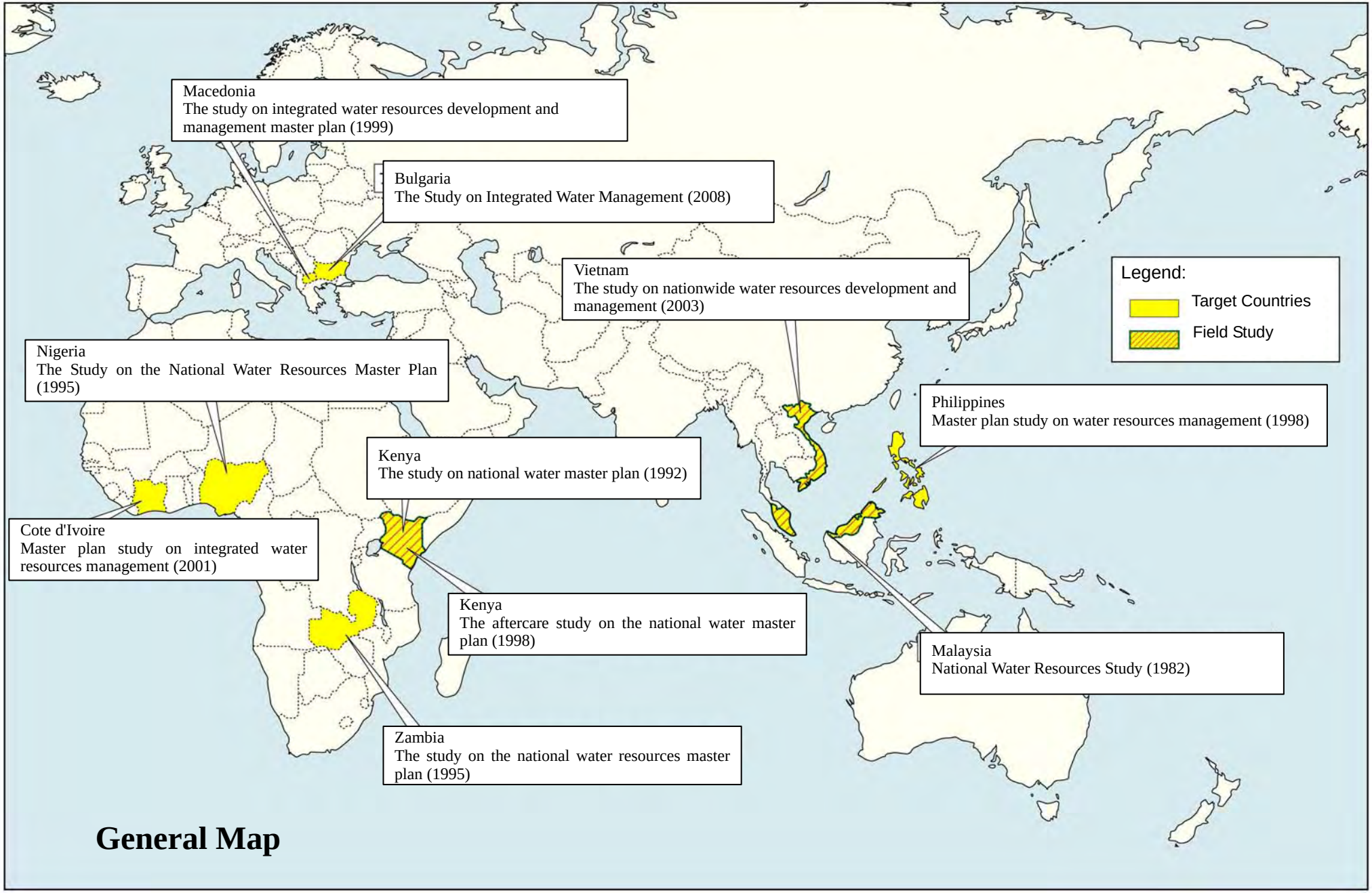
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Exchange Rates used in the Report

MR	1.00	=	US$	0.45	=	JP¥	97.087	Ave. from Jul. to Dec. in 1980*
KS	1.00	=	US$	0.04	=	JP¥	5.173	As of Feb. 1991
KS	1.00	=	US$	0.02	=	JP¥	2.041	As of Feb. 1998

Note: MR: Malaysian Ringgit, KS: Kenya Shilling

Source: *: National Water Resources Study, Malaysia, 1982, JICA

**: The Study on the National Water Master Plan, Kenya1992, JICA

***: The Aftercare Study on the National Water Master Plan, Kenya, 1998, JICA

Abbreviations and Acronyms

GENERAL

ADB	Asian Development Bank
AfDB	African Development Bank
CD	Capacity Development
C/P	Counterpart
CLMV	Cambodia, Laos, Myanmar, Vietnam
EIA	Environmental Impact Assessment
GTZ	German Development Cooperation
IRBM	Integrated River Basin Management
IT	Information Technology
IWRM	Integrated Water Resources Management
JBIC	Japan Bank for International Cooperation
JICA	Japan International Cooperation Agency
KfW	German Government-affiliated Financial Institution (Kreditanstalt Fur Wiederaufbau)
M/P	Master Plan
NWR-M/P	National Water Resources Development and/or Water Resources Management Master Plan
SEA	Strategic Environmental Assessment
TICAD	Tokyo International Conference on African Development
WB	World Bank

TERMS USED FOR MALAYSIA

AGC	Attorney General's Chambers
DID	Department of Irrigation and Drainage
DOE	Department of Environment
EPU	Economic Planning Unit
FD	Forestry Department
FWRD	Federal Water Resources Department
MADA	Muda Agricultural Development Authority
MOA	Ministry of Agriculture
MoNRE	Ministry of Natural Resources and Environment
MWRC	National Water Resources Committee
NAHRUM	National Hydraulic Research Institute, Malaysia
NEB	National Electricity Board
PWD	Public Works Department
SWRC	State Water Resources Committee
SWRD	State Water Resources Department
PKP	Perlis, Kedah, Pulau Penang

TERMS USED FOR KENYA

CAACs	Catchment Area Advisory Committee
KFS	Kenya Forest Service
LBDA	Lake Basin Development Authority
MOA	Ministry of Agriculture
MOE	Ministry of Energy

MOF	Ministry of Finance
MOWD	Ministry of Water Development
MLRRWD	Ministry of Land Reclamation, Regional and Water Development
MORD	Ministry of Rural Development
MWI	Ministry of Water and Irrigation
NEMA	National Environmental Management Authority
NES	National Environment Secretariat
NWCPC	National Water Conservation and Pipeline Corporation
TARDA	Tana Athi River Development Authority
WAB	Water Appeal Board
WRMA	Water Resources Management Authority
WRUAS	Water Resources Users Associations
WSB	Water Service Board
WSRB	Water Service Regulatory Board

TERMS USED FOR VIETNAM

DARD	Department of Agriculture and Rural Development
DOMHDD	Department of Meteorology, Hydrology and Climate Change
EVN	Electricity of Vietnam
CCFSC	Central Committee for Flood and Storm Control
MARD	Ministry of Agriculture and Rural Development
MONRE	Ministry of Natural Resources and Environment
MPI	Ministry of Planning and Investment
VEA	Vietnam Environment Administration

TERMS USED FOR NIGERIA

CMO	Catchment Management Office
NIWRMC	Nigeria Integrated Water Resources Management Commission

TERMS USED FOR NIGERIA

DENR	Department of Environment and Natural Resources
NWRB	National Water Resources Board

TERMS USED FOR MACEDONIA

CCWRDM	Coordination Committee of Water Resources Development and Management
PWME	Macedonian Water Public company

TERMS USED FOR ZAMBIA

MOEWD	Ministry of Energy and Water Development
NWASCO	National Water and Sanitation Council
WRA	Water Resources Authority

TERMS USED FOR BULGARIA

EU-WFD	EU Water Framework Directive
MoRDPW	Ministry of Regional Development and Public Work

Chapter 1. Outline of the Study

1.1 Background of the Study

The Japan International Cooperation Agency (hereinafter referred as “JICA”) has assisted a large number of developing countries for preparation of National Water Resources Development and/or Water Resources Management Master Plan (hereinafter referred as “NWR-M/P”) through the development study programs. The study approach to such comprehensive plan at national level covers reform of the organizational and institutional aspects as well as selection of the priority projects, and it could be one of the special characters of the cooperation of JICA.

The approach of “Integrated Water Resource Management (IWRM)” tends to be widely accepted in recent years and the strengthening of the water resources management is also being required as an adaptation measure to climate change. Under these backgrounds, it is necessary to consider the water resources and the water use by river basin as the basic unit and involve whole water sectors (flood control, water use and water environment) and stakeholders into a unified plan for the water resources development and management. The countries where the studies on NWR-M/P were conducted in the past, request the renewal and/or update of their NWR-M/Ps. Thus, there are the needs of the NWR-M/P and the project formation for the NWR/MP is in progress taking the significances of today such as the examination of the vulnerability of water resources influenced by the climate change and the cooperation with the program loan for the climate change.

The projects for the structural development proposed in the former NWR-M/Ps have been not a little implemented by financial assistances like the grant-aid and the yen loans. However, the active uses of nonstructural measures like policy and institutional aspects may have not been exactly grasped. Hence, this Study is carried out in order to review the previous cooperation by JICA related to NWR-M/P, confirm their superiorities, validities, problems and lessons and propose the assistance approaches for the IWRM.

1.2 Study Objectives

The objectives of the study are to:

(1) Review the previous assistances for the NWR-M/P by JICA, and examine their superiorities, viabilities, problems and lessons etc. and propose the future approach to the assistances tor the Integrated Water Resources Management and,

(2) Compile the results of the Study as reference materials and prepare a handout and presentation materials in order to share the results with other development partners.

1.3 The Objective Study Area

The objective study areas are as follows

(1) The study areas for the literature researches and interview surveys are the nine (9) countries where NWR-M/Ps have been conducted by JICA. The nine countries are as follows:

- Malaysia
- Republic of Kenya
- Nigeria
- Zambia
- Philippines
- Macedonia
- Cote D'ivoire
- Vietnam
- Bulgaria

(2) The study areas for field surveys are the three (3) countries of Malaysia, Vietnam and Kenya

1.4 Review Targets of the past Water Resources M/P Studies by JICA

As mentioned above the Study is to collect the superiority, effectuality, tasks and lessons etc. through the review of the past NWR-M/Ps. The target projects are 10 projects as follows

Table 1.1 The Review Targets of the NWR-M/Ps

Name of Study	Study Period
1. National Water Resources Study, Malaysia	From 1979 to 1982
2. The Study on the National Water Master Plan in Republic of Kenya	From 1990 to 1992
3. The Study on the National Water Resources Master Plan in Federal Republic of Nigeria	From 1992 to 1995
4. The Study on the National Water Resources Master Plan in the republic of Zambia	From 1993 to 1995
5. Master Study on Water Resources Management in the Republic of the Philippines	From 1997 to 1998
6. The Aftercare Study on National Water Master Plan in Republic of Kenya	From 1979 to 1998
7. The Study on Integrated Water Resources Development and Management Master Plan in the Former Yugoslav Republic of Macedonia	From 1998 to 1999
8. Master Plan Study on Integrated Water Resources Management in the Republic of Cote D'ivoire	From 2000 to 2001
9. The Study on Nationwide Water Resources Development and Management in the Socialist Republic of Vietnam	From 2001 to 2003
10. The Study on Integrated Water Management in the Republic of Bulgaria	From 2006 to 2008

1.5 Study Organization for Operation

The Examination Committee and the Working Group are organized for execution of this Study. The Examination Committee consists of the knowledgeable personnel outside of JICA (the personnel of the academic standing and administrative officials) and the JICA staffs (the International Cooperation Advisers, etc.) advising JICA the matters related to the Study. The Working Group consists of the JICA staffs and other experts for the water resources development and management participating in execution of the Study. Fig. 1.1 shows the relations among JICA, the Committee, the Working Group and the consultant team. The members of the committee and the Working Group as well as the major activities undertaken during the study period are shown in Annex-T 1 and T-2..

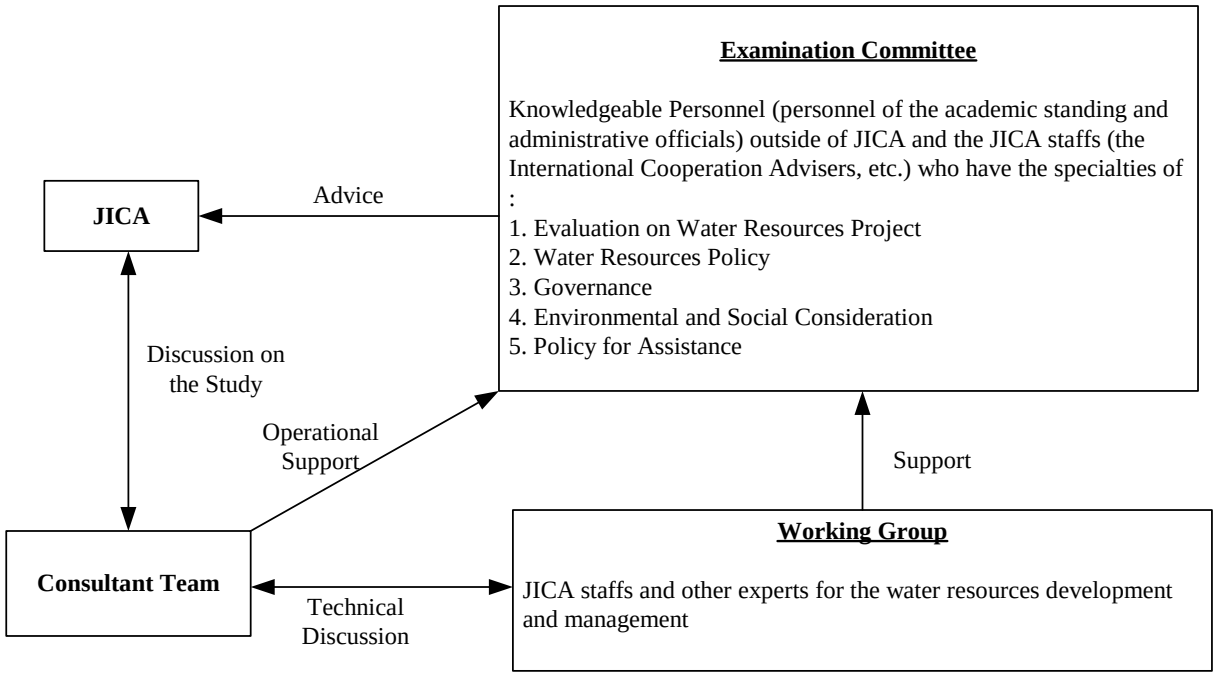

Fig. 1.1 Study Organization for Operation

Chapter 2. Case Study: Malaysia

2.1 Introduction

The field survey in Malaysia as one of the objective three countries was carried out in order to clarify the outcomes of and the principal problems/issues on the NWR-M/P. During the field survey, the interview survey was made to the personnel, who were involved into the NWR-M/P, the C/P agencies of the NWR-M/P such as DID, DOE, and the JICA Malaysia Offices. The field reconnaissance was also made, during the field survey, in the Sate of Kedah, where the water resources development projects were intensively implemented in accordance with the recommendations of the NWR-M/P. The list of members, who participated to the field survey, and the itinerary of the field survey are as shown in the Annex-T 3.

2.2 Outline of the NWR-M/P for Malaysia

2.2.1 The Principal Water-related Problems in Malaysia during the Time of the Study for NWR-M/P

Malaysia is a federal state consisting of 13 states and the Federal District of Kuala Lumpur, and, the water has conventionally belonged to each of the states as the right of property. Moreover, the state governments had jurisdiction over the water resources development and management within their territories during the 1980s, when the NWR-M/P was undertaken.

The rapid increase of the population/property and expansion of the urban area are causing various distortions in water uses in Malaysia. That is, the water deficit tends to be more serious even in the places, which has been believed to be rich in water resources, and the flood damage potentials as well as the deterioration of the water quality are being tangible. In order to cope with these water-related problems, which had grown worse, the water resources development and management crossing over the state territories were becoming more important in Malaysia.

The above water-related problems were, however, hardly solved solely by the state governments, whereby the federal government was required to play the vital roles on the water resources development and management became more important. However, the role for the federal government was limited only to adjustment of water allocation, which crosses over more than two states. Moreover, there were various federal and state water related agencies such as DID, PWD, DOE and FD, and the water management works were rather independently made by such various agencies without adequate coordination among them. As the results, the effective and rational water resources development and management under a consistent national policy were hardly attained.

2.2.2 The Principal Study Items in NWR-M/P for Malaysia

Due to the tangible water problems, the formulation of the national policy on the water resources development and management was the pressing need in Malaysia. In order to catch up the need, the Study on the NWR-M/P for a target year of 2000 was carried out through the JICA technical assistance for a period from 1979 to 1982 and the following items were undertaken through the Study:

- Formulation of the plan for water resources development based on the present and future water demands in the water sectors and the regions,
- Formulation of the plan for flood mitigation and water quality conservation based on the present and future flood damage potentials and possible levels of water contamination,
- Formulation of the plan for hydropower generation based on the balance of the present and future power demand and supply, and
- Formulation of the plan for reformation of the present Waters Act and water-related administrative organization, which aims at attaining the efficient and effective water resources development and management.

2.2.3 The Organization for Study on the NWR-M/P

The Government of Malaysia fully supported the execution of the Study on the NWR-M/P assigning all core agencies for water works such as DID, PWD, DOE, NEB and AGC as the counterpart agencies for the Study. The Government of Japan also organized a study team involving a large number of the experts, who had the high degree of the technical skills, and further dispatched two long-term-experts for planning of the water resources development and the institutional setup in parallel with execution of the Study

2.3 Progresses of the Projects for Water Resources Development and Management after the Study of NWR-M/P in Malaysia

Malaysia lunched out the Look East Policy for the social/economic development and establishment of the firm industrial basis and achieved the rapid economic development with the GDP growth of 9%/year in the latter half of 1980s. Although the economy was once stagnant due to the Asian Financial Crisis in the latter half in 1990s, Malaysia continues the high GDP growth of about 5%/year through establishment and promotion of the high-tech and/or knowledge industries. As the results, Malaysia has brought the dynamic changes related to the water resources such as increment of the municipal water demand, increment of the flood damage potentials and deterioration of the water-related environment.

The NWR-M/P was followed by the regional water resources development studies such as “Perlis-Kedah-Pulau Pinang Water Resources Study” and “South Johor Regional Water Resources Development Study”. The “Comprehensive Management Plan of Muda River Basin”, “Integrated Urban Drainage Development Project”, “Beris Dam Project” and other various water resources

development projects were originally proposed in the NWR-M/P and implemented through the said regional water development studies (refer to Annex-F 1).

The NWR-M/P also furnished important basic information and concepts, which could strengthen the administrative organizations and/or promote implementation of the water resources development structures. The progress of and the issues relevant to the projects proposed in the NWR-M/P are confirmed as described hereinafter (refer to Appendix-1).

2.3.1 Establishment and Strengthening of Water-related Administrative Organizations

The NWR-M/P proposed the following new organization setups in order to strengthen the authorities of the federal government for determination of the national policy on the water resources development and management and coordination with the state governments.

(1) National Water Resources Council (NWRC) and State Water Resources Council (SWRC)

The NWR-M/P proposed the NWRC and SWRC, which have the authorities to finally approve the water policy and the water resources development plan at the federal and state levels, respectively. Of these two organization setups, NWRC had been established in 1996 enhancing the policy of the nation-wide consistent water development and management. On the other hand, the establishment of SWRC had been once conceived but not achieved in the States Kedah and Pahang, and even any concept on it has not come out in other states, yet.

(2) Federal Water Resources Division (FWRD) and State Water Resources Division (SWRD)

The NWR-M/P proposed the FWRD and SWRD, which have the authorities to formulate the definite water resources development plans at the national and state levels and the roles to support the above NWRC and SWRC, respectively.

The Ministry of Natural Resources and Energy (MoNRE) was established through reorganization of the Ministries and Agencies in 2004. There were various departments, which functioned as the regulators for water resources development and management, such as: (a) DID for regulating of water resources/river development and management, (b) DOE for regulating of water-related environment and FD for watershed management. All of these departments had belonged to the different Ministries but they were reorganized to be under MoNRE in 2004. At the same time, MoNRE acts as the secretariat of the above NWRC undertaking all of the practical water-related administrative works at the federal level. From this point of view, the MoNRE could be regarded to substantially perform the functions of the aforesaid FWRD.

FWRD is required to have the high expertise for water resources development and management. In this connection, the Federal DID, which is in charge of regulating the water resources development and management under MoNRE, has enhanced its regulating capacities as described in the under-mentioned subsection 2.3.5. Accordingly, the Federal DID could certainly

fulfill the required tasks of the FWRD. Moreover, the State DID would be the most eligible candidate of the SWRD to technically support the SWRC.

(3) Water Resources Development and Management Corporation (WRDMC)

The NWR-M/P proposed establishment of WRDMC to realize the centralized and efficient implementation and operation of the nationwide water resources development projects. This proposal for the WRDMC has not been realized yet, but the following agencies currently undertake the substantial functions required to WRDMC, which is deemed to have stepped forward to the water resources development executed in accordance with the unifies national policy.:

- The Water Asset Management Company (WAMCO), which was newly established as the state-run enterprise in accordance with the Water Services Industry Act 655/2006, is in charge of development and management of the nationwide municipal water and sewerage system under supervision of the National Water Services Commission (NWSC), which belongs to the Ministry of Energy, Green Technology and Water. The private companies are entitled to rent the municipal water supply system from WAMCO and provide the municipal water supply services to the end users.
- The Ministry of Agriculture (MOA) took over the roles for development of the national irrigation system and its related water sources from the Federal DID after the aforesaid reorganization of the Ministries and Agencies in 2004.

2.3.2 Revision of Water-related Laws and Regulations

The NWR-M/P proposed the revision of Waters Act and the regulations related to the financial system for water resources development and management. The major contents and progresses of the proposed revisions are as described hereinafter:

(1) Waters Act

The Waters Act was enacted in 1989 but it was just oriented to the minor revision of the former Water Regulations established in 1920 keeping a fundamental rule such that all of the property rights on the water resources belonged to the State Government. In order to revise the contents of the Waters Act and attain the unified water resources development and management by the Federal Government, establishment of the National Water Resources Code, which shall replace the Waters Act, was proposed in the NWR-M/P. However, replacement of the Water Act by the National Water Resources Code has not been made, and thus the proposal by the NWR-M/P has not been made effect.

(2) Financial System for Water Resources Development and management

The following various new financial systems were proposed in the NWR-M/P in order to secure the available budget for development and operation of the municipal water system, the sewerage system, the irrigation water supply system, the urban drainage system and the multipurpose water sources:

Table 2.1 Financial Systems proposed by the NWR-M/P for Development and Operation of Water-related Services/Facilities

Sector	Financial System
Municipal Water Supply Service	• The cost for the project of development, operation, maintenance and management for the municipal water supply service shall be imposed, in principal, to the beneficiaries. • However, the subsidy from the federal and/or state government shall be accepted, when the project aims at promoting the participatory of beneficiaries to the project implementation and/or support the low income class.
Sewage Service	• The cost for the project of development, operation, maintenance and management for the public sewerage shall be imposed, in principal, to the beneficiaries. • However, the existing loan system by the Federal Government for development of the sewerage system shall be maintained.
Urban Drainage Service	• The construction costs for the public drainage pipes shall be financed from the tax revenues of the State Government, while the costs for the private drainage pipes shall be imposed on the beneficiaries.
Development of Multipurpose Water Sources	• The rules of cost sharing among the relevant agencies for development of the multipurpose water sources shall be established.

Source: National Water Resources Study, Malaysia, JICA, 1982

Of the above proposals, those for the municipal water supply services have been substantially attained by the aforesaid privatization. That is, the aforesaid WAMCO (the state-run enterprise) constructs the municipal water supply facilities, while the private enterprise rents the facilities from the WAMCO and renders the municipal water supply services. Thus, the cost for operation and management of the municipal water supply services is imposed to the beneficiaries through privatization, although cost for development of the relevant facilities is still shouldered by the Federal Government. On the other hand, the proposed financial systems for sewerage services, urban drainage services and development of the multipurpose water sources have not been attained yet.

2.3.3 Progress of the Projects for Structural Measures proposed in the NWR-M/P

The total budget for the Fifth Five-Year Malaysia Plan (1986-1990) had been drastically reduced due to the serious financial crisis in 1985. In spite of such large reduction of the total budget, the budget in the sector for the water resources development in the Fifth Malaysia Plan had exceptionally increased by 1.3 times. This exceptional increment of the budget could be attributed to a great impact by the NWR-M/P, which lunched out the national policy emphasizing the necessity of water resources development and flood mitigation. In accordance with the increment of the budget in the sector for water resources development, construction of dams and other relevant facilities had been largely progressed as described hereinafter.

(1) Construction of Facilities for Water Resources Development and Distribution

Of the existing 48 dams in Malaysia[1], 23 dams had been constructed increasing the total storage capacity from about 9 billion m^3 to 30 billion m^3 since1985 with NWR-MP as a turning point as shown in Table 2.2[2]. Moreover, out of the said 23 dams, which had been constructed after 1985, 21 dams are for the municipal water supply and/or the multipurpose, which include the municipal water supply as one of the purposes. Thus, the priority in the water resources developed after NWR/MP was given to the municipal water supply. The NWR-M/P aimed at increasing the supply capacity from 2million m^3/day in 1980 to 10.3million m^3/day in 2000.and achieving the coverage ratio of 90% for the municipal water service. The actual supply capacity in 2000 had reached 11.8million m^3/day, which was over the said target of 10.3million m^3/day proposed in the NWR-M/P.

As for the dams for irrigation, however, NWR-M/P proposed construction of 22 dams, while the number of the dams actually completed in 2000 was limited to 5 only. As the results, the NWR-M/P targeted at 85% as the self-sufficiency of the paddy in 2000, while the present self-sufficiency rate is limited only to 70%. It is, however, herein noted that the less self-sufficiency rate would be not necessarily attributed only to sluggishness of the dam construction, but also the low-priced paddy imported from Thai and/or Vietnam and the change of the industrial structure from the primary sector to the second/third sector industry in Malaysia.

Table 2.2 Transition of the Number and Effective Storage Capacity of Dams in Malaysia

Period	Number of Dams	Number of Dams by Purposes (including the multipurpose dams)				Effective Storage Capacity (Mil. m^3)
		Municipal Water Supply	Irrigation	Flood Mitigation	Hydropower Generation	
Before 1985	25	15	5	8	2	8,872
After 1985	23	21	5	2	5	20,737
Total	48	36	10	10	7	29,609

Note: The figures in the Table are for the dams, which have the effective storage capacity of more than one million m^3

Source: Malaysia Water Industry Report, JKR

(2) Construction of River Structures for Flood Mitigation

Most of the major river structures for flood mitigation had been constructed after 1985 the year of completion of the NWR-M/P as shown in Table 2.3. However, the length of the river channel improvement and the number of the flood control dams actually completed are still limited to 260km and 3 dams, respectively, which are far less than the proposed figures by NWR-M/P (i.e., 850km and 12 dams).

[1] The dams, which have the effective storage capacities of more than one million m^3

[2] It is noted that the dam construction has not been implemented in Malaysia after completion of Beris Dam in 2004 due to the recent worldwide trend of the anti-dam construction.

Table 2.3 The Principal Flood Mitigation Projects implemented after Completion of NWR-M/P

Item	Contents
River Channel Improvement	Klang River (29km)、Muda River（52km）、Kelantan River（100km)、Melaka River Floodway（5km）、Penang River（2km）、Perlis River（34km）、Linggu River（41km）
Flood Control Dam	Timah Tasoh Dam、Batu Dam、Bekok Dam

Note: The figures in parenthesis for river channel improvement are extracted from the project explanatory note or estimated with referring to the length of the river channel improvement proposed in NWR-M/P

Source: "River and Water Resources Report of Malaysia, by Kawasaki Hideaki & Shindo Hiroyuki, 1997
"Malaysia Water Industry Report, JKR"

2.3.4 Progress of the Projects for Non-structural Measures proposed in the NWR-M/P

Of the projects for the non-structural measures proposed in the NWR-M/P, the following items have been implemented and made a contribution to the water resources management in Malaysia.

(1) Strengthening of the Hydrological Gauging System

The NWR-M/P proposed strengthening of the hydrological gauging system and development of the hydrological database and the ledger for river management as one of the eligible approaches to the unified nationwide water resources management. The DID has completed the hydrological database, which compiles the long-term data for rainfall and the surface water level/discharge covering the whole nation, already. Moreover, the DID has completed the river information system (GIS) for four river basins and scheduled to expand them into the nationwide network.

(2) Renewal of National Water Resources Development and Management Plan

The water resources development and management projects had been independently implemented by each of the State Governments, while the NWR-M/P put the priority to the implementation of projects under the unified national policy. The NWR-M/P further pointed out the necessity of the periodical renewal of the national water resources development and management plan so as to meet the dynamic changes of the social and natural environments related to the water works.

The NWR-M/P was formulated, through the technical assistance by JICA, as the original national water resources development and management plan in 1982, and it was renewed by the Government of Malaysia twice without support by any donors. The first renewal if the NWR-M/P was made by EPU in 1998-2000 to update the water resources potential in the Peninsula of Malaysia and formulate the new water resources development and management plan. The second renewal was made by the DID in 2009-2011 to review the results of the said first renewal of the plan and enact the new laws related to the policy on the nationwide water resources development and management.

(3) Formulation of Regional Water Resources Development and Management Plan

In order to materialize the aforesaid national water resources development and management plan, the NWR-M/P pointed out the necessity of formulation of the regional water resources development and management plan, which covers the areas of most serious shortage as its objective area. Immediately after the NWR-M/P in 1982, two regional water resources development plans were carried out for: (a) the northern three States of Perlis, Kedah and Pulau Pinang and (b) the southern part of Johor State. However, after the aforesaid two NWR-M/Ps undertaken in 2000 and 2011, any regional water resources development and management plan had not been carried out.

2.3.5 Capacity Development（CD）

The DID had been in charge of implementation of the projects for irrigation and agricultural drainage, as derived from its name, and it had possessed the scarce knowledge on regulatory works for the water resources development and management during the time of execution of NWR-M/P in 1980s. On the other hand, the transfer of knowledge on the regulatory works had been intensively made to the DID through the NWR-M/P as well as the JICA long-term experts, which had been assigned ever since the NWR-M/P, and as the results, the DID had gradually sifted its principal role and authority from the operation of the irrigation/drainage to the regulation of water resources development and management. The said sift of the principal roles of the DID could be also recognized from the changes of the budget allocated to DID as described below:

- The budget of the Federal DID for the irrigation and agricultural drainage took about 80% of the total budget, while the share of budget for the water resources development was less than 10%. in the five year-period of 1976-1980 (i.e., before commencement of NWR-M/P),
- The Federal DID reduced its share of budget for the irrigation and agricultural drainage to 20% and, on the contrary, the share of the budget for the water resources development had increase to 20% in the five-year period of 1996-2000.
- Due to the reorganization of the government ministries in 2004, the Federal DID transferred to the Ministry of Natural Resources and Energy (MoNRE) from the former Ministry of Agriculture. Taking this opportunity, the Federal DID abolished the section for the irrigation and agricultural drainage, and allocated its entire budget to the water resources development and management.

In addition to the aforesaid transition of organization setup, the Federal DID had also endeavored to build the capacities of its staffs through transfer of knowledge from the long term experts dispatched from JICA and experiences as the C/P for the JICA-assisted studies on the water resources development and management (refer to subsection 2.3.9). As the results, the Federal DID has attained the capacity to undertake the transfer of knowledge on the water resources development and management, as the trainer, for other Asian developing countries, as seen in the Malaysian Technical Cooperation Programme (MTCP).

2.3.6 Environmental and Social Consideration

There had not been existed the guideline for environmental and social consideration in Malaysia at the time of execution of NWR-M/P in the first half of 1980s. Therefore, the environmental and social consideration had not been adequately taken in NWR-M/P. However, NWR-M/P proposed the standards of river water quality, the river maintenance flow and development of the sewerage system for the sake of improvement of water contamination.

The Department of Environment (DOE), which currently belongs to the MoNRE together with the DID, had established the standards for river water quality after completion of NWR-M/P, and further prepared the Decree on the environmental impact assessment, which obligated execution of EIA for development projects including those for water resources development, in 1987. The EIA went along the prevailing worldwide trend, and therefore, the above series of DOE's activities would not be necessarily caused by NWR-M/P. The river environmental flow proposed in NWR-M/P had be taken into consideration in the recent water resources development projects such as Beris Dam Projects but it has not been officially systematized in Malaysia.

2.3.7 Development of basic Information on Water Resources Development and Management

The NWR-M/P furnishes a large volume of the basic data on the water resources, and the fundamental concepts/standards for water resources development and management as listed in Table 2.4. These data, concepts and standards are widely adapted as the bases for the water-related administrative works.

Table 2.4 Basic Data, Concepts and Standards furnished by NWR-M/P

Classification	Contents
Basic Technical Information on Water Resources Development and Management	- Nationwide hydrological gauging data such as the data of rainfall, water level and discharge - Nationwide water resources potentials and eligible water supply capacities - Nationwide flood hazard maps
Basic Concepts and Standards adapted to Water Resources Development and Management Plan	- Concepts and method for setting of the river environmental flow - Allowable risks on water allocation for irrigation and municipal water supply in the extraordinary drought - Adaptation of the inter-state water transmission - Setting of criteria for river water quality - Rules on beneficiary-to-pay principle - Government subsidiary system for water resources development and management

Source: National Water Resources Study, Malaysia, JICA, 1982

2.3.8 Water Resources Development and Management for International Rivers Examined in NWR-M/P

During the time of execution of NWR-M/P (i.e., 1980s), Malaysia had supplied the raw water of within the limit of 415million m^3/year (13m^3/s) to Singapore in accordance with the agreement in 1962. However, the incremental water demand in Singapore could not be fulfilled by the said water supply from Malaysia and the water supply capacity in Singapore itself. In order to cope with the inadequate water supply capacity for Singapore, a new water resources development project was proposed in

NWR-M/P and further examined in detail through the succeeding “South Johor Regional Water Resources Development Study in 1985”.

Based on the results of the above two studies, the new agreement had been made in 1990, whereby Singapore constructed Linggui Dam in Johor River Basin as a part of the source for municipal water supply. This agreement is, however, to be expired in 2011, and since then, the raw water transmission from Malaysia to Singapore may possible be terminated. In order to cope with this issue, Singapore currently attempts various approaches such as utilization of rainfall, the desalination of the sea water and filtering of sewage as the measures for development of the new water sources.

2.3.9 Japanese Technical Cooperation in Malaysia

The major technical cooperation for water resources development and management in Malaysia had been by United States, England and Australia in 1970s, while that by Japan had been extremely little. After completion of NWR-M/P, however, the technical cooperation by the countries other than Japan had been reduced to a few projects such as “Klang River Basin Environmental Improvement and Flood Mitigation Project by ADB, 2007” and “Melaka Rehabilitation Project by DANIDA, 1998”. On the contrary, the technical cooperation by Japan such as dispatch of the long term experts and execution of the development studies has continued until 2001 after NWR-M/P, and it was based on the consistent themes of (a) regional water resources development, (b) flood mitigation, (c) river and basin management and (d) improvement of water related environment. Such technical cooperation by Japan made a great contribution to improvement of water resources development and management originating from NWR-M/P. The development studies undertaken and long-term experts dispatched by the Government of Japan in connection with the water resources development and management are as listed below:

Table 2.5 Development Studies Water Resources Development and Management under Technical Cooperation by Japan

Main Theme of Study	Name of Study	Study Period
Regional Water Resources Development	National Water Resources Study, Malaysia: Perlis-Kedah-Pulau Penang Regional Water Resources Study	1983～1984
	National Water Resources Study Malaysia, Regional Water Resources Study of South Johor	1984～1985
Flood Mitigation	The Study on Flood Mitigation of Klang River Basin	1988～1989
	The Kelantan River Basin Study	1988～1989
	The Study on Flood Mitigation and Drainage in Penang Island	1989～1991
	The National River Mouth Study	1991～1994
River and basin Management	Comprehensive Management Plan of Muda River Basin	1993～1994
	The Study on Establishment of the River Information System in Malaysia	1997～1998
Improvement of Water Related Environment	The Study on Integrated Urban Drainage for Melaka and Sungai Petani in Malaysia	1998～2000
	The Study on the Sustainable Groundwater and Environmental Management for the Langat River Basin in Malaysia	2000～2001

Source: JICA Library

Table 2.6 Long-Term Expert on Water Resources and River Management Assigned during and after NWR-M/P

Name of Expert	Main Theme for assignment	Period of Assignment
Tanimoto Shuji	Water Resources Development（Dam, Flood and Water Use Plan）	1979～1982
Kimiduka Akira	Water Resources Development (Water Law)	1979～1982
Sazawa Eiichi	Flood Mitigation (River Improvement)	1983～1986
Matsuishi Tadatoshi	Flood Mitigation (Flood Inundation Analysis, Flood Mitigation Plan)	1986～1989
Masuda Akinori	Flood Mitigation (River Engineering, Urban Drainage)	1989～1992
Sumi Tetsutaro	Flood Mitigation (Closure of River Mouth, Coastal Erosion）	1990～1992
Kawasaki Hideaki	River and Basin management	1992～1995
Shindo Hiroyuki	River Environment Management	1996～1998
Takagi Katsunori	Comprehensive River Basin Management	1998～2000
Sasahara Hidenori	Comprehensive River Basin Management	2001～2003

Source: River and water Resources Report of Malaysia 1997, Kawasaki and Shindo Kaigai Kensetsu Jouho

2.3.10 Results of Field Reconnaissance (Confirmation of Outcomes of NWR-M/P in the State of Kedah)

The State of Kedah was selected as the priority area for water resources development together with its neighboring States of Pulau Penang and Perlis by NWR-M/P. The national irrigation area managed by Muda Agricultural Development Authority (MADA) is located in the State of Kedah and it is one of the five major granary areas in Malaysia producing about 30% of the national entire paddy[3]. The importance of the water resources development for such granary area continues in order to increase the paddy production and raise the self-sufficiency of the paddy in Malaysia.

The following water resources development projects in the State of Kedah have been made in accordance with the plans proposed by the NWR-M/P[4] (refer to Annex-F 2 and 3).

- In 1985, the feasibility study was made for the Beris Dam Project, which had been selected as the priority project in NWR-M/P, and the Project was implemented through the financial assistance by JBIC Loan.
- Timah Tasoh Dam and Ahning Dam had been constructed by the financial assistance of ADB and the national budget, respectively.
- The detailed design for the Jeniang Irrigation System is also now in progress by the Malaysian local consultant with using the national budget[5].

[3] The entire extent of MADA is 96,558ha and its 35% has been provided with the irrigation facilities. The density of irrigation canals is currently planned to increase to 30km/ha to 11m/ha. The present paddy production is 5 to 6 ton/ha, while the future target is set at 8 to 10ton/ha. In accordance with the reorganization of the ministries, the Muda Regional Office of Federal DID plans, designs, procures and constructs the irrigation facilities for the national irrigation areas and handover them to the agricultural development authorities like MADA.
Aside from the area of MADA, there exist the irrigation area of 16,000ha and the rain harvesting area of 20,000ha in the State of Kedah: the paddy production volume by the irrigation area is about 2.5 to 3.5ton/ha and the rain harvesting 2.2 to 2.5 ton/ha.,

[4] Of the projects proposed in the NWR-M/P, those for construction of Durian Dam and Badak Dam have not been implemented due to the expansion of the urban area and or the plan of construction for the campus of a university at the proposed dam sites.

- The Project for Muda River Improvement with the initial project investment cost of about 25billion yen in equivalent is in progress by the national budget.

The consistent water allocation system among the states and/or water users has not been established yet but it would be indispensable as proposed in the NWR-M/P taking the incremental water demand and the on-going water resources development/supply facilities into account. The State Government of Keda established the State Water Resources Council (SWRC) in order to coordinate and adjust the water allocation rules. In the event of the drought, the priority of the water supply is given to the municipal water demand and the reduction of paddy production caused by the inadequate irrigation water supply is covered by the budget of the State Government. The hydrological data such as those for the river discharge, water level and rainfall have been gauged at 17 gauging stations since 1960s and used for various analyses.

Mr. Asrul, the DID person in charge of dam management explained the following items

(1) He participated as the counterpart personnel to the NWR-M/P and its relevant Perlis-Kedah-Pulau Penang Regional Water Resources Study, and could learn the processes for formulation of the water resources development plan through the experience as the counterpart.

(2) He also learned the sincere approaches of the Japanese engineers toward the dam construction through his assignment for Beris Dam Project.

(3) The "5S" (the five mottos to be thoroughgoing in the work, which have been adopted in the Japanese manufacturing industrial offices) was indicated at DID head office as well as the Beris dam control office. This is deemed to inherit from the Japanese stile in line with the "Look East Policy".

(4) Beris dam was deemed to be well maintained through the monitoring system of the physical transformation of the dam body as well as other dam structures/facilities.

(5) The NWR-M/P proposed the river environmental flow (or the river maintenance flow), which is indispensable to maintain the river environment and ecosystem and preserve the vested water use right. The proposed river environmental flow was included into the one of the obligations to be guaranteed through the reservoir operation of Beris dam, and its corresponding discharges of 0.41 m^3/s is currently being constantly released from the dam.

The details of the said Beris Dam Project as well as the present status of water resources management in the State of Keda are as described hereinafter:

(1) Beris Dam

The Project of Beris Dam was commenced in 1998 upon releasing the loan of 97.37billion yen through the 17th Yen Package Loan, and it was completed in 2004. The Dam has the gross reservoir storage capacity of 114million m^3 supplying the water to the irrigation areas in the

[5] The Jeniang Irrigation System is composed of Naok Dam with the dam body of 18m high and the storage capacity of 57 million 3 and the diversion tunnel of 9m in diameter with the diversion capacity of 55m^3/s.

lower reaches of Muda River, the municipal/industrial water use in the State of Pulau Penang and the use for the river environmental conservation. The Beris Dam guarantees the river maintenance flow of 0.41m^3/s for the downstream of the dam site, which is indispensable to preserve the river natural environment.

The Beris Dam supplies the water to the multipurpose uses in the extensive areas and therefore, it is important to adjust and/or coordinate the proper allocation of the water supplied by the Dam among the beneficiaries and the relevant state governments. The Dam is located within the sate boundary of Kedah, while its objective supply area covers over not only the irrigation area in the State of Kedah but also the metropolitan area in the State of Pulau Penang. In the event of the serious drought in 2010, the priority of water supply by the Dam was given to the municipal water use and, the irrigation schedule was adjusted to cope with the reduction of water supply from Dam to irrigation areas.

The dams such as Muda and Pedu adjacent to Beris Dam are currently managed by MADA, while Beris Dam has ever been by the federal government (i.e., DID), since the Dam had been constructed by the DID. The equipment for monitoring and controlling of the dam structures are well maintained. The leakage and/or distortion of the dam structures are monitored all the time and the monitoring data are sent to the Headquarter of DID in Kuala Lumpur at the real time base.

The Beris Dam is the concrete faced rock-fill dam, which is the particular dam type seldom adopted in Japan. As compared with the typical rock-fill dam with center core, the Dam could shorten 6 months for its construction period and reduce the construction cost by 20%.

The resettlement of about 600 houses for construction of the Beris Dam had been completed through preparation of the resettlement site about 20km away from the dam site and the Yen Loan was allocated to the resettlement works, which include construction of houses, the multipurpose hall, the basic infrastructure such as the water and power supply system at the resettlement site and other relevant facilities.

An appraisal on Yean Loan for the Beris Dam Project had been once made in 1993, but the Loan had not been approved due to the immature resettlement plan in the project. As the results, it took 5 years to complete the Project. Nevertheless, the project implementation period of 5 years could be evaluated necessary to mature the resettlement plan, and construction period had been shortened as described above, which could finally bring about the earlier effect of the Dam.

(2) Water Resources Management in the State of Kedah

The following water resources management in the Sate of Keda was confirmed through the field reconnaissance:

(a) Hydrological Gauging System by the DID in the State of Kedah

The Hydrological gauging of river discharge, water level and rainfall in Muda River Basin had been commenced in 1960s, and the hydrological data are currently gauged at 17 stations, stored and used for various hydrological analyses. These hydrological gauging works are essential for the DID to undertake the proper river management and flood mitigation works.

(b) The Field Office of the Federal DID

There exists a field office of the Federal DID in the State of Kedah called Muda River Office, which is in charge of planning, designing and construction of the irrigation facilities for MADA national irrigation area of about 100 thousand ha. Based on the interview survey to this field office and field reconnaissance on the irrigation facilities in the MADA irrigation area, it is confirmed that about 40% of the nationwide entire paddy production is attained by the water supply of the following existing and proposed facilities: (i) the existing Muda Dam and Pedu Dam, which had been construction by Kashima and Obayashi Co., Ltd.., respectively, (ii) the Beris Dam and (iii) other proposed water resources facilities such as Jeniang Diversion System and Reman Dam to be constructed in the lower reaches of Muda River. The current paddy production in the rain harvesting area of MADA is limited to about 3 ton/ha, but it could increase to 5 to 6 ton/ha through expansion of the irrigated area as well as the intensive farming approaches.

(c) Muda Agricultural Development Authority (MADA)

The MADA intends to carry out the detailed design for the aforesaid Jeniang Diver System in the lower reaches of Muda River and complete it within 5 years.

(d) Reconnaissance on the Relevant Water Resources Management Works in the State of Kedah

It is confirmed through reconnaissance that the water resources development and management works in the State of Kedah are well progressed in accordance with the concepts and plans proposed in the NWR-M/P since 1982 such as “Thima Tasoh Dam Development Project”, “Ahning Dam Development Project”, “Beris Dam Development Project” and Watershed Management and Comprehensive Urban Drainage Improvement Project of Muda River Basin (on going)”. Moreover, the knowledge on development of the water-related infrastructure has been accumulated in parallel with the economic growth, and the field office of DID is gradually shifting its roles of the project implementation to the private firms. The local consultants in Malaysia are evaluated to have enhanced their capacity to undertake the planning, designing and construction supervision for the water-related projects by themselves.

2.4 Evaluation of NWR-M/P and Future Directions of Cooperation

The NWR-M/P could be the first long-term and nationwide master plan and/or national policy on the water resources development and management in Malaysia making a great contribution to the progress of the relevant water-related projects in the country and furnishing many valuable results of the study as the precedent of the succeeding M/Ps in other developing countries

In addition to formulation of the policy/plan for the water resources development in the technical aspect, the NWR-M/P also went deeply into the organization and institutional reforms reflecting the urgent necessity of the comprehensive water resources development and management. Thus, the NWR-M/P for Malaysia is judged to have furnished the advanced and/or leading contents of the plans. A substantial part of the plans proposed in the NWR-M/P has not been implemented yet leaving several issues. Taking the principal issues and problems latent in the NWR-M/P into consideration, the following matters are pointed out as the future directions of cooperation related to NWR-M/P.

2.4.1 Improvement and Strengthening of the Organization and Institutional Setup

As described in subsection 2.3.1 above, the National Water Resources Council (NWRC) had been established in 1996 as proposed in the NWR-M/P. The reorganization of the Ministries and Agencies in 2004 had also brought about the Ministry of Natural Resources and Environment (MoNRE), which is expected to possess the similar functions to those of the Federal Water Resources Division (FWRD) proposed by the NWR-M/P. Moreover, the Federal DID, which belongs to MoNRE, has enhanced its adequate capacity for regulating of the nationwide water resources development and management through transfer of knowledge by the long-term experts dispatched from JICA since the completion of the NWR-M/P onward. Establishment of the NWRC and the MoNRE as well as capacity development of the DID are judged to have facilitated to formulate of the consistent national policy on the water resources development and management and implement the water-related projects based on the policy.

However, the revision of the Water Act as well as establishment of the State Water Resources Committee (SWRC) as proposed in the NWR-M/P has not been made yet. As the results, the property right of the water still belongs to the State Government, which hinders the unified water resources management based on the adequate coordination between the Federal Government and the State Government.

The above issues on the legal and organization setup could be attributed to the extremely strong decentralized powers vested to the State Governments, and it is essentially required to integrate such decentralized powers into the centralized power vested to the Federal Government in order to implement the nationwide consistent water resources development and management under the unified national policy. This direction toward the centralization of the powers in Malaysia may be different from the movement of the decentralization of powers for attaining of more effective water resources development and management in other many developing countries.

It is said that the principal factors which hampered the revision of the Water Act as proposed in the NWR-M/P, are indirectly attributed to the prolonged rule of water by the State Government since independence from England, and directly to the resistance by the State Government and/or the political wills. It would not be easy to solve such factors in a short-term and it is required to gradually improve the contents of Water Act through continuous coordination among the Federal and Sate Governments.

2.4.2 Progress of the Projects for Structural Measures

As described in subsection 2.3.3, the NWR-M/P has made a certain contributed to implementation of the projects for development of the water resources development facilities. The projects in the northern three states of Perlis, Pulau Penang and Keda in particular proved the eligibilities of the NWR-M/P and succeed to the present remarkable progress. On the contrary, however, it is also true that the actual investment cost for the projects is far smaller that that proposed in the NWR-M/P, and many of projects for construction of the water resources development have not been implemented yet. The NWR-M/P estimated at about 41.3billion Malaysian Ringgits as the cost for implementation of the whole projects. On the other hand, the actual cost invested to the project implementation throughout the 4th to 7th Five-Year Malaysia Plan from 1981 to 2000 was limited to 24.5billion Malaysian Ringgits only as shown in Table 2.7. As the results, many of proposed facilities for irrigation in particular have not been implemented, which led to reduction of the self-sufficiency rate of paddy as described above. From this point of view, it is deemed to be necessary to propose more realistic target of the water resources development taking the affordability of the national budget into account.

However, the NWR-M/P fundamentally aims at prospecting the long-term water supply-demand balances and clarifying the water resources development facilities required to cope with future potential water deficit. Moreover, the contents estimated and/or proposed by the NWR-M/P should be revised one after another through the process for formulating of more definite mid-term development programs and prioritizing of the projects. From these points of view, even if some of the projects proposed by the NWR-M/P are not implemented for a time span of more than 10 years due to the external factors, the value of the M/P is not to be spoiled.

Table 2.7 Comparison between Investment Cost Proposed in the NWR-M/P and Actual Investment Cost for Water Resources Development Facilities

(Unit: Million Malaysian Ringgit)

Item	4th Malaysia Plan (1981-85)	5th Malaysia Plan (1986-90)	6th Malaysia Plan (1991-95)	7th Malaysia Plan (1996-20)	Total
Proposed	5,970.0	16,223.0	13,386.0	5,710.0	41,289.0
Actual*	6,548.8	4,884.5	5,957.8	7,079.4	24,470.5

*: The actual cost invested to the infrastructures for the flood mitigation, irrigation/agricultural drainage, the integrated agricultural development, urban drainage, municipal water supply, hydropower generation

Source: River and water Resources Report of Malaysia 1997, Kawasaki and Shindo

2.4.3 Development of Basic Information in the NWR-M/P

The NWR-M/P developed various basic information such as the hydrological gauging data, the estimated potential water resources and the potential flood hazard areas. These basic information are widely and sustainably utilized by the relevant plans for the regional and basin water resources development and management. The water supply-demand balance provided as one of the basic information are also used as the definite grounds to prove the necessity of the water resources development and management succeeding to the NWR-M/P. From these points of view, development of the basic information could be one of the important outcomes of the NWR-M/P having the values almost equal to formulation of the water resources development plans and/or proposals on the organization/institutional reforms.

2.4.4 Capacity Development (CD) in the NWR-M/P

As described in the foregoing subsection 2.3.5, there had not existed any government agencies, which had possessed the adequate capacity for executing the consistent water resources development and management under the national policy, before the NWR-M/P had been executed. Under these conditions, the Federal DID could have enhanced the capacity to regulate the nationwide water resources development and management in particular through transfer of knowledge made in the NWR-M/P and by the long-term experts dispatched after the M/P. This capacity development given to the Federal DID could be one of the important outcomes of the NWR-M/P.

The Government of Malaysia has reviewed and updated the NWR-M/P twice in 2000 and 2011 without any assistance by the donors. This could prove that the Government of Malaysia has established its ownership of the NWR-M/P and enhanced the capabilities to formulate the NWR-M/P for oneself. It is indispensable to periodically update the NWR-M/P in order to cope with the dynamic changes of the natural and socio environments, and the awareness of the Government of Malaysia on the necessity of the updating of the NWR-M/P could be also one of the important outcomes of the NWR-M/P.

The above outcomes of CD have been attained through the extremely large volume of the inputs of the experts for the study of the NWR-M/P and the long-term experts assigned after the NWR-M/P[6], while such large volume of inputs would be hardly expected to the future NWR-M/P. Moreover, the CD has not been deliberately executed based a program originally prepared. Taking these issues into account, the following expedients would be required in order to attain the effective CD:

(1) The priority objectives of CD on the water resources development and management shall be selected during the time of the Study for the NWR-M/P, and

(2) The consistent program for execution of the CD during and after the NWR-M/P shall bee prepared

[6] The Study on the NWR-M/P for Malaysia was executed for a 4-year period, during which about 30 experts were assigned in total from four consulting firms. In addition, 10 long-term experts were dispatched to support the results of the NWR-M/P from 1979 until 2003.

taking the technical cooperation not only by JICA but also by other donors and/or the recipient country for oneself.

2.4.5 Approaches to the Climate Changes in the NWR-M/P

The Study for NWR-M/P in Malaysia had been carried out from 1979 to 1982 as the first among those on the nationwide water resources development and management by the technical assistance of JICA. During the said study period, the present prevailing issue of the climate changes had not been examined.

However, the urban effect of a natural disaster in particular tends to be more serious due to concentration of the population into the urban area and increment of the rainfall intensities and the peak flood runoff discharge inflicted by the climate changes. At the same time, the extraordinary droughts occur more often, which could also be attributed to the effects of the climate changes. Accordingly, the climate change should be one of the important issues to be examined in the future NWR-M/Ps, and from this point of view, the following approaches against the climate changes have been commenced in Malaysia already:

(1) Formulation of the plans for adaptations to and mitigation of the climate changes in the 10th Fiver-Year Master Plan (2011-2015）

(2) Study on the climate changes in Malaysia undertaken by National Hydraulic Research Institute, Malaysia (NAHRIM) for a period from 2002 to 2006）

(3) Study by JICA technical assistance on the changes of the flood runoff discharges influenced by the climate changes in Muar River Basin (refer to “Preparatory Survey for Integrated River Management Incorporating Integrated Management with Adaptation of Climate Change, 2009-2011”).

In this new era requiring the new measures for energy resources, several approaches to the climate changes other than those made by ODA are expected to be jointly undertaken by Malaysia and Japan.

2.4.6 Approaches to Integrated Water Resources Development (IWRM) in NWR-M/P

There had not existed the concept of the day on the IWRM during the time of NWR-M/P in 1982. However, the objectives of the NWR-M/P expands over various water sectors such as irrigation, municipal water supply, hydropower generation, flood mitigation and water-related environment, and from this point of view, the NWR-M/P could have fulfilled one of the important issues of IWRM. On the other hand, the following issues on the IWRM have not been adequately examined in the NWR-M/P:

(1) Reforms in Water Resources Development and Management for Dynamic Changes of the Surrounding Environments

The IWRM requires the flexible approaches to the water resources development and management, which could cope with the dynamic changes of the surrounding social and natural environments such as population growth, economic growth and climate changes. Some attempts for such flexible approaches in Malaysia have been made through the aforesaid updating of NWR-M/P in 2000 and 2011 succeeding to the original M/P in 1982. Moreover, the under-mentions new approaches to the IWRM are programmed in Malaysia. Based on these approaches to the IWRM, Malaysia is deemed to establish the system, which could attain the spiral evolution of the water resources development and management repeating the cycles (with a span of about 10 for unit of cycle) for: (a) "Analysis on the Present Situation"→(b) "Plan Formulation"→(c) "Project Implementation"→ (d) "Monitoring of the Effects of the Projects".

(a) The National Water Resources Council (NWRC) has decided to formulate the Integrated River Basin Management (IRBM i.e., the basin-wide IWRM) for 189 river basins in Malaysia.

(b) The trials of the above IRBMs have been commenced in Langat River Basin and other three river basins.

(c) The Federal DID has prepared the technical standards and guideline for IRBM.

(d) The technical guideline for IRBM, which pays a particular attention to the climate change, has been prepared through the JICA technical assistance (refer to "Preparatory Survey for Integrated River Management Incorporating Integrated Management with Adaptation of Climate Change, 2009-2011").

(2) Involvement of Stakeholders

The IWRM requires involvement of the stakeholders into the all stages on water resources development and management including: (a) Analysis on the present situation, (b) "Plan formulation, (c) Project implementation" and (d) "Monitoring of the Effects of the Projects". The stakeholders involved to the NWR-M/P in 1982 were limited to the water-related government agencies such as EPU and DID, which are assigned as the members of the Steering Committee for the Study. The future studies on the NWR-M/P shall involve not only the government agencies but also other private entities such as the water users and the academies as the stakeholders.

(3) Wider Points of View for Water Resources Development and Management

The IWRM requires attaining of the water resources development and management from wider points of view including: (a) fairness, (b) economical viability, (c) sustainability and (d) environmental impacts inflicted by the project. The NWR-M/P in 1982 had paid a substantial attention to the fairness and the economic viability on its proposed projects, while the

environmental assessment in the M/P in particular is deemed to be inadequate, and the further study in this aspect would be required in the future NWR-M/P.

Chapter 3. Case Study: Kenya

3.1 Introduction

During the field reconnaissance for Kenya, the interview survey was made to the government agencies, which are in charge of formulation and/or implementation of the water-related policy, such as: the Ministry of Water and Irrigation (MWI), Water Resources Management Authority (WRMA) and Tana-Athi River Development Authority. The interview survey was also made to the consultants engaged into the previous and the on-going NWR-M/Ps for Kenya. Furthermore the field reconnaissance was carried out in the upper reach of the Tana River, the surroundings of Lake of Naivasha in the central part of Kenya and the Nyando River Basin in the southeastern part of Kenya. The members and itineraries of the field reconnaissance are as shown in Annex-T 4.

It is noted that the following two NWR-M/Ps had been undertake through the technical assistance by JICA in Kenya, that is: the “National Water Master Plan, 1992” (hereinafter referred to as the NWR-M/P_1992) and the “Aftercare Study on National Water Master Plan” ((hereinafter referred to as the NWR-M/P_1998). Moreover, the third NWR-M/P was commenced in October 2010 and it is now in progress with a schedule of two-year study period in order to review the results of the above two NWR-M/Ps.

3.2 Outline of the NWR-M/P for Kenya

3.2.1 The Principal Water-related Problems in Kenya during the time of the Study for NWR-M/P

Kenya, where about 80% of the land is covered by arid or semi-arid lands, is essentially short of the water resources. Under such circumstances, Kenya recorded the high economic growth of 4 to 7%/year in GDP from 1985 to 1990, which had led to various strains on water use even in the areas where the water resources had been deemed abundant. In spite of such water deficit, the water resources development and management were undertaken under the separate jurisdictions of many government agencies. As the results, the conflicts among the water uses as well as the water-related agencies tend to have often occurred. In order to cope with such unfavorable conditions and attain the efficient use of the water resources, the NWR-M/P_1992 was undertaken in 1990-1992. The NWR-M/P_1998 was further undertaken to review the NWR-M/P_1992 and promote the municipal water supply improvement project in particular.

3.2.2 The Principal Study Items in the NWR-M/Ps_1992 and 1998

The principal study items in the NWR-M/Ps_1992 and 1998 are described hereinafter.

(1) NWR-M/P_1992

The NWR-M/P_1992 aimed at estimating the future water demand, the future development needs and the eligible water resources potentials until 2010. It further proposed the national targets for the water resources development based on the estimated indicators and formulated a development program to attain the targets. The principal study items for the NWR-M/P_1992 are enumerated as below:

(a) To set up macro-frameworks such as the socio-economic indicators, the water demands, the water resources potentials and the water supply-demand balance,

(b) To set up the national water resources development indicators in the sectors of the municipal water supply, the sewage treatment, the agriculture/irrigation, the hydropower generation and the river management/flood prevention,

(c) To formulate the water resources development plans until 2010 for the municipal water supply and sewerage, the irrigation, the livestock breeding/wild animals/inland fishery, the hydropower generation and the river management/flood prevention,

(d) To preliminarily estimate the project costs

(e) To propose an master action plan for the above water resources development plans assuming 2010 as the target completion year for the proposed plans,

(f) To propose the future study programs and

(g) To propose for the relevant organization and legal setups.

(2) NWR-M/P_1998

Objectives of the NWR-M/P_1998 are: (a) to review the development plans in the sector of the municipal water supply and sewerage treatment proposed in the NWR-M/P_1992, (b) to revise the plans proposed in the NWR-M/P_1992, (c) to strengthen the related legal and organization setups, and (d) to improve the operation, maintenance and management of the facilities. The principal study items are enumerated as below.

(a) To formulate the development plans for the municipal water supply system assuming 2010 as the target completion year for the proposed plans,

(b) To formulate the development plans for the sewerage system assuming 2010 as the target completion year for the proposed plans, and

(c) To propose the organization and institutional setup plan for operation, maintenance and management of the municipal water supply system and sewerage system.

3.2.3 The Organization for Study on the NWR-M/Ps_1992 and 1998

The NWR-M/P_1992 involved the National Water Conservation and Pipeline Corporation (NWCPC) as the leading counterpart agency and 18 member of the Steering/Technical Committees such as: the Ministry of Water Development (MOWD), Ministry of Energy (MOE), Ministry of Agriculture (MOA), Ministry of Regional Development (MORD), National Environmental Secretariat, Tana-Athi River Development Authority (TARDA), Lake Basin Development Authority (LBDA) and Ministry of Finance (MOF). On the other hand, the NWR-M/P_1998 involved the Ministry of Land Reclamation、Regional and Water Development (MLRRWD) as the leading counterpart agencies and the same members of the Steering/Technical Committee as those of the NWR-M/P_1992.

3.3 Progress of the Plans proposed in the Two NWR-M/Ps

The NWR-M/Ps_1992 and 1998 are judged to have provided the basic information and/or concepts on the water resources development and the water resources management, which had been utilized to the water-related administrations and plan formulations.

The water resources development plans proposed in the NWR-M/Ps were little implemented through the cooperation of Japan; however, they could be utilized by the other donors as the bases to spread the water related projects in Kenya. The NWR-M/P also proposed the plans for the organization and institutional setup related to the water resources management, which could give the basic frame for the subsequent reforms of the government organizations. As for the capacity development (CD) executed in the OJT for the NWR/MPs, the explicit enhanced ability of the counterpart agencies and/or C/Ps have been hardly observed, but the enhanced ability subsequent to the NWR/M/P has been attained, to some extent, through the technical cooperation of Japan, which have been undertaken after the NWR/M/P. The major progresses and issues of the proposed plans are as described hereinafter (refer to Annex F 4.

3.3.1 Progress of Improvement of Organization and Institutional Setups -Water Sector Reform -

The following plans for strengthening of the organization and institutional setups were proposed through the NWR-M/Ps_1992 and 1998:

(1) To establish a section for water resources management under the umbrella of the Ministry of Water and irrigation (MWI) in order to unify the authority for supervision, coordination and regulation for the nationwide water resources development and management,

(2) To strengthen the functions of the existing public water service corporation and establish a new department for the sewerage service under the MWI, and

(3) To transfer the roles and authorities for water resources development and the public water/sewerage services from the central government to the water service corporation, the local government unit,

community and/or the private forms.

The above proposals had effects on enactment of the Water Act in 2002 and the water sector reform in 2005, and have contributed to strengthening and/or improvement of the organization and institutional setup. The proposed and realized plans on organization and institutional setup in the NWR-M/Ps are as shown in the following Table 3.1:

Table 3.1 Proposed and Realized Plans on Organization and Institutional Setup in the NWR-M/Ps_1992 and 1998

Item	Proposed	Realized
Organization	The Ministry of Water development (MOWD) shall unify the policy on the water resources development and the public water/sewerage services	The Ministry of Water and Irrigation (MWI) was newly established as the organization equal to the proposed one.
	A section for control and management of the water resources management shall be established under MOWD aiming unified control and management.	The Water Resources Management Authority (WRMA) was established to take the roles and authorities for control and management of the water resources management as originally proposed.
	The functions of the existing Public Water Supply Department shall be strengthened. Further, the Sewerage Department shall be newly established under the MOWD.	The Water Service Regulation Board, which had the functions proposed in the NWR-M/P, had been newly established under the Ministry of Water and Irrigation (MWI).
	The authorities for actual operation of water resources development and use shall be actively handed over to the local government from the central government.	The Catchment Area Advisory Committees (CAACs) for six river basins have been newly established as the regional offices of WRMA. The Water Resources Users Associations (WRUAS) have been further established under CAACs. CAACs and WRUAS could take the actual operation of water resources development and use as proposed in the NWR-M/P.
	The roles for operation of public water supply services shall be transferred to the public water service corporations, the autonomies, the communities and/or the private firms.	The Water Service Board (WSB) and the Water Service Providers (WSPs) for eight river basins had been established to promote privatization for the public water supply services.
Institution	The Water Act shall be revised in order to improve the operation for water resources development and management.	The Water Act had been revised in 2002 supporting the water sector reforms.
	The Environmental Management and Coordination Bill 1996 shall be executed.	The Environmental Management and Co-ordination Act (EMCA) had been enacted in 1999 and National Environmental Management Authority (NEMA) had been established to execute the EMCA.

Source: The Study on the National Water Master Plan in Republic of Kenya, JICA, 1992
The Aftercare Study on the National Water Master Plan in the Republic of Kenya, JICA, 1998
Human Rights Based Approach to Reforms in the Kenya Water Sector, KWAHO, 2009

The organizations newly established by the water sector reforms in 2002 are judged to have made a substantial contribution to realization of the organizations proposed in the NWR-M/Ps_1992 and 1998. At the same time, the proposed organizations had been realized as the results of the synergy effects by not only the NWR-M/P but also the pressures of all relevant donors and the continual cooperation by GTZ and other donors. The results of the organizational reform are as shown in Fig, 3.1. The Ministry of Water and Irrigation (MWI) is placed at the apex of the organization setup for formulating the unified national policies on the water resources development and management as well as the municipal water supply/sewerage services.

It is, however, noted that there exist the other central government agencies for water-related policies such as: (a) Ministry of Energy (MOE) for policy of hydropower generation development, (b) Ministry of Rural Development (MORD) for multipurpose dam development, and National Environmental Management Authority (NEMA) for conservation of water-related environment. The Water Appeal Board (WAB) was established to arbitrate in the conflicts between the policies of the MWI and the said other central government agencies.

The aforesaid Water Resources Management Authority (WRMA) and its six regional offices called the Catchment Area Advisory Committees (CAACs) are in charge of supervision, coordination and management for water resources development and use. Similarly, the Water Service Regulation Board (WSRB) and its eight regional offices called the Water Service Boards (WSBs) take the jurisdiction of supervision, coordination and management for the municipal water supply and sewerage services. Moreover, the Water Resources Users Association (WRUAS) and the Water Service Providers (WSPs) are organized as the operators for water resources development and the municipal water supply/sewerage services, respectively.

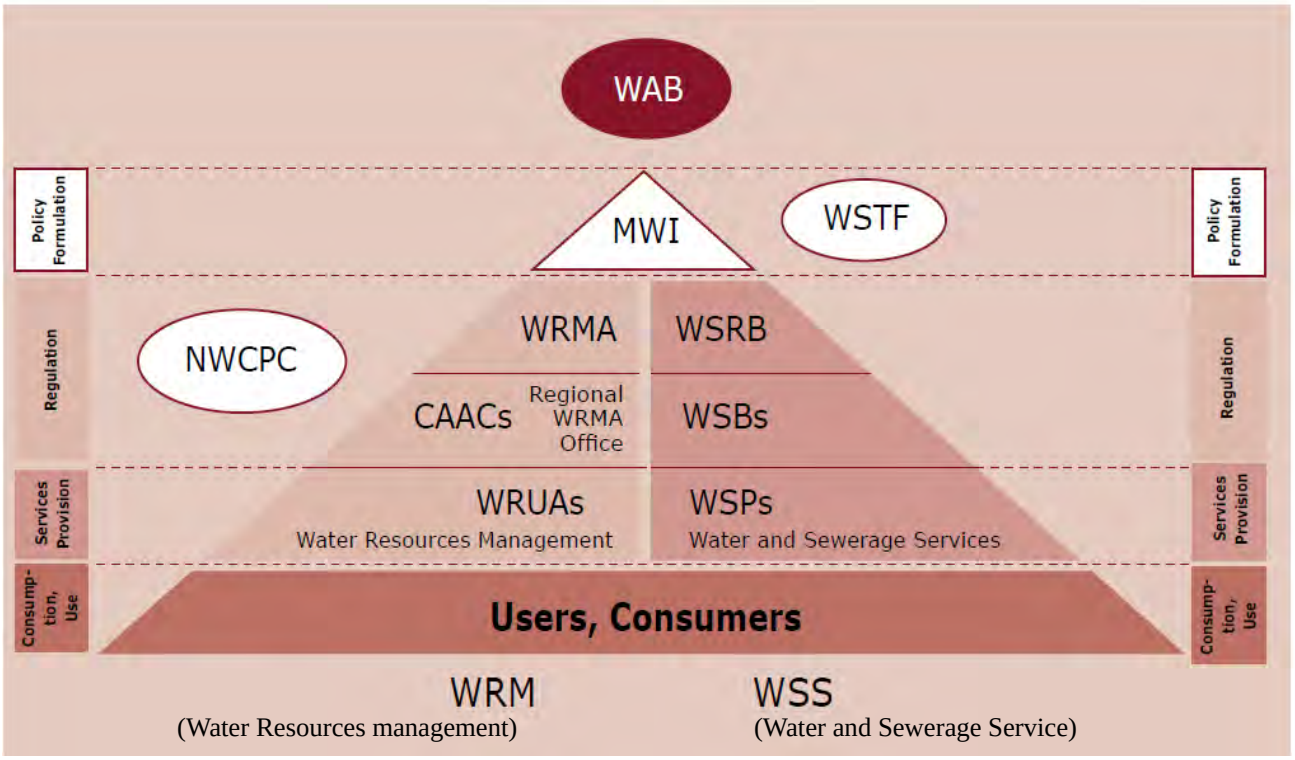

Fig. 3.1 Organization Setup for Water Management established by the Water Reforms in Kenya
（Source: Human Rights Based Approach to Reforms in the Kenya Water Sector, KWAHO, 2009）

3.3.2 Progress of the Projects for Structural Measures (Water Resources Development) proposed in the NWR-M/P

Table 3.2 shows the contrast between the projects for the structural measures proposed in the NWR-M/P and those actually implemented.

Table 3.2 The Projects for Structural Measures proposed in the NWR-M/P and Actually Implemented

Item	Proposed	Implemented
Water Use	• Dams for water supply: 28dams	• Construction of 11dams had been completed or in progress.
	• Municipal mater supply for urban Area: 141cities* • Municipal mater supply for rural Area: 50 areas*	• The municipal water supply projects had been implemented through JICA grant-aid and WB's financial assistance to some extent. However, the projects completed are far less than those proposed in the NWR-M/P as whole.
	• Inter-basin water transfer: 16 projects • Intra-basin water transfer: 24 projects	• Inter-basin water transfer:: 6projects were completed • Intra-basin water transfer: 2projects were completed
	• Large-scale Irrigation: 18areas, 110,000ha • Small-scale irrigation: 140areas, 7,000ha	• Large-scale Irrigation: 6,000ha were completed • Small-scale irrigation: 47,000 to 50,000ha were completed
	• Hydropower Dev.: 6 projects	• 2 projects were completed and 3 projects are in progress
治水	• Plans for Flood control: 5 plans proposed • Urban drainage improvement: 48 cities • Small-scale river improvement • Tana River channel stabilization project	• One plan was formulated and another plan is now being formulated.
Water Environment	• Sewerage system: 40cities*	• The sewerage system in 15 cities were completed covering the beneficial population of 900,000

*: Proposed in NWR-M/Ps_1998

Source: The Study on the National Water Master Plan in Republic of Kenya, JICA, 1992
The Aftercare Study on the National Water Master Plan in the Republic of Kenya, JICA, 1998
Ministry of Water and Irrigation (by Hearing)

The proposed projects have not attained a striking achievement, which resulted in the limited project implementation as shown in Table 3.2, because of the ambitious target year as set in 2010. In this connection, the Permanent Secretary of the MWI commented that the Government of Kenya had given priority to the water resources development rather than the water resources conservation against a background of the serious water deficit in Kenya, and that the NWR-M/PS_1992 proposed various projects for water resources development facilities based on the results of the exact estimation on the water supply-demand balance, but many of the projects have not been implemented due to the inadequate financial resources and the deficient system/regulation for the project implementation. The Permanent Secretary further commented that the on-going third NWR-M/P should indicate a realistic plan for water resources development in due consideration of the eligible financial capacity of the Government of Kenya.

3.3.3 Progress of the Projects for Non-structural Measures (Water Resources Management) proposed in the NWR-M/P

Table 3.3 shows the contrast between the projects for the non-structural measures proposed in the NWR-M/P and those actually implemented.

Table 3.3 The Projects for Non-structural Measures proposed in the NWR-M/P and Actually Implemented

Item	Proposed	Implemented
Management of Basic Information	Development of the inventory and/or database for the basic information such as hydrological data, the river longitudinal/cross sections, land uses along rivers and river structures	Development of the hydrological database by WRMA is in progress.
Flood Control and River Management	Conduct of the river patrol by the river administrator.	The river patrol is currently undertaken by the WRMA and the WRUAS. It is, however, difficult to perform the adequate river patrol due to inadequate number of the staffs.
	Administration of the flood hazard area including the land use control, introduction of the flood forecasting and warning system, development of flood fighting system, development of flood evacuation and rescue system and development of the system for the flood monitoring and prediction.	The community-based administration of the flood hazard area is currently being made in Nyando River Basin.
Water Use and Water Environmental Management	Strengthening of the systems for issuance of license on use of groundwater including development of the inventory for the groundwater resource potential and uses.	The administration for the abstraction of the groundwater as well as development of the inventory for groundwater is being made by WRMA.
	Continuation of the water quality monitoring at 120 points for the surface water and the groundwater at the major wells.	The monitoring for the quality of the surface water is being made by WRMA and NEMA.
	Conduct of the watershed management including designation of the water resources conservation areas and control of soil erosion and sediment runoff.	The watershed management works have been undertaken by Kenya Forest Services (KFS), WRMA and NGOs. However, the scales of the management works were extremely small and the works have been made without adequate coordination among the relevant agencies.

Source: The Study on the National Water Master Plan in Republic of Kenya, JICA, 1992
The Aftercare Study on the National Water Master Plan in the Republic of Kenya, JICA, 1998
The Programme for the Improvement of Capabilities to cope with Natural Disaster Caused by Climate Changes, JICA, 2009
WRMA (By hearing)

Some of the projects for non-structural measures proposed in the NWR-M/Ps_1992 and 1998 have been implemented but they are deemed to be very limited. Development of the basic information such as the hydrological data for formulation of the water resources development and management in particular is one of the important non-structural measures, and it is now in progress by WRMA as described in detail in subsection 3.3.5. As for the management of the flood hazard area, the community-based flood mitigation is being examined in the Nyando River Basin, but any other notable activities have not taken in the other river basins yet.

3.3.4 Progress of Environmental and Social Consideration

There were not any guidelines on the environmental and social consideration in Kenya during the time of the studies on the NWR-M/P_1992 and 1998, and thereby the NWR-M/Ps recommended the necessity of development of the guidelines. The Environmental Management and Coordinating Act (EMCA) was enacted in 1999 immediately after completion of the NWR-M/P 1998, and in accordance with the EMCA, the National Environmental Management Authority (NEMA) was established to take jurisdiction of the environmental and social consideration.

3.3.5 Development and Present Situation of the Basic River Information

The workstation, which facilitates the centralized control of the hydrological data such as river water levels, discharges and rainfall depths, was introduced to the Ministry of Water Development (MOWD) as a part of the technical assistance for the NWR-M/P_1992. The database, which records the hydrological data, was also developed through the NWR-M/P_1992, and it is now dispersedly managed by the six regional offices of the Water Resources Management Authority (WRMA), which were established in 2005

The WRMA has seldom updated the database for the hydrological data. However, the WRMA currently has been developing a new network system, which enables the WRMA to monitor the dispersed databases at the regional offices and thereby, the network system is expected to facilitate the centralised control and updating of the hydrological data in the future.

3.3.6 Present Situation of Approaches to International Tran-boundary Rivers

The following water resources management for the international trans-boundary rivers were proposed in the NWR-M/P_1992:

(1) The water use of 18 international river systems in Kenya shall be made in accordance with the Helsinki Rule in 1996

(2) The water resources potentials in the Malaba, Umba and Daura River Basins out of the 18 international trans-boundary rivers in Kenya shall be estimated based on the hydrological gauging data.

(3) The conferences shall be made among the countries relevant to the 13 rivers, which flow into Lake Victoria, whenever the inter-basin water transfer among the rivers is made.

(4) The environmental assessment shall be made for Ewaso Ngiro River, which flows into Lake Natron and Lumi River, which flows into Lake Turkana.

(5) The hydrological and environmental assessment shall be made for the Mara River from the standpoint of preservation of wildlife

In connection with the above item (3) for the rivers flowing into Lake Victoria, the water management of the rivers and lake has currently been discussed and the agreement on them has been made among the relevant countries of Kenya, Tanzania and Uganda. Furthermore although not mentioned in the recommendation above, about the Nile the discussion and agreement is conducted among the relevant countries.

3.3.7 Promotion of Japanese Technical Cooperation and Change of its Position among Donors in Kenya

In connection with the water-related cooperation in Kenya, JICA has undertaken four technical cooperation projects, three development studies, dispatch of 12 long-term experts, 12 grant projects and four yen loan projects ever since completion of the NWR-M/P_1998 (refer to Table 3.4 and Annex T 6). Implementation of these continued cooperation projects are judged to have been attained through the efforts of the long-term experts, who sustainably followed up the directions proposed in the NWR-M/Ps_1992 and 1998.

The cooperation by European countries including the former suzerain countries is dominant in Kenya as well as other African countries. On the contrary, the cooperation by Japan had been less influential in Kenya in those days of the execution of the study on the NWR-M/P. Under the circumstances, it is noteworthy that the NWR-M/P by the cooperation of Japan could help the Government of Kenya to show a direction of the comprehensive water resources development and management. This is deemed to have has a great significance in making aware of the unification of the cooperation in the water sector before the necessity of the joint cooperation system by the donors was emphasized. The Government of Kenya and the donors for Kenya currently formulate their plans for the water resources development and management with referring to the results of the NWR-M/P. This would prove that the data used in the NWR-M/P are reliable and the comprehensive plan proposed in the NWR-M/P is justifiable.

Table 3.4 Cooperation by JICA after Completion of NWR-M/Ps_1992 and 1998

Scheme	No.	Name of Cooperation	Execution Period		
Technical Cooperation Project	1	The Promotion of Sustainable Community-based Smallholder Irrigation Development	2000	to	2003
	2	Project for Improvement of Environmental Management Capacity in Nakuru Municipality and Surrounding Area	2005	to	2009
	3	The Project for Sustainable Smallholder Irrigation Development and management in Central and Southern Kenya	2005	to	2011
	4	The Project for Management of Non-Revenue Water in Kenya	2009	to	2014
Development Study	5	The Study on Institutional Improvement and Rehabilitation of Water Supply System for 10 Local Towns	2000	to	2000
	6	The Study on Integrated Flood Management for Nyando River Basin	2006	to	2008
	7	The Project on the Development of the National Water Master Plan	2010	to	2012

3.3.8 Results of Field Reconnaissance

The field reconnaissance was made for three locations (refer to Annex-F.5). The findings given from the reconnaissance could indicate the symbolic status of the present water resources management in Kenya, and the possible solutions for the problems on the water resources development and management identified through the reconnaissance would suggest a direction of the future cooperation.

(1) Environment of Lake Naivasha

Lake Naivasha, which is the 2nd largest lake in Kenya, is located at an altitude of 1,884m in Great Rift Valley. The Lake is the habitat for 325 species of wild birds and mammals including hippopotamuses. At the same time, it is the important water source for the domestic water use as well as the water use for the horticulture/the agriculture as represented by floriculture.

According to the regional office of WRMA, which exercise jurisdiction over the Lake, the water level of the Lake tends to drop year by year and the lowest water level in 1990s is about 2 m lower than that in 1980s. As the results, the surface area of the Lake has reduced to about 92 km^2 from 120 km^2 before. According to the local tourist guide for the lake, the deterioration of water environment would be due to the following two factors: (a) the excessive water abstraction from the Lake and the groundwater around the Lake for the sake of the large-scale rose cultivation, and (b) the inter-basin transfer from Naivasha Lake to the adjacent Nakuru Lake.

The Catchment Area Advisory Committees (CAACs) of the WRMA commented that the rose cultivators properly abstract the water of the Lake in accordance with their permitted water use rights, and can not cause any adverse effects on the lake environment. However, taking the large drop of the lake water level into account, it is questionable whether the comment of WRMA is based on the fair hydrological gauging and water balance simulation. In order to avoid a suspicion such that the administrator of the water resources management may unjustly defend those who have the ability to pay for their water use rights from their unfavorable water abstraction, the fair water management based on the exact estimation of water balance would be required. It is herein noted that the Government of Kenya has recently announced the policy for strengthening of the control of water abstraction and the watershed management through the government publicity.

(2) Environment of Lake Victoria

Lake Victoria is surrounded by three countries of Kenya, Uganda and Tanzania having the largest water surface area of 68,000km^2 in Africa. The large-scale water intakes for irrigation from the Lake have been made not only in the territory of Kenya but also in Uganda and Tanzania. Though the extensive deforestation in the watershed around the lake has caused the serious decrease of the water conservation capacity in the watershed, numerous applications for water use rights for irrigation are still being made and the illegal water abstractions for irrigation are

also made from the lake. As the results the surface area of the lake is diminished by sedimentation and the considerable part of it is covered with the aquatic plants due to the eutrophication of the Lake.

In order to cope with these problems, the Water Resources Users Associations (WRUAs) organized by the Catchment Area Advisory Committees (CAACs) currently undertake the patrol against the unfavorable activities such as the illegal water abstraction from the Lake and the rivers flowing into the Lake, and support the CAACs for the water resources management. The above activities by the WRUAs would be one of the important supports for the WRMA, which is suffered from the manpower-shortage.

(3) The Upper Basin of the Tana River

The members of Japan Oversea Voluntary Cooperation (JOVC) have been dispatched to Meru city in order to follow up the previous Japanese grant-aid project for improvement of the public water supply system and further undertake the technical support on the countermeasures against the non-revenue of the public water supply.

A private company (i.e., the cooperation association union) was reorganized from a division of the local government and it stated the operation for the public water supply services taking the self-supporting accounting system in accordance with the recommendations by the NWR-M/P, when the above Japanese grant-aid project was commenced. It is informed that this cooperation association union was the first case of privatization in Kenya.

The members of JOVC have been dispatched three times in order to support the operation of the water supply company since commencement of the privatization, and the present member of JOVC follows up reduction of the non-accounted water supply. Such support by the members of the JOVA may be the small-scale cooperation but the continuation of the support could be the important program-oriented cooperation contributing to the capacity development of the relevant organizations.

The field reconnaissance was also made at the sites of: (a) the Japanese grant-aid project for improvement of the public water supply system in Embu City and its surrounding areas and (b) improvement of the Muea Irrigation System. The Water Supply Company for Embu City was privatized as a joint-stock corporation in accordance with the recommendation by the NWR-M/P_1992, and its president, who was invited from a private enterprise, stated the clear targets of the Company as the official facility. As for the Project of the Muea Irrigation System, the development study together with the detailed engineering study had been carried out in 1995 and the Project had been commenced through the financial assistance by the yen loan in 2010.

3.4 Evaluation of NWR-M/P and Future Directions of Cooperation

According to the Permanent Secretary of MWI as well as other relevant government officers, the results of NWR-M/Ps_1992 and 1998 are still being widely utilized as the base for water resources development and management from the following points of view:

(1) The NWR-M/Ps have furnished the nationwide project list for the water-related infrastructure such as those for the municipal water supply, sewerage treatment, irrigation and hydropower generation as the valuable information, which is hardly obtained from other donors' study reports.

(2) The plans for the water resources development, which is formulated by the NWR-M/Ps based on the estimation of the detailed water resource potentials and water demands piled up from a large volume of the data, are judged to be fully reliable. The nationwide study based on such basic data is limited to the NWR-M/P only.

(3) The plan for the institutional setup proposed by the NWR-M/P could make a great impact to the enactment of the Water Act in 2002 and the water sector reforms succeeding to the Water Act.

The NWR-M/Ps are highly appreciated by the relevant government officers, while there still remain many issues to be coped with. The major issues on the results of the NWR-M/Ps and the future directions of cooperation guided from the field survey in Kenya are as described hereinafter.

3.4.1 Management of Organizations and Approach to Decentralization posterior to Water Sector Reforms

Both of the NWR-M/Ps_1992 and 1998 made a great contribution to enactment of the Water Act in 2002 and the water sector reforms starting from 2005 and they formed the framework of the present organization and institutional setup for water resources development and management. However, there still remain the following major issues and/or problems, which need to be solved, in the management of the organizations posterior to the water sector reforms.

(1) Unification of the System for Permit and License of Water Use Rights

The water sector reforms were oriented to formulation of the unified national policy for the water resources development and management by MWI. However, there are other central government agencies, which have the jurisdiction over water-related works, such as MOE for hydropower development, MORD for multipurpose dam development, NEMA for conservation of the water-related environment. As the results, the unified national policy for water resources development and management has not been realized by MWI yet. The Water Appeal Board (WAB) has been established to arbitrate the conflicts among the water-related agencies but it has actually arbitrated three times only thus not substantially functioning yet. Thus, it would be necessary to strengthen the functions of the MWI and WAB.

(2) Short of Staffs for the WRMA and CAACs

The Catchment Area Advisory Committees (CAACs) as the six regional offices of the WRMA take the wide jurisdiction over the supervision, coordination, and regulation for permission of water use right, control of water abstraction and river management. In spire of such wide jurisdiction, the CAACs have the inadequate number of staffs. The Government of Kenya should make effort to fill up the necessary number of staffs, or devise other alternative schemes to cope with the problem.

(3) Consistency in Decentralization of Administration Units

The WRMA and WSRB divide the country into six and eight administrative regions respectively, which causes the inconsistent administrative boundaries. Moreover, in accordance with the new constitution, the country would be divided into 47 counties, which would bring out another issue to adjust among the administrative boundaries of the WRMA, WSRB and counties. The WRMA would be required to take initiative for the coordination between the river basin management and the administrative unit in order to attain smooth river basin management.

3.4.2 Future Direction of Projects for Structural Measures (Projects for Water Resources Development)

The principal points of evaluation on the progress of the projects for structural measures are described hereinafter:

(1) Formulation of Development Plans with Care to Practical Budgetary Arrangement for Project Implementation

Only a part of the projects for structural measures, which were proposed in the NWR-M/P_1992 and 1998, have been implemented. The defect in the organization setup for project implementation would be one of the reasons why the projects have not been fully implemented, but the deficit of the budget could be judged to be more serious issue on the project implementation

The total investment cost required to implementation of the whole proposed projects in the NWR-M/P_1992 is estimated at 12.1 billion US$. This total investment cost is equivalent to the annual average investment cost of 6,700 thousand US$ assuming the project implementation period of 18 years from 1993 (the year immediately after completion of the M/P) to 2010 (the target project completion year). On the other hand, the total budget of the Government of Kenya for the year of 2010 was 11.0 billion US$ and about 30% of it was allotted to the infrastructure development. Furthermore, more than half of the budget for the infrastructure development relies on the financial assistance by the donors. The actual budget allotted to the water resources development projects has been further limited to a part of the budget for the

infrastructure development and not adequate for implementation of the whole of the projects proposed in the NWR-M/P.

The essential target of the NWR-M/P is to clarify the long-term water supply-demand balance until the target year and propose the water resources development projects, which could fulfill the water deficit estimated from the water supply-demand balance. Because of such backgrounds behind, the cost for the whole projects proposed in the NWR-M/P may have not been necessarily affordable for the Government of Kenya, which led to difficulties in implementing the projects in many cases. Thus, the financial capacity of the government may need to be considered as one of the factors for proposing of the practical plans for water resources development.

(2) Necessity of the Projects for Municipal Water Supply and Sewerage Services

The Government of Japan has extended its technical and financial assistance for 14 projects through the loan and the grant-aid ever since the completion of the NWR-M/P_1998 and 8 projects of them are for the municipal water supply. Thus, the cooperation by the Government of Japan for Kenya has devoted especially to the sector of the municipal water supply. As for the grant-aid project in particular, out of seven projects implemented after the NWR-M/P_1998, six projects were for the municipal water supply services.

The project for the municipal water supply tends to increase the sewage volume due to the population growth, and therefore, some of the projects for the municipal water supply assisted by the other donors such as GTZ and WB are implemented together with the projects for development of the sewerage system. On the contrary, the cooperation by the Government of Japan has never accompanied the municipal water supply system with the sewerage system. This distinctive feature of the cooperation by the Government of Japan is attributed to restrictions of the Japanese grant-aid system. However, when the increment of effluent by expansion of the municipal water supply system and other relevant environmental problems are taken into account, the simultaneous project implementation for the municipal water supply and sewerage system development would becomes one of the future essential issues for the cooperation by the Government of Japan. It is also an important issue for the sewerage projects to include not only those for development of the public sewerage system but also those for expansion of the simple domestic wastewater treatment units such as septic tanks and/or pit latrines.

(3) Cooperation for the projects of Mid/Small Scale Irrigation

The large-scale irrigation schemes managed by the government management have been extremely little implemented as compared with the mid/small scale irrigation projects managed by the private firms. This would be due to the difficulties in constructing and maintaining the large-scale irrigation facilities. The subsequent NWR-M/Ps would be required to take consideration on the importance of water source development for the mid/small scale irrigation

schemes taking the ability of operation, maintenance and management of the irrigation system into account.

(4) Cooperation for Development of Mid- Scale Hydropower Generation and Multipurpose Dams

Most of the multipurpose dams as well as the dams for the hydropower generation proposed in the NWR-M/P_1992 were oriented to the large-scale structure. However, the Ministry of Energy (MOE) commented that the Government of Kenya currently gives the priority to mini-hydropower generation with the install capacity of less than 10MW. Moreover, the Vision 2030 schedules construction of 24 multipurpose dams, out of which the large-scale dams are limited to two units only. Thus, the future development of dam reservoirs in Kenya is deemed to turn toward the small and/or medium-scales instead of the large-scales, and this should be taken into account in the on-going and/or subsequent NWR-M/Ps.

3.4.3 Importance of the Basic Information (Field Data) in NWR-M/P

It is identified through the field survey that the NWR-M/P-1992 induced the workstation and database, which facilitate the centralized control of the hydrological gauging data, while difficulties are arising in centralized control and updating of the hydrological data. Moreover, the meteorological data are currently gauged and stored by the Meteorological Agency, but thereby difficulties are encountered in sharing the data. In order to cope with the above difficulties, the government shall take the following tasks;

(1) Recognize the importance of basic data of rivers,

(2) Reorganize the observation network, which could be operated within the limits of the available budget,

(3) Instruct the steady and sustainable collection of the field data through WRMA,

(4) Understand importance of the gauging stations and execute the necessary gauging works,

(5) Urge the hydrological gauging data and process them through the regional offices of WRMA,

(6) Recognize the importance of the centralized data management and urge the periodical submission of the gauging data to the central data management center, and

(7) Complete the mutual agreement on sharing the meteorological gauging data between the MWI and the Meteorological Department.

In order to attain the above item (2) in particular, it would be necessary to divide the hydrological gauging stations, which include the key stations, into the several groups by priority orders and improve the gauging systems by the priority orders within the budget. Achievement of the above items (1) to (7) might be due to the results of the capacity development of the relevant personnel and organizations.

3.4.4 Capacity Development (CD) in the NWR-M/P

There would be several viewpoints on the CD and thereby, the discussions on the CD are made in this subsection from the following three viewpoints: (1) the CD for the Government of Kenya attained through the processes of formulation of the two NWR-M/Ps, (2) the recommendations and/or the concepts of the NWR-M/P keeping the CD in mind and (3) the CD and/or the concepts to activate the organizations.

(1) CD for Government of Kenya Attained through Processes for Formulation of the NWR-M/Ps

The NWR-M/P is appreciated by the relevant government officials in Kenya, and the third NWR-MP is in progress through the technical cooperation by JICA as its necessity was pointed out in this Report.

If the MWI could learn the processes for formulation of NWR-M/P well, the MWI must have attached the more importance to the collection of the hydrological data as the base of the M/Ps even under the inadequate budget. However, the on-going NWR-M/P has needed to emphasize the importance of the basic data collection again, which means that the CD on the processes for formulation of NWR-M/P has not been attained by the MWI yet. Thus, the ownership of the MWI for the NWR-M/P has not been fully brewed yet.

The personnel, who was the chief economist of the Water resources Department in 1992 and assigned as one of the counterparts of the NWR-M/P_1992, formulated “Tourism Development M/P”, which is similar to the NWR/M/P, through the technical assistance of JICA, after he transferred to the Ministry of Tourism. Thus, there is an example such that the know-how learned from the NWR-M/P was utilized at the individual level.

The future NWR-M/P would be required to enhance the individual and organized capacity development, whereby the counterpart agencies could strengthen their abilities to update the NWR-M/P and to achieve the other tasks, which are essentially required to the update of the NWR-M/P, such as: (a) improvement of the organizations relevant to update, and (b) collection, transmission and analysis of the information, which are used as the base for update.

(2) Recommendations of NWR-M/P on the Premises of CD in Mind

One of the important recommendations on the non-structural measures for water resources management is addressed to improvement of the schemes for the operation and management of the relevant organization and institutional setups. The efforts to realize the recommendations could be really regarded as a sort of the CD itself.

The following previous technical assistances of JICA could support the CD for the operation and management of the organization and institutional setups proposed in the NWR-M/P (refer to Table 3.4): (a) Strengthening of communities (as special example: “The Study on Integrated

Flood Management for Nyando River Basin") and (b) Strengthening of the function of water resources management in the pilot areas (as special example: "Project for Improvement of Environment Capacity in Nakuru municipality and Surrounding Area").

Moreover, the long-term JICA experts dispatched after the NWR-M/P are deemed to have made a great contribution to the personnel training and the establishment of the detailed operation rules for enforcement of the regulations and policies introduced by the NWR-M/P. On the other hand, the long-term JICA experts are judged to have made a rather small contribution to establishment of the institutional setup itself proposed by the NWR-M/P.

The issues and/or problems for the water resources development and management raised in the NWR-M/P are related each other, and the combinations of the countermeasures for them would be attained through the sector and/or subsector cooperation programs.

(3) CD to Activate the Organizations Proposed in the NWR-M/P

The revision of the Water Act in 2002 and the water sector reforms based on it is deemed to reflect the frameworks proposed by the NWR-M/Ps_1992 and 1998. Judging from the proposals of the NWR-M/Ps and the results of them, the NWR-M/Ps have contributed to the reformation of the organizations and institutions for water resources development and management. However, there is also another viewpoint such that the contents of the organizations and institutions proposed in the NWR-M/Ps were limited to the level of basic framework only, and the specific water sector reforms have largely depended on the subsequent cooperation by the WB and GTZ[7]. Taking the various viewpoints into account, it would be concluded that the NWR-M/P_1992 have played a part of the water sector reform.

The water sector reform itself does not mean the goal of the CD. Instead, the CD should be carried out in order to attain the proper operation and management of the organizations and institutions established by the sector reform. In case of execution of the CD, it would necessary to identify the important fields for the CD, clarify the roles of the JICA cooperation for the CD and formulate a program of the CD involving the other donors and the government of the recipient country.

The Government of Kenya seems to have not well developed the water–related systems for: (a) the rational and fair water allocation/distribution, (b) the adjustment of water charges based on the affordability of the water users and (c) the environmental and social consideration. It would be also one of the important issues to cope with the inadequacies in the systems for the said items (a) to (c).

[7] The "Water and Sanitation Service Improvement Project by WB, 2007" and the "Water Sector Reform Programme Kenya-Sanitation Study, 2020"

3.4.5 Approaches to Climate Changes in the NWR-M/P

The recent river flow regimes in Kenya tend to largely change throughout a year due to the climate changes, which cause the extremely low river discharge and/or extremely large fall of the lake water level during a dry season, and the large peak runoff discharge during a rainy season. These extreme hydrological conditions used to occur almost once in 10 years, while they currently occur with an interval of about 2 to 5 years. Under these backgrounds, the Government of Kenya is quite concerned with the flood control measures and the effective use of water resources, and it would be important to review and update the NWR-M/P every 10 years at least based on the last 10 years' data in order to cope with the climate changes,

In accordance with the recommendations by the NWR-M/P_1992, the Government of Kenya has carried out the "Study on Integrated Flood Management for Nyando River Basin", which aims at promoting the community-based disaster management and coping with the increment of the flood peak discharge inflicted by the climate change. In the on-going third NWR-M/P by the JICA technical assistance, the low water and high water regimes inflicted by the climate changes would be also analyzed and the relevant adaptation measures would be contemplated. Thus various approaches have being made to cope with the climate changes, and the adaptations to the climate changes would be certainly focused as one of the important issues in the future water resources development and management.

The basic data for rivers and the meteorological data are also indispensable to formulate the plan for countermeasures against the droughts as well as floods and to make the simulation of the environmental changes taking the climate changes into account. In order to establish the system, which could cope with the global issues, the sustainable collection of the basic data in the fields would be required.

3.4.6 Approaches to Integrated Water Resources Management (IWRM) in the NWR-M/P (-Importance of Water Resources Management-)

Similarly to Malaysia, the NWR-M/P_1992 for Kenya covers the principal sectors of the IWRM such as: the water use, the flood control and water-related environmental sectors. The on-going third NWR-M/P also intends to approach to the important themes of IWRM such as (a) involvement of various stakeholders, (b) unify the various water sectors, (c) approaches from the wider points of view and (d) flexible response to the dynamic changes of the social and natural environments. It would not be denied that the NWR-M/P_1992 focused on "the water resources development" rather than "water resources management, although it also includes the elements of IWRM. In order to introduce the concept of the IWRM more properly, it is urgently required to involve various stakeholders and to formulate M/P, which makes much account of the water resources management.

3.4.7 Direction of Cooperation for Kenya and Other African Countries

Future directions of water resources development for the arid and semi-arid lands in Kenya and ither African countries are discussed hereinafter.

(1) Water Use with Deliberate Regional Characteristics and Grasp of Actual Water Use Conditions

Kenya as well as other African countries are exposed to the severe natural environment and depopulated in general. The effective use of the groundwater is essential for those countries because of the low density of the river channels, the far distance to the river channel, and the deteriorated river environment. However, most of the groundwater resources, which are subject to easy development, have been already developed, and the rests have the harsh conditions requiring the high development cost. Accordingly, it is important for Kenya and other African countries to effectively use not only the surface water but also the groundwater resources and to grasp the potential groundwater resources including the water deposits in the international trans-boundary aquifers in order to cope with the future increment of the water demand. The Government of Kenya expects that the hydrogeological map is developed and the potential water resources volume is clarified through the ongoing third NWR-M/P. There existed 8,000 wells in 1989 and over 20,000 wells in 2009, while the groundwater data at only a part of the wells have been collected and kept. Hence, it is also urgently required to develop a groundwater database for the more extensive wells

(2) Usage of Water Resources with Consciousness of Environment

It is important to promote the saving-oriented water use with deliberate load to environment instead of the mass acquisition/consumption-oriented water use in order to properly share the competing water resources among various stakeholders. The Government of Kenya has already promoted to introduce the mid-scale dams and mid/small-scale irrigation projects. In addition to this, it would be important to propose the drainage system, which is subject to reuse of the drainage and strengthening of water-saving-oriented irrigation. The recommendations on the effective and efficient water use would be required especially to the Africa where water resources are limited.

(3) Cooperation Focused on River Basin or Region

In Kenya, the areas where the water resources could be effectively utilized are limited, and it is desirable in Kenya to focus the cooperation of JICA for water resources development and management on the specific river basins or regions in order to follow the policy of the project programming and to effectively use the budget for the cooperation. In this connection, the upper reaches of the Tana River Basin would be a suitable area for the intensive implementation of the programmed projects since many cooperation projects currently concentrate to the river

basin (refer to Annex-F 5). As an example, the cooperation by JICA for Meru City is described in the foregoing subsection 3.3.8 (3).

(4) Utilization of Information Technology (IT) and Satellites

A highly reliable plan could be formulated based on the definite evidences and it is indispensable to collect and properly manage the basic hydrological data in order to support the evidences. From this point of view, the long-term effort shall be made for development of the hydrological gauging/management system. It is especially important to make full use of the latest technologies such as the IT and satellite data in order to attain the effective and efficient water resources management.

(5) Coordination with Other Schemes of JICA

It is necessary to include the cooperation with the volunteers at the field level such as the “Water Defense Force” worked out in TICAD-IV into the cooperation program for the water resources development.

Chapter 4. Case Study: Vietnam

4.1 Introduction

During the field survey for Vietnam, the interview survey has been carried out at the Ministry of Agriculture and Rural Development (MARD), Ministry of Natural Resources and Environment (MONRE), ADB Vietnam Office and JICA Vietnam Office, and furthermore the field investigation has been conducted for the Kone River Basin, which has been selected as one of the priority projects in the NWR-M/P in order to confirm the updated status on the implementation of structural measures and non-structural measures proposed by the NWR-M/P. The members of the field survey team and the itineraries are shown in Annex-T 5.

4.2 Outline of the NWR-M/P for Vietnam

4.2.1 The Principal Water-related Problems in Vietnam during the Time of the Study for NWR-M/P

The water related problems in Vietnam are varied from region to region. In the northern part of the country, the shortage of water and deterioration of water quality due to the rapid industrial development and population concentration tend to become serious. On the other hand, the principal issues in the southern part of the country are addressed to securing of the irrigation water in the dry season and prevention of the intrusion of salt water. In the central part of the country, the flood mitigation together the salt water intrusions are identified as the major problems in the water sector. The flood in 1999 in particular claimed the casualties over 700 and other huge human/physical damages.

In order to cope with the various water resources problems as described above, each province (the administrative unit of Vietnam) has formulated the water resources development plans with the multi-purpose dam as their core measure. However, the proposed projects have not been consistently comprehensively formulated at the national level, the Ministry of Agriculture and Rural Development (MARD) has suffered from many hardships on the systematical implementation of the proposed projects.

4.2.2 The Principal Study Items in NWR-M/P for Vietnam

In order to cope with the water problems described above, the Government of Vietnam made requests to the Government of Japan to conduct the two (2) technical assistance projects of: “The Study on Nationwide Water Resources Development and Management” and “Comprehensive Flood Control Plan for the Huong River”. In response to the request, the two projects were unified into the NWR-M/P and undertaken from 2001 to 2003 through the technical assistance of the Government of Japan taking the efficiency and urgency of the two projects into account.

The Study set up a target year of 2020 and the following items were examined in the Study:

(1) Formulate the master plan for the water resources development and management for the nationwide principal 14 river basins,

(2) Conduct the feasibility study on the comprehensive management plan for Huong River as a priority river, and

(3) Conduct the feasibility study on the comprehensive management plan for the Kone River as a priority river.

4.2.3 The Organization for Study on the NWR-M/P

The Ministry of Agriculture and Rural Development (MARD) was assigned as the counterpart agency for the Study on the NWR-M/P, and the Ministry of Planning and Investment (MPI), National Institute for Agriculture Planning and Protection, Vietnam National Mekong Committee, and People's Committee of each Ministries were involved s the members of the Steering Committee in order to assist the Study.

4.3 Progresses of the Projects for Water Resources Development and Management after the Study of NWR-M/P in Vietnam

In Vietnam, the water supply and sewerage improvement projects had been undertaken through the Japanese assistance in Hanoi and Ho Chi Minh as a center of the northern part and southern part respectively. After that, the Japanese technical assistances have further expanded to the water resources development and flood mitigation for the central part of Vietnam from 2001 to 2003, (refer to Annex-F 6). The progresses of the specific water resources development and management projects developed after completion of the NWR-M/P are as described hereinafter:

4.3.1 Reformation of the Water Sector

Vietnam stated the policy called "*Doi Moi* (economic reforms)" in the second half of the 1980 and adopted the free economy maintaining the socialism structure by one-party dictatorship, which had led to the great economic development in the 1990s. However, the administrative system could hardly catch up the pace of such economic reform and various problems have broken out. As the results, the Government of Vietnam has commenced comprehensive and practical review on the whole administrative reform around 2000.

The water sector reform has been made as a part of the administrative and, the Ministry of Natural Resources and Environment (MONRE) was established in 2002 in order to take the roles and authorities for formulation of the policies on and conduct administrations for water resources development and management. However, the Water Act was not revised to legitimate the roles and authorities of the MoNRE, and a part of the jurisdiction, which should be fundamentally under the MoNRE, still remains as the jurisdiction of the Ministry of Agriculture and Rural Development

(MARD) [8]. As the results, the clear demarcation has not been given between the roles and authorities of MoNRE and MARD on the river basin management.

Since the Study on the NWR-M/P was carried out during the water sector reform was in progress, the NWR-M/P had not be able to recommend any details of the reform. Instead, the NWR-M/P proposed only the expansion of the consistent river basin management by the River Basin Organization (RBO) to the whole country.

There had existed the RBOs for the following four river basins, when the NWR-M/P was studies: Red River Basin, Don Nai River Basin, Cuu Long River Basin and Huong River Basin. The expansion of the RBOs as proposed in the NWR-M/P was oriented to establishment of the new RBOs for other ten principle river basins in the country. However, the number of the RBOs, which have been actually established after completion of the NWR-M/P, is limited to two for Srepok River Basin and Vu Gia Thu Bon River Basin. Moreover, of the existing six RBOs, three for Don Nai River Basin, Cuu Long River Basin and Huong River Basin are under the jurisdiction of the MARD and the other three are under the MoNRE. Thus, the vertical administrative systems of MoNRE and MARD for the water resources development and management still remain at the local level, which indicates that the unified administration by RBOs has not been attained yet.

4.3.2 Progress of the Projects for Structural Measures proposed in the NWR-M/P

The projects for the structural measures projects proposed in the NWR-M/P and actually implemented are as shown in Table 4.1:

Table 4.1 Projects for the Structural Measures Proposed in the NWR-M/P and Actually Implemented

Item		Project Proposed	Project Implemented
Flood Mitigation	12 river basins targeted in M/P	Flood control dam:：15 projects (14 Multi-purpose dams and 1 flood control dam)	Four dam projects complete、one project study on-going（multi-purpose dams）
		River improvement：five (5) rivers	Three river improvement projects, complete （Improvement: 205.6km）
	2 priority river basins for F/S	Three flood control dams in Huong River Basin:	One project （Ta Trach dam）to be completed in 2013
		River channel improvement (62 km) in Kone River Basin:	Complete
		Flood control dam in Kone River Basin	Flood peak cut by Dinh Binh Dam and river channel improvement project is complete
Water Use	12 river basins targeted in M/P	Water use dam：18 projects (6 multi-purpose dams, 2 water use dams）	Water use dams : 10 projects complete (Multi-purpose dams including flood control dam）
		Irrigation development : 12 rivers irrigation development plans	Four river irrigation development projects complete (Irrigation area expanded to 158,500ha (2000～2020)
		12 rivers water supply, industrial water supply plan	Unknown
	2 priority river basins for F/S)	Huong river basin water use dams: three projects	One project (Ta Trach dam) to be completed in 2013
		Kone River Van Phong barrage construction and irrigation and drainage system project	On going

Source：the results of questionnaire to the MARD

[8] The MARD had the authorities of formulation of policy and contro on water resources development and management which have been transferred to the MONRE and also the authority on water resources development like irrigation development and hydropower development. After the water sectpr reform the MARD is ostensibly specialized for Irrigation and hydropower development.

The implementation period of the projects listed above was assumed as 17 years from 2004 to 2020, while it has taken only eight years since the completion of the Study on the NWR-M/P as of 2011. During the said eight years, many facilities for the water resources development and management have been implemented and/or completed. That is, Ta Trach Dam, which is principal facilities of the Huong River, is under construction and to be complete in 2013, Dinh Binh Dam, which is principal structure of Kone River, has been completed and Van Phong Irrigation Barrage and its related irrigation canals are under construction. Furthermore other 10 dams out of the 19 dam projects proposed in the NWR-M/P have been completed and also four irrigation projects out of the proposed 12 irrigation projects have been completed. Thus the water resources development projects proposed in the NWR-Mp are judged to be progressed well.

4.3.3 Progress of the Projects for Non-structural Measures proposed in the NWR-M/P

The projects for the non-structural measures proposed in the NWR-MP and actually implemented are as listed in Table 4.2:

Table 4.1 The Projects Proposed for Structural Measures and Actually Implemented

Item	Project Proposed	Project Implemented
Water Use	• Water Use Management Plan (Proper management of water demand and supply, management of latest water resources information and proper water allocation during drought	• Almost None
Flood Mitigation	• Flood management plan (Central and regional disaster information management, Disaster management facilities/preparedness, preparation of flood hazard map and open it to the public, river management, establishment of flood forecast and warning, land use management, and formulation of river basin conservation plan)	• The flood hazard map for Tinh Quang Ngai Province in the central Vietnam has already been prepared by the assistance of Australia, but nationwide inundation maps have mot used yet. • Flood forecasting system based on hydrological observation facilities and evacuation guidance during floods has been conducted by MoNRE and MARD respectively.
Water Environment	• River environmental management plan (management for river maintenance flow, water quality monitoring and water quality control)	• Almost None
Dam Operation	• Dam operation management plan (Integrated operation management for the existing and proposed dams in the Kone River basin, and warning and dissemination system for discharges from dams).	• Almost None

Source：the consultants for the study team (Interviews at sites)

As listed above, the NWR-M/P proposed various projects for nonstructural measures but almost none of them have been implemented except the preparation of the flood hazard maps in Tinh Quang Ngai Province of the central Vietnam, and flood warning system by MoNRE and evacuation system by MARD.

The NWR-M/P especially proposed the integrated operation of the dam reservoirs based on the real-time flood information. The Dinh Binh Dam was constructed in Kone River Basin for water supply, flood control and hydropower generation in 2009 but the clear dam reservoir operation rule has not been established yet. As the results, the dam reservoir could hardly have the full effects of the

flood control and it could also not guarantee the safety of dam body against the unusual floods. Furthermore, there is no integrated and synchronized operation rule for all dam reservoirs located in a river basin based on the real time flood information furnished from the flood forecasting system.

It is however noted that the Central Committee for Flood and Storm Control (CCFSC), which consists of the MARD as the chair and the MoNRE, the Meteorological Agency and other water-related agencies as the members, has been newly established. The CCFSC aims at improving the flood forecasting warning system, which may facilitate the aforesaid integrated and synchronized dam reservoir operation.

4.3.4 Progress of Environmental and Social Consideration after the NWR-M/P

There was only a draft of the guideline for EIA in Vietnam, during the Study on the NWR-M/P was carried out from 2001 to 2003. In spite of such circumstances, the NWR-M/P had carried out the detailed environmental impact assessment for the priority projects. .

The Vietnam Environment Administration (VEA) under the MoNRE has the authority to enact the laws, regulations and guidelines concerned with the whole environmental problems based on the Law on Environment Protection (LEP). The VEA prepared the new guidelines in 2009, and furthermore it is likely to enact a Bill for the Strategic Environmental Assessment (SEA). However, the organization reform for the VEA is still in progress in accordance with the regulations promulgated by the Prime Minister.

Under the above circumstance, the roles and authorities of the VEA for environmental management have not been clearly defined yet, and the environmental and social consideration would still remains as an important issue to be examined in the future in Vietnam. The VEA is not necessarily able to fully force the project implementing body to rectify the projects for water resources development especially those for the large scale dam development from the viewpoints of the environmental and social consideration.

According to the Department of EIA, which belongs to VEA, the implementing body for construction of facilities is required to prepare and submit EIA Report on the natural environment to the Department, but the Report on social environment is not required. Furthermore, the Department of EIA is not entitled to possess the strong legal enforcement to suspend or prohibit the project implementation based on the Report of the natural environment

4.3.5 Approaches to the International Rivers

There are many international rivers in Vietnam, and the Government of Vietnam has organized an International Committee and a National Committee for Mekong River as one of the international rivers. When water intake or hydropower development facilities are proposed, it is necessary to get approvals from the relevant countries through the International Committee. On the other hand, no discussion on the water resources management for Red River and others, which run through China and Vietnam, has

been made, in spite of the serious reduction of river flow discharge and deterioration of river water quality encountered in Vietnam

4.3.6 Japanese Technical Cooperation for Water Resources Development and Management posterior to the NWR-M/P

Since the NWR-M/P was completed in 2004, the nine Japanese technical cooperation projects have been undertaken in Vietnam as shown in Table 4.3. These technical cooperation projects include those for follow-up of the structural measures proposed in the NWR-M/P as represented by the "The Ta Trach Dam Reservoir Construction Plan" and those for promotion of the nonstructural measures such as the "The Study for Water Environment Management on River Basins".

The MoNRE hopes the future Japanese technical cooperation, especially for development of the nonstructural measures through execution of the Phase 2 of the Study on the Cau River Basin Water Environment such as: (a) development of dam reservoir operation rules, (b) establishment of the standards for river maintenance flows and (c) formulation of integrated water resources management plan for Cau River Basin as a model river basin

Table 4.3 Technical Cooperation Projects Executed after the NWR-M/P

No.	Name of Project	Duration
1	The water sector training center project	2000 to 2003
2	The study for water environment management on river basins	2003 to 2006
3	The project for capacity development of participatory irrigation management system through Viet Nam institute for water resources research for sustainable agricultural development	2005 to 2010
4	The study on groundwater development in the rural provinces of the southern coastal zone	2007 to 2009
5	The project on human resources development for water sector in the middle region	2007 to 2009
6	Comprehensive Water Environment Project in Hanoi	2007 to 2010
7	The study for water environment management on river basins	2008 to 2010
8	The study for watershed environment management on the three river basins in Hanoi area	2008 to 2012

4.3.7 Results of Field Reconnaissance (Confirmation of Water Resources Development and Management Situation for the Kone River Basin)

As a part of the field survey in Vietnam the field survey has been conducted about Dinh Binh Dam which was located in the Kone River Basin, recommended in the NWR-M/P and completed in 2009 and also about Van Phong Irrigation Barrage and related irrigation canal which are located the downstream of the Kone River are under construction (refer to Annex-F 7). Through the field survey the followings are confirmed:

(1) Organizations for Maintenance and Operation of Dinh Binh Dam and Van Phong Irrigation Barrage/Related Irrigation Facilities

Dinh Binh Dam is the multiple-purpose dam for flood control, irrigation water supply and hydropower generation, and the following three organizations were involved to the construction, maintenance, management and operation of the related facilities.

(a) The Department of Agriculture and Rural Development (DARD) of Dinh Binh Province had constructed the Dinh Binh Dam (Complete in 2009), and it is presently in charge of operation, maintenance and management of the dam related facilities such as gates and dam bodies.

(b) The Vinh Son Song Hinh Co., Ltd. is the private company for electric power generation and it installed the electric power generation plant with the installed capacity of 6.6 MW immediately downstream of the Dam. It is presently in charge of operation, maintenance, management and running the electric power generation plant.

(c) The National Irrigation Corporation currently constructs the Van Phong Irrigation Barrage and related irrigation canal in the lower reaches of the Dinh Binh Dam. It will be in charge of operation, maintenance, management and running the facilities after completion of the dam construction.

(2) Privatization of Dinh Binh Dam Hydropower Project

In Vietnam, the privatization for the hydropower generation is partially in progress in the manner such that the private companies installs the hydropower generation plants by their own funds, and conducted operation, maintenance, management and running of the plants for the most of the dam projects for the hydropower generation. . In the case of Dinh Binh Dam, the private company installed the hydropower generation plant and presently conduct the maintenance, management and running of the plant. The electricity generated by the plant is provided to the Electricity of Vietnam (EVN) and the EVN pays the equivalent value to the private company. The private company pays to the DARD 9% of the charge paid by the EVN.

(3) Corporatization of Water Supply Project for Irrigation related to Dinh Binh Dam

The charges for the irrigation facilities are not collected from farmers, and the public fund is required to maintenance and management in Vietnam. Due to such financial system, the national irrigation company owned by the government is established in each province and entrusted with the irrigation water supply service to farmers by the government.

As mentioned above, the National Irrigation Company of Dinh Binh Province is in charge of construction, operation, maintenance and management of irrigation facilities in Kone River Basin. The National Irrigation Company collects the fixed charge from the DARD as the compensation for the irrigation water supply services to irrigation area, and utilizes the collected charges as the financial source for operation, maintenance and management of the facilities.

(4) Flood Control Situation of Dinh Binh Dam

The Dinh Binh Dam is provided with 12 flood control gates, which are operated by the following hydrological gauging data only:

(a) Rainfall data gauged at two stations around the dam reservoir, which are managed by the Meteorological Observation Center and the National Irrigation Company respectively, and

(b) Water level data of the river channel and rainfall data gauged at the station for hydropower generation station located in the upper reach of the dam.

All hydrological data mentioned above are not provided on the real-time base and therefore, the Dinh Binh Dam has not have detailed gate operation rules based on the real time flood information for rainfall, stream-flow discharge and water level of the reservoir. The present gate operation rules for Dinh Binh Dam are as below:

(a) During the flood season from May to mid-November, the gates are kept open, and the reservoir water level of EL 65 m, which corresponds to the reservoir volume of 226million m^3 is maintained.

(b) During the non-flood season from mid-November to the end of April, the gates are kept to be closed and the reservoir water level of EL. 91 m, which corresponds to the reservoir volume of: 350 million m^3 is maintained.

The above gate operation rule to keep all gates open in the flood season and closed in the non-flood season could be the practical method to secure the safety of the dam body against dam inflow. However, since the detailed gate operation responding to real time flood inflows has not been executed, it may be difficult to have the effective function for reduction of flood peaks at the downstream river stretch from the Dam. According to the official of the DARD who is in charge of the management of Dinh Binh Dam, the gate operation as stated above is adopted to almost all dams in Vietnam.

(5) Water Use Management Situation at Dinh Binh Dam and related Water Use Facilities

The Van Phong Barrage and its irrigation trunk canal would function to supply the water to the irrigation area of about 40,000ha upon completion of them. However, the specific rules for allocation of the water supply volume for each of the subdivided irrigation areas during drought have not been established yet, and the monitoring system for the water intakes in the extensive irrigation area has not been established yet. Furthermore the minimum river maintenance flow for the river channel has not been also set up yet.

The water allocation rules, the monitoring system for water intake and the minimum river maintenance flow are the important factors for the water use management. Without establishment of those factors, it may cause serious water conflicts and/or deterioration of river environment. However, the DARD and National Irrigation Company, which are in charge of the water use management, are deemed to not be adequately aware of the importance of the factors.

This is not in the special case of Dinh Binh Dam, but common to almost all of the dams in the country.

(6) Progress of the River Improvement Projects

The construction of the river dike of 45km in length together with the partial river dredging has been completed along the downstream stretch from Dinh Binh Dam for the sake of flood mitigation. However, the flood overflow has frequently occurred along the improved river channel sections. The design safety levels for the completed river channel improvement projects have not been able to be confirmed from the officials of DARD.

About 30% of the river dyke is constructed with concrete revetment, and the remaining 70% is earth-fill dyke where the serious damages were observed. There are 26 small scale irrigation barrages along the downstream river stretch. All of the barrages had been constructed in 1960s and has become too old impeding the safety flow of the flood discharge. The DARD hopes to improve the earth-fill dyke and small scale irrigation barrages, but the improvement works have been delayed because of shortage of funds.

(7) Issues

It is learned from the above updated states of the Dinh Binh Dam and its relevant projects that almost all of the proposed facilities have been completed and/or implemented, while the effective operation, maintenance and management for them are little attained. The principal cause for such lack of the appropriate management of the facilities could be attributed to the inadequate management capacity of the government agencies. Hence, the future technical cooperation for the capacity building (CB) and the capacity development (CD) on the nonstructural measures would be raised as one of the important issues.

4.4 Evaluation of NWR-M/P and Future Directions of Cooperation

The NWR-M/P for Vietnam, which was formulated just eight years ago, is the second newest next to that for Bulgaria in 2008 among the ten NWR-M/Ps executed through the assistance by JICA. Accordingly, many of the projects proposed in the NWR-M/P are still in progress, and there are many relevant issues to be monitored. Under such circumstances, the present outcomes of the NWR-M/P are assessed and the directions of future cooperation are examined. Principal results of the examination are discussed hereinafter:

4.4.1 Strengthening of the Institutional Setup

As described in the subsection 4.3.1, the jurisdiction of the policy formulation and the administration for water resources development and management at national level were transferred from the MARD to MoNRE during the water sector reform in 2003. The NWR-M/P was still in progress, when the said transfer of jurisdiction as well as the water sector reform was made. In other words, the reforms

for the organization and institutional setup had not been settled yet, when the NWR-M/P was carried out.

Accordingly, the NWR-M/P is judged to have hardly made any contributions to the water sector reforms and/or the reforms of the organization and institutional setup for the water resources development and management. On the other hand, the "Water Sector Review Project", which was carried out from 2008 to 2009 through the technical assistance by ADB and EU (including Netherlands, Austria and Denmark), could be recognized as the actual driving force to carry forward the water sector reforms.

There still remain the numerous duplications in the jurisdiction for water resources development and management between the MoNRE as the new entity and the MARD as the existing entity. In connection with the duplicated jurisdiction, the above "Water Sector Review Project" emphasized the "Importance of tie-up of the both of the MoNRE and MARD" and recommended to take the dual administrative system for the water resources development and management, which could utilize the accumulated experience of the MARD, for the time being instead of the immediate unification of the administrative system. These problems would be gradually solved after enactment of the new Law for Water Resources, which is now being drafted through the assistances by ADB and other donors and aims to be finalized around July 2012. However, the time of the enactment of the Law has not been fixed yet, and it may take the long period until the Law comes into effect for the actual water resources development and management.

4.4.2 Progress of the Projects for Structural Measures

As mentioned above, the progress of the project implementation for the structural measures proposed in the NWR-M/P has made a relatively good progress. The backgrounds for the progress of the project implementation are assumed as below:

(1) Vietnam has attained as high economic growth taking an average annual economic growth rate of 7.26% for a period from 2000 to 2010. Under the backgrounds of such high economic growth, the government of Vietnam aimed at being admitted into the group of the industrial nations by 2020 and it has disbursed the national budget, which is equivalent to about 30% of GDP, for the infrastructure development. Such ample disbursement for infrastructure development is judged to have contributed to the progress of the project implementation in the water sector.

(2) The most of structural measures proposed in the NWR-M/P had been preliminarily conceived by the Government of Vietnam even before the NWR-MP was commenced. Accordingly, the necessary budgetary arrangement for the proposed projects is very likely to be committed in advance.

As described above, the favorable progress of the project implementation for the structural measures is deemed to be due to the coincident accumulation of the several factors. However, considering that about 70% of the investment for the infrastructure in Vietnam is financed by the financial support from

the foreign countries, it would be uncertain whether or not the projects for the structural measures in the water sector could progress well as before in the future. The future NWR-M/P for Vietnam would be required to propose the projects for the structural measures taking the affordability of the national budget into account just like the cases for Malaysia and Kenya. .

4.4.3 Progress of the Projects for Nonstructural Measures

In contrast to the aforesaid projects for the structural measures, the projects for nonstructural measures proposed in the NWR-M/P have been hardly implemented. This would be attributed to the inadequate awareness of the Government of Vietnam on the importance of nonstructural measures. The delay of establishment of dam reservoir operation rules in particular is deemed to have hindered the effective operation of dam reservoirs.

The Government of Vietnam is, however, likely to be gradually aware of the importance of nonstructural measures through execution of the Japanese technical cooperation projects posterior to the NWR-M/P as described in the subsection 4.3.6 above. Hence, it is expected to expand the projects for the nonstructural measures by the Government of Vietnam for itself or by the assistance of the donors including Japan. Of the projects for the nonstructural measures proposed in the NWR-M/P, the following items would especially need to be implemented as the priority projects in the earlier stage:

(1) Preparation of the rules for water allocation and distribution in the drought including establishment of the priority orders for water supply to the users of the domestic water, the irrigation water and the hydropower in the unusual drought.

(2) Preparation and open public of the flood hazard maps and development of flood forecasting and warning systems for the entire country,

(3) Setting and management of river maintenance flows, execution of the water quality monitoring and control of the waster-water,

(4) Formulation of operation rules for dam reservoirs and

(5) Strengthening of the River Basin Organizations (RBOs), which aim at promoting the above items of (1) to (4).

4.4.4 Environmental and Social Consideration in the NWR-MP

As described in the subsection 4.3.4, the detailed guidelines for EIA were not available and the environment and social consideration was not made for implementation of the specific infrastructure projects in Vietnam in those days of execution of the Study on the NWR-M/P. Under such circumstances, it would be significant that the NWR-M/P carried out the environment impact assessment for the priority project areas of Huong and Kone River Basins.

The Vietnam Environment Administration (VEB) prepared the EIA guidelines in 2009, and further intends to preparation of the Bill for Strategic Environmental Assessment (SEA). These concerns on the environmental and social consideration are judged to be enhanced as the international tendency, but it is difficult to consider that the environmental assessment made in the NWR-M/P had made a certain contribution to the said enhanced concerns on the environmental and social consideration. However, there is no doubt that the environment and social consideration, especially the Strategic Environmental Assessment (SEA) will become an important theme in the NWR-M/P in the future.

4.4.5 Development of Basin Information in the NWR-M/P

The NWR-M/P has furnished a variety of the basic information for the nationwide water resources development and management as mentioned below:

(1) Long-term daily rainfall data and river discharge data in the nationwide 14 river basins for 25 years (1976~2000),

(2) Water demands for agriculture, domestic and industrial uses by 2025 in each of the nationwide 14 river basins,

(3) Discharge for river maintenance flow for each of the nationwide 14 river basins (the discharge is required to prevention of saltwater intrusion, prevention of water pollution, prevention of adverse impacts to navigation and the other usages of the river) and

(4) Annual maximum flood peak discharges for 25 years (1976 to2000) and probable flood peak discharges for the nationwide 14 river basins.

Most officials of the Government of Vietnam have pointed out that the information mentioned above have been utilized for formulation of the individual water resources development plans as well as analysis of the hydrological conditions for each of the river basin and the water-demand and supply balances in “Water Sector Reform Projects, which was undertaken through the technical assistance of ADB. From this point of view, the NWR-M/P has made a big contribution to the project implementation for the water resources development and management. At the same time, the basin information furnished by the NWR-M/P could have produced the basic grounds for applying of the structural and nonstructural measures. Accordingly, it is recommended that development of the basic information should be continued in the future NWR-M/Ps as the basis for plan formulation.

4.4.6 Capacity Development (CD) in the NWR-M/P

According to the information from the consultants who were engaged into the former NWR-M/P, the Government of Vietnam was not ready to accept the C/P trainings by the JICA Study Team, and its

ownership on the NWR-M/P was also very weak. Due to these conditions, the transfer of knowledge had been seldom made during execution of the Study on the NWR-M/P[9].

Furthermore the NWR-M/P has not made any significant contribution to the water sector reform, since the Study on the NWR-M/P was made in parallel with the progress of the water sector reforms. The NWR-M/P has hardly rendered strengthening of the organization and institutional setups posterior to the water sector reforms as described above. From these points of view, the outcome of the CD in NWR-M/P is judged to be low as far as the case for Vietnam is concerned.

As mentioned above, the strengthening and establishment of the organization and institutional setups in the water sector is now in progress through the "Water Sector Review Project" assisted by ADB. In connection with strengthening of the organization setup, the MoNRE has been established, as the core administrative agency for the water resources development and management, just through the recent water sector reform. However, the MoNRE has not the adequate experience/knowledge in its competent field and needs CD for water resources development and management. Under these backgrounds behind, the MoNRE strongly wishes to take the knowledge on the nonstructural measures such as those for dam reservoir operation and flood forecasting and warning through the JICA technical cooperation projects.

In Vietnam, the water sector reform is still in progress leaving many problems and/or issues especially in the aspects of: (1) strengthening of organization and institutional setups and (2) the capacity development (CD) and transfer of knowledge. It is indispensable to clarify the important fields, where the CD shall be intensively made, and to make attempts to execute them through cooperation with other donors like ADB and others.

4.4.7 Approaches to the Climate Changes in the NWR-M/P

The serious floods, which seemed to be inflicted by the climate change, have caused severe damages including those to the rice production in Vietnam especially the Mekong Delta, Red River Delta and the Central Vietnam. In connection with such recent flood problems, the MARD has independently conducted the study on the relation between flood damages and climate changes. Furthermore the Department of Meteorology, Hydrology and Climate Change (DoMHCC), which belongs to the Ministry of Natural Resources and Environment (MoNRE), intends to formulate the plans to develop the countermeasures against the climate change and the capacity development against the natural disasters under the "Long-term Development Strategy (2010~2020)". The DoMHCC has established the Climate Change Examination Committee and estimated the increment of rainfall intensities in the different gas emission scenarios. It is considered that such countermeasures for climate changes will be adopted as one of the important measures for water resources development and management in future.

[9]. In Vietnam, the donor is required to provide salaries to the C/Ps, when the C/Ps are engaged into the Study led by the donor. This causes difficulties in attaining the transfer of knowledge through on the job training (OJT).

4.4.8 Approaches to Integrated Water Resources Development (IWRM) in NWR-M/P

The MoNRE and the MARD have duplicated their authorities for policy formulation and administration for water resources development and management as described above, and it would be necessary to establish more clear roles and authorities of the two organizations, which could facilitate to attain the more practical IWRM. For the issues, the Government of Vietnam has expected the technical assistances by JICA for examination of the IWRM, and has made a request to JICA the "Study on River Basin Water Environmental Management for the Cau River (Phase 2) ". The attempts oriented to the IWRM are being one of the important themes in Vietnam, and it is necessary to delineate the definite proposals for IWRM. The practice of the IWRM at the river basin level by RBO in particular is deemed to be effective as the initial approach.

Chapter 5. Results of Review on Former JICA NWR-M/Ps

5.1 Introduction

The former JICA-assisted NWR-M/Ps for nine objective countries were reviewed through the following four approaches. The results of review are shown in Annex 1~9 and summarized in the sections 5.2 to 5.7.

(1) Field surveys for Malaysia, Kenya and Vietnam (Refer to Chapters 2 to 4),

(2) Questionnaire surveys to the JICA local offices and the counterpart agencies of the NWR-M/Ps in the nine countries (Malaysia, Kenya, Vietnam, Nigeria, Zambia, Philippines, Macedonia, Cote D'ivoire and Bulgaria),

(3) Interview surveys to consultants that have been engaged to the NWR-M/Ps, and.

(4) Study on the reports and reference materials related to the NWR-M/Ps.

5.2 The Objectives Aimed by the NWR-M/P and Status of Their Realizations

5.2.1 The Objectives Aimed by the NWR-M/P

The principal issues on the water resources development and management in the objective nine countries during the time of execution of the NWR-M/P are as shown in Table 5.1, and these are broadly classified into three (3) groups. The first was addressed to the excessive water use over the limit and the deficiency of the water supply capacity, which is distinguished in seven countries of Malaysia, Kenya, Nigeria, Zambia, Philippines and Cote D'ivoire. In order to cope with this issue, these courtiers raise the strengthening of the water supply capacity by the development of the dam reservoirs and wells for groundwater as the priority policy.

The second issue was addressed to the duplicated functions of the relevant agencies for water resources development and management. This issue was common in all of the objective nine countries. In order to cope with this issue, the NWR-M/Ps for Malaysia, Kenya and Cote D'ivoire in particular aimed at reforming the organization and institutional setup related to the water resources development and management.

The third issue was further raised as the deficiency of the management capacity for monitoring of the surface water and groundwater, conservation of the water quality and appropriate water allocation. This issue was common in all of the objective nine countries. In order to cope with issues, the following definite counter measures were proposed for Malaysia, Nigeria, Macedonia and Bulgaria, while the countermeasures proposed for other five countries are judged to be confined to the conceptional level only.

(1) Establishment of the standards of the river water quality and strengthening of the hydrological

gauging system as proposed in the NWR-M/P for Malaysia,

(2) Development of the programs for monitoring of the water resources and the rules for dam reservoir operation as proposed in the NWR-M/P for Nigeria,

(3) Formulation of the watershed management plan, which is subject to deliberation on the influences to the downstream, as proposed in the NWR-M/P for Macedonia, and

(4) Formulation of the watershed management plan, which could meet EU Water Framework Directive (WFD), as proposed in NWR-M/P for Bulgaria.

Table 5.1 The Principal Issues on Water Resources Development and Management Raised in the NWR-M/Ps

Name of Country & Study Period of NWR-M/P	Principal Issues
Malaysia (1979 – 1982)	• Conflict among water users and excessive water uses over the limit • Duplicated functions of the relevant agencies on the water resources development and management
Kenya (First: 1990 - 1992) (Second:: 1997 - 1992)	• Conflict among water users and excessive water uses over the limit • Duplicated function of the relevant agencies on the water resources development and management
Nigeria (1992 – 1995)	• Biased large scale development with neglect of the efficient water management of the river systems • Deficiency of the inventory for water resources potential and water resources development/management projects • Lack of the capacity for the water-related administration
Zambia (1993 – 1995)	• Deterioration of the public water supply services • Transition from the rain-fed agriculture to the irrigation-oriented agriculture
Philippines (1997 – 1998)	• The future potential water deficit in the major cities
Macedonia (1998 – 1999)	• Difficulties in accessing to the safe water • Adverse effects to the downstream by the incremental pollution loads inflicted by the water resources development
Cote D'ivoire (2000 – 2001)	• Inconsistent water resources development and management separately made in each of the water sectors
Vietnam (2001 – 2003)	• Lack of the consistent water resources development plan, which aims at coping with the water deficit in a dry season and mitigating the flood during a rainy season.
Bulgaria (2006 – 2008)	• Formulation of the watershed management plan, which accords with the EU Water Framework Directive (WFD)

Source: JICA NWR-M/Ps

5.2.2 Status on Realization of Objectives Aimed by the NWR-M/Ps

The aforesaid objectives aimed by the NWR-M/PS are judged to be going toward realizations, although the status in each of the countries is different. The definite cases of realization are as described below;

(1) ***Strengthening of Water Supply Capacity:*** In Vietnam, of 18 dam projects proposed in the NWR-M/P, which were to be constructed from a period from 2014 to 2020, 10 projects have been completed already by 2011. Malaysia has also attained the substantial development for municipal water system after completion of the NWR-M/P, and the target service ratio of the municipal water supply has reached to 90%, which was set as the target of the NWR-M/P. Similarly, Nigeria has realized the service ratio of 70% for the municipal water supply for the urban areas by 2010.

In addition to the above four countries, the four countries namely Zambia, Philippines, Macedonia and Cote D'ivoire, which raised the strengthening of the water supply capacity as the priority policy, attained the following outcomes:

- Zambia: Development of 5,827 wells for the groundwater has been completed.
- Philippines: Detailed design and/or tender preparation for two multipurpose dams for irrigation and hydropower generation are in progress.
- Macedonia: The reginal water supply project for Skopje (the capital) and its surroundings as well as Zietovica multipurpose dam projects have been completed.
- Cote D'ivoire: The updated status on the progress of the proosed projects us unknown.

(2) ***Reform of the Organization and Institutional Setup:*** Malaysia and Kenya has reformed the organization and institutional setup for water resources development and management, which led to the strengthening of the capacity for formulation of the consistent national policy and plans for the water resources development and management. The concrete instances for the reform of organization setup are given to: (a) Establishment of the National Water Resources Council (NWRC) as well as the Ministry of Natural Resources and Environment (MoNRE) in Malaysia and (b) Establishment of Ministry of Water and Irrigation (MWI) and Water Resources Management Authority (WRMA) in Kenya.

(3) ***Enhanced Capacity for Water Resources Management:*** The principal projects for enahanced capacity of the water resources management implemented in nine countries are as shown in Table below:

Table 5.2 Principal Projects implemented for Enhanced Capacity for Water Resources Management

Country	Major Projects implemented for Enhanced Capacity for Water Resources Management
Malaysia	Strengthening of the hydrological gauging system
Kenya	Development of the processing system for the hydrological data and the river information
Vietnam	Estimation of the long-term water supply-demand balance
Nigeria	Rehabilitation of the water resources monitoring system and introduction of the participatory system of the residents to the water resources management
Zambia	Educational campaign on the maintenance and operation of the municipal water supply system
Philippines	Development of the system for collection, processing and communication of the hydrological data
Macedonia	Development of the monitoring system for the quality of the surface water
Cote D'ivoire	Development of the river information system
Bulgaria	Development of the tools for water resources management such as the GIS data model

(4) Of the objective nine countries, the four countries, namely Malaysia, Zambia, Macedonia and Bulgaria are judged to have strengthened the capacity for the water resources management through development of the hydrological gauging system.

5.2.3 The NWR-M/P Evaluated from the Viewpoint of Integrated Water Resources Management (IWRM)

The Global Water Partnership (GWP) defined the IWRM as below in the 2nd World Water Forum 2000:

Integrated Water Resource Management is:

"A process that promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems" (GWP, 2000).

In the above definition, the “coordinated” is considered to give the following suggestion:

The word of ”coordinated” in the above definition suggests:

Integrated water resources management depends on collaboration and partnerships at all levels from individual citizens to international organizations.

The former NWR-M/Ps emphasized the necessity of the consistent water resources development, while they did not adequately considered the importance of the water resources management. They also intended the unified policy integrating the various water sectors such as the municipal water supply, irrigation and hydropower generation, while they intended to involve the government agencies only as the core stakeholders but seldom involve other stakeholders such as the research institutes and NGOs.

The NWR-M/P aimed at integrating the policies and plans relevant to all of the water resources development and management. From this point of view, the NWR-M/P is judged to have materialized a part of the IWRM. The NWR-M/Ps for Malaysia (1982) and for Kenya (1992) in particular had proposed such integrated policies and plans prior to the Dublin Principles on the priority approach to formulation and implementation of the IWRM Plan, which was adopted in the International Conference on Water and Environment, 1992. Accordingly, the NWR-M/Ps for Malaysia and Kenya could be regarded as the forerunner of the IWRM. At the same time, the objectives of the NWR-M/Ps could be judged to have realized to a certain extent contributing to laying of the foundation for the integrated water resources development and management in the countries. It is, however, noted that any distinct changes have not seen in the direction of the former NWR-M/Ps, which have emphasized the importance of the water resources development rather than the water resources management.

5.3 Policy and Plan on Water Resources

5.3.1 The Contents on the Organization and Institutional Setups Proposed in the NWR-M/P

The former NWR-M/Ps have proposed the organizations and institutional setups, as shown in Tables 5.2 and 5.3 in order to realize the consistent water resources development and management based on the unified national policy. In this proposal, the important theme was addressed to the following two items: (1) To strengthen the function for the unified policy determination by the central government and (2) To separate the regulators and the operators for water resources development and management. The typical case for the operators is given to the "Water Resources Management Authority" proposed for Malaysia, the" Federal River Basin Development Authority" for Nigeria and the privatization of the municipal water supply and sewerage services for Kenya.

As for the institutional setup, the main theme in the proposals of the NWR-M/P was oriented to: (1) To enact and/or reform the Water Act, which should be the national unified water-related regulation (as proposed for Malaysia, Kenya, Zambia and Cote D'ivoire), and (2) To establish the detailed enforcement regulations for the Water Act (as proposed for Nigeria and Bulgaria). It is, however, noted that the contents of the proposed institutional setup for all NWR-M/Ps other than that for Malaysia are judged to be confined to conceptional level only.

Table 5.3 Proposed Organization and Institutional Setup for Water Resources Development and Management Proposed in NWR-M/P (1/2)

Classification	Name of Country	Proposed Contents
Organization	Malaysia	• To establish the National Water Resources Committee (NWRC) and Federal Water Resources Department (FWRD), • To establishment the State Water Resources Committee (SWRC) and State Water Resources Department (SWRD), and • To establish the Water Resources Development and Management Corporation (WRDMC)
	Kenya	• To establish water resources management division under Ministry of Water Development (MOWD) in order to unify water resources management, • To transfer the authority of performing water resources development and management to local government, • To establish sewerage department under MOWD in order to unify water supply and sewerage sectors, • To promote privatization of water supply and sewerage services and • To promote unification of irrigation information by Ministry of Agriculture (MOA).
	Nigeria	• To establish the Department of Water Administration under Federal Water Resources and Rural Development (FMWRRD), • To establish four Regional Water Administration Offices, • To concentrate the technical responsibility of hydrology and hydrogeology on National Water Resources Institute (NWRI) and • To strengthen the authority vested of the Federal River Basin Development Authority.
	Zambia	• To separate regulatory and operational functions, • To separate water resources management from water supply and sanitation sectors, • To conduct the phased development of re-organization, • To strengthen the Water Development Board, • To establish the Kafue River Development Authority, • To re-organize water supply and sanitation sector, • To re-organize water resource conservation sector, and • To clarify the functions of Department of Natural Resources (DNR) and Environmental Council of Zambia (ECZ), and transfer personnel from DNR to ECZ

Table 5.4 Proposed Organization and Institutional Setup for Water Resources Development and Management Proposed in NWR-M/P (2/2)

Classification	Name of Country	Proposed Contents
Organization	Philippines	• To strengthen of the NWRB (Interim Target) and • To create the Water Resources Authority of the Philippines (Ultimate Target)
	Macedonia	• To establish Coordination Committee of Water Resources Development and Management, • To establish Public Water management Enterprise (PWME) management system, • To establish Rural Water Supply Unit and • To promote community participation (Institutional strengthening of users level).
	Cote D'ivoire	• To establish Water Authority, • To establish Basin Water Authority and • Establishment of Water Management Committees at national and Water Management Cooperation at river basin levels
	Vietnam	• To establish basin management organization.
	Bulgaria	• To strengthen organizations both in the central level (Water Directorate of MoEW) and the district level (four Basin Directorates) and • To strengthen organizations and establishing of collaboration with other relevant agencies.
Institution	Malaysia	• To enact National Water Act.
	Kenya	• To revise Water Act for its effective use for water resources development and management, • To revise Parliament Act Chap. 441 in order to strengthen "Tana and Athi Rivers Development Authority", • To revise lakes and Rivers Act in order to conduct the management of river and lakes/marshes, • To maintain coherent application of Water Act and Local Gov. regulation and • To enact guideline for environmental assessment and management.
	Nigeria	• To develop operational regulations of Federal Water Resources Decree.
	Zambia	• To enact laws on water resources development and management and • To enact laws on water resources conservation.
	Philippines	• To make legal arrangement for establishment of IWRM.
	Macedonia	• To establish laws on water supply/sewage treatment and blackish water based on EU standards and • To establish polluter pay principle.
	Cote D'ivoire	• To enact executive orders and government ordinances for enforcement of Water Law enacted in 1998, • To enact legal frameworks surrounding the Water Law and • To establish water right.
	Vietnam	• No noteworthy proposal.
	Bulgaria	• To prepare the detailed enforcement regulations for the new Water Act • Enhancement of coordination systems among stakeholders in the basins

5.3.2 Progress of the Proposed Projects

The projects for organization and institutional setup proposed in the NWR-M/Ps are as described hereinafter.

(1) Progress of the Proposed Projects for Organization Setup

The organization setup for water resources development and management are judged to have been improved and/or strengthened through the water sector reforms and the reorganization of the government agencies in the seven countries of Malaysia, Kenya, Vietnam, Nigeria, Zambia, Philippines, and Macedonia as shown in Table 5.4.

Table 5.5 Latest Improvement and Reinforcement of Organization Setups

Country	Major Activities for Improvement and Reinforcement of Organizations
Malaysia	In 1996 establishment of National Water Resources Committee（NWRC） and in 2004 reorganization of water related government offices
Kenya	In 2005, establishment of Ministry of Water Resources and Irrigation and related organizations through the reformation of water sectors.
Vietnam	In 2003 年 establishment of Ministry of Natural Resources and Environment (MoNRE) through the reformation of water sectors.
Nigeria	In 2008 establishment of Nigeria Integrated Water Resources Management Commission (NIWRMC) and eight (8) River Basin Water Resources Management Office.
Zambia	In 2011 improvement of water related organizations
Philippines	In 2010 National Water Resources Board (NWRB) was absorbed to Department of Environment and Natural Resources.
Macedonia	In 2008 establishment of Coordination Committee of Water Resources Development and Management (CCWRDM)
Cote D'ivoire	Unknown
Bulgaria	No noteworthy implementation and/ reinforcement of organizations has not been confirmed.

Source: (1) The results of Questionnaire Surveys and Interviews
(2) The Study on Integrated Water Resources Management for Poverty Alleviation and Economic Development in the Pampanga River Basin in the Republic of the Philippines
(3) The Study on Skopje Sewerage Improvement Plan in the Former Yugoslav Republic of Macedonia

Through the general view of the organization improvement and strengthening of the objective countries in the Table 5.4 above, it is understood that the six countries (Malaysia, Kenya, Nigeria, Zambia, Philippines and Macedonia) except Vietnam have established committees and government offices as proposed in the NWR-M/P.

However, it does not mean that all of the proposed measures have been realized. In Malaysia in particular, the proposed reforms of the organization setup at the Federal Government level has been attained, but the proposed organization arrangement at the state government level have not been made yet (refer to subjections 2.3.1 and 2.4.1). Furthermore the donors such as ADB, WB an, GTZ other than JICA are likely to have highly contributed to the direct opportunity to the organization reforms and/or the capacity buildings of the organizations after the reform, while the contributions by the NWR-M/Ps for them are judged to be very low.

ADB has conducted the "Water Sector Reform Study" for 17 countries including Malaysia, Vietnam and Philippines from 2001 to 2004, and the "Water Sector Review" for Vietnam from 2008 to 2009. These technical assistances by ADB have given direct impacts to the Asian three countries to accelerate the water sector reform or the organization reform, and subsequently promote the organization improvement and reinforcement. Similarly, WB, GTZ and the other Europe donor countries have conducted the various programs for strengthening of the organizations setup and the capacity development contributing to the water sector reforms in Kenya, Nigeria, Zambia and Macedonia.

The results of review on the improvement and/or strengthening of the organization setups in the nine objective countries are summarized as below:

(a) Malaysia

Based on the proposed organization setup by the NWR-MP, which aimed at the unified management of water resources, the National Water Resources Committee (NWRC) was established in 1996 having the role to decide the national water policy. The Ministry of Natural Resources and Environment (MoNRE) was further established, through re-organization of the ministries in 2004, to support the NWRC in the technical and administrative aspects. These reforms of organization setups are judged to have strengthened the administrative functions of Federal Government for water resources development and management.

However, any radical reforms of the organization setup for the 13 State Governments have not been carried out yet. Furthermore the Water Act, which was enacted in 1989, follows the conventional rights of the State Government for water resources development and management. For this reason, the functions to unify and coordinate the water resources development and management at the State Level are deemed to be still inadequate..

(b) Kenya

The Water Act was revised in 2002 and the new organization setup with the MWI as the core for the water-related administration was established, through the water sector reform, in 2005 (refer to subsection 3.3.1). The NWR-M/P has contributed to formulation of the new frameworks for organization setup. However, it has not been long since the water sector reforms were made, and therefore, there still remain the issues on coordination by MWI with other relevant government offices and the problems such as the shortage of human resources and inconsistencies of the water-related administrative boundaries.

(c) Vietnam

The new organization setup, which includes the MoNRE as the core ministry for policy-making and implementation of water resources development and management, was established through the water sector reform in 2003. However, there still remain several issues such as duplication of authorities and roles between MoNRE and MARD, which had taken the substantial part of the present roles of MoNRE. The water sector reform was made in parallel with execution of the Study for the NWR-M/P, and therefore, the NWR-M/P is judged to have little contribution to the water sector reform.

(d) Nigeria

Establishment of the Nigeria Integrated Water Resources Management Commission (NIWRMC) was recommended in the NWR-M/P in order to attain the unified water resources management. In accordance with the recommendation by NWR-MP, the NWRMC together with its eight regional offices called “Catchment Management Offices (CMOs)”

were established in 2008.

(e) Zambia

In accordance with recommendations by the NWR-M/P, the National Water Supply and Sanitation Council (NWASCO) was established to control the urban sanitary sector in 2011. The Water Resources Authority (WRA) was established for the implementation of water resources development and management projects. Furthermore, the administrative authorities for the water resources management and the municipal water supply/sanitations were bestowed on the Ministry of Energy and Water Development (MOEWD) and Ministry of Local Government and Housing (MOLGH), respectively.

(f) Philippines

In line with the recommendation by the NWR-M/P, the National Water Resources Board (NWRB) was reorganized to be one of the departments of the Department of Environment and Natural Resources (DENR) in 2010, whereby the financial conditions and the man powers of the NWRB were improved.

(g) Macedonia

The new organization setup and legal setup conformed to European Union (EU) Standards was proposed in the NWR-M/P in order to promote the affrication of Macedonia to EU/ The proposals were realized through enactment of the new Water Act in 2008.

(h) Cote D'ivoire

Strengthening and/or establishment of various organization and institutional setups related to water resources development and management were proposed in NWR-M/P. The proposed institutional setups include those for the water use right. However, the updated stratus on these proposed organization and institutional setups have not been confirmed in this Study.

(i) Bulgaria

Bulgaria aimed to join the EU and established the Ministry of Environment and Water (MoEW) and issued "New Water Act" as a part of the improvement of organizations and institutions in the 1990s. After 2000 the MoEW has established four River Basin Directorates according to the New Water Act and the EU-WFD, and started the preparation of River Basin Management Plan. The NWR-M/P have proposed the strengthening of stuff and capacities of the MoEW and the four (4) River Basin Directorates, the adoption of river management, and the strong control of permission of water rights, water intake and waste water discharge. It has not past long and the strengthening of organizations is not yet dealt with.

(2) Progress of the Proposed Projects for Institutional Setup

The NWR-M/Ps for seven countries, namely Malaysia, Kenya, Nigeria, Zambia, Philippines, Macedonia and Bulgaria among the nine objective countries have proposed the improvement of legal systems for water resources development and management. However, the proposals of six countries except Malaysia were limited to conceptual levels just recommending execution of improvement of the legal setup relevant to the water resources development and management. On the other hand the NWR-M/P for Malaysia proposed the legal setup specifying the detailed and definite contents, but the proposed legal setup had not been enacted. The contents of the proposed laws and/or regulations proposed in each of the NWR-M/Ps and their updated status are as described hereinafter:

(a) Malaysia

The "National Water Resources Act" was proposed in order to strengthen the administrative powers of the Federal Government and realize the consistent national policy for the water resources development and management. However, the proposed act has not been enacted yet.

(b) Kenya

The Water Act was revised in order to reform the water-related organizations in 2002 as stated in the above Item (1)-(b). However, this revision of the Act was made solely by the then Ministry of Water Development (MOWD), and the NWR-M/P had nothing but recommended it only.

(c) Nigeria

The NWR-M/P has proposed to improve operational regulations concerning the Federal Water Resources Decree, but the proposed improvements have not been executed yet.

(d) Zambia

The NWR-M/P has proposed the enactment of the Water Law in order to strengthen the administration for the water resources development and management. The proposed Law was enacted, and baed on it, the application on the Water Resources Management Bill has passed through the investigation at the Parliament in 2011. The Bill is going to be legislated after the final approval by the Presidential.

(e) Philippines

The NWR-M/P proposed to enact the two legal systems. One was to unify the authorities and roles for water resources development and management, which were dscattered with various government departments. Another was to strengthen the organization of the National

Water Resources Board (NWRB). The legal system for strengthening the organization of NWRB has already been improved, but the legal arrangement for the former has not realized yet.

(f) Macedonia

The establishment of new organizations for water resources development and management and the arrangement of legal systems based on the EU standards have been proposed in the NWR-M/P in order to attain the target to join the EU, and these proposals were realized upon the enactment of the New Water Law in 2008.

(g) Bulgaria

For Bulgaria's accession of the EU, Bulgaria promoted the improvement of organizations and institutions and the enactment of the New Water Act in the 1990s, and Bulgaria has become a member of the EU since January 2007. The New Water Act was the first integrated legal document on water resources, water use, and water quality in Bulgaria and in August 2006 the Water Act was revised. The revised Water Act was provided the integrated management of waters, introduction of river basin unit management principle, polluter pay and user pay principle. The NWR-M/P has proposed the introduction of river management principle, the review of roles and powers of the managing organizations required in the specific river basin management.

5.3.3 Capacity Development (CD) on Formulation of Water Resources Policy and Plan

As described in subsections 5.3, the eight objective countries except Cote D'ivoire are judged to have substantially strengthened their administrative capacities for the water resources development and management through reforms of the organization and legal setups, which have ever been made since 2000. At the same time, the NWR-M/Ps for seven (7) objective countries except Cot D'ivoire and Vietnam are deemed to have made a great contribution to building up of the frameworks for the above reforms of the organization and legal setups. However, the sustainable capacity development for the relevant government agencies after the reforms are mostly due to the assistances by the other donors such as ADB, WB and GTZ, while it is not clear whether or not the NWR-M/P could have contributed to the capacity development.

The NWR-M/P for Malaysia has been reviewed and updated by the Government of Malaysia, themselves without any donor assistance twice in 2000 and 2010 succeeding to the NWR-M/P by JICA. As described in the foregoing subsection 2.3.9, the JICA long-term experts for the water resources development and management had been assigned to Malaysia for about 20 years from 1982 (i.e., the year of completion of the Study on the NWR-M/P) until 2003. Hence, the follow-up to the NWR-M/P by these long-term experts are judged to have made a certain contributions to the said review/update of the NAME/MPs.

The review and/or update of the NWR-M/P have been also made and/or it is now in progress through the technical assistance by JICA in Kenya and Nigeria. The Government of Zambia also wishes to update the NWR-M/P through the assistance by JICA. Judging from the said activities for updating of the NWR-M/P, at least the four countries of Malaysia, Kenya, Nigeria and Zambia are deemed to have realized the importance of the NWR-M/P and the necessities of updating of it.

5.4 Water Resources Development

5.4.1 Water Resources Development Plan Based on the Data

The NWR-M/P has ever furnished the nationwide plan for water resources and management adopting the basic method such that the country is divided into several river basins and, the available water resources, the long-term water supply-demand balance and the eligible projects for water resources development/ management are estimated for each of the river basins. The total extent examined in the NWR-M/Ps for the objective nine countries is about 3.7 million km^2, which was divided into 108 units of river basin in total as listed in Table 5.6.

Table 5.6 The Objective Areas and Number of Water Regions Adopted in the Former NWR-M/Ps

Name of Country	Objective Area（km^2）	Number of Water Regions/River Basins
Malaysia	330,803	35
Kenya	580,367	9
Nigeria	923,768	8
Zambia	752,612	10
Philippines	299404	11
Macedonia	25,713	5
Cote D'ivoire	322,463	11
Vietnam	331,212	14
Bulgaria	110,879	5
Total	3,677,221	108

Source: NWR-M/P

The Studies on the NWR-M/P have collected and utilized the enormous volume of the hydrological data (the rainfall and river discharge data) and the socio-economic census (those for the population and industries) as the basic data for estimation of the available volume of the water resources and the long-term water supply-demand balance The Study further stored these hydrological data as well as the socio-economic census in the database as shown in Table 5.7, and the data and census are even now being used as the variable basic information for formulation of the water resources development and management plans. It is, however, herein noted that these hydrological data and socio-economic census have been seldom updated in all of the objective countries except Malaysia.

Table 5.7 Basic Information collected and processed through the NWR-M/Ps

Name of Country	Basic Information
Malaysia	Hydrological data for the nationwide major river system, information of the water resources potentials, and flood hazard maps
Kenya	Hydrological and water quality data, information of river channel features, inventory of river facilities and the information on the groundwater
Vietnam	Water supply-demand balance estimated from the existing basin data
Nigeria	Basic topographic maps, hydrological data, socio-statistic data, water resources development and management concerned reports
Zambia	Hydrological data and socio-economic census for basic analysis
Philippines	Hydrological information and information in water supply and sanitary sectors
Macedonia	Topographic maps (1: 2000) at five dam sites and nationwide groundwater data
Cote D'ivoire	GIS data for major river basins
Bulgaria	GIS deta model for nationwide river basins

Source: (1) The results of questionnaire surveys
(2) The field surveys
(3) List of JICA project outlines
(4) The Study on Integrated Water Resources Management for Poverty Alleviation and Economic Development in the Pampanga River Basin in the Republic of the Philippines
(5) The Study on Integrated Water Resources Development Plan for the Agency River in Cote D'ivoire
(6) The Study on Skopje Sewerage Improvement Plan in the Former Yugoslav Republic of Macedonia

The collection and cumulation of the basic data as described above is the particular and unique approach for the NWR-M/P and not seen in the technical assistances by other donors. The NWR-M/P for Malaysia had a study period of four (4) years, and in the entire study period, one year was fully devoted to collection and cumulation of the basic data. These basic data/census are now being utilized for other various water-related plans even after completion of the NWR-M/P, and therefore, highly appreciated by the recipient countries as well as other donors.

5.4.2 The Contents on the Water Resources Development Proposed in the NWR-M/P

The contents on the water resources development proposed in the NWR-M/Ps for the objective nine countries are as shown in Tables 5.8 and 5.9. The projects proposed for the water resources development are classified into the following groups according to their purposes of the projects:

- The projects, which aim at three sectors, namely the water use, the flood mitigation and the conservation of the water related environment, as seen in the cases of the NWR-M/Ps for Malaysia and Kenya,
- The projects which devote to two water sectors of the water use and the flood mitigation, as seen in the case of NWR-M/P for Vietnam,
- The projects, which devote to two water sectors of the water use and the conservation of the water related environment, as seen in the cases of the NWR-M/Ps for Nigeria and Bulgaria,
- The projects, which specialize in the sector of the water use only, as seen in the cases of the NWR-M/Ps for Zambia, Philippines, Macedonia and Cote D'ivoire. Of these NWR-M/Ps for four

countries, that for Philippines in particular aimed at developing the municipal water supply facilities for Metro Manila, Cebu and Bagio and other major cities. On the other hand, those for Zambia, Macedonia and Cote D'ivoire aims at developing not only the municipal water supply system but also the facilities for irrigation and hydropower generation.

The following items are further raised as the particularities of the NWR-M/P from the viewpoints of the type of the facilities proposed:

- The facilities proposed for the Asian countries (i.e., Malaysia, Vietnam and Philippines) and European countries (i.e., Macedonia and Bulgaria) include many of the large-scale structures, which are suited to the water supply for the large urban centers and/or the large-scale irrigation. On the other hand, in the African countries (i.e., Kenya, Nigeria, Zambia and Cote D'ivoire), one of the principal issues was addressed to the rural water supplies for the semi-arid regions and in order to cope with the issue, the development of wells for securing of the groundwater was proposed as the major structural measure for the water resources development.
- The sewerage development was proposed as the principal measure for Malaysia, Kenya and Bulgaria, while it was not the subject of the proposal for other six countries. In order to cope with the deterioration inflicted by increment of the urban population, however, the sewerage development would be certainly highlighted as one of the major issues for many of the developing countries, and therefore, it should be one of the important subjects of the NWR-M/P in the future.

Table 5.8 Facilities for Water Resources Development and Management Proposed in NWR-M/P (1/2)

Country	Purpose	Proposed Facilities
Malaysia	Flood control	• River improvement: 850 km, Excavation of floodway: 82 km, Construction of ring bunds: 12 towns/villages • Flood control dam: 12 dams (including multi purpose dams)
	Water utilization	• Water utilization dam: 50 dams (including flood control dams above) • Water supply facility (Increase from 2 million m³/day to 10.3 million m³/day) • Irrigation (Expansion of paddy field from 302,000 ha to 545,000 ha)
	Water environment	• Sewerage facility: 11 urban centers • Industrial wastewater treatment facility : Sewerage systems for 20 turban centers
Kenya	Flood control	• Five flood control plans • Drainage facility improvement: 47 major urban centers • Small river improvement projects • River channel stabilization measures for the Tana River
	Water utilization	• Water supply dam: 28 dams • Urban water supply: 141 urban centers • Local water supply: 50 regions* • Inter-basin water transfer: 16 regions • Basin water transfer: 24 regions • Irrigation: 110,000 ha for major and 7,000 ha for small scale • Hydropower projects: six (6) projects
	Water environment	• Sewerage project: 40 urban centers*
Nigeria	Water utilization	• Rehabilitation of existing dam：50 • Construction of new dams：Total reservoir volume: 10,000 Million m³ • Water supply facilities rehabilitation to attain the water supply service ratio of 80% • Irrigation: 1,120,000 ha for public and 380,000 ha for private • Dadin Kowa dam hydropower plan（34MW）
	Water environment	• Gully restoration at Anambra and Knung States

….. To be continued

Table 5.9 Facilities for Water Resources Development and Management Proposed in NWR-M/P (2/2)

Country	Purpose	Proposed Facilities
Zambia	Water utilization	• Water supply project for Lusaka Urban Area, Copper belt and other 5 urban areas • Water demand and supply plan for 80 small urban areas (Surface water: 17 urban areas, Groundwater: 63 urban areas) • Water supply projects for rural areas • Establishment of groundwater development system) • Irrigation development plan (ASIP Rehabilitation Project, Expansion Projects of Existing Irrigation, New Development Projects) • Irrigation dam development projects (Lufubu Dam, Lundazi Dam) • Fish pond development plan (three areas) • Livestock development plan
	Multipurpose	• Three multi-purpose dams (Chongwe Dam, Kafubu dam, Mutundu Dam)
Philippines	Water utilization	• 22 impounding dam projects for major river basins • Urban water supply (Manila, Cebu, Baguio, Davao City, and other 6 cities)
	Multi Purpose	• Water Resources Development Project (Cagayan, Abulug, Agno, Pampanga, Pasig-Laguna Bay, Amnay-Patric)
Macedonia	Water utilization	• Municipal water supply: Upper Vardar (37,000 people) and Lower Vardar (24,000 people), • Irrigation: Upper Vardar (1,500 ha) and Lower Vardar (3,600ha) and Crn Drim River irrigation System Betterment Project (5,200 ha)
	Multi Purpose Development	• Vardar River Basin Multi Purpose Dam Development Project • Strumica River Oraovica Dam Project
Cote D'ivoire	Water utilization	• Urban water supply: 3 projects for Abidjan waterway, Man City water storage and Bouake city water storage) • Irrigations: 5 projects (10,584ha) • Hydropower generation; 3 projects (39,100kw)
	Multipurpose	• 6 projects (Municipal water supply 370,000m3/day, irrigation 109,203ha, hydropower generation 4,894kw)
Vietnam	Flood control	• Flood control dam: 14 projects (13 multipurpose dams and one flood control dam) • River improvement: 14 rivers • The Kone River downstream flood control project
	Water utilization	• Water use dam: 18 projects (16 multipurpose dams, and 2 water use dam) • Agricultural development: 12 rivers agricultural development plan • 12 rivers domestic and industrial water supply plan • Kone River basin Van Phong and Irrigation and drainage project
Bulgaria	Water utilization	• Replacement of water supply pipes: 21,450 km • Improvement of Irrigation Are: 367,202 ha
	Water environment	• New waste water treatment plants: 24 towns • Rehabilitation of existing waste water treatment plants: 7 towns

5.4.3 Progress of the Proposed Projects for Water Resources Development

As described in subsections 4.3.2 and 2.3.3, the structural measures proposed in the NWR-M/P for Vietnam are judged to have been relatively well realized. The municipal water supply projects proposed in the NWR-M/P for Malaysia have been also substantially implemented. However, the projects proposed for other seven countries have been hardly implemented due to the financial deficit, the defect in the project implementation system, and/or the too short period after completion of the Study on the NWR-M/P. None of the project proposed for Philippines and Bulgaria in particular has been implemented yet. Furthermore, most of the projects implemented in three countries of Africa: Kenya, Nigeria and Zambia, are limited to be small-scale development of wells for the municipal water supply, and the large scale projects like those for the irrigation development and the multi purpose dam development have been seldom implemented.

(1) Malaysia (Expected implementation period: From 1983 to 2000)

The projects for the municipal water supply had been substantially implemented by the target year of 2000 of the NWR-M/P, and the target water supply capacity proposed in the NWR-M/P had been attained. However, after 2000, any major water resources development projects have not been completed in Malaysia, except of Beris Dam which was completed in 2004, although the "Phang-Selangor Interstate Water Transfer Project" is now in progress aiming to supplement the municipal water supply capacity for Kuala Lumpur and its suburbs.

Furthermore, of 22 projects for development of the irrigation dam (including multipurpose dams) proposed in the NWR-M/P, only five (5) dams have been implemented, resulting the current rate of self-sufficiency as low as 70%, which is far lower than 85% of the target of the NWR-M/P. The NWR-M/P also proposed the river improvement of 850 km in total length and 12 flood control dams for the nationwide flood mitigation, while the implemented projects are limited to only 263 km for the river improvement and three flood control dams.

(2) Kenya (Expected implementation period: From 1999 to 2010)

The rural water supply projects proposed in the NWR-M/P are judged to have been implemented to a certain extent, while the projects for irrigation and hydro-power development have been little implemented. According to the Vice Minister of MWI, such little implementation of the projects would be attributed to shortage of financial resources and the inadequacy of implementing organization and institution.

(3) Vietnam (Expected implementation period: From 2004 to 2020)

The NWR-M/P for Vietnam was subject to the project implementation period of 17 year from 17 years from 2004 to 2020. Out of the project implementation period of 17 years, only eight years has passed, but within this period, many of the proposed projects for the structural measures have been implemented and/or completed including: (a) the major structures for the Huong River and Kone River, which are the priority river basins, (b) 10 dams out of 19 dams proposed for 12 river basins, and (c) four irrigation development projects out of 12 proposed. Thus it could be said that the progress of the water resources development projects in Vietnam have been successfully implemented.

(4) Nigeria (Expected implementation period: From 1996 to 2025)

The NWR-M/P has proposed major structural measures for the surface water sources development, the municipal water supply, the irrigation and drainage, the hydropower generation and the river channel conservation (i.e., the control of the gully erosion). For surface water development, the NWR-M/P proposed both of the rehabilitation of existing dams and the construction of new dams, but the projects implemented are only limited to construction of new dams, and their dam storage capacities are summed up to1,158million m^3, which is only 12% of

the proposed storage capacity (10,000million m^3). The NWR-M/P also proposed the target service ratio of 80% for the municipal water supply, while the the ratios achieved are confined to 70% for the urban area and 50% for the rural area. Furthermore the NWR-M/P proposed to develop the irrigation area of 1,500,000ha, while the actual irrigation area has tended to decrease and it currently remains 232,000ha only, which is equivalent to 15% to the proposed extent for irrigation development.

(5) Zambia (Expected implementation period: From 1996 to 2025)

The major theme of the NWR-M/P was oriented to development both for the municipal water supply and the irrigation. However, the actually implemented projects are confined only to those for municipal water supply, which is made solely by development of wells. The number of wells developed is 5,827, which is equivalent only to 19% of the proposed number of wells (i.e., 29,979 wells) by the NWR-M/P.

(6) Philippines (Expected implementation period: From 1999 to 2025)

The NWR-M/P proposed 22 dams, one intake barrage and six water transfer projects in order to supplement the municipal water supply capacity for Metro Manila, Metro Cebu and Baguio City, however, none of them has been implemented. The NWR-M/P proposed the desalination plant as the supplemental water source for Metro Cebu, and it has been studied through the "Water Supply and Sanitary Improvement for the Metro Cebu (JICA Study in 2010)". However, the project has not been also implemented yet.

(7) Macedonia (Expected implementation period: From 2000 to 2025)

The NWR-M/P proposed 42 municipal water supply/sanitary improvement projects, which take the measures of the water sources development and basin water transfer. However, the projects actually implemented are limited to only the following 2 items: (a) the "Project for Improvement of Water Supply in Inhabited Places in Skopje Outskirts" (JICA Grant Project) and the "Zletovicia Multi purpose Dam Project"(Japanese Loan Project).

(8) Cote D'ivoire (Expected implementation period: From 2002 to 2025)

The NWR-M/P proposed six multi-purpose dam projects which aim at developing the municipal water supply, irrigation and hydroelectric power generation, but none of them has been implemented. Furthermore, five agricultural development projects, three hydroelectric-power development projects and Abidjan water transfer project have been proposed, but their progresses are unknown.

(9) Bulgaria (Expected implementation period: From 2009 to 2027)

The NWR-M/P proposed the rehabilitation and construction of sewerage treatment plants and rehabilitation of sewer systems in order to improve the water quality, to decrease the losses of the

municipal water supply and to improve irrigation facilities. The contents proposed in the NWR-M/P have been reflected into the National Development Plan, but they have not been implemented yet.

5.5 Water Resources Management

5.5.1 Water Resources Management Proposed in NWR-M/PM

As described above, many of the former NWR-M/Ps tend to have given priority to the water resources development by the structural measures and less consideration to the water resources management by the non-structural measures. The water resources management proposed in the NWR-M/Ps includes a variety of schemes such as the water quality management, watershed conservation, monitoring of the surface water/groundwater, operation/management of the existing facilities, land use control and involvement of stakeholders as shown in Tables 5.10 and 5.11. However, the contents proposed for the objective countries other than Malaysia, Macedonia and Bulgaria are confined at the conceptional level without clarification of the definite measure.

On the other hand, the NWR-M/Ps for Malaysia, Macedonia and Bulgaria had examined the water resources management more deeply delineating the more definite measures and project scales. For instance, the NWR-M/P for Malaysia raised necessity to strengthen the hydrological gauging system and development of the ledger for river management as the important issues for the water resources management and proposed the gauging objectives, the gauging locations and the gauging methods. The significance on development of the ledger for river management and the contents to be recorded in the ledger are further proposed in the NWR-M/P for Malaysia. The NWR-M/Ps for Macedonia and Bulgaria also proposed the detailed and concrete contents on the water quality and quantity management taking the requirement for affiliation to EU into account.

Table 5.10 Non-structural Measures for Water Resources Management Proposed in NWR-M/P (1/2)

Name of Country	Proposed Contents
Malaysia	• Formulation of National Water Resources Master Plan • Improvement of hydrological gauging system and preparation of river management ledger • Implementation of regional water resources development plans • Investigation of groundwater in the coastal area of Sarawak • Master Plan for Hydropower Development of Sabah and Sarawak • Formulation of basin water resources master plan and feasibility study (for Port Dicson, Kota Kinabaru, and its suburb and Labuan island)
Kenya	• Preparation of inventory of hydrological data, river longitudinal and cross sections, river bank land use and land use. • Execution of river patrol by the responsible agency for river management • Flood prone area management • Strengthening management capacity for groundwater • Continuation of water quality monitoring program) • River basin conservation

… To be Continued

Table 5.11 Non-structural Measures for Water Resources Management Proposed in NWR-M/P (2/2)

Name of Country	Proposed Contents
Nigeria	• Rehabilitation and installation of monitoring facilities for surface water and groundwater • Preparation of operation programs for the existing reservoirs • F/S on the proposed Comprehensive River Basin Management Program • Increment of benefit at invested areas by promotion of positive public participation system • Effective use of existing large reservoirs, expansion of service areas and improvement of environmental conservation of marsh • Completion of national water resources inventory and development of data base
Zambia	• Encouragement of public awareness of beneficiary-to pay principle and of saving water
Philippines	• M/P and F/S on Municipal Water Supply for Metro Manila, Metro Cebu and Baguio City • Improvement of data acquisition system • Establishment of a national water information • Enhancement of water management system to achieve proper demand control • Environmental consideration on the proposed water resources development plans • Establishment of a system to review the water resources management master plans • Execution of a master plan study for specific major river basin
Macedonia	• Vandar river water quality conservation plan • Watershed conservation plan • Surface water and groundwater monitoring improvement plan • Facilities operation, maintenance and improvement plan • Human resources development plan
Cote D'ivoire	• Establishment of 47 water quality monitoring stations • Conservation of forest and land use control • Unified operation and management of the existing gauging systems • Development of the hydrogeological gauging system and data storing system • Establishment of river database • Preparation of the river ledger
Vietnam	• Water use management plan • Flood disaster management plan • River environment management plan • Preparation of dam operation plan
Bulgaria	• Water quality management • Water quantity management • Underground water management • River Management • Encouragement of public awareness of and establishment of collaboration system with stakeholders • Maintenance and updating of the tools for water resources management such as GIS database and the model for integrated river basin analysis

5.5.2 Progress of the Proposed Projects for Water Resources Management

The projects for the non-structural measures proposed for four countries: Malaysia, Zambia, Macedonia and Bulgaria are evaluated to have shown the good progress. On the other hand, the projects for three countries: Kenya. Nigeria and Philippines are likely to be stagnant, and the particular attention is given to the status such that the follow-up programs for the NWR-M/P have not been implemented yet. Furthermore, the proposed projects have been seldom implemented in Vietnam.

The progress of the project implementation for the non-structural measures inr nine objective countries are described in the following items (1) to (9), and thereby, the following three items are regarded as the major influential factors on the progress of the project implementation:

- ***The incentives of the government on the proposed projects:*** Macedonia and Bulgaria addressed the affiliation with the EU as one of the principal issues in their national policies. Similarly, Zambia is also strongly concerned with the enhanced public awareness on the importance of the maintenance/ management/operation of the municipal water supply. These matters of the primary concerns are judged to have derived forward the strengthening of the water resources management.
- ***The donor assistance:*** When the project is not supported by the donor assistance, it is hardly implemented.
- ***The financial resources, manpower and administrative system required to the project implementation:*** The distinct example on this matter is given to the case in Kenya, where the projects for development of the hydrological data processing and the river information system are have been hardly implemented due to the decentralization.

The progresses of the project implementation for the non structural measures in the objective countries are as described hereinafter:

(1) Malaysia

Almost all of the major proposed projects for the non-structural measures are judged to have been implemented. The projects implemented are such as: (a) improvement and strengthening of hydrological gauging system, (b) update and/or formulation of the national water resources master plan posterior to the NWR-M/P and (c) implementation of the regional water resources development plans" (refer to subsection 2.3.4).

(2) Kenya

Attempts were made to all of the major proposed projects for the non-structural measures, which include (a) development of the hydrological gauging/river information systems, (b) execution of river patrol, (c) management for the flood prone area, (d) strengthening of the system for management of the groundwater and (e) watershed management. However, the attempts are deemed to have not been fully attained yet judging from the following conditions:

- The project implementation for development of the hydrological gauging/river information systems is stagnant.
- The river patrol is not adequately made due to the shortage of the man-powers.
- The projects for the above items (c) to (d) are being undertaken to a certain extent (for example the management for the flood prone area in Nyando River Basin), but they are hardly implemented in the nationwide scale.

(3) Vietnam

Almost none of the projects for the non-structural measures proposed in the NWR-M/P have been realized. (Details in Section 4.3.3)

(4) Nigeria

In accordance with recommendations by in the NWR-M/P, several projects for the non-structural measures have been implemented including those for (a) rehabilitation of monitoring facilities for water resources, (b) introduction of public participation to the selected water management projects under the assistance of WB, (c) conservation of Lake Chad Wetland". However, the following two major projects have not been implemented yet: (a) preparation of reservoir operation programs for the existing dams and (b) formulation of the integrated river basin management program for the pilot river basins.

(5) Zambia

In accordance with the recommendations by the NWR-M/P, implemented is the enhancement activities of public awareness for maintenance and management of water supply facilities. Moreover, the attempts for almost all of the proposed measures have been made.

(6) Philippines

In accordance with the recommendations by the NWR-M/P, the following projects for the non-structural measures have been implemented: (a) collection and processing of hydrological data, (b) establishment of the National Water Information Network System and (c) execution of the feasibility studies as the follow-up to the NWR-M/P. Of the projects proposed by the NWR-MP, however, the review and update of the NWR-M/P" has not been carried out yet.

(7) Macedonia

The major projects for the non-structural measures proposed by the NWR-MP include the following items of (a) to (b), and they are judged to have been successfully completed: (a) establishment of the surface water quality monitoring system and (b) the water management by the river basin units under the New Water Law since 2000.

(8) Cote D'ivoire

The projects for the non-structural measures proposed by the NWR-M/P include those for: (a) processing of meteorological and hydrological data and river information, (b) establishment of water quality monitoring network and (c) forest conservation and land use control. Among the proposed projects, that for the processing of meteorological and hydrological data and river information has been implemented, through development of GIS database, for two large river basins, namely: the Sasandra River system (70,800km^2) and Comoe River System (74,000km^2) .

(9) Bulgaria

The tools for the water resources management (such as the GIS data models, the integrated basin analysis models and monitoring programs) had been development through the NWR-M/P, and they are currently fully utilized. Thus, the water resources management based on the utilization of various tools as proposed by the NWR-M/P is judged to have been almost attained.

5.5.3 Water Resources Management Crossing over the National Borders

As shown in Table 5-12, the five countries of Malaysia, Vietnam, Nigeria and Macedonia have made attempts to execute the measures of the following items (a) to (c) for the water resources development and management of the international rivers such as water use, flood control and conservation of the water-related environment: (a) conclusion of the international agreements, (b) organization of the international committee, (c) establishment of the mechanism for the international conferences and issuance of the international notifications. The NWR-M/P proposed the following items as the sorts of the said measures for the international river: the international agreement on the international water transfer from Johor River in Malaysia to Singapore, and organization of the international committee for conventions/agreements on the water resources development and management of Lake Victoria.

Table 5.12 Activities for Water Resources Development and Management for International Rivers in the Objective Countries

Name of country	Activities taken for Water Resources Development and Management for International Rivers
Malaysia	Conclusion of the bilateral agreement for the water transfer from the Johor River in Malaysia to Singapore
Vietnam	Establishment of the international committee for water resources development and management of Mekong River
Kenya	Establishment of the committees for conference and agreement on the water resources development and management of Lake Victoria and Nile River
Nigeria	Establishment of the committees for conference and agreement on the water resources development and management of Niger River and Lake Chad.
Macedonia	Conference and issuance of the notifications on the plan for water resources development and management, which shall be the objectives of the international consultation, to the relevant countries

Source : The results of the questionnaire surveys and interview surveys
The results of field surveys
The National Water M/P Reports

5.6 Other Viewpoints

5.6.1 Japanese Knowledge Adapted to the NWR-M/P

According to the results of the interview to the consultants, who had been engaged in the formulation of the former NWR-M/Ps, it is evaluated that the formulation of NWR-M/P, has commonly referred to various Japanese technical standards, guidelines and regulations such as: the “Technical Standards for River and Sabo”, the “Water Quality Standards” and the “River Law”. It is, however, recognized that there are many cases such that the Japanese technical standard is hardly applied, as it is, to the recipient country, because of the differences in the politics, the culture, the customs and the natural

conditions among the countries. The specific examples of the practical application of the Japanese knowledge to formulation of the NWR-M/P are as listed in Table 5.13.

Table 5.13 Specific Examples of Practical Application of the Japanese Knowledge to Formulation of the NWR-M/P

Field		Facts	Applied Countries in the NWR-M/P
Water Resources Development	Seawater Desalination	Merits, issues, and cost for installation of the plant for desalination of the seawater	Philippines
	Drilling Technology for Wells	Drilling technology of the wells for water supply	Zambia
Water Management	Basic data processing	Gauging and processing methods of hydrological data	Common in the nine (9) target countries
		Development of GIS-based river management system	Macedonia and Bulgaria
		Development of the long term runoff model	Malaysia, Kenya, Vietnam, Nigeria, Zambia, Philippines, Macedonia
		Estimation of probable flood discharges	Malaysia, Kenya, Vietnam
	Establishment of River Maintenance Flow	Purposes, necessity and estimation methods of river maintenance flow and dam storage volume for securing of the river maintenance flow	Malaysia, Vietnam
	Adjustment for Drought	Minimum water supply levels for each of water users during drought	Malaysia, Vietnam
	Dam Reservoir Operation Program	Rules on the dam reservoir operation for water supply and flood control	Vietnam, Nigeria
	Public Awareness on Flood Hazard Map	Purposes, merits and contents of the flood hazard maps	Vietnam
	Maintenance, Management and Operation of Well Water Supply Facilities	Purpose, merits and methods of maintenance, management, operation of wells for supply of groundwater	Zambia
Institution	Water Allocation	The system for application of the water use right and water allocation for drought	Kenya, Zambia, Macedonia, Cote D'ivoire
	Financial System for Water Resources Development and management	Beneficiary-to-pay principle and government subsidy system for financing for water resources development and management	Malaysia
	Cost Allocation for Development of Multipurpose Dam	Cost allocation rule for multipurpose dam development among the users of irrigation, water supply and hydropower	Malaysia
	Enactment of Water Law	Introduction of the necessary legal system for unification of water resources development and management	Malaysia, Kenya

Source : The questionnaire surveys and interview surveys
The review results of the NWR- M/P
Metro Cebu Water Resources Development Plan Preparatory Study Report in Republic of Philippines

5.6.2 Contribution to Environmental and Social Consideration by the NWR-M/P

During the time of formulation of the NWR-M/P, the guidelines for the environment and social consideration (IEE and EIA) had bee available in the four countries of Vietnam, Philippines, Macedonia and Bulgaria.[10] In accordance with the guideline, the Initial Environment Examination (IEE) on the priority projects had been carried out as a part of the study on the NWR/M for the said four countries as shown in Table 5.14. On the other hand, the necessity of the environmental and social

[10] The guideline for the environmental and social consideration in Vietnam was still at the draft level.

consideration was pointed out but any detailed examination on it was not carried out in the NWR-M/Ps for Kenya and Nigeria. Furthermore, even any description on the environmental and social consideration was not made in the NWR-M/Ps for Malaysia, Zambia and Cote D'ivoire.

Judging from the above conditions, the NWR-M/Ps for at least Kenya, Nigeria, Malaysia, Zambia and Cote D'ivoire are deemed to have hardly made a substantial contribution to improvement of methods of assessment for the environmental and social consideration posterior to completion of the NWR-M/P.

The primary purpose of the NWR-M/P is given to formulation of the policy for long-term nationwide water resources development and management rather than formulation of the plan for individual project. From this point of view, the future NWR-M/Ps would be required to examine the Strategic Environment Assessment (SEA) on the nation-wide long-term policy as its major subject in advance of the initial examination of environment (IEE) of an individual project.

Table 5.14 Attempts of Environment and Social Consideration by the NWR-M/Ps

Name of Country (Study period)	Attempts to Environment and Social Consideration in the NWR-M/P
Malaysia (1979-1982)	At the stage of formulation of the NWR-M/P, there was no guideline for the environmental assessment in Malaysia and, therefore, the environmental impact study on the proposed projects was not conducted.
Kenya (1st:1997-1992) (2nd:1997-1998)	At the stage of formulation of the NWR-M/P there was no guideline for the environmental assessment in Kenya and, therefore the environmental impact study on the proposed projects was not conducted. However, the necessity of preparation of guidelines was pointed out in the NWR-M/P.
Vietnam （2001-2003）	In the NWR-M/P, the detailed and specific environmental impact studies have been conducted on the priority projects.
Nigeria （1992-1995）	In the NWR-M/P, the necessity of the implementation of EIA was discussed, but the environmental impact study on the proposed projects was not conducted.
Zambia (1993-1995)	At the stage of formulation of the NWR-M/P there was no guideline for environmental assessment in Zambia and the environmental impact study on the proposed projects was not conducted.
Philippines (1997-1998)	In accordance with the guideline for environmental assessment, the environmental impact study on the proposed projects was conducted for the proposed projects.
Macedonia (1998-1999)	In accordance with the guidelines of JICA and JBIC for environmental assessment, the environmental impact study on the proposed projects was conducted.
Cote D7ivoire (2000-2001)	At the time of formulation of the NWR-M/P there was a guideline for environmental assessment, but the environmental impact study on the proposed projects was not conducted.
Bulgaria (2006-2008)	In accordance with the guideline of EU and Bulgaria, the environmental impact study on the proposed projects was conducted. .

Source : NWR-M/P Reports (9 countries and 10 projects' reports)
The questionnaire survey and interview surveys
The results of field surveys
The Study on Integrated Water Resources Management for Poverty Alleviation and Economic Development in the Pampanga River Basin in the Republic of the Philippines
The Study on Integrated Water Resources Development Plan for the Agneby River in Cote D'ivoire
The Study on Skopje Sewerage Improvement Plan in the Former Yugoslav Republic of Macedonia

5.7 Present Status of the Objective Country of the NWR-M/P

5.7.1 Decentralization in Water Sector

As described above, the NWR-M/Ps have put their priority target to the formulation of the unified and centralized national policy on the water resources development and management. On the contrary, another the important issue is being highlighted, as the worldwide tendency, to decentralization, which

enhances more proper and flexible execution of the water resources development and management under the unified national policy. From this point of view, the progress of the decentralization for practice of the water resources development and management in the nine objective countries are described in this subsection.

The nine objective countries could be divided into three groups according to the present states of decentralization in the water sector. The 1st group includes Malaysia and Nigeria, where the federal governance system is taken and the decentralized administrative services have been conventionally made. The 2nd group includes Kenya, Zambia, Philippines, Macedonia, where the decentralization is being enhanced through the current water sector reform. However, the decentralization in the water sectors of this 2nd group has not been firmly established yet because of the inadequate financial and human resources. The 3rd group includes Vietnam and Bulgaria, where: the decentralization system has not been legally accepted. The detailed current decentralization situations of the objective countries are described hereinafter:

(1) Malaysia

Malaysia is the federal state composed of 13 states, and it has ever had the decentralized administrative system with a strong autonomy of each state. The state government posses the property rights of the water resources and the administrative authority for the water resources development and management. Under these circumstances, the unified national policy for the water resources development and management together with the proper practices of the policy by the state government is being highlighted as an important national issue.

(2) Kenya

The decentralization in the water sector was initiated by the water sector reform in 2005 and it is now in progress based on the administration by Catchment Area Advisory Committees (CAACs) for water resources development in six river basins and the administration by the Water Service Boards (WSBs) for the municipal water services and sanitary services in eight river basins.

(3) Vietnam

The decentralized and autonomous administration is not legalized. For this reason the discretionary powers of the central governments (Ministry of Natural Resources and Environment (MoNRE) and Ministry of Agriculture and Regional Development (MARD)) for water resources development and management are strong, and the discretional power at local government level is very limited.

(4) Nigeria

Nigeria is the federal state composed of 36 states and taking the decentralized administration system such that the federal government takes the role to formulate the national policies for

water resources development and management, and the state government undertakes the actual practices of the policies.

(5) Zambia

In order to improve the administrative services, the "Decentralization Implementation Plan (DIP)" was drafted in 2006. The DIP aims at transferring the authorities and roles of the administrative service including water sector from the central government to the local government. However, the DIP has not been finally approved by the Cabinet yet.

(6) Philippines

The "Local Government Code (LGC)" was enacted in 1991 in order to improve the administrative services and downsize the organization of the central government. However, the local governments have not become independent from the central government due to inadequate financial capacity and man-power of the local governments. As the results, the decentralization concerned water resources development and management has not been progressed enough

(7) Macedonia

The Law for the decentralization was enacted in 2006. The Law requires the local government to establish a self-supporting accounting system, and further to transfer the administrative services which have been undertaken by the central government, to the local government. However, the capacity of the local government is still weak and, many roles for the central and local governments have not been clearly demarcated yet.

(8) Bulgaria

The autonomy of the local governments has not been legislated and, the decentralization has not been established yet.

5.7.2 Privatization and Public-Private-Partnership (PPP) for the Municipal Water Supply and Other Water Services

Among nine objective countries, Malaysia, Kenya, Vietnam, Nigeria, Zambia and Bulgaria currently make attempts to introduce the private fund to the municipal water supply and sanitary services and/or the hydropower supply services in order to reduce the burden of the government's financial expenditure and improve the quality of the water services as shown in Table 5.15.

In the case of Malaysia, however, the privatization for the municipal water supply and sanitary services were promoted by the state governments, while the expansion for the municipal water supply and sanitary system had been delayed and the maintenance of the system was seriously deteriorated due to the shortage of the funds of the private firms and the state governments. In order to cope with these problems, the federal government purchased the municipal water supply and sanitary system

owned by the private firms and/or the state government and it entrusted the operation, maintenance and management works of the system to the private firms.

In case of Philippines, the serious shortage in the municipal water supply for Metro Manila has occurred due to delay of the water resources development inflicted by the shortage of the budget of the Manila Water and Sewerage System (MWSS).[11] Furthermore, the privatization of the municipal water supply and sanitary services caused the difficulties in supplying the water to the poverty class, who could hardly afford the water charge: This occurs in the service area of the Manilad Water Service Inc., which is the concessioner for the municipal water supply services for the eastern part of Metro Manila.

Table 5.15 Privatization of Water Sectors at the Target Countries

Name of Country	Privatization of Water Sector
Malaysia	Hydropower and electric supply and water supply and sanitary services
Kenya	Hydropower and electric supply services, water supply and sanitary services
Nigeria	Hydropower and electric supply services
Zambia	Hydropower and electric supply services
Philippines	Water supply and sanitary services
Bulgaria	Water supply and sanitary services at the Capital City: Sofia

Source : The results of questionnaire surveys, field survey and the review results of the National Water M/P
Metro Cebu Water Resources Development Preliminary Study Report

5.7.3 Update of the NWR-M/P

The NWR-M/P aims at presenting the overview of the projects for the water resources development and management based on the estimation of the water supply-demand balance until the target year, and thereby, update of the NWR-M/P is required in accordance with the changes of the future socio-economic conditions posterior to the target year of the former NWR-M/P.

The update of the NWR-M/P has been made and/or it is currently in progress in Malaysia, Kenya and Nigeria as described below, but it has not been made in other countries.

- The target area of the NWR-M/Ps for Malaysia and Kenya are set at 2000 and 2010, respectively and the update of the M/Ps has been made within the period by the target year. The update of the NWR-M/P for Nigeria is also now in progress, although the time has not come to its target year of 2020 yet.
- The former NWR-M/Ps for Zambia, Philippines, Macedonia, Cote D'ivoire, Vietnam and Bulgaria assumed their target years in a rage of 2015 to 2020, and the update for them have not been made yet.

In Malaysia, the projects for the municipal water supply proposed in the NWR-M/P had been implemented well by 2000, which was assumed as the target year of the original NWR/MP, while the project implementation is stagnant after 2000, in spite of the update of the NWR-M/P in 2000. As the

[11] The MWSS was formerly the government owned corporation but privatized in 1997. It currently possesses the authority and role for securing the municipal water supply and sanitary services for Metro Manila.

results, the water shortage in Kuala Lumpur and other major urban centers tend to be more serious as increase of the urban population and expansion of the urban area. In order to cope with this problem, the following matter would need to be considered:

- The study on the original NWR-M/P was carried out under the leadership of the DID, which is in charge of water resources development and management, while the update of the NWR-M/Ps were undertaken afterwards by EPU and PWD, which are the government authorities for the economic affairs and the municipal water supply and sanitation, respectively. Such inconsistent implementing bodies for the NWR-M/Ps are deemed to have caused the inconsistencies in continuation of the policy and project implementation for the water resources development and management. The future update of the NWR-M/Ps would need to be consistently made by the same government agency.

5.7.4 Comparison of Supports by JICA and Other Donors

It was conformed through the databases of the donors that there are 353 projects for the water resources development and management, which have been under taken through the assistances of JICA as well as other donors such as ADB, WB and AfDB, , after completion of the NWR-M/Ps (refer to Annex-T 6 to 9). The questionnaire survey was further made to clarify the water-related projects undertaken by the donors other than the above entities, and as the results of the survey, the performances of the water resources development and management in the objective nine countries are overviewed as shown in Table 5.16.

As shown in Table 5.16, the major objectives of the assistance by JICA, WB and ADB are addressed to the municipal water supply and sanitary services in Malaysia, Vietnam and Philippines. On the other hand, the donors in the Western countries, as well as WB, AfDB and JICA could be regarded as the major donors for the three African countries, namely, Kenya, Nigeria and Zambia and their major concerns are oriented to the expansion of the municipal water supply system and the capacity development for the operation, maintenance and management of the system. In Africa, the cooperation organization by the various donors in each of the water sectors has been established. In Kenya in particular, WB and GTZ have selected the strengthening of the organization and institutional setups related to the water sector reform in 2005 in addition to development of the municipal water supply system as their principal objectives of assistance. Furthermore, in the two European countries of Macedonia and Bulgaria, the European donors currently make attempts to enhance the capacity on the water resources management/watershed management for the sake of improvement of the water-related environment.

Table 5.16 Other Donors' Performance and Results for Water Resources Development and Management

Name of Country	Name of Donor	Major Performance and Result
Malaysia	WB、ADB	Water supply and sanitary improvement 、 irrigation development and water sector reform
Kenya	WB 、 AfDB 、 The Western Donors including GTZ	Water sector reform, water supply and sanitary improvement, River basin management (forest conservation)
Vietnam	BAD	Water supply improvement, irrigation development and water sector reform
Nigeria	UNICIF、EC、WB、AfDB	Water supply improvement (Rehabilitation and borehole development), small scale irrigation development
Zambia	NORAD、GTZ	Water supply improvement (Technical transfer for shallow well maintenance, management and operation)
Philippines	WB、ADB、GTZ	Water supply and sanitary improvement and water environment improvement・poverty reduction program
Macedonia	Germany, Australia	Organization ・legal system improvement and strengthening of water management ability
Bulgaria	Germany, Netherlands	River basin management plan based on EU-WFD

Source：The results of questionnaire survey and interview survey and field survey
Lessons Learned & Good Practices from Support to the Kenyan Water Sector
WEB provided by WB、ADB、AfDB
Rural water supply improvement plan for Skopje and surrounding area

The lists of the projects assisted by JICA as well as other donors such as WB, ADB and AfDB after completion of the NWR-M/Ps are as shown in Annex-T 6 to 9. The number of the projects listed is 353 in total, and based on these projects, the details features of the assistance by JICA and other donors are evaluated as described hereinafter.

(1) Features Evaluated in Terms of the Purposes of the Projects

The number of projects is re-estimated in terms of the purposes of the projects as shown in Table 5.17.

Table 5.17 Number of Projects assisted by JICA and Other Donors in Terms of the Purpose of the Projects

Purpose	JICA		ADB		WB		AfDB		Total	
M/P on Wide Area Water Resources Dev.	17	9.5%	5	4.7%	0	0.0%	0	0.0%	22	6.3%
Municipal Water Supply & Sewerage Dev.	72	40.2%	55	51.9%	11	21.6%	11	91.7%	149	42.8%
Dam Development	5	2.8%	0	0.0%	4	7.8%	0	0.0%	9	2.6%
Irrigation Development	30	16.8%	33	31.1%	18	35.3%	0	0.0%	81	23.3%
Hydropower Development	28	15.6%	6	5.7%	2	3.9%	0	0.0%	36	10.3%
Flood Mitigation	24	13.4%	3	2.8%	4	7.8%	0	0.0%	31	8.9%
Watershed Management	1	0.6%	0	0.0%	11	21.6%	1	8.3%	13	3.7%
Others	2	1.1%	4	3.8%	1	2.0%	0	0.0%	7	2.0%
Total	179	100.0%	106	100.0%	51	100.0%	12	100.0%	348	100.0%

Source: The Consultant engaged in this Study
Note: The figures in the Table are the numbers of the projects implemented after completion of NWR-M/Ps.

Based on the figures in Table 5.12, the following features of the projects assisted by each of the donors are evaluated:

(a) The "M/P on Wide Area Water Resources Development" shown in Table 5.17 includes the master plans for national/regional water resources development, which aim at proposing the basin policy for water resources development. The number of the projects for "M/P on Wide Area Water Resources Development" is 25, out of which 20 are by the JICA technical assistance followed by 5 by the ADB technical assistance. Thus, the JICA technical assistance lays emphasis on the basic policy on the national/regional water resources development , which could be one of the typical features of the JICA technical assistance.

(b) The largest number of the projects assisted JICA as well as other donors except WB is for the municipal water supply and sewerage development. The projects for the municipal water supply and sewerage development assistance by WB also takes the second largest next to those for the irrigation development. The municipal water supply is indispensable to meet the Basic Human Needs, and at the same time, it is important for the poverty alleviation. These backgrounds could be the factor to increase the number of the projects for the municipal water supply. Moreover, many of the municipal water supply projects adopt the small scale development of wells not requiring the large amount of financial assistance, which could be also one of the factors for boosting up the number of the projects.

(c) The JICA almost equally extends its assistance to the infrastructure projects for irrigation development, hydropower development, sewerage development and mitigation of the water-related disasters. On the other hand, the assistance by ADB and WB are concentrated on the projects for municipal water supply and irrigation development and it is seldom extended to the projects for hydropower development and mitigation the water-related disasters. The assistance by AfDB is also mostly for the project of the municipal water supply/sewerage development but little for other purposes.

(d) When the projects for the municipal water supply/sewerage development are divided into three groups of: (i) those solely for municipal water supply, (ii) those for solely for sewerage development and (iii) those for combination of municipal water supply and sewerage development, the number of the projects in each of the groups is added up as shown in Table 5.13. As shown in the Table, the projects for combination of the water supply and sewerage development is far less than others. On the contrary, all of the projects assisted by AfDB are devoted to the group of the combination of the water supply and sewerage development. A considerable part of the projects assisted by ADB and WB are also for the same group.

Table 5.18 Number of Projects for Municipal Water Supply and Sewerage Development

Purpose*	JICA		ADB		WB		AfDB		Total	
A	46	63.0%	45	76.3%	6	42.9%	0	0.0%	97	61.8%
B	1	1.4%	9	15.3%	3	21.4%	10	90.9%	23	14.6%
C	26	35.6%	5	8.5%	5	35.7%	1	9.1%	37	23.6%
Total	73	100.0%	59	100.0%	14	100.0%	11	100.0%	157	100.0%

*: A = The projects solely for municipal water supply
B = The project for combination of municipal water supply and sewerage development
C = The projects solely for sewerage development

(2) Features Evaluated in Terms of the Measures adopted to the Projects

The number of projects is re-estimated in terms of the following measures adapted to the projects as shown in Table 5.19.

- Structural measures such as dam and water transfer system,
- Non-structural measures such as preparation of the water allocation and development of the flood hazard maps,
- Capacity building and/or personnel training
- Improvement and strengthening of the organization and institutional setups related to water resources development and management

Table 5.19 Number of Projects assisted by JICA and Other Donors in Terms of the Measures adapted to the Projects

Adopted Measures*	JICA		ADB		WB		AfDB		Total	
A	115	64.2%	82	77.4%	23	45.1%	8	66.7%	228	65.5%
B	15	8.4%	16	15.1%	18	35.3%	2	16.7%	51	14.7%
C	23	12.8%	4	3.8%	7	13.7%	1	8.3%	35	10.1%
D	19	10.6%	0	0.0%	0	0.0%	1	8.3%	20	5.7%
E	7	3.9%	4	3.8%	3	5.9%	0	0.0%	14	4.0%
Total	179	100.0%	106	100.0%	51	100.0%	12	100.0%	348	100.0%

*: A = Structural Measure, B = Non-structural Measure, C = Combination of Structural and Non-structural Measures, D = Capacity building/personnel training, E = Improvement and strengthening of the organization and institutional setups

Based on the figures in Table 5.19, the following features of the projects assisted by each of the donors are evaluated:

(a) The largest number of and/or more than half of the projects assisted by JICA, ADB and AfDB are oriented to the structural measures.

(b) The second largest number of the projects assisted by JICA is for the capacity building/personnel training being undertaken through the technical cooperation programs, while the projects for improvement and strengthening of the organization and institutional setups are the second largest in case of assistance by ADB and WB. According to the results of the interview survey, the following projects assisted by ADB and WB are judged to have made a great contribution to the water reforms for Vietnam and Kenya, respectively: (a) the “Water Sector Review (2007～2010)” by ADB in Vietnam and (b) the

“Nairobi Water and Sewerage Institutional Restructuring Project（2004から2007）” and “Water and Sanitation Service Improvement Project (2007～2012)” by WB for Kenya.

Chapter 6. Recommendations

6.1 Ever Lasting Significance of NWR-M/P

The technical assistances extended to the former NWR-M/Ps by JICA are deemed to be unique containing the different features from those by other donors. In contrast to the M/Ps for the particular river basins, which have been undertaken through many technical assistances by JICA as well as other donors, the NWR-M/P contains the following distinct and significant features, which could enhance the nationwide well-balanced water resources development and management:

- The NWR-M/S would make possible to grasp the nationwide status on the areal uneven distributions of the water resources and water demands, and facilitate to select the priority areas for water resources development, water use, flood management and conservation of water-related environment in the entire country.
- The NWR-M/S would facilitate to take an overview of the nationwide statuses of water resources, which is useful to clarify the viability of the inter-basin water transfers and furnish the eligible information required to coordination for management of the international rivers with the relevant countries.
- The NWR-M/P could be the first step to effectively appropriate the national development funds for the priority areas in the country and to maximize the effects of the water resources development and management.

It is reasonable to formulate the M/P of the water resources development and management for the particular river basins, after the NWR-M/P is formulated grasping the nationwide water supply-demand balance and selecting the priority areas for allocation of the national budget. Hence, the NWR-M/P should be placed as the first step prior to the M/P for the particular river basins, and the formulation of it would be the appropriate and necessary cooperation for the developing countries, where the national policy and/or plan for the water resources development and management are still immature.

It is, however, needless to say that clarification of the nationwide water supply-demand balance should not be terminated, after it is completed once, and the review/update of the supply-demand balance should be made, as required, according to the mid or long-term changes of the natural environment and the socio-economic conditions. It is indispensable to review the water-supply demand balance again; especially when the future dynamic changes of the rainfall depth and/or intensity are estimated taking the climate changes into account. From this point of view, the NWR-M/P is regarded to still keep its viability even for the many developing countries, which have attained the mature contents of the plans for the water resources development and management.

The NWR-M/P should stand at the apex of the various plans and projects in the water sector and, the technical assistance for it would lead to holding the initiatives of the water-related cooperation by the donors for the developing countries. The program approach is currently being promoted in the ODA of

Japan. Under this program approach, the NWR-M/P would be the very important objective of the technical assistance as the base for: (1) delineating of the future perspectives in the water sector, (2) showing of the visible relationship of the cooperation by Japan and other donors, and (3) determining of the policy for the future cooperation by Japan.

6.2 Importance of Water Resources Management

The former NWR-M/Ps tend to have attached much importance to the water resources development plan focusing construction of the facilities, while they are likely to have made light of the water resources management plan. That is, the contents of the proposed water resources management plans in the NWR-M/Ps are limited to be at the conceptual levels only in the aspects of improvement of the organization and institutional setup, and/or development of the human capacity and technologies in the water sector.

Moreover, the NWR-M/P made a little contribution to the actualization of the proposed water resources management as a whole, although the plan for reform of the organization proposed in the NWR-M/P had been partially realized. Since the proposed plans for the water resources management proposed by the NWR-M/P showed the conceptual contents only not indicating the specific courses and/or threads toward realization, they may not have been paid adequate attention. As the results, the water resources development plan proposed in the NWR-M/P is likely to have been given priority, and less consideration to the water resources management.

It is, however, obvious that the water resources development facilities would hardly have their intended effects, unless the appropriate operation, maintenance and management for them are made after development of them. Moreover, the operation, maintenance and management for the facilities have to be carried out on the premises of the proper watershed management.

Accordingly, the definite measures for the water resources management should be proposed in the NWR-M/P taking the following issues into account: (1) maintenance and management of the proposed facilities, which enhances the most appropriate watershed management, and (2) improvement and/or strengthening of the organization/institutional setups and the technologies, which enhances the proper operation, maintenance and management of the facilities.

It is also important to execute the water resources management based on the concepts of the integrated water resources management (IWRM), which aims at: (1) the holistic approaches to the water resources development and management in various water-related sectors, (2) the multi-stakeholder engagement and involvement into all stages and key processes of the plan formulation, (3) the adaptive approaches to the dynamic changes of the natural and social environment related to the water resources and (4) a broader focus on the fairness, economic affairs, and environmental and social consideration. Furthermore, it is necessary to attach importance to the efficient utilization of the finite water resources taking the following factors into account.

- The developing countries tend to largely prefer the development of the water resources facilities such as dams rather than the water resources management, as experienced through the study on the NWR-M/P. However, it would be necessary to make them aware of importance on the water resources management in each of the river basin including the operation, maintenance and management of the facilities after completion of them.
- The NWR-M/P should propose the stepwise development of the water resources management, which start from the execution of the practical and steady measures not leaping to the ideal management. The ideal management means such status that: (1) all proposed management facilities (such as the hydrological gauging systems) and the water resources development (such as dams) are completed, (2) the appropriate operation, maintenance and management for those facilities are made and (3) the proper water allocation is made during a drought.

The NWR-M/P is required to propose the definite plans for improvement of the water resources management based on evaluation/clarification of the present status and the principal issues on the water resources management in the recipient country. These requirements to the NWR-M/P (i.e., "Evaluation of the present status"→"Clarification of the present principal issues" → "Recommendation of the plan for improvement") shall be satisfied through integration of the following factors: (1) strengthening of the organization/institutional setup, (2) formulation of the policy for the project implementation and (3) capacity development to support of the items (1) and (2). The important notices related to the above items (1) to (3) are as described in the following subsections 6.2.1 to 6.2.3.

6.2.1 Organization and Institutional Setup for Water Resources Management

The organization and institutional setup proposed in the former NWR-M/Ps except that for Malaysia are deemed to be quite conceptual. Instead, many causes of the actual reforms and/or improvements of the organization setup have been attained through supports of the donors other than JICA such as ADB, WB and GTZ.

Improvement and strengthening of the organization and institutional setup could be sustainably executed through the following activities: (1) forming of the framework of the organization and institutional setup, which may include acceptance of the present frame, (2) coordination with the relevant government agencies, (3) capacity development of the relevant organizations and personnel. Because of these activities required, it would take a long span to accomplish the objective improvement and strengthening of the organization and institutional setup. From this point of view, the NWR-M/P would need to prepare the road map for improvement of the organization and institutional setup stating from forming of the framework until accomplishment of reform and/or establishment of the organization and institutional setup. Since the implementing agency for the NWR-M/P alone would hardly accomplish all of the said activities, the coordination with the other relevant government agencies, the donors and/or the communities, which support the water sector reform, would be required to collaborate for the activities. Hence it would be indispensable to involve the government of

the recipient country as well as the donors into the above activities. At the same time, .the capacity development would have to be given to these stakeholders, and the implementing program for it should be included into the aforesaid road map.

Under the above backgrounds behind, the study on the framework of the organization and institutional setup in the NWR-M/P should be carried out taking the following factors into account: (1) the present and future desirable demarcation of the roles and authorities for water resources development and management granted to the central and local governments, (2) tasks to be turned over from the government entities to the private firms and (3) the system and regulation for budgetary allocation and disbursement.

6.2.2 Measures for Water Resources Management

The water resources management should be based on the sustainable monitoring of the quantity and quality of the water resources and it should aim at: (1) executing the stepwise development of the hydrological monitoring system, (2) grasping the water-related problems such as the water shortages, the flood and the deterioration of the water quality based on the results of monitoring, and (3) taking the necessary countermeasures against the water-related problems. The following tasks for the water resources management should also be undertake one after another: (1) improvement of the management system for the data monitoring and the water utilization, (2) implementation of the flood mitigation and watershed management (such as prevention against the soil erosion for the particular river basins and (3) monitoring of the quantity and quality of the effluent from the major pollutant sources.

The principal issues in the study on the NWR-M/P would be to indicate the plan on the whole measures for the water resources management including the stepwise development of the network for the hydrological monitoring and the particular countermeasures against the water-related problems in the specific river basins and to propose the road map, which furnish the implementation program of the said proposed plan. The road map has to also include the definite programs for the capacity development for the enhanced technology and knowledge on the measures for the water resources management.

6.2.3 Capacity Development for Water Resources Management

As described above, the former NWR-M/Ps are judged to have made little contribution to realization of their proposed plans for the water resources management. The water resources management would essentially require the particular knowledge and technical-skills. In case that such knowledge and/or technical-stills are inadequate, the capacity development on them would be indispensable to realize the plans for the water resources management proposed in the NWR-M/P. Thus, the necessary programs for the capacity development should be prepared through the study on the NWR-M/P and followed up through the JICA technical cooperation project, as required. The capacity development would be also sometimes undertaken by JICA in collaboration with other donors.

6.3 Plan Formulation in the NWR-M/P based on the Basic Data

One of the distinct features of the NWR-M/P could be addressed to the highly accurate analysis on the water resources potentials and the water supply-demand balance, which are based on the nationwide enormous hydrological gauging data. Collection and processing of such enormous data requires a great deal of the works, which the donors other than JICA seem to have kept at a distance. Under such conditions, it is noteworthy that JICA has been faithfully engaged in collection and processing of the data.

The nationwide gauging data, which were compiled in the NWR-M/P, are currently utilized by the governments of the recipient countries as well as various donors for the sake of formulation of the various development plans posterior to the NWR-M/P. Such wide utilization of the data could be one of the reasons why the NWR-M/Ps are highly appreciated by the recipient countries. In order to appeal of this particular feature of the JICA's approach, it is recommended to continue the data-oriented analysis in the future NWR-M/Ps.

Application of the hydrological data monitored by the satellite would be useful to interpolate the data in the area, where the hydrological gauging on the ground is difficult. The application of the satellite data is one of the Japanese strong points, and it is recommended to accumulate more accurate and wider range of data and elevate the accuracy of the plan formulation through introduction of the satellite data.

6.4 Practical Use of Japanese Knowledge

The "Water Plan" for the whole country and the "Full Plan" for the separate river basins have been formulated as the blue prints for the water resources development plans after the Second World War in Japan. The concept on "formulation of the NWR-M/P" itself is regarded as the application of these "Water Plan" and/or the "Full Plan" in Japan to the developing countries,

Under the above backgrounds, the technical-skills and knowledge, where Japan is at its strongest, should be utilized in the study on the NWR-M/N so as to make the NWR-M/P more useful and valuable for the developing countries. The particular technical-skills and knowledge, which Japan is good at, are as enumerated below:

- ***The knowledge on the accurate plan formulation and the practice of the water resources management at the field site based on the hydrological gauging data:*** This knowledge has been utilized for various water resources management works such as those for the flood management and the water allocation/distribution during the drought: And the knowledge have been improved through the actual field works, which have been executed in accordance with the aforesaid "Water Plan", "Full Plan" and "River Law" in Japan, and should be succeedingly placed as the base for the NWR-M/P.
- ***The knowledge on the legal system for the comprehensive water resources management as represented by the "River Law:***: The legal system in the water sector aims at legally supporting

adjustment of the water uses in a drought, maintenance of the normal flow discharge, control of detention and/or abstraction of the flow discharge, cost sharing for the water resources development. The knowledge on this system would be possibly utilized for improvement of water resources management.

- ***The knowledge on the development of the basin runoff simulation model based on the satellite data:*** This knowledge includes those on estimation of the potential volume of the rainfall and the groundwater and on estimation of the future climate changes. And this would be useful to estimate more accurate water resources potential, to evaluate the influences by the climate changes to the water resources and to review the future water resources development and management.

6.5 Formulation of Viable Water Resources Development Plan

As the results of review on the former NWR-M/Ps for nine countries, it is identified that many of the projects for water resources development facilities proposed in the NWR-M/Ps have not been implemented yet. This may be apparently because the proposed plan for water resources development facilities itself was irreverent.

A series of the facilities proposed in the NWR-M/P aim at attaining the development target, which is raised as the planning framework for the NWR-M/P. This means that the development target is hardly attained, when many of the projects for the proposed facilities have not been implemented. However, the development target is largely influenced by the future financial conditions of the recipient country and/or the amount of the financial assistance by the donors, and it may have often failed due to such external influences. Accordingly, it should not be instantly concluded that the reason why many of the projects for water resources development facilities have not been implemented, is because of the irreverent plan for water resources development facilities proposed in NWR.

However, the development targets in the former NWR-M/Ps have been determined, in many cases, with referring to the targets locally declared through the National Lon-term Plan or those internationally declared such as the Millennium Development Goals (MDG) proposed in the UN-Millennium Summit. These development targets have been often too ambitious and hardly afforded by the financial capacity of the recipient country. In order to cope with such unfavorable conditions, the following measures should be taken: (1) to prepare several alternatives for the development target and/or (2) to make the priority orders of the projects to be implemented taking the impacts by the projects and the capacity of the government of the recipient country for project implementation into account. These measures would enable the government of the recipient country to select the eligible projects among those proposed in the NWR-M/P depending on the financial status of the government.

The water resources development generally involves several government agencies and other various stakeholders, which are concerned with the water-related affairs such as municipal water supply, irrigation, flood mitigation and hydropower generation,. The water resources development project

would be hardly implemented, unless these stakeholders are involved into the project. Accordingly, involvement of the stakeholders into the project even at the M/P stage is indispensable in order to actualize the project.

6.6 Capacity Development (CD）

As described in subsection 6.2.3, many of the projects proposed in the former NWR-M/Ps have not been implemented and of no practical use, and thereby, the NWR-M/P shall indicate the clear path of the projects toward the implementation and, the CD shall succeed the NWR-M/P so as to ensure the project implementation.

The government of the recipient country would also be required to comprehend the process of formulation of the NWR-M/P and enhance the ability to formulate the M/P by its own efforts. Through these efforts, the government of the recipient country would be able to comprehend, materialize and surely implement the projects proposed in the NWR-M/P.

In the former NWR-M/Ps except that for Malaysia, the abilities of the C/Ps for plan formulation have been seldom enhanced, and ownerships of the C/Ps for the NWR-M/P were often weak. Even in the NWR-M/P for Malaysia, the capacity development for the C/Ps is judged to have been attained through the continuous transfer of knowledge by the long-term experts after completion of the NWR-M/P rather than through OJT made in the NWR-M/P.

Taking the above conditions into account, the type of the cooperation for the NWR-M/P should be turned from the development study to the technical cooperation, where the C/Ps would carry out the study on the NWR-M/P as the main player and the consultants dispatched by JICA would guide and/or support the C/Ps.

6.7 Program Approach

As described above, the most serious issue concerned with the former NWR-M/Ps would be addressed to the status such that many of the projects proposed in the NWR-M/P has not been implemented. One of the principal causes for this issue would be addressed to the inadequate and inappropriate follow-up by JICA for the proposed projects.

The NWR-M/P should visualize the relevancy of the cooperation by Japan to other donors and determine the policy for cooperation of Japan after delineating the future figures of the entire water sector. From this point of view, it is indispensable that the NWR-M/P is placed as the base for the program approach and, JICA shall support the necessary capacity development through the technical assistance and the project implementation proposed in the NWR-M/P through the financial assistance.

As the definite process for the program approach, the technical assistance for the NWR-M/P by JICA should be given, in principal, to the developing countries, where one of the important national issues is in the water sector and JICA is ready to extend the cooperation. On the premises of this, JICA should coordinate and promote to attain the following status: (1) the projects proposed in the NWR-M/P

should be acknowledged by the recipient countries and the donors, and (2) the project should be implemented through not only assistance by JICA but also introducing disbursement of the budget of the recipient country and/or the donors other than JICA. Thus, JICA should aim at alining the projects assisted by the donors in the water sector with the NWR-M/P.

6.8 Involvement of Stakeholders

As described above, the water resources development involves several government agencies and other various stakeholders, and the water resources development project would be hardly implemented solely by the project implementing agency without involvement of the stakeholders into the project. Accordingly, the NWR-M/P should be formulated requesting the relevant government agencies as well as other stakeholders to take part in the study on the NWR-M/P and gaining understandings of the stakeholders through discussions and explanations through the Steering Committee Meeting and other relevant opportunities.

The progress of the development projects in the developing countries would largely rely on the technical and financial assistance by the donor. Accordingly, in addition to the follow-up by JICA, the cooperation with other donors, which support the water sector, is indispensable to facilitate the progress of the projects for the water resources development. From this point of view, it is necessary to gain the understandings of the donors on the projects proposed by the NWR-M/P through various approaches such as invitation of the donors to the aforesaid Steering Committee for the NWR-M/P and explanation to the donors through the international donor's conferences.

From the viewpoint of the IWRM, the stakeholders for the NWR-M/P would also need to involve the surrounding countries, which have the common international trans-boundary rivers and/or aquifers. The possible objectives of cooperation by JICA for the water resources management of the international trans-boundary rivers and/or aquifers would be such as: (1) preparation of the occasions for discussions and explanations among the relevant countries; and (2) development of the said occasions for discussions and explanations to the international committee meetings which would have the functions to coordinate and/or adjust the management of the international trans-boundary rivers and aquifers.

6.9 Other Matters to be Considered

6.9.1 Influence by Climate Change

The urban type floods and the flood inundation in the low-lying delta is being more serious due to increment of the storm-rainfall intensities/the peak flood discharges and rise of the tidal level inflicted by the climate change. At the same time, the water shortages caused by the climate change is getting more serious, which leads to the extremely large drop of the river discharge in a dry season. The future possible hydrological effects by the climate changes should be estimated as much as possible, and they should be incorporated into the water resources development and management plans in the NWR-M/P.

6.9.2 Approach to International Trans-boundary Rivers and Aquifers

The former NWR-M/Ps are judged not to have taken the adequate consideration on the international trans-boundary rivers and aquifers. On the other hand, the conflicts of the interest in water use, flood control and water-related environmental conservation for the international trans-boundary rivers and aquifers are getting more serious among the relevant countries, whereby the coordination with the countries for the conflicts is being more important. The NWR-M/P assisted by JICA may possibly worsen the conflicts of the interest in management of the international trans-boundary river and aquifers. In order avoid such potential conflicts, it is required to hold the information relevant to the international trans-boundary rivers and aquifers in common with the relevant countries stating from the initial stage for formulation of the NWR-M/P. The opening of the international conference for exchange of the opinions would be one of the eligible measures for holding of the information in common. Furthermore, it would be important to grasp the hydraulic conditions in the international trans-boundary aquifers.

6.9.3 Environmental and Social Consideration

The Initial Environmental Examination (IEE) for the priority projects were made in the former NWR-M/P for Vietnam, Philippines, Macedonia and Bulgaria among the nine objective countries. On the other hand, the necessity of the environmental and social consideration was just mentioned in the NWR-M/Ps for Kenya and Nigeria but not conducting the IEE. Furthermore, even any description on the environmental and social consideration had not been given in the NWR-M/Ps for Malaysia, Zambia and Cote D'ivoire.

The above differences in approaches to the environmental and social consideration by the former NWR-M/Ps would be due to the different legal setups and/or guidelines for the environmental and social consideration in the recipient countries of the NWR-M/P and/or the temporal transition of the JICA guideline for the environmental and social consideration. Accordingly, the said various approaches by the NWR-M/Ps would be not necessarily the fatal problem, however, the future NWR-M/P would be required to execute the prescribed environmental and social consideration in accordance with the JICA guidelines.

The NWR-M/P aims at formulating the nationwide and long-term water resources development and management plans and therefore it should stand at the upper level over the individual water resources development plans. From this point of view, the NWR-M/P may need the strategic environmental assessment (SEA) on the strategies for the entire development of the water resources rather than the IEE on the individual development projects.

Tables

Annex-T 1 Members of Examination Committee and Working Group

Classification	Name	Office & Position
Examination Committee	NAKAYAMA Mikiyasu	Professor, the University of Tokyo
	TANIGUCHI Makoto	Professor, Research Institute for Humanity and Nature
	KAKUTA Ieko	Professor (Development Anthropology, Asia University)
	OKAZAKI Yuji	Senior Special Advisor, JICA
	SUEMORI Mitsuru	Senior Advisor, JICA
	OOI Hideomi	Former JICA Senior Advisor
	ISHIWATARI Mikio	Senior Advisor, JICA
	OKAZUMI Toshio *	Director, River Flow Management Office, River Environment Division, River Bureau, Ministry of Land, Infrastructure, Transport and Turism
Working Group	KAWASAKI Tadanari	International Affairs Division, Incorporated Administrative, Agency Japan Water Agency
	NAGATA Kenji	Senior Advisor, JICA
	SASAKI Yosuke	Guest Senior Advisor, JICA
	SUDO Katsuyoshi	Deputy Director General, Groupe Director for Water Resouerces and Disaster Management, Grobal Environment Department, JICA
	MIYASAKA Minoru	Senior Advisor ot the Director General, Grobal Environment Department, JICA
	UKAI Hikoyuki	Director of Program Evaluation Division 2, Evaluation Department, JICA
	OKIURA Fumihiko	Director of Water Resources Management Division 1, Water Resources and Disaster Management Group, Global Environment Department, JICA
	WAKUI Junji	Director of Water Resources Management Division 2, Water Resources and Disaster Management Group, Global Environment Department, JICA
	MATSUMOTO Shigeyuki	Director of Disaster Management Division 2, Water Resources and Disaster Management Group, Global Environment Department, JICA
	INADA Kyosuke	Planner of Climate Change Office, Global Environment Department, JICA
	MIMAKI Junko	Credit Risk Analysis Division 2, Credit Risk Analysis Department, JICA
	MAYUSUMI Masanobu	Electric Power Division, Indudstrial Development Department, JICA
	FURUMOTO Kazushi	Water Resources Management Division 1, Water Resources and Disaster Management Group, Global Environment Department, JICA
	SATO Hayato	Water Resources Management Division 2, Water Resources and Disaster Management Group, Global Environment Department, JICA
	SHIMANO Toshiyuki	Disaster Management Division 1, Water Resources and Disaster Management Group, Global Environment Department, JICA
	INOUE Hiromu	Disaster Management Division 2, Water Resources and Disaster Management Group, Global Environment Department, JICA

*: Observer

Annex-T 2 The Major Operation Process of the Study

Timing	Major Activities
December 2010	Preparation of Plan of Operation
December 24, 2010	1st Working Group Meeting (Agenda: Confirmation of the Study Plan etc.)
January 2011	Preparation of Questionnaire
January 13, 2011	2nd Working Group Meeting (Agenda: The Study Plan and confirmation of questionnaire)
January 21, 2011	1st Committee (Agenda: Confirmation of the Study Plan and the Study Schedule
February 2011	Interview of the consultants*, that conducted NWR-M/Ps
March 05 to March 27, 2011	Field survey for Malaysia, Vietnam and Kenya
April 07, 2011	3rd Working Group Meeting (Agenda: Reporting of Field Surveys)
April 11, 2011	4th Working Group Meeting (Agenda: preparation Meeting for the next Committee)
April 19, 2011	2nd Committee (Agenda: the results of field surveys)
June 02, 2011	5th Working Group Meeting (Agenda: The Drafts on the Future Directions of Cooperation as the Results of Review on the NWR-M/P)
June 13 2011	3rd Committee (Agenda: The Results of Review on the NWR-M/Ps and The Drafts on the Future Directions of Cooperation as the Results of Review on the NWR-M/P

Annex-T 3 Members and Itinerary for the Field Survey in Malaysia

Member of Survey Team

Name	Designation/Organization
OKAZAKI Yuji	Senior Special Advisor, JICA
ISHIWATARI Mikio	Senior Advisor, JICA
OTOGAWA Makihiko	CTI Engineering International Co., Ltd.
MITSUKURAMakoto	CTI Engineering International Co., Ltd.
WAKABAYASGU Tomonori	Water Resources and Disaster Management Group, Global Environment Department, JICA

Itinerary

NO	Date		Schedule			
			Mr. Okazaki	Mr. Wakabayashi	Mr. Ishiwatari	Consultant
1	2011/3/6	Sun	Arrival at Kuala Lumpur			
2	2011/3/7	Mon	Courtecy call to and meeting with Director General, Department of Irrigation and Drainage (DID) JICA Malaysia Office Meeting with Mr. Sieh Kok Chi (Former Chief Counterpart) at Plympic Center			Courtecy call to and meeting with Director General, Department of Irrigation and Drainage JICA Malaysia Office Meeting with Mr. Sieh Kok Chi at Plympic Center
3	2011/3/8	Tue	to Penan by air Site visit of Beris Dam and the Resettlement site			Meeting with DID Section Chiefs -Water Resources and Hydrological Management -River Basin and Coastal Management -Urban Storm Water Management -Flood Management
4	2011/3/9	Wed	Meeting with DID Kedah State Meeting with Project Office RP Muda Site vist to the irrigation area of Muda Agriculture Development Authority (MADA) Back to Kuara Lumpur			
5	2011/3/10	Thu	Wrap up meeting with DID Report to JICA Malaysia Office Meeting with Dr. Keizrul (Former Chief Counterpart)			
6	2011/3/11	Fri	Leaving Malaysia	Meeting with Department of Environment Leaving Malaysia	Leaving Malaysia	Meeting with Department of Environment
8	2011/3/12	Sat				Reporting
9	2011/3/13	Sun				Leaving Malaysia

Annex-T 4 Members and Itinerary for the Field Survey in Kenya

Member of Survey Team

Name	Designation/Organization
SUEMORI Mitsuru	Senior Advisor, JICA
MIYASAKA Minoru	Senior Advisor ot the Director General, Grobal Environment Department, JICA
OTOGAWA Makihiko	CTI Engineering International Co., Ltd.
MITSUKURAMakoto	CTI Engineering International Co., Ltd.

Itinerary

NO	Date		Schedule	
			JICA(Mr.Suemori&Miyasaka)	Consultant(Mr. Otogawa&Mitsukura)
1	2011/3/19	Sat	Narita QR803	
2	2011/3/20	Sun	Doha	
3	2011/3/21	Mon	9:00 Meeting with Nippon Koei Team (National Water M/P 2030) 10:00 WRMA (Chief Executive Officer and Technical Manager) 14:00 Courtesy call to Permanent Secretary, MWI 15:00 Meeting with Director, Water Sector Reform, Director, Irrigation, Drainage and Water Storage, Director, Water Resources Management at Maji-House 19:00 Meeting with JICA Chief Representative	
4	2011/3/22	Tue	10:30 TARDA (Managing Director, and Tana Basin Manager) 12:00 Ministry of Energy (Chief Economist, Planning) 14:00 Kenya Meteorology Department (Deputy Director)	
			to Embu (By road, 2.5 Hr)	to Kisumu (17:30 at Jomo Kenyatta International Airport, By Air)
5	2011/3/23	Wed	8:30 WRMA Regional Office 10:00 EWASCO and Grant Aid Project sites 12:00 Move to Meru (3 Hours) 16:00 MEWASS	8:00 WRMA Lake Victoria South Catchment(Regional Manager) 9:00 KIWASCO (Managing Directorand Technical Manager) 10:30 Lake Victoria Basin Development Authority (LBDA) 11:30 Move to Sondu-miriu 12:30 Meeting with Mr.Nakagawa(Project Engineer, Sondu-Miriu Project) 13:30 Site Visit of Sondu-Miriu and Sangoro power station 16:30 Back to Kisumu 18:30 Departure from Kisumu by Air 19:30 Arrival at Nairobi
6	3/24/2011	Thu	8:00 MEWASS (General Manager and Technical Manager) 8:30 Site Visit of MEWASS Facility (Grant Aid) 10:00 Move to Mwea (3.5 Hours) 15:00 NIB (Principal Irrigation Engineer) 15:30 Site visit to Mwea Irrigation Scheme 17:00 Back to Nairobi (2 Hours)	7:00 Move to Naivasha 8:30 WRMA, Naivasha (Meeting with Manager, Sub-Regional Office) 10:00 Site visit of Flower farming and Lake basin (groundwater abstraction) 12:00 Move to Nakuru 14:00 WRMA, Nakuru (Meeting with Manager, Regional Office) 15:30 Back to Nairobi(3 Hours)
7	2011/3/25	Fri	9:00 Internal meeting and preparation of field survey report 14:00 Debriefing to National Water M/P 2030 Team, Mr.Matsuoka, JICA Kenya Office (Mr.kato and Mr.Kawazumi) Departure from Nairobi on Miyasaka QR 535 (18:50) Departure from Nairobi on Mr. Suemori KQ860* (23:20)	
8	2011/3/26	Sat		Departure from Nairobi on Mr. Otogawa and Mr. Mitsukura
9	2011/3/27	Sun		Arrival at Japan

Annex-T 5 Members and Itinerary for the Field Survey in Kenya

Member of Survey Team

Name	Designation/Organization
SUDO Katsuyoshi	Deputy Director General, Groupe Director for Water Resouerces and Disaster Management, Grobal Environment Department, JICA
OTOGAWA Makihiko	CTI Engineering International Co., Ltd.
MITSUKURAMakoto	CTI Engineering International Co., Ltd.

Itinerary

NO	Date		Schedule	
			JICA(Mr.Sudo)	Consultant(Mr.Otogawa&Mitsukura)
1	2011/3/13	Sun	Arrival at Hanoi	
2	2011/3/14	Mon	9:30 JICA Vietnam 13:30 General Irrigation and Water Management Office, MAARD Department of science, Technolody & internatuional cooperarion, MARD Department of Construction management, MARD Dyke management and flood control Department, MARD Institute of Water resources planning, MARD	
3	2011/3/15	Tue	10:30 Department of Meteorology, Hydrology and Climate Change, MONRE 14:00 Vietnam Environment Administration, MONRE 16:00 Agency for Environmental Impact Assessment and Appraisal, MONRE	
4	2011/3/16	Wed	11:00 ADB 14:00 Institute of Water resources plannning	
5	2011/3/17	Thu	Back to Japan	Move to HoChiminh, proceed to QuiNhon city 11:00 Binh Dinh DARD 13:00 Site visits (Kone river, Binh Dinh Dam and Van Phong Dam)
6	2011/3/18	Fri		7:30 Binh Dinh DARD 8:00 Site visits (Dyke sistem around QuiNhon and Irrigation works) Back to Hanoi
7	2011/3/19	Sat		Leaving Hanoi

Annex-T 6 (1/6) Project Lists by Assistance of JICA

Country	Scheme		Project Name	Period		Field*	Component**
				Star	End		
Malaysia	Study	S1	National Water Resources Study	1979	1982	RWR	3
		S2	Perlis-Kedah-Pulau Pinang Regional Water Resources Study	1982	1984	RWR	3
		S3	Regional Water Resources Development of South Johor	1983	1985	RWR	3
		S4	Feasibility Study Small Scall Hydroelectric Power Project in Sarawak	1984	1988	HP	1
		S5	Feasibility Study on the Tanjong Karang Irrigation Development and Management Project	1985	1987	ID	1
		S6	Feasibility Study Lebir Dam Project	1986	1989	WRD	1
		S7	The Study on the Flood Mitigation of the Klang River Basin	1986	1988	DM	1
		S8	The Study on Kelantan River Basin-wide flood mitigation	1987	1989	DM	1
		S9	The Study on Flood Mitigation and Drainage in Penang Lsland	1988	1990	DM	1
		S10	National River Mouths Study	1990	1994	DM	1
		S11	Small Scale Hydroelectric Power Development Project at Upper Liwagu River Basin	1991	1992	HP	1
		S12	The Feasibility Study on Small Reservoir Development in Peninsular Malaysia	1992	1994	ID	1
		S13	Comprehensive Management Plan of Muda River Basin	1993	1995	RWR	3
		S14	The Study on the Establishment of the River Basin Information System	1996	1998	OT	2
		S15	The study on modernization of irrigation water management system in the granary areas of Peninsular Malaysia	1996	1998	ID	2
		S16	The Study on Integrated Urban Drainage Improvement for Melaka and Sungai Petani in Malaysia	1998	2000	DM	1
		S17	The Study on the Sustainable Groundwater Resources and Environmental Management for the Langat Basin in Malaysia	1999	2001	WS	2
		S18	Preparatory Study on Sewerage Treatment Plant Project (II)	2009	2009	WS	1
		S19	The Preparatory Survey for Integrated River Basin Management Incorporating Integrated Flood Management With Adaptation of Climate Change	2009	2011	DM	1
	Yen Loan	Y1	Tenom Pangi Hyhdroelectric Project	1979		HP	1
		Y2	Bersia Hydroelectric Project	1980		HP	1
		Y3	Hulu Terengganu Hydroelectric Project	1980		HP	1
		Y4	Kenering Hydroelectric Project	1980	1984	HP	1
		Y5	Batang Ai Hydroelectric Project	1982		HP	1
		Y6	Tenom Pangi Hydroelectric Power Plant Project	1983		HP	1
		Y7	Tenom Pangi Hydroelectric Power Plant Rehabilitation Project	1992		HP	1
		Y8	Beris Dam Project	1999		WRD	1
		Y9	Sewerage Treatment Plant Project	2000		WS	1
		Y10	Pahang-Selangor Water Transfer Project	2005		MWS	1
	Technical co-operation	T1	National Water Resources Study	2006	2006	WS	4
	JICA Expert		Integrated water resources management (Leakage prevention)	1989	1991	MWS	
			Integrated water resources management (Water distribution system)	1989	1991	MWS	
			Integrated water resources management (Water distribution system)	1992	1994	MWS	
			Integrated water resources management (GIS/Water supply)	1998	2000	MWS	
			Integrated water resources management (Design of Water supply)	1993	1996	MWS	
			Measures against windstorm and flood damage (Flood control)	1986	1989	DM	
			Measures against windstorm and flood damage (Flood control)	1989	1992	DM	
			Measures against windstorm and flood damage (Flood control)	1992	1995	DM	
			Measures against windstorm and flood damage (Flood control)	1995	1998	DM	
			Measures against windstorm and flood damage (Flood control)	1998	2001	DM	
			Measures against windstorm and flood damage (Flood control)	2001	2004	DM	
			River engineering / coastal engineering	1990	1992	DM	
			Irrigation and drainage	1989	1992	ID	
			Irrigation and drainage	1992	1995	ID	
			Irrigation and drainage	1995	1998	ID	
			Irrigation and drainage	1998	2001	ID	

*: WRD=Water Resources Development and Management, MWS= Municipal Water Supply, MWSS= Municipal Water Supply & Sewerage, ID= Irrigation ad Drainage, HP= Hydropower Development, DM= Water Related Disaster Management, WS= Sewerage Development, EI=Watershed management, OT=Others

**: 1=Structural Measures, 2=Nonstructural Measures, 3=Complex of 1&2, 4=Capacity Development, 5=Institutional Setup

Annex-T 6 (2/6) Project Lists by Assistance of JICA

Country	Scheme	Project Name		Period		Field*	Component**
				Start	End		
Kenya	Study	S1	The Study for Construction of Dam in Malewa River System	1988	1990	WRD	1
		S2	The Study on National Water Master Plan	1989	1992	RWR	3
		S3	Kano Plain Irrigation Project	1989	1991	ID	1
		S4	Magwagwa Hydroelectric Power Development Project	1989	1991	HP	1
		S5	The Project Formulation Study on Water Supply and Sewerage Systems	1990	1990	MWS	1
		S6	The Study on the Nakuru Sewage Works Rehabilitation and Expansion Project	1993	1995	WS	1
		S7	Mutonga/Grand Falls Hydropower Project	1993	1997	HP	1
		S8	The Study on the Water Supply for Seven Towns in Eastern Province	1995	1997	MWS	1
		S9	The Mwea Irrigation Agricultural Development Project	1995	1995	ID	1
		S10	The Study on Kisumu Water Supply and Sewerage System	1996	1998	WS	1
		S11	The study on community-based small holder irrigation development project for promotion of horticultural production in the foothills of Mt. Kenya	1996	1998	WR	1
		S12	The aftercare study on the national water master plan	1997	1998	RWR	3
		S13	The study on institutional improvement and rehabilitation of water supply systems for 10 local towns	2000	2000	MWS	2
		S14	The Study on Integrated Flood Management for Nyando River Basin	2006	2008	DM	3
		S15	The Project on the Development of the National Water Master Plan	2010	2012	RWR	3
	Grant Aid	G1	Follow up project on Groundwater Development in South Nyanza	1992		MWS	1
		G2	Project for Expansion of Kapsapet Water Supply System	1992		MWS	1
		G3	Project for water supply in Itanga Area	1994		MWS	1
		G4	The Project for Groundwater Development in Laikipia and the Surrounding Areas of Samburu, Koibatek, and Baringo Districts	1998		MWS	1
		G5	The Meru Water Supply Project	1999		MWS	1
		G6	The Meru Water Supply Project (1/2)	2001		MWS	1
		G7	The Meru Water Supply Project (2/2)	2002		MWS	1
		G8	The Project for Groundwater Development in Rural Districts (Machakos, Kitui, Makueni and Mwingi)	2003		MWS	1
		G9	The Project for Rural Water Supply	2004		MWS	1
		G10	The Project for Rural Water Supply	2006		MWS	1
		G11	The Project for Rural Water Supply	2007		MWS	1
		G12	Detail Dedign for the Project for Augmentation of Water Supply System in Kapsapet Town	2008		MWS	1
		G13	The Project for Augmentation of Water Supply System in Kapsapet Town	2009		MWS	1
		G14	The Outline Design Study of the Project for Community-based Flood Disaster Management to Adapt to Climate Change in the Nyando River Basin	2009		DM	3
		G15	The Programme for the Improvement of Capabilities to cope with Natural Disasters Caused by Climate Change	2009		DM	4
		G16	The Project for Improvement of Water Supply System in Enbu and the Surrounding Areas	2010		MWS	1
	Yen Loan	Y1	Nairobi Water Supply Project	1990		MWS	1
		Y2	Tana Delta Irrigation Project	1990		ID	1
		Y3	Mwea Irrigation Development Project (E/S)	1995		ID	1
		Y4	Sondu/Miriu Hydropower Project (I)	1997		HP	1
		Y5	Sondu/Miriu Hydropower Project (II)	2003		HP	1
		Y6	Sondu-Miriu / Sangoro Hydropower Plant Project	2006		HP	1
		Y7	Mwea Irrigation Development Project	2010		ID	1
	Training	Water supply plan		1996	1996	MWS	
		Water and Sewege		1998	1998	MWS	
	Technical co-operation	T1	The Promotion of Sustainable Community-based Smallholder Irrigation Development	2000	2003	ID	4
		T2	Project for Improvement of Environmental Management Capacity in Nakuru Municipality and Surrounding Areas	2005	2009	WS	4
		T3	The Project for Sustainable Smallholder Irrigation Development and Management in Central and Southern Kenya	2005	2011	ID	4
		T4	The Project for Management of Non-Revenue Water in Kenya	2009	2014	MWS	4

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Annex-T 6 (2/6) Project Lists by Assistance of JICA

Country	Scheme	Project Name	Period		Field*	Component**
			Start	End		
Kenya	JICA Expert	Integrated water resources management (3 years)	1988	1990	RWR	
		Integrated water resources management (3 years)	1989	1991	RWR	
		Integrated water resources management (6 months)	1990	1990	RWR	
		Integrated water resources management (6 months)	1990	1990	RWR	
		Integrated water resources management (2 years)	1990	1992	RWR	
		Integrated water resources management (2 years)	1991	1993	RWR	
		Integrated water resources management (3 years)	1992	1995	RWR	
		Integrated water resources management (2 years)	1993	1995	RWR	
		Integrated water resources management (6 months)	1994	1994	RWR	
		Integrated water resources management (2 years)	1995	1997	RWR	
		Integrated water resources management (3 years)	1998	2001	RWR	
		Integrated water resources management (2 years)	1999	2001	RWR	
		Integrated water resources management (3 years)	2001	2004	RWR	
		Integrated water resources management (9 months)	2002	2002	RWR	
		Integrated water resources management (5 months)	2004	2004	RWR	
		Integrated water resources management (5 months)	2005	2005	RWR	
		Integrated water resources management (9 months)	2004	2005	RWR	
		Extensive priority issue support / City water supply (2 years)	2007	2009	DM	
		Extensive priority issue support / Rural water supply (3 years)	2009	2012	DM	
		Irrigation (National irrigation board)	1989	1991	ID	
		Organization of famers in small-holder irrigation (4 years)	1998	2002	ID	
		Irrigation (National irrigation board)	1991	1993	ID	
		Irrigation (National irrigation board)	1993	1995	ID	
		Promotion of small-holder irrigation	1997	2003	ID	
		Irrigation advisor (9 months)	2004	2005	ID	
		Irrigation planning advisor (2 years)	2009	2011	ID	
Nigeria	Study	The Study on the National Water Resources Master Plan	1991	1994	RWR	3
		Study on the Project for Water Supply in Bauchi and Katsina States	2008	2010	MWS	1
	Grant Aid	The Project of Water Supply for Middle to Large Scale Village in the Northern Area	1992		MWS	1
		The Project for Rural Water Supply and Sanitation in Oyo State	2002		MWSS	1
		The Project for Rural Water Supply and Sanitation in Kano State	2005		MWS	1
		The Project for Rural Water Supply and Sanitation in Yobe State	2007		MWS	1
		The Project for Water Supply in Bauchi and Katsina States	2010		MWS	1
		the Project for Emergency Repair and Overhaul Works for the Jebba Hydro Power Station	2011		HP	1
	Training	O&M skills for regional water supply facility	2004		MWS	
		Environmental administration and economy	2004		OT	
		Water supply facility	2004		MWS	
		Hydropower generation	2004	2005	HP	
		Agricultural drainage	2004	2005	ID	
		River and Dam engineering	2006		OT	
		O&M skills for regional water supply facility (domestic: Kano State)	2006	2008	MWS	
Zambia	Study	The study on the national water resources master plan	1993	1995	RWR	3
	Grant Aid	Project for Mongu Rural Development	1996		ID	1
		The Rural Water Supply Development Project in Southern Province	1996		MWS	1
		Living Environmental Improvement Project for Unplanned Urban Settlements in Lusaka	2004		WS	1
		Groundwater Development and Sanitation Improvement Project in the Northern Province	2004		MWS	1
		Groundwater Development and Sanitation Improvement Project in Luapula Province	2007		MWS	1
	Yen Loan	Increased Access to Electricity Services	2008		HP	1
	Technical co-operation	Sustainable Operation and Maintenance Project for Rural Water Supply	2005	2007	MWS	4
		Sustainable Operation and Maintenance Project for Rural Water Supply (SOMAP) Phase 2	2007	2010	MWS	4
		Study on the Capacity Building and Development for Community -Based SmallHolder Irrigation Scheme in Northern and Luapula Provinces			ID	4
	Training	O&M for drilling machine	2001	2001	MWS	
	JICA Expert	Integrated water resources management	2001	2001	WR	

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Annex-T 6 (4/6) Project Lists by Assistance of JICA

Country	Scheme	Project Name	Period		Field*	Component**
			Start	End		
Philippines	Study	Master plan study on water resources management	1996	1998	RWR	3
		The study on jalaur irrigation systems and rural area development project	1996	1998	EI	2
		The study on the provincial water supply, sewerage and sanitation sector plan	1997	2000	MWSS	1
		The feasibility study of the flood control project for the lower Cagayan River	1999	2001	HP	3
		The study on strengthening of NIA's management system	1999	2001	ID	5
		The study on water resources development for Metro Manila	2000	2002	RWR	2
		The study on the irrigators association strengthening project in national irrigation systems	2000	2003	ID	5
		The master plan study for watershed management in upper Magat and Cagayan River basin	2001	2003	ID	2
		The master plan study of power development in Palawan Province	2001	2003	HP	3
		Baseline survey on nationwide groud water quality monitoring	2002	2003	WS	2
		The study for the maintenance, rehabilitation and improvement planning methodology of national irrigation systems	2005	2006	ID	2
		The project for strengthening the flood management function of department of public works and highways (DPWH)	2005	2010	HP	5
		The study on the nationwide flood risk assessment and the flood mitigation plan for the selected areas	2006	2007	HP	1
		The study on comprehensive flood mitigation for Cavite Lowland area	2006	2007	HP	3
		The study on integrated water resources management for poverty alleviation and economic development in the Pampanga River basin	2007	2011	RWR	3
		The preparatory study for sector loan on disaster risk management	2009	2010	HP	1
		The study for improvement of water supply and sanitation in Metro Cebu	2009	2010	MWSS	1
		Strenghthening of Flood Forecasting and Warning System for Dam Operation	2009		HP	2
	Grant Aid	The project for rehabilitation of the apron of Angat afterbay regulator dam	2000		ID	1
		The project for rehabilitation of the flood control operation and warning system in Metro Manila	2001		HP	2
		The project for improvement of water quality in local areas	2002		WS	2
		The project for rehabilitation of Cagayan irrigation facilities	2002		ID	1
		The project for rehabilitation of Cagayan irrigation facilities	2003		ID	1
		The project for upgrading of flood forecasting and warning system in the Pampanga and Agno River and basins	2007		DM	2
		the Programme for the Improvement of Capabilities to cope with Natural Disasters Caused by Climate Change	2009		DM	4
	Yen Loan	Provincial Cities Water Supply Project (Phase V)	1996		MWS	1
		Agno River basin flood control (II)	1998		DM	1
		Iloilo Flood Control Project (Phase I)	1998		DM	1
		Central Luzon Irrigation Project	1998		ID	1
		Pasig-Marikina River Channel Improvement Project (Phase I)	1999		DM	1
		Bohol Irrigation Project (II)	1999		ID	1
		The provincial water supply, sewerage and sanitation sector plan (V)	1999		MWS	1
		KAMANAVA Area Flood Control and Drainage System Improvement Project	2000		DM	1
		Agno River Flood Control Project (Phase II-B)	2001		DM	1
		Iloilo Flood Control Project (II)	2001		DM	1
		Bago River Irrigation System Rehabilitation and Improvement Project	2001		ID	1
		Sabo and flood control in the Laoag River basin	2001		DM	1
		Pasig-Marikina River Channel Improvement Project (II)	2006		DM	1
		The Post Ondoy and Pepeng Short-Term Infrastructure Rehabilitation Project	2010		DM	1
	Technical co-operation	The Project for Enhancement of Capabilities in Flood Control and Sabo Engineering of the Department of Public Works and Highways	2000	2005	DM	4
		The project for rehabilitation of apron at Angat Afterbay regulator dam	2005	2010	MWS	4
		Strengthening of flood forecasting and warning administration project	2003		ID	2
		Small Water Districts Improvement Project	2004	2006	DM	4
		The irrigators association strengthening support project	2005	2006	ID	5
		Strengthening the flood management function of department of public works and highways (DPWH)	2006	2011	WS	5
		Capacity development project on water quality management	2005	2010	DM	5
		Technical cooperation for the project for strenghthening of flood forecasting and warning system for dam operation	2007	2011	DM	4
		The irrigators association strengthening support project	2007	2010	ID	5
		The Project for Enhancement of Capabilities in Flood Control and Sabo Engineering of the Department of Public Works and Highways	2007	2010	RWR	4

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Annex-T 6 (5/6) Project Lists by Assistance of JICA

Country	Scheme	Project Name	Period		Field*	Component**
			Start	End		
Philippines	Training	Water Resources Development	2003	2003	RWR	
		Water Resources Development/Management	2003	2003	RWR	
		Flood Control and Water Resources Development	1997	1997	RWR	
		Water Resources Development Plan / Management Plan	1998	1998	RWR	
		Water Sector Development Plan	1998	1998	DM	
		Water Sector Development Plan	2005	2005	DM	
		Capacity Improvement of Flood Control Potential	2002	2002	RWR	
		Hydraulic Model	2006	2006	OT	
		Flood Control Administration	2007	2007	DM	
	JICA Expert	Water Supply (Water Supply Development Plan)	1999	2002	MWS	
		Improvement of Flood Control Administration	2004	2007	MWS	
		Rural Water Supply	1989	1991	MWS	
		Project Development for Rural Water Supply and Sewarage	1991	1993	MWS	
		Project Development for Rural Water Supply and Sewarage	1995	1996	MWS	
		Water Supply Development Plan (Province)	1996	1998	MWS	
		Local City Water Supply Plan	2002	2004	MWS	
		Local City Water Supply Plan	2002	2005	MWS	
		Metropolitan Water Supply	2001	2001	MWS	
		Countermeasure for Non Revenue Water Reduction	2003	2003	MWS	
		Countermeasure for Non Revenue Water Reduction	1997	2000	DM	
		Countermeasure for Non Revenue Water Reduction	2000	2002	DM	
		Countermeasure for Non Revenue Water Reduction	2000	2002	DM	
		Improvement of Local Water Supply (Non Revenue Water Reduction)	2002	2004	DM	
		Flood Control	1993	1995	DM	
		Flood Control and River Development Plan	1995	1998	DM	
		Flood Control and Water Resources Development	1998	2001	DM	
		Flood Control and Water Resources Development	2007	2010	DM	
		Capacity Development for Flood Forecasting and Warning	2010	2012	DM	
		River Management Administration	1988	1991	DM	
		River Management Administration	1988	1991	OT	
		Sabo Engineering	2002	2005	ID	
		Sabo Engineering	2005	2008	ID	
		Sabo Engineering	2008	2010	ID	
		Integrated River Management	2010	2012	ID	
Macedonia	Study	The study on integrated water resources development and management master plan	1998	1999	RWR	3
		The study on wastewater management in Skopje	2007	2009	WS	1
	Grant Aid	Project for improvement of water supply in inhabited places in Skopje outskirts	2003		MWS	1
	Yen Loan	Zletovica Basin Water Utilization Improvement Project	2003		WRD	1
Cote d'Ivoire	Study	The Feasibility Study on Sewerage Facility in Western District of Abidjan City	2000	2001	RWR	3
		Master plan study on integrated water resources management	2002	2002	RWR	3
	Technical co-operation	Farming System Improvement Project for Small-scale Irrigated Agriculture	2001	2001	ID	2
	Training	Water resources development and irrigation	1996	2001	ID	
		Water supply facility	2000	2000	WS	
		Non-revenue water management	2002	2002	WS	
		Regional water environment and conservation	2002	2005	OT	
		O&M for sewege system	2003	2003	ID	
		Sewerage engineering	2003	2003	OT	
		Natural resources management	2004	2004	MWS	
		Operational management of Irrigation system	2004	2004	MWS	
		River and Dam engineering	2006	2006	WS	
		Water supply facility	2006	2009	WS	
Bulgaria	Study	The Study on Integrated Water Management in the Republic of Bulgaria	2005	2007	RWR	3

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Annex-T 6 (6/6) Project Lists by Assistance of JICA

Country	Scheme		Project Name	Period		Field*	Component**
				Start	End		
Vietnam	Study	S1	The study on nationwide water resources development and management	2001	2003	RWR	3
		S2	The study on groundwater development in the rural provinces of the southern coastal zone	2007	2009	MWS	1
		S3	The study for water environment management on river basins	2008	2010	WS	3
	Grant Aid	G1	The project for the groundwater development in rural part of northern provinces	2002		MWS	1
		G2	The project for the groundwater development in rural part of northern provinces (2/3)	2003		MWS	1
		G3	Basic design study report on the project for the groundwater development in rural part of northern provinces（the 3rd period）	2004		MWS	1
		G4	Detail Design for the project for the groundwater development in rural part of central highlands provinces	2006		MWS	1
		G5	The project for the groundwater development in rural part of central highlands provinces	2007		MWS	1
		G6	Outline design study report on the project for rehabilitation of small-scale reservoirs in Quang Ngai Province	2010		WRD	1
	Yen Loan	Y1	Dai Ninh Hydropower Project (I)	1998		HP	1
		Y2	Dai Ninh Hydropower Project (II)	2000		HP	1
		Y3	Phan Ri - Phan Thiet Irrigation Project (E/S)	2000		ID	1
		Y4	Ho Chi Minh City water environment improvement project (I)	2000		WS	1
		Y5	Ho Chi Minh City Water Environment Improvement Project (II)	2002		WS	1
		Y6	Dai Ninh Hydropower Project（III）	2003		HP	1
		Y7	Thac Mo Hydropower Station Extension Project	2003		HP	1
		Y8	Southern Viet Nam Water Supply Project (II) (Dong Nai and Ba Ria-Vung Tau Provinces (II))	2003		MWS	1
		Y9	Hai Phong City Environmental Improvement Project (I)	2004		WS	1
		Y10	Phan Ri – Phan Thiet Irrigation Project	2005		ID	1
		Y11	Second Hanoi Drainage Project for Environmental Improvement (I)	2005		WS	1
		Y12	Second Ho Chi Minh City Water Environment Improvement Project (I)	2005		WS	1
		Y13	Southern BinhDuongProvince Water Environment Improvement Project	2006		WS	1
		Y14	Hue City Water Environment Improvement Project	2007		WS	1
		Y15	Second Ho Chi Minh City Water Environment Improvement Project (II)	2007		WS	1
		Y16	Hai Phong City Environmental Improvement Project (II)	2008		WS	1
		Y17	Second Hanoi Drainage Project for Environmental Improvement (II)	2008		WS	1
		Y18	Ho Chi Minh City Water Environment Improvement Project (III)	2010		WS	1
		Y19	Support Program to Respond to Climate Change (II)	2010		OT	3
	Technical cooperation	T1	The water sector training center project	2000	2003	MWS	4
		T2	The study for water environment management on river basins	2003	2006	WS	4
		T3	The project for capacity development of participatory irrigation management system through Viet Nam institute for water resources research for sustainable agricultural development	2005	2010	ID	4
		T4	The project on human resources development for water sector in the middle region	2007	2009	MWS	4
		T5	The study for watershed environment management on the three river basins in Hanoi area	2008	2012	WS	4
	Training		Comprehensive Water Environment Project in Hanoi	2007	2010	WS	
	JICA Expert		”Training Program on Water supply engineering”	2001	2002	MWS	
			”Training Program on Water supply engineering”	2001	2002	MWS	
			”Training Program on Water supply engineering”	2001	2002	MWS	
			”Training Program on Water supply engineering”	2002	2002	MWS	
			”Training Program on Water supply engineering”	2002	2003	MWS	
			”Training Program on Water supply engineering”	2002	2003	MWS	
			”Training Program on Water supply engineering”	2003	2003	MWS	
			”Training Program on Water supply engineering”	2003	2004	MWS	
			O&M drainage network	2004	2004	MWS	
			O&M drainage network	2004	2005	MWS	
			Capacity Development of Paticipatory Irrigation Management System through Vietnam Institute for Water Resources Research (VIWRR) for Improvement of Agricultural Productivity	2005	2008	ID	
			Capacity Development of Paticipatory Irrigation Management System through Vietnam Institute for Water Resources Research (VIWRR) for Improvement of Agricultural Productivity	2008	2010	ID	
			Project for Building Disaster Resilient Societies in Central Region	2009	2011	DM	
			Project for Northwest Region Rural Development	2010	2012	ID	
			Project for Promotion of Participatory Irrigation Management for Sustainable Small-Scale Pro Poor Infrastructure Development	2010	2012	RWR	

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Annex-T 7 (1/2) Project Lists by Assistance of ADB

Country	Project	Period		Sector*	Measure**
		Start	End		
Malaysia	Klang River Basin Environmental Improvement and Flood Mitigation	1997	2006	DM	1
	Impact Evaluation Study of the Water Supply and Sanitation Sector			WS	2
	Rehabilitation and Upgrading of Water Supply Systems Sector	1994	2000	MWSS	1
	Sungai Piah Hydropower			HP	1
	Kedah Water Supply			MWS	1
	Mini-Hydropower Sector			HP	1
	Pahang Barat Integrated Agriculture			ID	1
	Kalaka-Saribas Integrated Agricultural Development	1986	1994	ID	1
	Second Sabah Water Supply			MWS	1
	Pahang State Small-Scale Hydroelectric Development Study			HP	1
	Water Supply & Sanitation Sector Profile			MWSS	2
	Rural Water Supply Master Plan			MWS	3
	Batang Ai Hydropower			HP	1
	Johor, Perak and Trengganu Water Supply			MWS	1
	Trengganu Hydropower			HP	1
	Sabah Water Supply			MWS	1
	Johor and Kelantan Water Supply			MWS	1
	Kuching-Sibu Water Supply			MWS	1
	Greater Ipoh Water Supply			MWS	1
	Malacca Water Supply			MWS	1
	Penang Water Supply			MWS	1
Vietnam	Ho Chi Minh City Water Supply Expansion	2000	2008	MWS	1
	Secondary Provincial Towns Water Supply	1997	2006	MWS	1
	Hai Phong Water Supply	2007	2010	MWS	1
	Ho Chi Minh City Water Supply	2009	2010	MWS	1
	Hue Water Supply	2008	2010	MWS	1
	Water Supply Project	2008	2010	MWS	1
	Rural Water Supply and Sanitation	2008	2010	MWSS	1
	Central Region Small and Medium Towns Development	2006	2011	OT	1
	Low Income Housing and Urban development	2006	2011	OT	2
	Third Provincial Water Supply and sanitation	2006	2010	MWSS	2
	Water Sector Review	2007	2010	OT	5
	Song Bung 4 Hydropower Project	2005	2010	HP	1
	Climate Change Impact and Adaptation Study in the Mekong Delta	2009	2010	DP	2
	Strengthening Water Management and Irrigation Systems Rehabilitation	2008	2010	ID	5
Philippines	Davao del Norte Irrigation			ID	1
	Pulangui River Irrigation			ID	1
	Provincial Cities Water Supply			MWS	1
	Second Davao del Norte Irrigation	1976	1989	ID	1
	Tago River Irrigation			ID	1
	Second Manila Water Supply			MWS	1
	Allah River Irrigation	1978	1990	ID	1
	Manila Sewerage			WS	1
	Water Supply Sector			MWS	1
	Third Davao del Norte Irrigation	1982	1992	ID	1
	Manila Water Supply Rehabilitation			MWS	1
	Irrigation Sector Loan I (Southern Philippines)			ID	1
	Fourth Mindanao Irrigation Study			ID	1
	Allah River Irrigation	1978	1990	ID	1
	Second Manila Water Supply Rehabilitation			MWS	1
	Angat Water Supply Optimization			MWS	1
	Irrigation Systems Improvement			ID	1
	Metropolitan Cebu Water Supply	1991	1997	MWS	1
	Manila South Water Distribution			MWS	1
	Municipal Water Supply			MWS	1

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Annex-T 7 (2/2) Project Lists by Assistance of ADB

Country	Project	Period		Sector*	Measure**
		Start	End		
Philippines	Cotabato Irrigation			ID	1
	Agusan del Sur Irrigation			ID	1
	Second Agusan Irrigation	1978	1989	ID	1
	Irrigation Systems Improvement			ID	1
	Metropolitan Cebu Water Supply	1994	1997	MWS	1
	Water Management			RWR	2
	Water Management - Extension			RWR	2
	Angat and Magat Irrigation			ID	1
	Davao del Norte Irrigation			ID	1
	Laguna de Bay Water Resources Development Study			RWR	1
	Manila Water Supply			MWS	1
	Mindanao Irrigation Study			ID	1
	Aerial Mapping for Second Mindanao Irrigation Study			ID	1
	Second Mindanao Irrigation Study			ID	1
	Bulacan Bulk Water Supply Scheme			MWS	1
	Fourth Mindanao Irrigation Study (MIS IV)			ID	1
	Groundwater Salinity Intrusion Control Study			ID	1
	Study on Irrigation Management for Crop Diversification			ID	1
	Water Supply and Sanitation			MWSS	1
	Study on Irrigation Management for Diversified Crops (Phase II)			ID	1
	Irrigation Systems Improvement			ID	1
	Bicol River Basin Flood Control Irrigation Development	1990	1992	DM	1
	Institutional Strengthening of the National Irrigation Administration			ID	5
	Irrigation Systems Improvement (Detailed Engineering)			ID	1
	Cebu Water Supply - Phase II			MWS	1
	Umiray-Angat Trans-basin Technical Assistance	1995	2002	MWS	1
	Training System for Rural Water Supply Personnel			MWS	2
	Cebu Water Supply - Phase II (Supplementary)			MWS	1
	Municipal Water Supply			MWS	1
	Second Irrigation Systems Improvement	1995	2006	ID	1
	Institutional Strengthening of Local Water Utilities Administration and Water Districts			OT	5
	Socioeconomic Survey and Evaluation of the Island Provinces Rural Water Supply Sector			MWS	2
	MWSS Operational Strengthening Study			MWSS	3
	MWSS Water Supply Improvement Study			MWS	2
	Small Towns Water Supply Sector	1997	2004	MWS	1
	MWSS Privatization Support			MWS	2
	Water Resources Management (Angat Reservoir)			MWS	2
	Manila Water Supply			MWS	1
	Rural Water Supply and Sanitation Sector	1997	2004	MWS	1
	Water Supply and Sanitation Sector Plan Study		1997	MWSS	1
	Review of Cost Recovery Mechanisms for National Irrigation Systems	1999	2000	ID	2
	Capacity Building for the Regulatory Office of the Metropolitan Waterworks and Sewerage System	2002	2004	MWSS	3
	MWSS TA Loan	2003	2008	MWSS	1
	Pasig River Environmental Rehabilitation	2000	2003	WS	1
	Pasig Rivet Catchment Sewerage Project			WS	1
	Second Irrigation Sector			ID	1
	Participatory Irrigation Management Sector			ID	2
	Agusan Integrated Water Resources Management Project			RWR	2
	Integrated Natural Resources and Environmental Management Sector Development Program		2008	RWR	3
	Urban Water Supply and Sanitation Project		2010	MWS	1
	Water District Development Sector Project		2008	MWS	2

*: RWR=Regional Water Resources Development/ Management Planning, WRD=Water Resources Development, MWS= Municipal Water Supply, MWSS= Municipal Water Supply & Sewerage, ID= Irrigation ad Drainage, HP= Hydropower Development, DM= Water Related Disaster Management, WS= Sewerage Development, EI=Watershed management、OT=Others

**: 1=Structural Measures, 2=Nonstructural Measures, 3=Complex of 1&2, 4=Capacity Development, 5=Institutional Setup

Annex-T 8 Project Lists by Assistance of WB

Country	Project	Period		Sector*	Measure**
		Start	End		
Malaysia	Johor State Water Supply Project	1986	1995	MWS	1
	Western Johor Agricultural Development Project	1986	1996	DM	1
Kenya	Tana River Primate National Reserve Conservation Project	1996	2001	EI	2
	Mombasa Coastal Water Supply Engineering and Rehabilitation	1992	1998	MWS	1
	Emergency Drought Recovery Project (EDRP)	1993	1997	OT	2
	Energy Sector Reform and Power Development Project	1997	2004	HP	5
	Nairobi Water and Sewerage Institutional Restructuring Project	2004	2007	MWSS	5
	Water and Sanitation Service Improvement Project	2007	2012	MWSS	5
Nigeria	Nigeria Erosion and Watershed Management Project	NA	NA	ID	2
Zambia	Power Rehabilitation Project	1998	2005	HP	1
	Irrigation Development and Support Project	2011	2018	ID	1
Philippines	Upper Pampanga Irrigation Project	1969	1977	ID	1
	Aurora Penaranda Irrigation Project	1974	1981	ID	1
	Tarlac Irrigation Project	1974	1983	ID	1
	Magat River Multipurpose Project	1975	1983	WRD	1
	Chico River Irrigation Project	1976	1985	ID	1
	National Irrigation Systems Improvement Project	1977	1985	ID	1
	National Irrigation Systems Improvement Project (02)	1978	1986	ID	1
	Magat River Multipurpose Project (02)	1978	1985	WRD	1
	Magat River Project (03) - Stage 02 Irrigation	1978	1986	ID	1
	Medium Scale Irrigation Project	1980	1990	ID	1
	Watershed Management and Erosion Control Project	1980	1988	EI	3
	Communal Irrigation Project	1982	1991	ID	1
	Irrigation-Supplement Loan	1984	NA	ID	1
	Irrigation Operation Support Project - IOSP	1988	1993	ID	3
	Communal Irrigation Development Project (02)	1990	1999	ID	2
	Irrigation Operation Support Project (02)	1993	2000	ID	2
	Water Resources Development Project	1996	2005	WRD	1
	Laguna de Bay Environmental Management	1999	2001	EI	2
	Laguna de Bay Community Watershed Rehab	2006	2018	EI	2
	National Program Support for Environment and Natural Resources Management Project	2007	2012	EI	2
	Participatory Irrigation Development Project	2009	2015	ID	2
	Climate Change Adaptation Program	2010	2015	EI	2
	Liguasan Marsh Wetland Biodiversity Conservation	NA	NA	EI	2
	River Basin and Watershed Management Project (RBWMP)	NA	NA	EI	3
Macedonia	Irrigation Rehabilitation Project	1997	2006	ID	1
Vietnam	Vietnam-Red River Delta Rural Water Supply and Sanitation (Project Stage: Implementation)	2005	2013	MWSS	1
	Vietnam Rural Water (East Meets West)	2007	2012	MWS	1
	Vietnam-National Urban Upgrading Project-Mekong Delta Region	NA	NA	EI	3
	Vietnam-Medium Cities Development Project	NA	NA	DM	3
	Vietnam-Managing Natural Hazards Project	NA	NA	DM	2
	Vietnam -Water Supply Development Project	2004	2012	MWS	1
	Vietnam -TDMilot Design Build Lease-Bac Ninh Province	2005	2007	MWS	2
	Vietnam-TDMilot Design Building Lease Haiphong	2005	2007	MWS	2
	Urban Upgrading Project	2004	2014	WS	3
	Water Resources Assistance Project	2004	2011	WRD	3
	Vietnam-Red River Delta Rural Water Supply and Sanitation Project-Additional Finance	2010	NA	MWSS	1
	Vietnam-Natural Disaster Risk Management Project -Additional Finance	2010	NA	DM	2
Bulgaria	Wetlands Restoration & Pollution Reduction GEDMroject	2002	2008	EI	2
	Lake Pomorie Conservation, Restoration and Sustainable Management Project	2005	NA	EI	2
	Bulgaria Irrigation Restructuring	NA	NA	ID	2

*: RWR=Regional Water Resources Development/ Management Planning, WRD=Water Resources Development, MWS= Municipal Water Supply, MWSS= Municipal Water Supply & Sewerage, ID= Irrigation ad Drainage, HP= Hydropower Development, DM= Water Related Disaster Management, WS= Sewerage Development, EI=Watershed management、OT=Others

**: 1=Structural Measures, 2=Nonstructural Measures, 3=Complex of 1&2, 4 =Capacity Development, 5=Institutional Setup

Annex-T 9 Project Lists by Assistance of AfDB

Country	Project	Period		Sector*	Measure**
		Start	End		
Kenya	Nairobi River Systems: Sewerage Reticulation Improvement Project	2010	Ongoing	MWSS	1
	Small Town Water Supply & Waste	2009	Ongoing	MWSS	1
	Rift Valley Water Supply & Sanitation	2004	Ongoing	MWSS	1
	Water Services Boards Support Project	2007	Ongoing	MWSS	4
	Ewaso N'giro North Natural Resources Conservation	2005	Ongoing	EI	2
Nigeria	Niger Delta Social and Environment Study	2004	Ongoing	WS	2
	Water & Sanitation for Oyo and Taraba States	2009	Ongoing	MWSS	1
	Rural Water Supply and Sanitation Program	2007	Ongoing	MWSS	1
Zambia	Nkana Water Supply and Sanitation Project	2008	Ongoing	MWSS	1
	Central Province Eight Centres Water Supply and Sanitation Project	2003	Ongoing	MWSS	1
	National Rural Water Supply and Sanitation Program	2006	Ongoing	MWSS	1
Cote D'voire	Lending Operations - Public Sector	2010	Approved	MWSS	3

*: RWR=Regional Water Resources Development/ Management Planning, WRD=Water Resources Development, MWS= Municipal Water Supply, MWSS= Municipal Water Supply & Sewerage, ID= Irrigation ad Drainage, HP= Hydropower Development, DM= Water Related Disaster Management, WS= Sewerage Development, EI=Watershed management、OT=Others

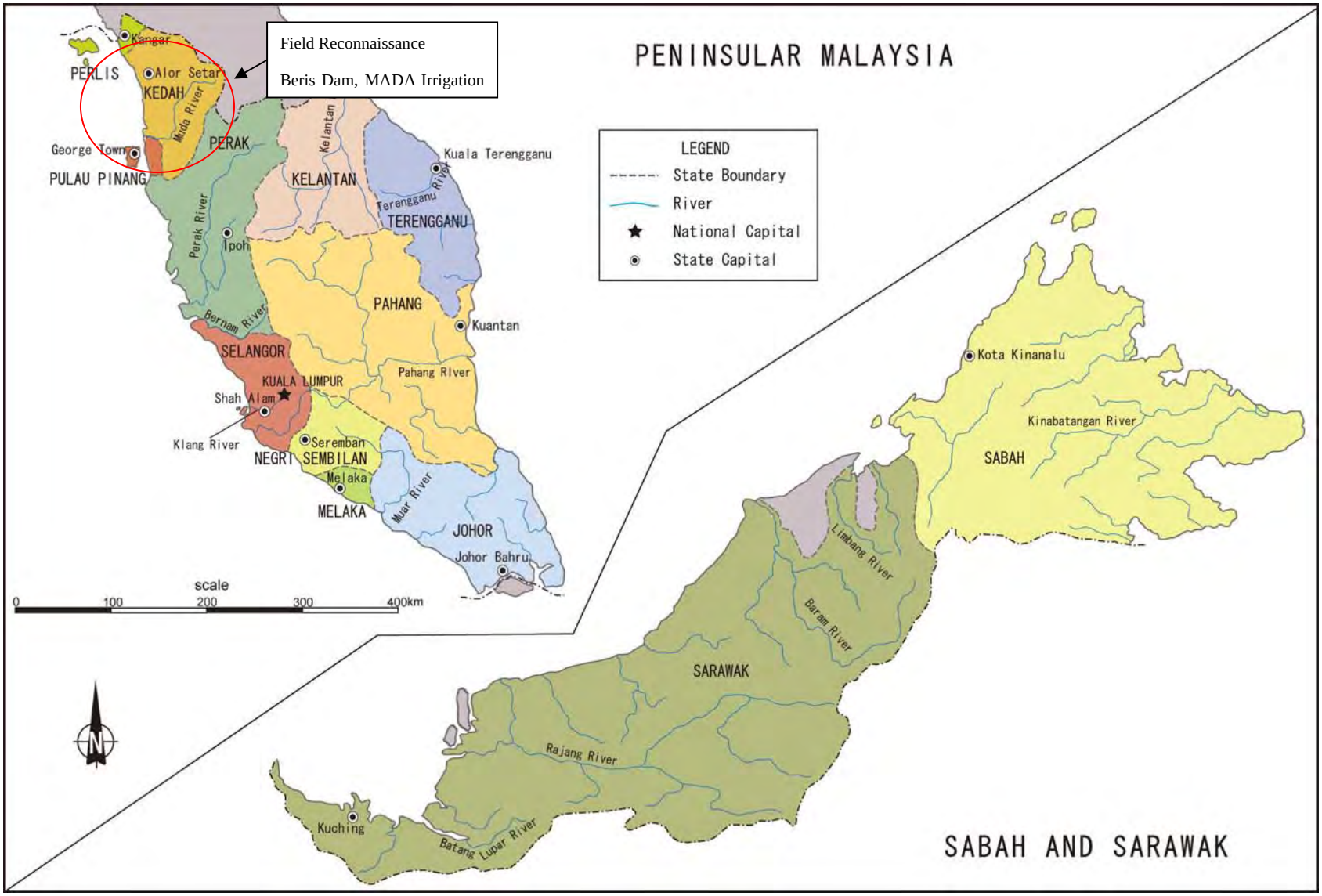
**: 1=Structural Measures, 2=Nonstructural Measures, 3=Complex of 1&2, 4 =Capacity Development, 5=Institutional Setup

Figure

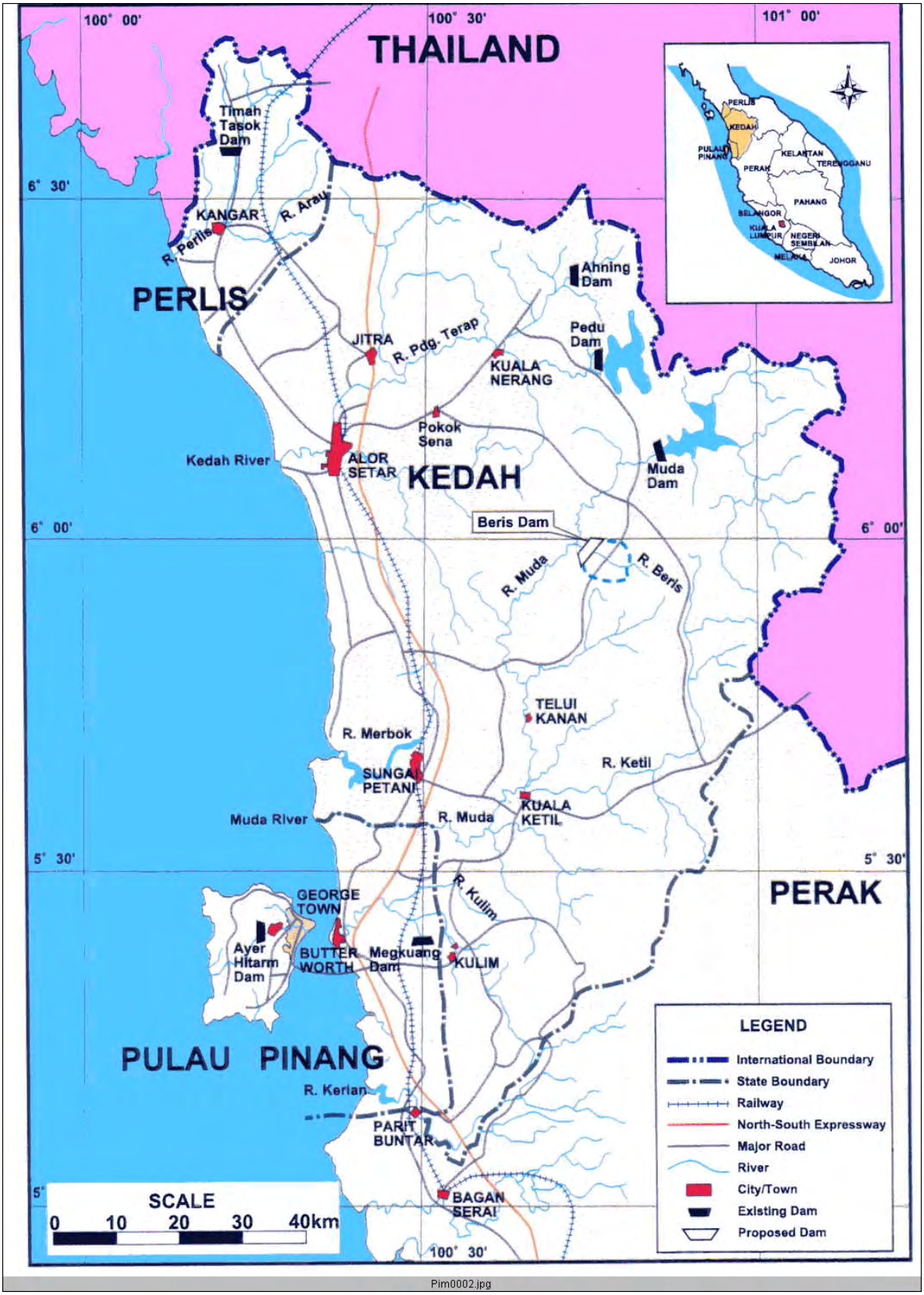
Year		80	85	90	95	2000	2005	2010
Background		New Economy Policy		Vision 2020				
			1st Industrialization Master Plan (IMP1)		IMP2		IMP3	
		Look East	Investment Promotion Act	Corporatizatio n Masterplan	Multimedia Super Corridor			
		Import-substituting industrialization						New Economic Model
			Promotion of Exportation and Foreign Investment		Enticement&Development of Hi-tech industry		Development of knowledge-based industry	
Whole Country	Overall water resources	S1 National Water Resources			S14 River Basin Information System			
	Irrigation			S12 Small Reservoir	S15 MIWMS in the Granary Areas			
	Water supply & Swage, Water Environment						IPC in Sewerage Sector	S18 Pre-study on STPP-II
						Y9 Sewerage Treatment Plant Project (STPP)		
	Flood Control and Disaster Management			S10 National River Mouths Study			S19 IRBM	
	Power Generation							
	ADB				Rehabil & Upgrading of WS system			
Northern 3 States	Overall water resources	S2 P.K.P Water Resources Study		S13 CMP of Muda River Basin				
	Irrigation					Y8 Beris Dam Project		
	WS & Swage, Water Env							
	Flood Cntrl & Disaster Mngmnt		S9 FMD in Penang					
	Power Generation							
Klang Valley	Overall water resources				S17 S on SGREM			
	Irrigation							
	WS & Swage, Water Env						Y10 Pahan-Selangor Water Transfer Project	
	Flood Cntrl & Disaster Mngmnt		S7 Klan River Flood					
	Power Generation							
	ADB			Pahan Barat Agriculture Dvlpmnt	Klang River Basin Envrnmntl Imprvmnt and Flood			
Southern Area	Overall water resources	S3 RWRD of South Johor						
	Irrigation							
	WS & Swage, Water Env							
	Flood Cntrl & Disaster Mngmnt				S16 UDI Melaka and Sungai Petani			
	Power Generation							
	WB		Johor State Water Supply Project					
			Western Johor Agricultural Development Project					
Other Area	Overall water resources							
	Irrigation		S5 FS on Tanjong Karang					
	WS & Swage, Water Env							
	Flood Cntrl & Disaster Mngmnt		S8 Kelantan River Flood					
	Power Generation	S4 FS SS HyP project; Y5 Batang Ai HyP; Y2 Bersia HyP; Y4 Kenering HyP; Y3 Terengganu; Y1,Y6 Tenom Pangi HyP	S6 FS on Lebir Dam	S11 SS HyP at Up-Riwagu river	Y7 Tenom Pangi HyP Rehabili			
	ADB		Kalaka-Saribas Agriculture Dvlpmnt					

Study | Technical Assisstance | Grant Aid | Yen Loan

Annex-F 1 Water-Related Projects Implemented in Malaysia



Annex-F 2 Location Map for Malaysia



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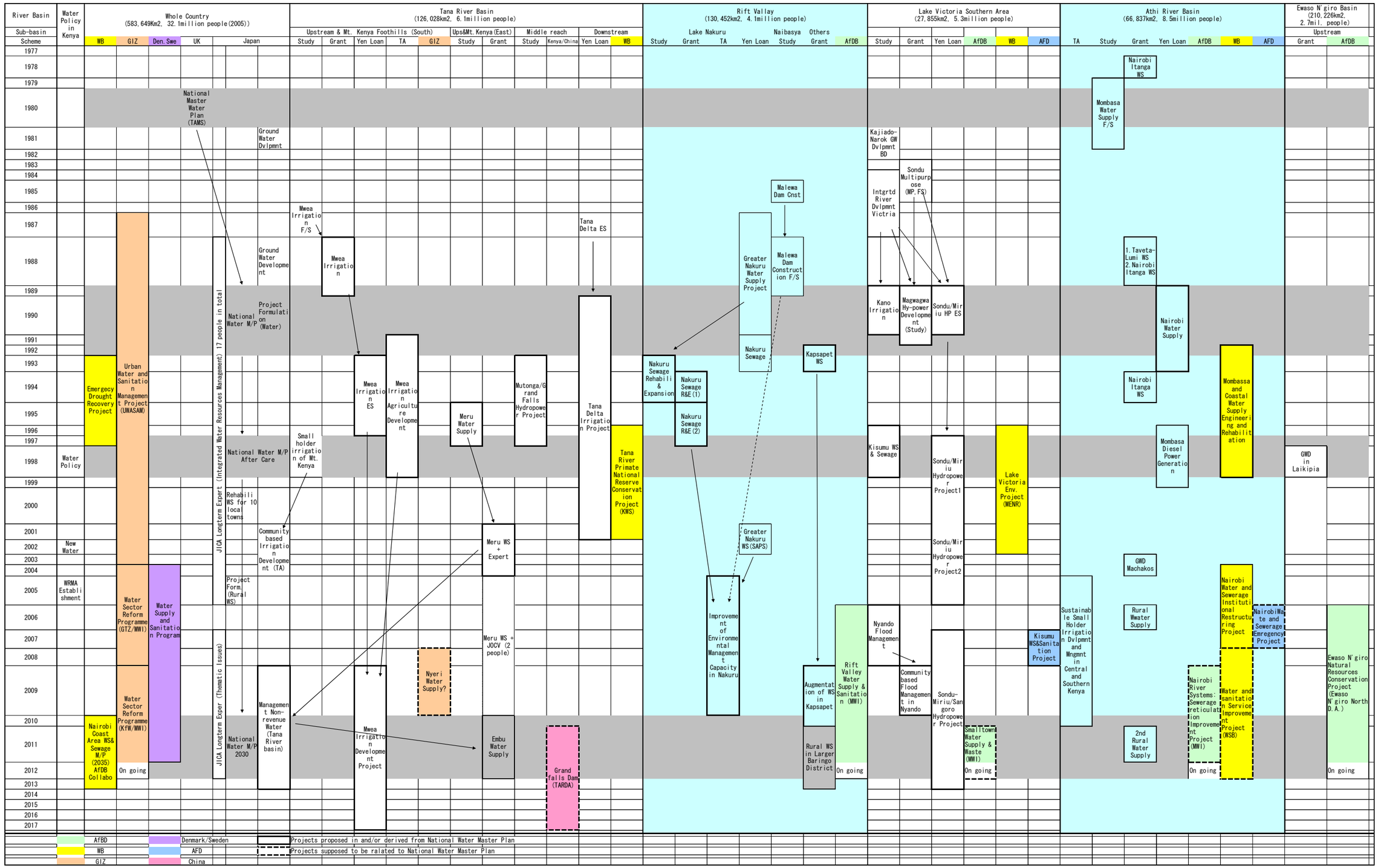
Annex-F 3 Detailed Location Map for Northern Part of Peninsula of Malaysia



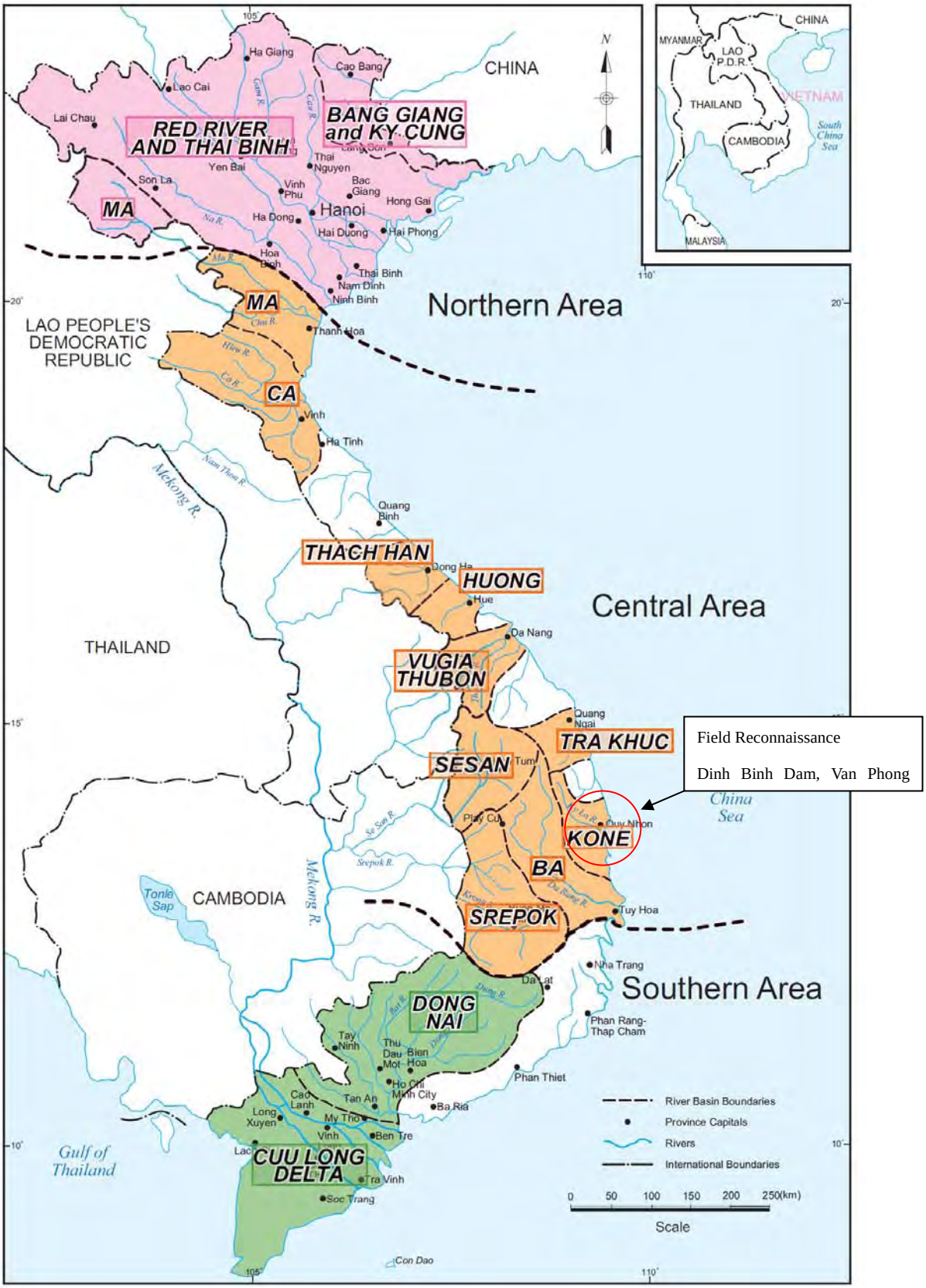
Annex-F 4 Water-Related Projects Implemented in Kenya

Annex-F 5 Location Map for Kenya

Year		1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Background			ASEAN Accession				APEC Accession					Environment Conservation Strategy				WTO Accession			
			Diplomatic Normalization with USA																
		Doi Moi (Renovation) Policy (1986-2005)																	
Whole Country	Overall water resources									S1 Nationwide Wtr Resources Study									
	Irrigation													T3 CD of participatory irrigation mngmnt					
	Water supply & Swage, Water Environment												T2 Water Envrnmnt mngmnt (I)			T5 Water Envrnmnt mngmnt (II)			
																	S3 Water Envrnmnt Mngmnt on RB		
	Flood Cntrl & Disaster Mngmnt																		
	Power Generation																		
	ADB					Secondary Provincial Towns Water Supply									Third Provincial Water Supply and Sanitation				
																Water Sector Review			
																	Strengthening Water Management		
	WB												Water Supply Development Project						
													Urban Upgrading Project						
													Water Resources Assistance Project						
Northern	Overall water resources																		
	Irrigation						Envrnmntl Imprvmnt Hanoi		Sanitation Imp Haiphong					Y9,Y16 Hai Phong City Environmental Improvement Project (I)(II)					
	Water supply & Swage, Water Environment		Urbn drainage & Sewage Hanoi		Hanoi Water Supply Systems		Grndwtr develop north				G1,2,3 Groundwater dvlpmnt in Northern Provinces								
			Water supply system in Gialam area in Hanoi city					Expansion of water supply system in Hai Duong City											
				Hanoi Drain Project for Envrnmnt Imprv		Hanoi Drain Project for Envrnmnt Imprv(II)								Y11 2nd Hanoi Drain for Envrnmnt Imprv			Y17 2nd Hanoi Drain for Envrnmnt Imprv		
	Flood Cntrl & Disaster Mngmnt																		
	Power Generation																		
	ADB																		
	WB													Red River Delta Rural Water Supply and Sanitation					
														TDMilot Design Build Lease					
Central	Overall water resources																		
	Irrigation																	G6 SS reservoirs in Quang Ngai	
	Water supply & Swage, Water Environment									Grndwtr develop Central						T4 Human resources dvlpmnt for water			
															G4,5 GW dvlpmnt in CHP				
											Ta Trach Resevoir Project (SAPROF)	Ta Trach Resevoir Project II (SAPROF)					Y14 Hue Water Envrnmnt Improve		
	Flood Control & Disaster Management																	Building Disaster Resilient Societies	
	Power Generation																		
	ADB																Hue Water Supply		
																	Water Supply Project		
																	Rural Water Supply and Sanitation		
															Central Region Small and MediumTowns Development				
															Low Income Housing and Urban Development				
														Song Bang 4 Hydropower Project					
	WB																Rural Water		
Southern	Overall water resources		Dong Nai River Water Resoueces Develop																
	Irrigation														Y3,Y10 Phan Ri - Phan Thiet Irrigation Project				
	Water supply & Swage, Water Environment						Urbn drainage & Sewage Hochiminh		T1 Water sector training center							S2 GW Develop in Southern coastal		Y18 3rd HCM Water Envrnmnt Improve	
						South VietNam Water Supply			Y4 HCMinh Water Envrnmnt Improve		Y5 HCMinh Water Envrnmnt Improve(II)			Y12,15 2nd HCM Water Envrnmnt Improve		Y13 Southern BinhDuong P Water Envrnmnt Improve			
	Flood Cntrl & Disaster Mngmnt																		
	Power Generation			Ham Thuan - Da Mi Hydropower Project (I)(II)(III)(IV)															
								Y1,Y2,Y3 Dai Ninh Hydropower Project (I)(II)(III)											
	ADB								Ho Chi Minh City Water Supply Expansion									HCM City Water Supply	
																		Climate Change	
	WB																		

Study | Technical Assisstance | Grant Aid | Yen Loan

Annex-F 6 Water-Related Projects Implemented in Vietnam



Annex-F 7 Location Map for Vietnam

Appendix
Outline, Contributions and Issues of NWR-MP and

Outline of National Water Resources M/P and its Contribution & Tasks
National Water Resources Study, Malaysia (1982) (1/3)

<table>
<tr><th>Item</th><th>Facts</th><th>Source</th></tr>
<tr><td>Study period and target Year</td><td>• Study period: From 1979 to 1982
• Target year: Year 2000</td><td>D</td></tr>
<tr><td>Objective of National Water Resources M/P</td><td>• The study objective is to establish a basic framework for the orderly planning and implementation of water resources development programs and projects consistent with the overall national socio-economic development objective.</td><td>D</td></tr>
<tr><td>Background of the implementation of the Study on National Water Resources M/P</td><td>• Malaysia is located in the tropical climate zone and belongs to a pluvial region. The average annual precipitation over Peninsula Malaysia is 2,400 mm, at Sabah 2,600 mm and at Sarawak 3,830 mm, especially during the northeast monsoon prevailing between November and January brings heavy rainfalls over Malaysia. On the other hand it becomes dry season from January to March. From April to July the southwest monsoon prevails, of which the rainfall amount is less than the northeast monsoon.
• At that time of the Study on National Water Resources M/P various strains in the use of water resources became revealed due to the rapid development. Water shortage problems even in the regions which were once considered as having plenty water resources.
• In Malaysia the authority over water resources development and management was distributed among various public entities and lack of a coordinating system among the public entities, and various water resources development and management activities were conducted severally in the past.
• For the reason the conflicts over water use were induced, and there were possibilities of duplicated activities and functions in water resources development and management by the public entities. In order to carry out effective usage of water resources and other resources it was necessary to study on water resources development and management from integrated aspects.</td><td>D</td></tr>
<tr><td>Contribution towards the implementation of construction projects</td><td>• Proposed projects by the National Water Resources M/P and implemented projects are as follows:
<table>
<tr><th>Field</th><th>Proposed Projects</th><th>Implemented Projects</th></tr>
<tr><td>Flood control</td><td>• River improvement: 850 km, Excavation of floodway: 82 km, Construction of ring bunds: 12 towns/villages
• Flood control dam: 12 dams (including multi purpose dams)</td><td>• River improvement: the Kelan river (29 km), Muda river (52 km), Kelantan river (100 km), Melaka river (Floodway), and partial river improvement
• Flood control dams: three (3) multi purpose dams</td></tr>
<tr><td>Water utilization</td><td>• Water utilization dam: 50 dams (including flood control dams above)
• Water supply facility (Increase from 2 million m³/day to 10.3 million m³/day)
• Irrigation (Expansion of paddy field from 302,000 ha to 545,000 ha)</td><td>• Water utilization dam: 12 dams (including 3 flood control dams)
• Water supply facility: 11.8 million m³/day (in 2000)
• Irrigation: About 390,000 ha (in 2000)</td></tr>
<tr><td>Water environment</td><td>• Sewerage facility: 11 urban centers
• Industrial wastewater treatment facility : Sewerage systems for 20 turban centers</td><td>• Sewerage coverage ratio: increase from 30% (in 1985) to 79% (in 2000)</td></tr>
</table></td><td>B, D</td></tr>
<tr><td>Contribution towards the improvement /strengthening of organization and institution</td><td>• Proposed projects by the National Water Resources M/P and implemented projects are as follows:
<table>
<tr><th>Field</th><th>Proposed projects</th><th>Implemented projects</th></tr>
<tr><td>Institution</td><td>• Enactment of National Water Act</td><td>• Enactment of Water Act (in 1989) (Unification of water resources development and management is not reflected as proposed in the National Water Resources M/P)</td></tr>
</table></td><td>B, D</td></tr>
</table>

to be continued

Source: A = NWR-M/P, B = Consultant engaged in NWR-M/P, C = Relevant government officers of the recipient country, D = Consultant engaged in this Study, E = Others

Appendix-1: Malaysia (2/3)

Outline of Nationwide Water Resources M/P and its Contribution & Tasks
National Water Resources Study, Malaysia (2/3)

<table>
<tr><th>Field</th><th>Facts</th><th>Source</th></tr>
<tr><td>Contribution towards the improvement/ strengthening of organization and institution</td><td>• Proposed projects in the National Water M/P and implemented projects are as follows.
<table>
<tr><th>Field</th><th>Proposed projects</th><th>Implemented projects</th></tr>
<tr><td>Organization</td><td>• Establishment of National Water Resources Committee and Department of Federal Water Resources
• Establishment of State Water Resources Committee and Department of State Water Resources
• Establishment of Water Resources Management Authority</td><td>• Establishment of National Water Resources Committee (in 1997)
• Due to reorganization of ministries and agencies, DID took charges of the function of Federal Water Resources</td></tr>
</table></td><td>B, D</td></tr>
<tr><td>Contribution towards the strengthening of water resources management ability</td><td>• Proposed projects in the M/P and implemented projects are as follows:
<table>
<tr><th>Proposed projects</th><th>Implemented projects</th></tr>
<tr><td>• Formulation of National Water Resources Master Plan
• Improvement and strengthening of hydrological observation and preparation of river management ledger
• Implementation of regional water resources development plans
• Investigation of groundwater in the coastal area of Sarawak
• Master Plan for Hydropower Development of Sabah and Sarawak
• Formulation of basin water resources master plan and feasibility study (for Port Dicson, Kota Kinabaru, and its suburb and Labuan island)</td><td>• In 2000 and 2011 the National Water Resources M/Ps have been formulated
• Completion of river management ledgers for four (4) states
• Implementation of regional water resources master plans (Perlis/Keda/Pulau Pinang region, Kelan valley region and South Johor region)</td></tr>
</table></td><td>B, D</td></tr>
<tr><td>Development of basic information</td><td>• The National Water Resources M/P has provided with massive water resources data concerned, basic approach and criteria. The results of the NWR-M/P have been utilized as the basic information for water resources development and water resources management. The specific results are as follows:
<u>Basic technical information applied for water resources /river plans</u>
- Hydrological data (rainfalls, river gauges, river discharges) covering nationwide
- Estimated values of nationwide water resources and water supply potentials
- Nationwide flood hazard and risk maps
<u>Way of thinking and criteria applied for planning of water resources and river flood control</u>
- Concept and method of setting of river maintenance flows
- Allowable irrigation/water supply risks at abnormal drought
- Introduction of inter states water transfer
- Establishment of river water quality criteria
- User pay principle for water resources development
- Government subsidy for water resources development and management</td><td>B</td></tr>
<tr><td>Contribution towards the Capacity development</td><td>• Based on the OJT during the Study on National Water M/P, and subsequent OJT by the long-term experts dispatched (1979~2003) and the wide area water resources management, The capacity of DID for water resources management has been strengthened.
• As the results of capacity development above, DID has attained a level giving technological transfer to the other Asian countries about flood risk management through Malaysian Technical Cooperation Program.</td><td>B</td></tr>
<tr><td>Contribution towards the environment and social consideration</td><td>• The National Water M/P has estimated river water pollution loads in future, and proposed establishment of river water quality standards and development of sewerage facilities
• The DOE (currently belong to MoNRE) , which was one of the counterpart of the National Water M/P, prepared Environmental Order for EIA in 1987, and made obligatory of conducting EIA for various development projects including water resources development. But promotion of environment and social consideration was a tendency of the world and not exactly the contribution of the National Water M/P.</td><td>D</td></tr>
</table>

Source: A = NWR-M/P, B = Consultant engaged in NWR-M/P, C = Relevant government officers of the recipient country, D = Consultant engaged in this Study, E = Others

Outline of Nationwide Water Resources M/P and its Contribution & Tasks
National Water Resources Study, Malaysia (3/3)

Item	Facts	Source
Application of Japanese technology and knowledge	• DID has developed various technical standards related to the water resources development and management like “River crossing structure”, “ Extraction of River Sand and Gravel”, “Conservation of River Reserve Area”, “Comprehensive Flood Control Plan”, referring Japanese technical standards and supported by long term technical experts • DID conducted international OJT using flood forecasting system using “Tank Model” developed by Dr. Sugawara under the support of Typhoon committee	B, D
Comparison with other donors	• Any large scale study like the National Water Resources M/P which has a close relation to the water resources policy, has not conducted by the donors except JICA. • JICA assistances on the water resources development and management have spread out to the systematic wide area water resources development and the implementation of individual project based on the National Water Resources M/P. • On the other hand the donors like WB and ADB have not concentrated on M/P, but specialized to support the implementation of single water concern projects like river improvement or water resources development.	B
Decentralization and the entry of private capital into water resources development and management project	• Malaysia adopts a federation system, and the state government has conducted the decentralized water resources development and management. • At Malaysia in 1990s the privatization of water supply and sewerage system was promoted under the responsibility of State Governments, but various problems have been revealed because of the lack of funds of private companies and state governments. • In order to cope with the problems above, in 2005 the power and responsibility to manage the water supply and sewerage facilities were centralized to the federal government, and now the national company conducts the construction and maintenance of facilities. • However, as for the water supply facilities, private companies are leased them from the public company, and conduct water supply services.	D
The manner of handling International rivers	• After the National Water Resources M/P, the regional water resources development plan for the south Johor (1985) developed a new water conveyance plan from the Johor River, which is located at the southern end of Peninsula Malaysia, to Singapore • After preparation of the developed plan above, the international agreement was concluded between Malaysia and Singapore, and Singapore offered to Malaysia the water resources development facility and Malaysia agreed to increase the volume of conveyance to Singapore. But due to the current water shortage, it may be difficult for Malaysia to continue the agreement. Singapore, besides the transferred water from Johor, has been developing the usage of rainwater, desalination of sea water (Reservoir) and developing a system to use sewage after filtering.	D
Coping with IWRM	• NWRC has recognized the necessity of IWRM (or IRBM) and decided to formulate IRBM for 189 river systems in the country • IWRM (or IRBM) has already started for the 4 river basin including the Langat river basin. • DID has already developed various guidelines for IRBM • Through JICA Preparatory Study, a technical guideline considering climate change has been prepared for IRBM	B
Coping with measures against climate change	• For the 10th Malaysia Plan (2011~2015) adaptation and mitigation measures against the climate change will be planned. • National Hydraulic Research Institute, Malaysia (NAHRIM) conducted a study on climate change from 2002 to 2006. • Through JICA Preparatory Study flood discharge affected by climate change and the required adaptation measures have been studied for the Muar river basin	B
Others	• Based on the M/P Study in 1982, the Government of Malaysia has formulated the National Water Resources M/P in 2000 and in 2011.	B

Source: A = NWR-M/P, B = Consultant engaged in NWR-M/P, C = Relevant government officers of the recipient country, D = Consultant engaged in this Study, E = Others

Outline of National Water Resources M/P and its Contribution & Tasks
The Study on the National Water Master Plan in Republic of Kenya・The Aftercare Study on National Water Master Plan (1/5)

<table>
<tr><th>Item</th><th>Facts</th><th>Source</th></tr>
<tr><td>Study period and target Year</td><td>• Study Period:
National Water Master Plan: 1990 to 1992
Aftercare Study on the National Water Master Plan: From 1997 to 1998
• Target Year:
National Water Master Plan: Year 2010
Aftercare Study on the National Water Master Plan: Year 2010</td><td>D</td></tr>
<tr><td>Objective of National Water Resources M/P</td><td>• Study on National Water Resources Master Plan:
- To establish a basic framework for the orderly planning and implementation of water resources development programs and projects and for rational water resources management consistent with the overall national socio-economic development objective.
• Aftercare Study on the National Water Master Plan:
- To review the water supply and sewerage development plan formulated in the National Water Resources Master Plan in 1992
- To propose arrangement of laws and regulations concerned, strengthening of implementation organization and improvement of O&M
- To conduct technology transfer to the counterpart personnel through the Study.</td><td>D</td></tr>
<tr><td>Background of the implementation of the study on National Water Resources M/P</td><td>• The north and central part of the northeast region of Kenya belong to the steppe climate, which is semi-dry with the average annual rainfall of less than 250 mm. On the other hand, the Indian Ocean coastal region and the south and central part of the southwest region belong to the tropical savanna climate, of which the average annual rainfall is over 1000 mm. The savanna climate zone has two seasons: rainy season (from November to May) and dry season (from June to October), affected by the monsoon from the Indian Ocean.
• In Kenya, due to a high economic growth (the growth rate: 4~7%) from 1985 to 1990, various strains arose in water utilization and a serious water shortage incremented even in the regions, where were considered as having plenty water resources.
• At Kenya water resources development and management activities of water resources were dispersed and conducted by various public organizations. As the result there were conflicts in water utilization and possibilities of duplication in the activities and functions of the organizations concerned. Under such circumstances the National Water Resources Study was conducted from 1990 to 1992 to aim effective usage of water and other resources.
• However, proposed projects were mostly not implemented in five years after the study. Aftercare Study on the National Water Master Plan was conducted from 1997 to 1998 in order to review the National Water Master Plan and aiming to promote the water supply projects.</td><td>D</td></tr>
<tr><td>Contribution to the implementation of construction projects</td><td>• The proposed projects by the NWR-M/P and the Aftercare study, and implemented projects are listed as follows:
<table>
<tr><th>Field</th><th>Proposed Projects</th><th>Implemented Projects</th></tr>
<tr><td>Flood control</td><td>• Five flood control plans
• Drainage facility improvement: 47 major urban centers
• Small river improvement projects
• River channel stabilization measures for the Tana River</td><td>• One (1) planning study and one (1) project for flood control</td></tr>
</table>
…to be continued</td><td>B, D</td></tr>
</table>

Source: A = NWR-M/P, B = Consultant engaged in NWR-M/P, C = Relevant government officers of the recipient country, D = Consultant engaged in this Study, E = Others

Outline of National Water Resources M/P and its Contribution & Tasks
The Study on the National Water Master Plan in Republic of Kenya・The Aftercare Study on National Water Master Plan (2/5)

<table>
<tr><th>Item</th><th>Facts</th><th>Source</th></tr>
<tr><td>Contribution towards the implementation of construction projects</td><td>
<table>
<tr><th>Field</th><th>Proposed Projects</th><th>Implemented Projects</th></tr>
<tr><td>Water usage</td><td>• Water supply dam: 28 dams
• Urban water supply: 141 urban centers*
• Local water supply: 50 regions*
• Inter-basin water transfer: 16 regions
• Basin water transfer: 24 regions
• Major irrigation scheme: 18 schemes 110,000 ha
• Small scale irrigation schemes: 140 schemes, 7,000 ha
• Hydropower projects: six (6) projects</td><td>• Water supply dams: 11 dams under construction stage at D/D stage
• Urban and rural water supply: Financial assistances by JICA Grant and WB, but only small scale compared with the proposed scale.
• Inter-basin water transfer: six (6) projects
• Basin water transfer: two (2) projects
• Major irrigation scheme: 6,000 ha
• Small scale irrigation schemes: 47,000~50,000 ha
• Hydropower: two (2) projects completed, and three (3) projects on-going</td></tr>
<tr><td>Water environ-ment</td><td>• Sewerage project: 40 urban centers*</td><td>• Sewerage project: 15 urban centers for serving 900,000 population</td></tr>
</table>
*: Proposed projects by the Aftercare study on National Water Resources Study
</td><td>B, D</td></tr>
<tr><td>Contribution towards the improvement of organization and institution</td><td>
• The proposed projects proposed by the NWR-M/P and the Aftercare Study, and implemented projects are listed as follows:
<table>
<tr><th>Field</th><th>Proposed Projects</th><th>Implemented Projects</th></tr>
<tr><td>Organiza-tion</td><td>• To establish water resources management division under Ministry of Water Development (MOWD) in order to unify water resources management.*
• Positive transference to local government the authority of performing water resources development and management.
• To establish sewerage department under MOWD in order to unify water supply and sewerage sectors.*
• To promote privatization of water supply and sewerage services.*
• To promote unification of irrigation information by Ministry of Agriculture (MOA).</td><td>• Water Resources Management Authority (WRMA) was established under Ministry of Water and Irrigation (MWI) in 2005
• Local WRMA offices for six (6) river basins and WRUAS under the local WRMA offices have been established.
• WSRB was established under Ministry of Water Resources and Irrigation (MWI) in order to unify the water supply and sewerage services in 2005
• Local Water Service Board (WSB) at eight (8) river basins and 117 water service providers have been established in order to promote privatization of water supply and sewerage services.
• Unification of irrigation projects was established by National Irrigation Board (NIB) under Ministry of Water and Irrigation (MWI)</td></tr>
</table>
</td><td>B, D</td></tr>
</table>

Source: A = NWR-M/P, B = Consultant engaged in NWR-M/P, C = Relevant government officers of the recipient country, D = Consultant engaged in this Study, E = Others

Outline of National Water Resources M/P and its Contribution & Tasks
The Study on the National Water Master Plan in Republic of Kenya (1992) ・The Aftercare Study on National Water Master Plan (3/5)

<table>
<tr><th>Item</th><th>Facts</th><th>Source</th></tr>
<tr><td>Contribution towards the improvement of organization and institution</td><td>
<table>
<tr><th>Field</th><th>Proposed projects</th><th>Implemented projects</th></tr>
<tr><td>Institution</td><td>• Revision of the Water Act for its effective use for water resources development and management.
• Revision of Parliament Act Chap. 441 in order to strengthen “Tana and Athi Rivers Development Authority”.
• Revision of lakes and Rivers Act in order to conduct the management of river and lakes/marshes.
• Maintenance of coherent application of Water Act and Local Gov. regulation
• Enactment of guideline for environmental assessment and management</td><td>• The Water Act was revised in 2002 and the revision became a legal support for the water sector reform
• Revision of the Parliament Act Cap. 441 is not conducted yet.
• Lakes and Rivers improvement Act was enacted in 1990.
• Unknown
• In 1999 “The Environmental Management and Co-ordination Act (EMCA) was enacted and after that NEMA enacted environmental guidelines and others</td></tr>
</table>
* : Recommendation by the Aftercare study on National Water Resources Study
</td><td>B, D</td></tr>
<tr><td>Contribution towards the strengthening of water Resources management abilities</td><td>
• The projects proposed by the NWR- M/P and the Aftercare study, and projects implemented are listed as follows:
<table>
<tr><th>Proposed Projects</th><th>Implemented Projects</th></tr>
<tr><td>• Preparation of inventory of hydrological data, river longitudinal and cross sections, river bank land use and land use.</td><td>• Database for Hydrological data are on going by WRMA, but centralized management of dater is delayed, and hydrological monitoring stations are decreasing.</td></tr>
<tr><td>• Execution of river patrol by the responsible agency for river management</td><td>• River patrol has been conducted by WRMA and WRUAS, but proper patrol activities are difficult due to lack of stuff.</td></tr>
<tr><td>• Flood prone area management (control of land use of flood-prone area, introduction of flood forecast and warning system, establishment of evacuation and salvation system, establishment hydrological observation and flood forecasting model),</td><td>Community based flood prone area management has been conducted for the Niando river basin</td></tr>
<tr><td>• Strengthening the managing organization for usage of groundwater and preparation of groundwater inventory)
• Continuation of water quality monitoring program (120 surface water sampling points and selected public boreholes)
• River basin conservation (Designation of river basin for water resources conservation, protection of surface erosion and discharge)</td><td>• WRMA is conducting groundwater use management and preparation of an inventory.
• Surface water quality monitoring has been conducted by WRMA and NEMA.
• River basin conservation projects have been conducted by KFS, WRMA and NGO, but the scale of projects are rather small and need better coordination among the organizations concerned</td></tr>
</table>
</td><td>B, C, D</td></tr>
<tr><td>Development of basic information</td><td>
• During the Study on the National Water Master Plan, it introduced the workstation was introduced for MOWD to enable centralized control of hydrological data and developed a database.
• The data base above was distributed to the six river basins WRMA, which were established in 2005. But the database has not updated by WRMA.
• But the central WRMA at Nairobi is developing a system to monitor the database at the 6 river basin WRMA, but not established yet.
</td><td>B</td></tr>
</table>

Source: A = NWR-M/P, B = Consultant engaged in NWR-M/P, C = Relevant government officers of the recipient country, D = Consultant engaged in this Study, E = Others

Outline of National Water Resources M/P and its Contribution & Tasks
The Study on the National Water Master Plan in Republic of Kenya (1992)・The Aftercare Study on National Water Master Plan (4/5)

Item	Facts	Source
Contribution towards the Capacity development	• During the Study on the NWR-M/P, Steering Committee, Technical Committee and Working Group were organized, and lively discussions have been conducted with C/P. Also the C/P have positively participated in the Study. These activities are evaluated to contribute to the capacity building of C/P for water resources development and management activities. • During the Aftercare Study on the National Water Master Plan, the assignment of C/P to the project were extremely small and almost no participation in the OJT. The almost no outcome of the capacity development is expected. • The capacity development of the on going third National Water Resources Study is also not expected, because the C/P assignment to the project is extremely small and the capacity development by the Study will be difficult as same as the Aftercare Study.	A
Contribution towards the environment and social consideration	• At that time of the Study on the National Water Master Plan and the Aftercare Study on the National Water Maser Plan Kenya had no guideline of environment and social consideration, and the necessity of preparation of a guideline for environment and social consideration was pointed out in the M/P Study. • National Environmental Management Agency (NEMA) was established based on the Act "The Environmental Management and Co-ordination Act (EMCA), which was enacted in 1999. NEMA has the authority of control and coordination of all problems, tasks and activities related environment, and prepared manuals, standards, guidelines, etc. environment concerned. • The cause-and-effect relation between the indication by the M/P Study and preparation of the environmental guideline by NEMA are not clear.	A, D
Application of Japanese technology and knowledge	• At that time of the NWR-M/P various technical standards for water resources concerned are most advanced in Japan and the NWR-M/P was formulated referring technical standards for river and sabo works and technical guidelines for river structures in Japan. • Japanese technical support for adaptation measures to climate change (especially for reduction of flood disaster risks) and groundwater recharge by underground dam reservoir are requested during the meeting with the Government Organization of Kenya (Tana and Athi Rivers Development Authority).	A, B
Comparison with other donors	• Any large scale study like the Study on the NWR- M/P which developed water resources policies, has not conducted except JICA. • World Bank and other donors have directed to support the projects of basic human needs like water supply and sewerage system development projects instead of large scale facility development projects	A
Decentralization and the entry of private capital into water resources development and management project	• The water supply and sanitary service were decentralized by the enactment of Water Act after 2002 and the reformation of water sector, and the country was divided into eight regions and at each region Water Service Board (WSB) was established. WSB has the function of adjustment and control of water supply and sanitary services. • Furthermore under the permission of WSB, WSP was established at each of 117 districts. WSP is a limited liability company and provide people with water supply and sanitary services under control of WSB and charges and operate independently.	D
The manner of handling International rivers	• In the NWR- M/P the followings are proposed: - The water use of the 18 international drainage basins should conform to the principles of "the Helsinki Rules on the Use of Waters of International Rivers (1966)". - Among the 18 international rivers for the Malaba River, Umba River and Daura River the water resources must be assessed through hydrological observation. - About the 13 rivers which are drained into the Lake Victoria, when an outer basin water transfer project will be conducted, it is necessary to discuss with the countries concern. - About the Ewaso Ngiro River drained into the Lake Natron, the Lumi River drain into the Lake Jipe and the Lake Turkana, the environmental study on the lakes is to be conducted. - As for the Mara River the study on hydrological environment is to be conducted from wild animal conservation aspects. • Recent year at the Lake Victoria, the Nile and the other international rivers and lakes, the decrease of drought river discharges, lake water levels, and the deterioration of water qualities are notable.	B, D

Source: A = NWR-M/P, B = Consultant engaged in NWR-M/P, C = Relevant government officers of the recipient country, D = Consultant engaged in this Study, E = Others

Outline of National Water Resources M/P and its Contribution & Tasks
The Study on the National Water Master Plan in Republic of Kenya (1992)・The Aftercare Study on National Water Master Plan (5/5)

Item	Facts	Source
Coping with IWRM	• At that time of the NWR-M/P (1992), water resources development and management plan, which is cross-sectional water environmental sectors of water use, flood control and water environment, was formulated through participation of various stakeholders, which is an important element of IWRM. • Since 2002 the water sector is pointed to practice basic elements of IWRM like “Involvement of various stakeholders”, “Integration of various factors water concerned” and “practice from wider perspectives”.	B, D
Coping with measures against climate change	• Due to the climate change river characteristics in Kenya are changing, decrease of river discharges in dry season and lake water levels and increase of flood discharges in rainy season have been observed. • Among the proposed projects in the National Water Development M/P, the flood control for the Nyand River the community based flood disaster management project has been conducted in order to control the increment of flood peak discharge due to the climate change. • The Government of Kenya has interested in developing underground dam reservoirs to recharge groundwater as adaptation measures to the lowering of river discharges due to the climate change.	B
Others	• In 1992 the Study on the National Water Resources M/P was conducted in 1992, and the Aftercare Study on National Water Master Plan was conducted in 1988, and now a new National Water Resources M/P is on going.	B

Source: A = NWR-M/P, B = Consultant engaged in NWR-M/P, C = Relevant government officers of the recipient country, D = Consultant engaged in this Study, E = Others

Outline of National Water Resources M/P and its Contribution & Tasks
The Study on the National Water Resources Master Plan in Federal Republic of Nigeria (NWR-M/P) (1995) (1/3)

<table>
<tr><th>Item</th><th>Facts</th><th>Source</th></tr>
<tr><td>Study period and target Year</td><td>• Study period：From 1992 to 1995
• Target year：Year 2000（Short term）、2020（Long term）</td><td>D</td></tr>
<tr><td>Objective of National Water Resources M/P</td><td>• The objective of the Study is to formulate a National Water Resources Master Plan which assures the optimum water resources use and provides the appropriate development scenarios on short (year 20000) - and long (year 2020) – term basis in meeting the predicted social-economic demand for regions over a wide range of water activities including ① the quantitative and qualitative assessment of water resources potential, ② the development and management of potential projects for water source works, irrigation and drainage, water supply and sanitation, and other related components such as hydropower generation, inland navigation and inland fisheries, ③ the integrated management of surface and groundwater and rivers and the watershed management inclusive of gully disaster control」, ④ the water-related environmental management, ⑤ the appropriate water administration.</td><td>D</td></tr>
<tr><td>Background of the implementation of the Study on National Water Resources M/P</td><td>• Nigeria, about 60% of the territory is drained by the Niger River and Benue River, and the rest is drained by the Lake Chad in the North-East Region and the South-East Coastal Region. The country is divided into three climate zones like semiarid in the north (annual rainfall: 400~700 mm), savannah in the central (annual rainfall: 1,000~1,500 mm), tropical-rainy region in the south (annual rainfall: 2,000~2,500 mm), and the annual rainfall of each region is concentrated in the rainy season (From November to May).
• Nigeria, having abundant water resources of tropical rainy region, has positively expanded water resources developing projects since 1970s. The Federal Ministry of Water Resources and Rural Development (FMWRRD) formulated “National Water Resources Master Plan”, which was assisted by FAO in 1984, aiming the nationwide effective water resources development and management, and the Master Plan prepared a preliminary draft report, but not completed due to the lack of funds.
• FMWRRD made a request for the Government of Japan to conduct the National Water Resources Master Plan in order to complete the Master Plan said above.</td><td>D</td></tr>
<tr><td>Contribution towards the implementation of construction projects</td><td>• Proposed projects by the NWR-M/P and implemented projects are as follows
<table>
<tr><th>Field</th><th>Proposed projects</th><th>Implemented projects</th></tr>
<tr><td>Water source works rehabilitation</td><td>• Rehabilitation of Existing dam：50
• Construction of new dams：Total reservoir volume: 10,000 Million m³</td><td>• Rehabilitation of Existing dam：Almost no progress
• Construction new dams：4 dams 、 Total reservoir volume: 1,158 Mm^3</td></tr>
<tr><td>Water supply facility rehabilitation</td><td>• Water supply facilities rehabilitation to attain the water supply service ratio of 80%</td><td>• Urban area water service ratio: Attaining 50 70%、
• Rural water service ratio: Attaining 10 50%</td></tr>
<tr><td>Irrigation and drainage</td><td>• Public irrigation improvement：1,120,000 ha
• Private irrigation improvement：380,000 ha</td><td>• Public irrigation improvement：104,000ha
• Private irrigation improvement：128,000ha</td></tr>
<tr><td>Hydropower development</td><td>• Dadin Kowa dam hydropower plan（34MW）</td><td>• Not implemented yet</td></tr>
<tr><td>Gully resoration works</td><td>• Gully restoration at Anambra and Knung States</td><td>• Unknown</td></tr>
</table></td><td>B</td></tr>
</table>

Source: A = NWR-M/P, B = Consultant engaged in NWR-M/P, C = Relevant government officers of the recipient country, D = Consultant engaged in this Study, E = Others

Outline of National Water Resources M/P and its Contribution & Tasks
The Study on the National Water Resources Master Plan in Federal Republic of Nigeria (NWR-M/P) (1995) (2/3)

<table>
<tr><th>Item</th><th>Fact</th><th>Source</th></tr>
<tr><td>Contribution towards the improvement/strengthening of organization and institution</td><td>
• Proposed projects by the National Water Resources M/P and implemented projects are as follows
<table>
<tr><th>Field</th><th>Proposed projects</th><th>Implemented projects</th></tr>
<tr><td rowspan="4">Organization</td><td>• New establishment of Department of Water Administration under Federal Water Resources and Rural Development (FMWRRD) in order to conduct unified water resources manage</td><td>• In 2008 established Nigeria Integrated Water Resources Management Commission (NIWRMC), which is equal to Department of Water Administration,</td></tr>
<tr><td>• Establish four Regional Water Administration Office</td><td>• Eight Catchment Management Office (CMO) were established as regional offices of NIWRMC</td></tr>
<tr><td>• The technical responsibility of hydrology and hydrogeology should be concentrated in National Water Resources Institute (NWRI)</td><td>• Not conducted yet</td></tr>
<tr><td>• Maintenance of the authority vested of the Federal River Basin development Authority</td><td>• Unknown</td></tr>
<tr><td>Institution</td><td>• Maintenance of operational regulations of Federal Water</td><td>• Not conducted yet</td></tr>
</table>
</td><td>B</td></tr>
<tr><td>Contribution towards the strengthening of water resources management abilities</td><td>
• Proposed projects by the National Water Resources M/P and implemented projects are as follows
<table>
<tr><th>Proposed projects</th><th>Implemented projects</th></tr>
<tr><td>• Rehabilitation and new installation of monitoring facilities for surface water and ground water</td><td>• The Nigeria Hydrological Service Agency (NIHSA) has conducted rehabilitation since 2007.</td></tr>
<tr><td>• Preparation of operation programs for the existing reservoirs</td><td>• Not started yet</td></tr>
<tr><td>• Implementation of a F/S on the proposed Comprehensive River Basin Management Program (Development study)</td><td>• Not started yet</td></tr>
<tr><td>• Increment of benefit at invested areas by promotion of positive public participation system</td><td>• Public participation system is considered at Fadama Project assisted by World Bank</td></tr>
<tr><td>• Effective use of existing large reservoirs, expansion of service areas and improvement of environmental conservation of marsh</td><td>• They are considered at planning of the basin water resources management plan for the hydrological basin of the Lake Chad</td></tr>
<tr><td>• Completion of national water resources inventory and development of data base</td><td>• Federal Ministry of Water Resources (FMWR) and NIWRMC have conducted inventory survey</td></tr>
</table>
</td><td>B</td></tr>
<tr><td>Contribution towards the Capacity development</td><td>• The OJT and seminars during the National Water M/P and thereafter dispatched long-term experts and the training in Japan</td><td>B</td></tr>
<tr><td>Development of basic information</td><td>• During the National Water Resources Master Plan the maintenance works were conducted as follows: Preparing of basic topographic maps, Development of hydrological data base, Development of social/economic statistic data base, Collection of study reports of water resources development and management concerned.</td><td>A, B</td></tr>
</table>

Source: A = NWR-M/P, B = Consultant engaged in NWR-M/P, C = Relevant government officers of the recipient country, D = Consultant engaged in this Study, E = Others

Outline of National Water Resources M/P and its Contribution & Tasks
The Study on the National Water Resources Master Plan in Federal Republic of Nigeria (NWR-M/P) (1995) (3/3)

Item	Facts	Source
Contribution towards the environment and social consideration	• During the NWR- M/P about EIA was discussed. But the discussion was at the level of necessity of EIA, and EIA of the current level was not conducted. • Law/ regulations and guidelines for environment and social consideration were established, but the contribution of the National Water M/P is not clear. - Procedural guideline for Environmental Impact Assessment (Federal Environmental Protection Agency) （enacted in 1995） - ENVIRONMENTAL IMPACT ASSESSMENT (EIA) ACT（enacted in 2004） - NATIONAL ENVIRONMENTAL STANDARDS AND REGULATION ENFORCEMENT AGENCY ACT （enacted in 2007）.	D
Application of Japanese technology and knowledge	• Grasping conditions of river basin using satellite images and estimation of river discharges	A
Comparison with other donors	• JICA has conducted rehabilitation of water supply facilities and development of groundwater. Similar assistances have been conducted by UNICEF, EC, WB and AfDB. Especially UNICEF has records of performance at 22 States and the biggest development partner in the water supply field. • In addition to the structural measures above, especially EC, WB and AfDB have conducted water supply and sanitary sector reform programs which aim to improve water governance and urban and rural water supply and sanitary improvement • Furthermore WB and AfDB have assisted the implementation of construction projects of small irrigation dams and irrigation facilities.	D
Decentralization and entry of private capital into water resources development and management project	• Nigeria is administratively composed of Federal Capital Territory and 36 States, and each State is divided into Local Government Areas (LGA) • About water resources development and management, Federal Agency basically forms a policy and formulates a whole plan, and conducts technical assistance to the State Agencies, and the States and local agencies implement the concrete projects. • In order to clear the division of duties between the Federal Agency and Local organizations, as local organizations of the Nigeria Integrated Water Resources Management Commission (NIWRMC) Catchment Management Offices (CMO) have been established for eight hydrological regions. Also for implementation and operation of water supply projects, under State Ministry of Water Resources State Water Agency/Corporation (SWB/SWC) and Rural Water Supply and Sanitation Agency (RUWASA) are in charge.	B
The manner of handling International rivers	• No special study was conducted in the National Water Resources • In the future Establishment of dialogue among concern countries, Assisting interchange of staff and engineer at the working level, Establishment and strengthening of a cross-sectional coordination organization among concern countries will be required. • For management of international rivers the following organizations have already established: Niger Basin Authority (NBA), Lake Chad Basin Commission (LCBC), Niger-Nigeria Joint Commission (NNJC) and Nigeria Cameroon Commission.	A, D
Coping with IWRM	• In the National Water Policy enacted in 2004, the necessity of formulation of integrated water resources management plan was stressed in order to adjust water resources development/distribution/utilization of concerned water sectors. • Based on the policy, “Water Supply Sector Reform Program 2005-2010” was conducted by EU assistance, integrated water resources management has been attempted to spread through the solving problems like the confrontation of water usage between upper and down streams, farmers and herdsmen, interests of stakeholders caused by transformation of wetlands.	D
Coping with measures against climate change	• The people in the low income group of Nigeria are farmers; most of them depend on the rain fed agriculture which is strongly affected by the climate change. In Vision 20:2020 indicated the possibility of increment of frequency of drought due to the change of rainfall amount and rainfall pattern, and the necessity of adaptation measures • About the climate change the Nigeria Meteorological Agency has been conducting the study “Climate Risk Analysis in Nigeria” assisted by the World Bank.	D
Others	• The National Water Resources M/P is a National Master Plan, and quite different from the detailed water resources development and management for a river basin unit. • Inventory study as the base for updating the National Water Resources M/P has been conducted every five year.	

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Outline of National Water Resources M/P and its Contribution & Tasks
The Study on the National Water Resources Master Plan in the Republic of Zambia (1995)
(1/3)

<table>
<tr><th>Item</th><th>Facts</th><th>Source</th></tr>
<tr><td>Study period and target Year</td><td>• Study period：From 1993 to 1995
• Target year： Year 2025</td><td>D</td></tr>
<tr><td>Objective of National Water Resources M/P</td><td>• To meet the future needs in the water supply sector and agricultural sector. Action plans are also formulated for immediate implementation, selecting out of the project proposed in the Master Plan.</td><td>D</td></tr>
<tr><td>Background of the implementation of the Study on National Water Resources M/P</td><td>• The northern part of Zambia belongs to the subtropical climate and has comparatively plenty rainfall, but the south belongs to the Sabannah climate and the annual rainfall is comparatively small, ranges from 700 mm to 1000 mm. In the north and south 90% of the annual rainfall concentrates in November to April.
• In Zambia the population growth rate was 2.7% in 1980s, and the population became 7,380,000 in 1990. The increased population concentrated in urban areas, and the water supply services were getting worse. Especially the Capital city of Lusaka was suffered from a serious water shortage: water supply capacity was dropped to 60% of the demand. On the other hand the major crop was maize. The rain fed agriculture was frequently damaged by drought and it was urgent to establish stabilized agriculture introducing irrigation farming. Furthermore the country maintenance of stabilized economic infrastructure by good use of water resources in order to get out of the mono-culture of cupper.</td><td>D</td></tr>
<tr><td>Contribution towards the implementation of construction projects</td><td>• Proposed projects by the NWR-M/P and implemented projects are as follows:
<table>
<tr><th>Name of Project</th><th>Period</th><th>Implementation Agency</th><th>Bore hole Nos.</th></tr>
<tr><td>Eastern Province water supply services</td><td>1998-2006</td><td>Ministry of Energy and Water Development-KfW</td><td>1,840</td></tr>
<tr><td>Northwestern water supply services</td><td>2004-2007</td><td>Ministry of Local Government and Housing-KfW</td><td>370</td></tr>
<tr><td>Central Province water supply/sanitary plan</td><td>2004-2005</td><td>Ministry of Local Government and Housing-AfDB</td><td>3,042</td></tr>
<tr><td>Northern Province groundwater development</td><td>2005-2007</td><td>Ministry of Energy and Water Development-JICA</td><td>175</td></tr>
<tr><td>WASGE Project</td><td>2004-2005</td><td>Ministry of Local Government and Housing-UNICEF</td><td>200</td></tr>
<tr><td>Luapula Province groundwater development plan</td><td>2007</td><td>Ministry of Local Government and Housing-JICA</td><td>200</td></tr>
<tr><td colspan="3">Total</td><td>5,827</td></tr>
</table>
Note：To add above projects “Copperbelt Province Urban Water Supply Project” to be implemented by JICA</td><td>B, C</td></tr>
<tr><td>Contribution towards the improvement and strengthening of organization and institution</td><td>• Based on the recommendation in the National Water Resources M/P the following organizations and institutions have been enacted or strengthen and improved.
- As the supervisory authorities of the urban water supply and sanitary field, National Water Supply and Sanitation Council has been established.
- Separation of water resources management (Ministry of Energy and Water Development: MoEWD) and water supply/sanitary (Ministry of Local Government and Housing: MoLGH)
- Establishment of Water Resources Authority for implementing agency of the Ministry of Energy and Water Development.
- Establishment of Drilling Centers at whole Provinces
• Proposed projects in the M/P have been put in the National the highest development plan, “FNDP: Fifth National Development Plan” and “SNDP: Sixth National Development Plan (2011-2015)”
• It was the same opinion of the Ministry of Energy and Water Development and Donor that though the large scale economic growth, lack of proper budgetary allocations was constrains for implementation of the Master Plan. In the interview to the Ministry of Energy and Water Development, the ministry has mentioned an supposition that the growth of water demand by the economic growth and environmental pollution gave negative impacts
…to be continued.</td><td>B, C</td></tr>
</table>

Source: A = NWR-M/P, B = Consultant engaged in NWR-M/P, C = Relevant government officers of the recipient country, D = Consultant engaged in this Study, E = Others

Outline of National Water Resources M/P and its Contribution & Tasks
The Study on the National Water Resources Master Plan in the Republic of Zambia (1995)
(2/3)

<table>
<tr><th>Item</th><th>Facts</th><th>Source</th></tr>
<tr><td>Contribution towards the strengthening of water resources management abilities</td><td>

Implementation of Agriculture Sector Investment Program (ASIP)
Promotion of public awareness of maintenance/management/operation for water resources development facilities

<table>
<tr><th>Name of Project</th><th>Period</th><th>Implementation Agency</th><th>Implemented projects</th></tr>
<tr><td>Eastern Province Water Supply Services</td><td>1998-2006</td><td>Ministry of Energy and Water Development-Kiwi</td><td>Promotion of public awareness for sanitary sector, maintenance and management</td></tr>
<tr><td>Northwest Province Water Supply Services</td><td>2004-2007</td><td>Ministry of Local Government and Housing - KfW</td><td>Promotion of public awareness for sanitary improvement</td></tr>
<tr><td>Northern Province Groundwater Development</td><td>2005-2007</td><td>Ministry of Energy and Water Development - JICA</td><td>Maintenance and management</td></tr>
<tr><td>Monitoring/Information Management</td><td>2004</td><td>Ministry of Local Government and Housing - DANIDA</td><td>Promotion of public awareness of information system, and establishment of water sector support center</td></tr>
<tr><td>Luapula Province Groundwater Development Plan</td><td>2007</td><td>Ministry of Local Government and Housing - JICA</td><td>Support for maintenance and management of water supply facilities</td></tr>
</table>
</td><td>B, C</td></tr>
<tr><td>Development of basic information</td><td>Execution of collection, supplement and arrangement of basic data including hydrological data in the National Water Resources M/P</td><td>A</td></tr>
<tr><td>Contribution towards the Capacity development</td><td>During the National Water Resources M/P, Groundwater Development Training Center Project was proposed for effective training of counterpart, but the proposed project was not implemented because there were no precedent in Africa and it was feared effectiveness. But afterward similar center projects have been implemented in Ethiopia and Nigeria.
According to the Ministry of Energy and Water Development, one of the results in the M/P is development of a runoff model including groundwater. The Ministry has a hope of updating the runoff model and developing a new model including the capacities of natural and artificial reservoirs</td><td>A, C</td></tr>
<tr><td>Contribution towards the environment and social consideration</td><td>It is not clear that whether the National Water Resources Master Plan has contributed to the improvement and contribution to the environment and social consideration system of Zambia or not.</td><td>-</td></tr>
<tr><td>Application of Japanese technology and knowledge</td><td>Technical aspects on water resources development and water Environment management (drought regulation, hydrological/meteorological observation, climate change forecast, etc.)
Information of organization (river office by basin unit, drought regulation committee, river basin committee, etc.)</td><td>A</td></tr>
<tr><td>Comparison with other donors</td><td>During the formulation of the National Water Resources M/P, the donors like NORAD and GTZ were conducting technical assistance for the shallow wells and public participation projects, but the M/P proposed facility development (construction of deep wells, strong measure against drought)
The other donors rarely depend on the observed data for formulating plans, and compile their report without clarifying facts, but the National Water Resources M/P and other Japanese Study/Planning are making steady efforts, planning based on the observed data and coordinating with the organizations concern.
Points for reconsideration of the National Water Resources M/P were week participation of the counterpart in demonstrative activities (pilot projects etc.) but the other donors promoted participation of counterpart, and technical transfer through actual projects. The current technical program has tendency to be restricted by PDM and need more flexible technical assistance.</td><td>C</td></tr>
</table>

Source: A = NWR-M/P, B = Consultant engaged in NWR-M/P, C = Relevant government officers of the recipient country, D = Consultant engaged in this Study, E = Others

Outline of National Water Resources M/P and its Contribution & Tasks
The Study on the National Water Resources Master Plan in the Republic of Zambia (1995)
(3/3)

Item	Facts	Source
Decentralization and the entry of private capital into water resources development and management project	• Water Resources Management Bill passed through Parliament in March 2011 and is waiting Presidential assend. Though the Water Development Board, which was established in 1949 and proposed to be strengthen, the Bill propose to establish Water Resources Authority (WRA) under the Ministry of Energy and Water Development and establish "Catchment Council" and "Sub-catchment Council", which holds up a policy to decentralization of the authority of regional water resources concern by catchment unit. The establishment of Kafue River Development Authority proposed in the Master Plan is considered as a pilot of the catchment management organization, and "Re-organization of water resources conservation sector" is also considered as a part of the establishment of catchment management organization.	C
The manner of handling International rivers	• Zambia is a landlocked country, and has international rivers and aquifers crossing boundary. However, currently large scale development has not conducted for surface water and groundwater, and International problems have not existed.	A
Coping with IWRM	• In the NWR-M/P the recommendations have been made from wider aspects including publicness, economic effect, persistence, environmental impact etc. • The Government formulated "Integrated Water Resources Management and Water Efficiency (IWRM/WE) (2007 – 2030) in 2008 as an implementation plan of the National Development Plan, and the development plan was in line with the NWR-M/P, and become more specific compared with the NWR-M/P.	B, C
Coping with measures against climate change	• At the formulation stage of the NWR-M/P no consideration was taken for climate change. • However, decrease of water resources and various problems caused by climate change are necessary to be assessed and the adaptation measures should be discussed. • For the assistance approach to the mentions above the JICA technical cooperation seem to be the most effective.	A
Request to JICA	Evaluation of the NWR- M/P by the Government of Zambia • The Government of Zambia: the Ministry of Energy and Water Development expressed that even after 15 years since 1995, the NWR-M/P is only the report to have comprehensive detailed data and all basic data of the country, and it will be the major issue for the Government to update the NWR-M/P, but there is no major donor to commit the assistance. • Donor: Evaluation by Germany and World Bank is that that even after 15 years since 1995, the M/P has been only report to have comprehensive detailed data and all basic data of the country and the M/P is very useful for implementation of projects. • Expectation to JICA: Updating the M/P - Government of Zambia: The Ministry of Energy and Water development: At the time of the M/P 1990~2001 the geological conditions of the country were comparatively dry, but after that the geological conditions have been gradually changed containing humidity, and the necessity of conducting environmental study and master plan study is recognized. - Government of Zambia: the Ministry of Energy and Water Development requests to the Government of Japan the implementation of the structural measures proposed in the M/P, especially the implementation of Chongwe multi purpose dam and Lundazi/Mufundu dams. - Donor: Germany: Water Resources Management Bill is waiting Presidential assend and after the Presidential ascend the Bill becomes a Law. When the Law will be enacted, the legal institution of water resources management will be reformed. Especially the organization so called Catchment Council will be established. The Catchment Councils are to be established at 9 basins and supposed to manage water resources. For catchment water management the latest and comprehensive information should be indispensable, and in the future the assistance need for the new national water resources M/P is very high.	C

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Outline of National Water Resources M/P and its Contribution & Tasks
Master Plan Study on Water Resources Management in the Republic of the Philippines (1998) (1/3)

Item	Facts	Source
Study period and target Year	• Study period：From 1997 to 1998 • Target year： 2025	D
Objective of National Water Resources M/P	• To formulate a master plan on water resources development and management in the twelve water resources regions of the Philippines. • To perform technology transfer to Philippine counterpart personnel in the course of the Study.	D
Background of the implementation of the Study on National Water Resources M/P	• The Philippines, which belongs to the tropical monsoon zone, is blessed with abundant water resources backed by the weather conditions of high rainfalls of the annual rainfall ranging from 1,900~2,400 mm. However, the water shortage and pollution of surface and groundwater of urban centers have become serious because of rapid increase of population and economic activities at urban centers, and the countermeasure was an urgent task. • However, the country had no master plan for the whole country, the degree of priority for the water resources development is unclear, and there were problems of conflicts among projects of agencies of water resources concern Under these circumstances, the necessity of formulation of mid-and -long term water resources plan, including urban and industrial water, irrigation and hydropower, was indicated in the" the action plan for reformation of the organization and system of NWRB" by the World bank, and the Master Plan Study on Water resources management in the country has been conducted.	D
Contribution towards the implementation of construction projects	• Dam development project: 22 dams and one intake barrage have been proposed, but not implemented yet. However, for the following two dams D/D and tender preparation are on going for implementation. - Balingtingon dam in the Pampanga river basin: In 2010 the EO of the president was issued. Nueva Ecija Province is the implementing agency. In the M/P it was proposed as a multi purpose dam, but planned as an irrigation dam. However, there is possibility to add the aim of water supply due to the urgency of water supply to the Metro Manila in the future. - Balog-Balog dam in the Agno River Basin: D/D is on going for the Multi purpose dam for irrigation and hydropower. NIA is the Implementing Ageency. • Water transfer project: The following water transfer projects have been proposed but not implemented yet. Metropolitan area of Manila： - Kaliwa-kanan inter basin water transfer project - Kanan-Umiray inter basin water transfer Cebu city: - Bohol-Cebu water transfer project - Malubog-mangana inter basin water transfer project - Lusaran-Pulanbator inter basin water transfer • Construction of the desalination plant at Cebu City • Due to the recommendation of the M/S on Water Resources Management in the country, construction of desalination plant was studied through the study "Water Supply and Sanitary Improvement for the Metro Cebu"(JICA Study in 2010), but the project has not implemented yet.	D

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Outline of National Water Resources M/P and its Contribution & Tasks
Master Plan Study on Water Resources Management in the Republic of the Philippines
(1998) (2/3)

Item	Facts	Source
Contribution towards the improvement and strengthening of organization and institution	• Strength of NWRB (Interim Measure) NWRB was established in 1979 as the agency to control and regulate all the national water resources development and management (at that time the name of agency was National Water Resources Council). Due to the Executive Order No. 123 (EO 123), NWRB was attached to the Presidential Office from DPWH, and furthermore reorganized as a bureau of the DENR due to the Executive Order No.860 (EO860). By EO860 the power of NWRB is strengthened through the financial and staff support of DENR. • Establishment of National Water Resources Authority A senate Bill No.799 is now under discussion, in order to establish a National Water Resources Authority which is to take over the authority of NWRB and to have wider authority and duties for water resources development and management.	D
Contribution towards the strengthening of water resources management abilities	• Implementation of M/P and F/S on Municipal Water Supply for Metro Manila, Metro Cebu and Baguio City The following studies have been conducted through JICA Technical assistance: - Study on Metro Manila Water Resources Development (2003) - Study on Metro Cebu Water Supply and Sanitary Improvement (2010) • Maintenance of hydrological data collection services NWRB developed and maintained “National Water Information Network” (So called “NWIN”) as a hydrological database, and started the effective use of internet websites since 2000. The database has data: rainfall data, river discharge data, water qualities, groundwater data time inventory, a list of rivers and water rights. However, the data have not updated since 2004 except water right data concern. • Establishment of national water information network system NWRB has collaborated with GTZ to developed “Philippine Water Supply and Sanitation (so called “PhilWARSAN”) as the national water information network, and utilized it since 2006. The net work has been utilized as a joint ownership among 10 relevant organizations. The network has the water supply and sanitary sector plans and statistic data and the information has been updated by the 10 organizations. • Review of the Master Plan Study on National Water Resources Management 1The Master Plan Study on National Water Resources Management conducted in 1998 has not been reviewed. • Execution of master plan studies for specific major river basins. Among the water supply plan for Metro Manila, Cebu City and Baguio City identified in the M/P The following studies for Metro Manila and Metro Cebu have been conducted through JICA technical assistance: - Metro Manila Water Resources Development Study (2003) - Metro Cebu Water Supply and Sanitary Improvement (2010)	D
Development of basic information	• As explained above, Two databases of NWIN and PhilWARSAN have been developed, and the data and information of hydrological and water supply and sanitary sector have been stored and maintained.	D
Contribution towards the Capacity development	• NWRB, which was the counterpart of the Master Plan Study on National Water Resources Management, was the coordination organization for water resources management, but lack of basic technical abilities, the staff and organization could not get enough strengthening through the capacity development (based on the information through hearing from the study team)	A

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Outline of National Water Resources M/P and its Contribution & Tasks
Master Plan Study on Water Resources Management in the Republic of the Philippines (1998) (3/3)

Item	Facts	Source
Contribution towards the environment and social consideration	• In Philippines before the Master Plan Study on National Water Resources Management Environment Impact Assessment (EIA) was established in 1978 and thereafter a series of amendment of the EIA and the current Philippine Environmental Image System (PEISS) are applied. The fact that the Master Plan Study on National Water Resources Management has contributed to the establishment and amendment of the EIA, has not recognized.	D
Application of Japanese technology and knowledge	• No special applied Japanese technology and knowledge are recognized.	A
Comparison with other donors	• Most of the Japanese assistance has been targeted to the water sector infrastructure improvement. Also the other donors like World Bank, ADB and GTZ etc. have promoted water sector projects, but their assistance target was specialized to the arrangement of water supply and sanitary project related to the improvement of water environment and poverty reduction. - Programme for rural water supply and sanitation 1998-2006 (Department of the Interior and Local Government)	A, D
Decentralization and the entry of private capital into water resources development and management project	• Local Government Code (LGC) was enacted in 1991 and decentralization was promoted and attempted by unification, reduction, reorganization of central government agencies. The aim is to transfer basic social services (public infrastructure etc.) to Local Government Units (LGU) and down scaling the regional offices of the central governments, transfer national staff to LGU together with facilities and equipment, and streamline the national government finance and stabilize Local government budgets. However, smooth transfer of functions from the national government to the local government, the division of roles between the national and local governments have not examined enough in advance, and the local government could not secure the necessary staff to take on the tasks of the government, and cooperate with government undertaking and the division of roles are not clear.	D
The manner of handling International rivers	• No international river in Philippine	D
coping with IWRM	• Medium - Term Philippine Development Plan (MTPDP) (2004 – 2010) includes development and management of water and related resources, aiming optimization of economy and social welfare without harming sustainability of active ecosystem, and set a planning policy of grappling with integrated water management. • In line with the policy of MTPDP, in 2006 the Planning framework of IWRM was formulated under guidance of NWRB, and four sustainable outcomes of Mid-term and long-term water resources management have been supposed. Furthermore nine strategic themes have also been set for IWRM-PFP in order to attain the four sustainable outcomes. These themes mean sector crossing urgent problems (urgently to be conducted).	D
Coping with measures against climate change	• Advisory Board of the Climate Change Commission, of which the core organization is DENR, has been organized, and the organization has prepared the Philippine Strategy on Climate Change Commission (PSCCA). NWRB, which was the counterpart of the M/P is also participating to PSCCA and in charge of examination of water field.	D
Request to JICA	• National Water Resources M/P should be conducted in order to examine of inter basin water transfer, and without discussion of inter basin water transfer river basin water resources M/P can not discussed. Accordingly continuation of National Water Resources M/P is hoped to be continued in future. • National Water Resources M/P study is possible to contribute to the economic growth and considered very important. Consequently as the results of the study, appropriate project recommendation is required. In order to secure the results, reasonable M/M and arrangement of experts are indispensable.	D

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Outline of National Water Resources M/P and its Contribution & Tasks
The Study on Integrated Water Resources development and Management Master Plan in the Former Yugoslav Republic of Macedonia (1999) (1/3)

<table>
<tr><th>Item</th><th>Facts</th><th>Source</th></tr>
<tr><td>Study period and target Year</td><td>• Study period：From 1998 to 1999
• Target year：2025</td><td>D</td></tr>
<tr><td>Objective of National Water Resources M/P</td><td>• To formulate an integrated water resources development and management master plan for the target year 2025 in the whole area of Former Yugoslav Republic of Macedonia、aiming sustainable development of water resources and environmental optimum water resources management for the whole country
• To transfer technology to the counterpart personnel in the course of the Study</td><td>D</td></tr>
<tr><td>Background of the implementation of the Study on National Water Resources M/P</td><td>• From the central to the south-east of Macedonia belongs to the Mediterranean climate, and the area of low rainfall of annual rainfall ranging from 400~700 mm. On the other hand the west part belongs to the continental climate and has comparatively a high rainfall of annual rainfall of 1000 mm.
• The urban areas represented by Skopje, which is the capital city of Macedonia, are located in the central part, and was under the serious water shortage in dry season (Summer), especially the domestic water were not supplied enough by the existing water sources like groundwater and springs. Furthermore the surface and ground waters had been polluted by household waste water and as the result the water infectious diseases were occurred. In the mountain region the water sources were far away and safe water were difficult to access.
• The three major rivers of Macedonia (the Vardar River, Crn Dorim River and Strumica River) are international rivers and discharge to the neighboring countries (Greece, Albania and Bulgaria) and the important tasks were to reduce the impacts by the pollution loads to the countries located downstream. The EU ordered each of the member countries to formulate a national river basin management plan, and Macedonia, which is aiming to join EU in future, was requested long term and integrated river basin management plan including the improvement of the water quality.</td><td>D</td></tr>
<tr><td>Contribution towards the implementation of construction projects</td><td>Among the 42 projects proposed in the National Water Resources M/P the implemented projects are as follows:
• Water supply and sanitary: Surrounding area of Skopje water supply improvement plan (JICA Grant, EN in 2003, and Skopje sanitary improvement plan (technical assistance, Master Plan Study, EN in 2003
• Dam : Zletovica multi purpose dam (Japanese loan, EN in 2003)
Note:
- Short-term investment plan for public works “Public Investment Program of the Republic of Macedonia 2002-2004” (PIP) was formulated based on the National Water Resources M/P
- PIP set up 46 projects for water supply and sanitary sector, of which 39 projects were water supply projects, and showed the high priority of water supply sector.
- Zletovica multi purpose dam aims to supply to water supply and irrigation (future plan) and the total storage is 23.5million m³. At Macedonia 13 dams have been constructed from 1960 to 1990, after 1990 only Zletovica multi purpose dam has been constructed by Japanese Loan (E/N in 2003).</td><td>B, D</td></tr>
<tr><td>ontribution towards the improvement/strengthening of organization and institution</td><td>
<table>
<tr><th>Field</th><th>Recommendation</th><th>Implementation</th></tr>
<tr><td rowspan="4">Organization</td><td>Establishment of Coordination Committee of Water Resources Development and Management</td><td>Established (Remark A</td></tr>
<tr><td>Early establishment Public Water management Enterprise (PWME) management system</td><td>Established (Remark B)</td></tr>
<tr><td>Establishment of Rural Water Supply Unit</td><td>Not established</td></tr>
<tr><td>Promotion of community participation (Institutional strengthening of users level)</td><td>Not promoted</td></tr>
<tr><td rowspan="2">Law and regulation</td><td>Establishment based on EU standards and proposed bill on water supply and discharge and sewage treatment and blackish water”</td><td>Established (Remark C)</td></tr>
<tr><td>Establishment of polluter pay principle</td><td>Established (Remark C・D)</td></tr>
</table>
Remark A: By new Water Law (1998) Ministry of Environment and Urban Planning hold responsibility of formulation of policy for water resources development and management
…To be continued</td><td>B, D</td></tr>
</table>

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Outline of National Water Resources M/P and its Contribution & Tasks
The Study on Integrated Water Resources development and Management Master Plan in the Former Yugoslav Republic of Macedonia (1999) (2/3)

<table>
<tr><th>Item</th><th>Facts</th><th>Source</th></tr>
<tr><td>Contribution towards the improvement/strengthening of organization and institution</td><td>Remark B: By old Water Law (1998) Ministry of Agriculture, Forestry, and Water Economy holds
Management of quantity and quality of surface water and groundwater.
Remark C: New Water Law (2008) involved EU-WFD, The new Water Law determines standards, principles, rights, duties and power of administrative organization/local・Local government
Remark D : By support of EU the Basic Law including environmental general and industrial waste water concern</td><td>B, D</td></tr>
<tr><td>Contribution towards the strengthening of water resources management abilities</td><td>• Projects proposed in the National Water Resources M/P are as follows
<table>
<tr><th>Proposed projects</th><th>Implemented projects</th></tr>
<tr><td>Vandar river water quality conservation plan</td><td rowspan="2">Based on the new Water Law, river basin Management is implemented by river basin</td></tr>
<tr><td>Watershed conservation plan (debris flow control, surface erosion control, restriction of sediment yield, protection of river bank erosion)</td></tr>
<tr><td>Surface water and groundwater monitoring improvement plan</td><td>Based on the old Water Law Ministry of Agriculture, Forestry and water economy and Republic Hydro meteorological Institute has establishes 60 surface water quality monitoring system</td></tr>
<tr><td>Facilities operation, maintenance and improvement plan</td><td>Based on the New Water Management Plan formulated in 2004, Ministry of Agriculture, Forestry and Water Economy stated the preparation of “Facilities Operation, Maintenance and Improvement Plan.</td></tr>
<tr><td>Human resources development plan</td><td>As yet unconfirmed</td></tr>
</table></td><td>B, D</td></tr>
<tr><td>Development of basic information</td><td>Through the National Water Resources M/P the following data have been developed
• Topographic maps (1: 2000) of five dam locations have been developed.
• National groundwater data</td><td>A, D</td></tr>
<tr><td>Contribution towards the capacity development</td><td>• During the formulation of the National Water Resources M/P, vice-minister level of each ministry was attentively participating to the steering committee.</td><td>A</td></tr>
<tr><td>Contribution towards the environment and social consideration</td><td>• During the formulation of the National Water Resources M/P based on the guidelines of JICA and JBIC environment study and Atmospheric Monitoring for Scopje City were conducted.
• Macedonia is one of the candidates of EU member countries, and making effort to adopt the Laws and regulation so EU for the environment concern laws and regulations. In June 2005 the Law on Environment was enacted and made public. After that the Law has been revised twice. The laws determine the right and duty of Country・City・public organization・individual person to environmental conservation related, and Integrated pollution prevention and management, environmental impact assessment and access to information are based on the EU standards.
• In Macedonia EIS system and strategic environment assessment (SEA) system are controlled by the Environment Law above. The EIA system is operated, but the SEA system is not operated yet.
• Under the Macedonian legal system the process of examination of an EIA report need to hold public hearings.</td><td>D</td></tr>
</table>

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Outline of National Water Resources M/P and its Contribution & Tasks
The Study on Integrated Water Resources development and Management Master Plan in the Former Yugoslav Republic of Macedonia (1999) (3/3)

Item	Facts	Source
Application of Japanese technology and knowledge	• During the National Water Resources M/P it was necessary to examine the EU standards to see compatible with Japanese standards. • Having a hard time developing a water balance at the Regions at high latitudes considering snow melt. About the snow melt Japanese knowledge would be applied.	A
Comparison with other donors	• Major donor countries were Germany, Austria, EAR (European Agency for Reconstruction) and USAID, Formosa, PHARE (Pologne et Hongri Aid a Reconstruction Economique), IOM (International Organization of Migration) have performance. • The donors above mainly assisted Macedonia with soft measures like improvement of organization・ legal system and strengthening of managing capacity.	D
Decentralization and the entry of private capital into water resources development and management project	• About 20 years ago, the M/P emphasized hard measures, and the M/P did not seem to have contributed to the strengthening of governance for river basins. • Macedonia became independent in 1994. Though the government was in decentralized conditions, the government did not have enough budgets for maintenance of facilities and the governance was deteriorated because of lack of budget. • Decentralization law was issued in 2005, and local government was to be a self-supporting system. The services conducted by the central government were transferred to the local government and the devolution of authority is advancing. However, the capacity of the local government is still weak and there are still many unclear points in the division of roles between the central and local governments. • Local government should established a Public Water Management Enterprise (PWME), and have duties to implement・operate・maintain irrigation water supply facilities for agriculture, water supply and sanitary facilities, flood control measures, Land erosion and drainage facility projects. The necessary budget of PWME should be met by the water charge from the water user and the subsidy from the national government, However, recently the collection rate of water charge are declined and adequate operation of PMWE become difficult. Under the circumstances the legal system enable of public participation should be in a hurry. However, the country is still stuck in the management stile of former socialism system effective privatization is not progressed.	A, B, D
The manner of handling International rivers	• During the formulation of the National Water Resources M/S the international rivers became the topics, but they have not examined, because no major international conflicts were anticipated from the small scale of economic activities in the country. • Presently when a project is decided as an appropriate plan through the SEA process, the implementing agency for the project shall make public the content of the SEA Report. If the project is related to the international river, the Ministry of Foreign Affaire shall notify it to the concerned countries.	A
Coping with IWRM	• During the National Water Resources M/P IWRM was not a topic and not examined.	A
Coping with measures against climate change	• During the National Water Resources M/P the climate change was not a topic and not examined.	A
Request for JICA	• The scale of the study area (or country) and the required total input of M/M and others, need consideration. In case of Macedonia, the country is comparatively small and the most parts of the country the study team were able to go and return in one day for field trips and data collection, but in the case of a large country it must be problems to know the conditions of a wide area. • It may be necessary to prepare the reports both in English and in the local language, because there are countries where English are not popular and the counterparts are not good at. If the results of the study have not been understood and not utilized. The project is no meaning.	A

Source: A = NWR-M/P, B = Consultant engaged in NWR-M/P, C = Relevant government officers of the recipient country, D = Consultant engaged in this Study, E = Others

Outline of National Water Resources M/P and its Contribution & Tasks Master Plan Study on Integrated Water Resources Management in the Republic of Cote D'ivoire (2001) (1/2)

<table>
<tr><th>Item</th><th>Facts</th><th>Source</th></tr>
<tr><td>Study period and target Year</td><td>• Study period： From 2000 to 2001
• Target year：2015</td><td>D</td></tr>
<tr><td>Objective of National Water Resources M/P</td><td>• To formulate a national master plan on integrated water resources management for the target year 2015.
• To pursue technology transfer to counterpart personnel in the course of the study</td><td>D</td></tr>
<tr><td>Background of the implementation of the Study on National Water Resources M/P</td><td>• The Sasandra River Basin is located in the west part of the country, belonged to a climate zone similar to the tropical rain-forest climate and is comparatively high rainfall area, of which the annual rainfall ranges from 1,800 mm~2,000 mm. But the Bandam and Comoe River Basins, located in the central and east part of the country, are low rainfall area, and the annual rainfall ranges 400 mm to 800 mm and concentrates in the rainy season (from June to October) and the water resources is not stabilized all the year round.
• The major water resources of Cote D'ivoire are 11 major rivers and groundwater. In 1970s of favorable economic conditions, large scale dams for hydro-power and numerous mid/small scale reservoirs for agriculture and animal husbandry were positively developed. However, the developed water resources have not effectively been distributed among the water resources sectors. Consequently preparation of legal framework and strengthening of organizations are important tasks in order to conduct effective distribution and management of water resources</td><td>D</td></tr>
<tr><td>Contribution towards the implementation of construction projects</td><td>• Proposed projects by the National Water Resources M/P and implemented projects are as follows:
<table>
<tr><th>Field</th><th>Proposed projects</th><th>Implemented projects</th></tr>
<tr><td>Multipurpose development</td><td>• 6 projects
Water supply： 370,000m^3/day
Irrigation： 109,203 ha
Hydro-power 4,894 KW</td><td>• One project (the Integrated Basin Development Plan for the Agneby River) was selected as the top priority project for the JICA assistance in 2002, of which the preparatory study was conducted, but the project has been pending because of the deterioration of security</td></tr>
<tr><td>Agricultural development</td><td>• 5 projects（10,584 ha）</td><td>• Unknown</td></tr>
<tr><td>Hydroelectric development</td><td>• 3 projects（39,100 KW）</td><td>• Unknown</td></tr>
<tr><td>Water transfer</td><td>• Abidjan water transfer</td><td>• Unknown</td></tr>
</table></td><td>D</td></tr>
<tr><td>Contribution towards the improvement/strengthening of organization and institution</td><td>• Proposed projects by the National Water Resources M/P and implemented projects are as follows:
<table>
<tr><th>Field</th><th>Proposed projects</th><th>Implemented projects</th></tr>
<tr><td>Organization</td><td>• Establishment of Water Authority</td><td>• Unknown</td></tr>
<tr><td></td><td>• Establishment of Basin Water Authority
• Establishment of Water Management Committees at national and Water Management Cooperation at river basin levels</td><td>• Unknown</td></tr>
<tr><td>Institution</td><td>• Enactment of executive orders and government ordinances for enforcement of the water law enacted in 1998
• Enactment of legal frameworks surrounding the Water Law
• Establishment of water right</td><td>• Unknown</td></tr>
</table></td><td>D</td></tr>
</table>

Source: A = NWR-M/P, B = Consultant engaged in NWR-M/P, C = Relevant government officers of the recipient country, D = Consultant engaged in this Study, E = Others

Outline of National Water Resources M/P and its Contribution & Tasks Master Plan Study on Integrated Water Resources Management in the Republic of Cote D'ivoire (2001) (2/2)

<table>
<tr><th>Item</th><th>Facts</th><th>Source</th></tr>
<tr><td>Contribution towards the strengthening of water resources management abilities</td><td>• Proposed projects by the National Water Resources M/P and implemented projects are as follows:
<table>
<tr><th>Field</th><th>Proposed projects</th><th>Implemented projects</th></tr>
<tr><td>Water Quality Management</td><td>• Establishment of 47 water quality monitoring stations</td><td>• Unknown</td></tr>
<tr><td>Watershed Management</td><td>• Conservation of forest and land use control</td><td>• Unknown</td></tr>
<tr><td>Hydrological gauging</td><td>• Unified operation and management of the existing gauging systems
• Development of the hydrogeological gauging system and data storing system</td><td>• Development of GIS for Sasandra and Comoe River Basins is in progress</td></tr>
<tr><td>River Data</td><td>• Establishment of river database
• Preparation of the river ledger</td><td>• Unknown</td></tr>
</table></td><td>D</td></tr>
<tr><td>Contribution towards the Capacity development</td><td>• Unknown</td><td>-</td></tr>
<tr><td>Development of basic information</td><td>• At Cote D'ivoire GIS has been developed for the Bandama River in the central part before the National water Resources M/P
• Through the National Water Resources M/P GIS was developed for the rest two large river basins of the Sasandra River System (70,800 km^2) and the Comoe River (74,000 km^2)</td><td>D</td></tr>
<tr><td>Contribution towards the environment and social consideration</td><td>• Unknown</td><td>-</td></tr>
<tr><td>Application of Japanese technology and knowledge</td><td>• GIS</td><td>A</td></tr>
<tr><td>Comparison with other donors</td><td>• Unknown</td><td>-</td></tr>
<tr><td>Decentralization and the entry of private capital into water resources development and management project</td><td>• Unknown</td><td>-</td></tr>
<tr><td>The manner of handling International rivers</td><td>• Most of the rivers in the country are international rivers, but special examination for the international rivers was not conducted in the National Water Resources M/P</td><td>A</td></tr>
<tr><td>Coping with IWRM</td><td>• IWRM was not included in the National Water Resources M/P Study subjects</td><td>A</td></tr>
<tr><td>Coping with measures against climate change</td><td>• Climate change was not included in the National Water Resources M/P Study subjects</td><td>A</td></tr>
<tr><td>Others</td><td>• No matters specially mentioned</td><td>-</td></tr>
<tr><td>Request to JICA</td><td>• No matters specially mentioned</td><td>-</td></tr>
</table>

Source: A = NWR-M/P, B = Consultant engaged in NWR-M/P, C = Relevant government officers of the recipient country, D = Consultant engaged in this Study, E = Others

Outline of National Water Resources M/P and its Contribution & Tasks
The Study on Nationwide Water Resources Development and Management in the Socialist Republic of Vietnam (2003) (1/3)

<table>
<tr><th>Item</th><th>Facts</th><th>Source</th></tr>
<tr><td>Study period and target Year</td><td>• Study period：From 2001 to 2003
• Target year：2020</td><td>D</td></tr>
<tr><td>Objective of National Water Resources M/P</td><td>• To formulate a water resources development and management master plan for nationwide (14 river basins) (Phase 1)
• To formulate a comprehensive basin management plan for the Houng River (Phase 2-1)
• To formulate comprehensive river basin management plan for the selected priority basin from the 14 basins (Phase 2-2)
• To conduct a feasibility study for priority projects in the priority river basin (Phase 2-3)
• To pursue technology transfer to counterpart personnel</td><td>D</td></tr>
<tr><td>Background of the implementation of the Study on National Water Resources M/P</td><td>• Vietnam belongs to a high temperature and rainfall area in the tropical monsoon climate. The annual rainfall is about 1,700 mm at Hanoi in the north, 2,000 mm at Da Nang in the central and Ho Chi Minh in the south, about 70%~90% of the annual rainfall concentrates in the rainy season from May to October at Hanoi, September to December at Da Nan and May to October at Ho Chi Minh.
• Vietnam has varied regional tasks of water resources concerned, the northern part has serious problems of water shortage and deterioration of water quality due to the rapid economic development and population concentration, and the southern part has problems of securing irrigation water in the dry season and preventing the intrusion of salt water. The central part needs tasks against drought, saltwater intrusion in the dry season and flood disaster management in the rainy season. Especially during the flood occurred in the area in 1999 the casualties were more than 700 nos. and caused large personal and impersonal losses.
• For the various water resources problems, each of the Ministries has planned water resources development projects which are focused on developing multipurpose dams. However, the planned and proposed projects have not formulated from nationwide comprehensive aspects the Ministry of Agriculture and Rural Development has agonized over how to implement the projects systematically.
• Under the circumstances above, the Government of Vietnam has requested to the Government of Japan to conduct the two technical assistance projects: “the Nationwide Water Resources Development and Management Study” and “Comprehensive Flood Control Plan for the Huong River”. The efficiency and urgency of the two projects were considered and the two projects were unified, and the Study on Nationwide Water Resources Development and Management M/P was conducted.</td><td>D</td></tr>
<tr><td>Contribution towards the implementation of construction projects</td><td>• Proposed projects by the NWR-M/P and implemented projects are as follows
<table>
<tr><th>Field</th><th>Proposed projects</th><th>Implemented projects</th></tr>
<tr><td>Flood control</td><td>• Flood control dam: 14 projects (13 multipurpose dams and one flood control dam)
• River improvement: 14 rivers
• The Kone River downstream flood control project</td><td>• Flood control dam: 4 projects completed, one project on going (all of them are multipurpose dams)
• River improvement: three river improvement projects (Length: 267 km)
• The Kone river flood control project: Flood peak cut by Dinh Binh Dam, river improvement for downstream</td></tr>
<tr><td>Water use</td><td>• Water use dam: 18 projects (16 multipurpose dams, and 2 water use dam)
• Agricultural development: 12 rivers agricultural development plan
• 12 rivers domestic and industrial water supply plan
• Kone River basin Van Phong and Irrigation and drainage project</td><td>• Water use dam: 10 projects completed, one project on going (All of them are multipurpose dams including flood control dam)
• Irrigation development: 4 river irrigation development projects, irrigation area will be expanded 158,500 ha from 2000 to 2020
• Kone River basin Van Phong barrage and irrigation and drainage project</td></tr>
</table></td><td>B</td></tr>
</table>

Source: A = NWR-M/P, B = Consultant engaged in NWR-M/P, C = Relevant government officers of the recipient country, D = Consultant engaged in this Study, E = Others

Outline of National Water Resources M/P and its Contribution & Tasks
The Study on Nationwide Water Resources Development and Management in the Socialist Republic of Vietnam (2003) (2/3)

<table>
<tr><th>Item</th><th>Facts</th><th>Source</th></tr>
<tr><td>Contribution towards the improvement/strengthening of organization and institution</td><td>
• Proposed projects by the National Water Resources M/P and implemented projects are as follows
<table>
<tr><th>Field</th><th>Proposed projects</th><th>Implemented projects</th></tr>
<tr><td>Organization</td><td>• Establishment of basin management organization</td><td>• In 2006 the reformation of water sector was conducted, and Ministry of Natural Resources and Environment (MONRE) was established aiming to strengthen water resources development and management. But the existing Ministry of Agriculture and Rural development (MARD) is having the large part of the authority to conduct water resources development and management, and the authorized limits between MONRE and MARD are not clear.
• The River Basin Organization (RBO) proposed in the Nationwide Water Resources M/P has been established at 8 basins, however, the responsible government office of the RBOs are not unified, but divided between MARD and MoNRE, the RBOs seem not work well.</td></tr>
<tr><td>Institution</td><td>• No special measures proposed</td><td></td></tr>
</table>
</td><td>D</td></tr>
<tr><td>Contribution towards the strengthening of water resources management abilities</td><td>
• Proposed projects by the NWR- M/P and implemented projects are as follows
<table>
<tr><th>Proposed projects</th><th>Implemented projects</th></tr>
<tr><td>• Water Use Management Plan (Proper management of water demand, management of latest information of water resources, proper allotment in severe drought conditions)
• Flood Disaster Management Plan (Management of disaster information at central and local levels, Preparation of flood control facilities and preparedness, Preparation and publication of flood hazard maps, River management, Flood forecasting, warning and communication systems, Management of land use (control), Formulation of river basin conservation plan)
• River Environment Management Plan (Management of river maintenance flow, Water quality control, and Water quality monitoring)
• Management of dam operation plan (Integrated management of the existing and planned dams for the Kone River basin, and warning and information system of dam water release)
• Administrative Management Plan</td><td>• The projects are mostly not realized or grappled partly but limited realization.</td></tr>
</table>
</td><td>D</td></tr>
<tr><td>Development of basic information</td><td>• Through the Nationwide Water Resources M/P, hydrological data (rainfall and river discharge), water demand forecast and water balance calculation results were prepared.</td><td>A</td></tr>
<tr><td>Contribution towards the capacity development</td><td>• Almost no results of the capacity development through the Nationwide Water Resources M/P have been recognized, because in Vietnam the circumstances are not ready for the counterpart to receive the technical transfer through the JICA development study.
• MoNRE, which was established through the water sector reformation, has an only short history and needs the capacity building for water resources development and management.
• The Government of Vietnam hopes to receive technical transfer for operation and management of dam, nonstructural measures for flood forecasting and warning through the JICA technical cooperation projects</td><td>A, D</td></tr>
</table>

Source: A = NWR-M/P, B = Consultant engaged in NWR-M/P, C = Relevant government officers of the recipient country, D = Consultant engaged in this Study, E = Others

Outline of National Water Resources M/P and its Contribution & Tasks
The Study on Nationwide Water Resources Development and Management in the Socialist Republic of Vietnam (2003) (3/3)

Item	Facts	Source
Contribution towards environment and social consideration	• At 2001 when the Nationwide Water Resources M/P was conducted, only a tentative guideline of EIA was formulated, but no detailed guideline. However, the M/P conducted detailed and specific EIA for priority projects. • National Environmental Agency (NEA) which is under MoNRE, prepared a new EIA guideline in 2009, and has a plan to introduce a bill for SEA. However, it is not recognized that the M/P has given an impact to the series of environmental actions. • The EIA department is to conduct the examination of EIA report. But it has only week legal power and the EIA report requires only natural environment, but social consideration does not require by law.	B, D
Application of Japanese technology and knowledge	• At that time of the Nationwide Water Resources M/P, Vietnam frequently used Russian technical standards it was extremely difficult to apply Japanese technology and knowledge. • The Government of Vietnam hopes to introduce the following technology and knowledge. - Quantification of river maintenance flows - Radar rainfall observation for flood forecasting and warning - Environmental impact assessment	A, D
Comparison with other donors	• The large scale study related to water resources policy like the Nationwide Water Resources M/P has not conducted by the donors except JICA • The other donors have assisted to projects focused on non-structural measures. For the water sector reform in 2006, ADB, Denmark and Belgium have conducted financial and technical assistances	A, D
Decentralization and the entry of private capital into water resources development and management project	• Vietnam has been promoting the participation of private sectors to invest in the generation of hydroelectricity in order to promote the electric power development. Concretely in the most cases of multipurpose dam construction, a private company constructs hydropower plant by his own funds and to operate and maintain sell electricity to Vietnam Hydroelectric company.	D
The manner of handling International rivers	• In order to discuss the water resources development and management for the Mekong River, there are the international committee consist of related country members and own domestic committee	B
Coping with IWRM	• The water management is conducted in unorganized manner and the water management is by far deviated from IWRM • As for the examination of IWRM the Government of Vietnam hopes the technical assistance of JICA. Presently the Government of Vietnam has requested to JICA to conduct "The Study on River Basin Water Environmental Management for Cau River". It is considered that the examination of IWRM and Climate Change will be added in the study scope as an option.	B, D
Coping with measures against climate change	• Department of Meteorology, Hydrology and Climate Change (DoMHCC) of MoNRE has a plan in the long term development strategy (2010 to 2020) to formulate "Countermeasure Project Plan for Climate Change" and "Capacity Development Project Plan for Natural Disaster" • Furthermore DoMHCC established a committee for examination of Climate Change, and estimated the increase of rainfall intensity by different gas emission scenarios • The climate change will give a large impact to the crop harvest of rice, MARD has independently conducted studies on adaptation measures for climate change for Mekon delta, Red River delta and the central Vietnam, because the climate change give a large impact to the crop harvest of rice	B, D
Others	• The results of the water balance analyses for the 14 river basins examined in the Nationwide Water Resources M/P, have been used for formulation of water resources development of MARD. Further the results were actively used in the analyses of river basin conditions in the Water Sector Review which was conducted by ADB as the core.	D

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Outline of National Water Resources M/P and its Contribution & Tasks
The Study on Integrated Water Management in the Republic of Bulgaria (2008) (1/3)

Item	Facts	Source
Study period and target Year	• Study period：From 2006 to 2008 • Target year： 2015 (Not attained in 2015, target year to be reset in 2021 and again in 2027)	D
Objective of National Water Resources M/P	• To assist the MoEW in the implementation of the required of the EU Water Framework Directive (WFD) which includes: - Preparation of the River Basin Management Plans for the East Aegean Sea River Basin Directorate (EABD) and West Aegean Sea River Basin Directorates (WABD) as selected areas, - Development of GIS, Monitoring Programs and Water Resources Balance for the whole country, • To transfer technology and conduct training on integrated Water Management to the counterpart personnel in the course of the Study.	D
Background of the implementation of the Study on National Water Resources M/P	• Bulgaria, aiming to join EU, has established the river basin management organization and has started to prepare the river basin management plan in order to achieve the requirement of the EU-WFD that was enacted in 2000 for realization of preferable good status of all the water bodies. Bulgaria enacted the new Water Act in 2000, divided the whole country into four river basin management districts, and set up four river basin directorates in 2003. The new Water Act was revised in August 2006 and introduced the idea of integrated management of water resources, polluter pay and user pay principle. • Bulgaria has a total land area of approximately 111,000 km². The her topography is roughly separated into the zones: the Danubian Table Land in the northern part, the Balkan Mountains in the center, the Thracian Plain in the southern part and the Rhodope, Rila, and Pirin Mountains in the southwestern part. Most of the lowland has annual rainfall of 500-700 mm, but the mountain area has much more rainfall, in some places, annual rainfall exceeds 900 mm. The mountain areas play an important role in the water resources. In the mountain area, not only rainfall but also snowfall contributes to annual precipitation. • As for annual water balance, in the most part of Bulgaria, annual potential evapo-transpiration (PET) exceeds annual rainfall amount, but in the mountain area annual rainfall amount exceeds PET. The river basins are divided into 14 river systems: 6 rivers drains to the Danube, one river to the Black Sea, one river to Turkey and six rivers to Greece. The longest river is the Iskar (338 km) and the largest river basin is the Maritsa River (21,292 km²). • Based on the common physic-chemical parameters the water quality of the country is moderate (Class III) to bad (Class V) conditions and the locations in more than 50% was poor (Class IV) to Bad (Class V), and polluted water was problem. Major water use sectors were hydro-power, agriculture, domestic and industrial waters, and superannuated facilities and inefficient water uses were problems. As for sewerage, organic matters by discharge of untreated sewage from urban areas, industrial wastewater with insufficient treatment, pollution loads from agricultural lands were the reasons for these wide spread water pollution in the country. The existing sewerage treatment plants (73 sites) and their sewer systems were superannuated and the water environment was required improvement. • In order to join EU the Urban Wastewater Treatment was planned in 2005. But the implementation of the plan has greatly been delayed because of deficit of the budget and shortage of talents.	D
Contribution towards the implementation of construction projects	• For improvement and management of water quality and water quantity, and river management in EABD and WABD, the following structural measures were proposed. • Construction of new waste water treatment plants: 24 towns (18 towns in EABD, 6 towns in WABD) • Rehabilitation of existing WWTPs: 7 towns (4 towns in EABD, 3 towns in WABD) • Improvement of water supply system for reducing high water loss over 60%: 21,450 km (16,654 km in EABD, 4,886 km in WABD) • Improvement of irrigation area for improvement: 123 irrigation systems and 367,202 ha (In EABD: 82 systems and 316,468 ha, WABD: 41 systems and 50,738 ha) …to be continue	A, B

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Outline of National Water Resources M/P and its Contribution & Tasks
The Study on Integrated Water Management in the Republic of Bulgaria (2008) (2/3)

<table>
<tr><th>Item</th><th>Facts</th><th>Source</th></tr>
<tr><td>Contribution towards the developing facilities</td><td>• The proposed projects have been reflected in the National Plan.
• Water supply and sewerage projects are included in the Municipal Infrastructure Development Project, which is aiming to improve and rehabilitate the nationwide water supply and sewerage facilities conducted by Ministry of Regional Development and Public Work (MoRDPW) and financed by World Bank. In Bulgaria water supply and sewerage sectors are under MoRDPW and managed by 51 Water Supply and Sewerage Companies (13 national company, 16 national and municipal companies, 22 municipal companies)</td><td>A, B</td></tr>
<tr><td>Contribution towards the improvement/strengthening of organization and institution</td><td>• Proposed projects in the Integrated Water Management M/P are as follows
<table>
<tr><th>Proposed</th><th>Implemented</th></tr>
<tr><td>• To strengthen the Ministry of Environment and Water (MoEW) and 4 River Basin Directorates</td><td>Not implemented yet</td></tr>
<tr><td>• To review of the roles of management from considering unified river management.</td><td>Not implemented yet</td></tr>
<tr><td>• To arrange operational regulations for appropriate execution of the New Water Law
・ Water quality improvement and management
・ Water quantity improvement and management
・ Groundwater management
・ River management</td><td>
On going
On going
On going</td></tr>
<tr><td>• To conduct basic study
・ The study on River Management Plan for the basis for basis for prevention of flood damages and controlling sand and gravel extraction as well as improvement of environmental status of water bodies
・ The study on pressures and impacts from discharges or priority substances defined by the EU-WFD
・ The study on the need of additional hydro-technical facilities to be constructed as well as the restarting of construction of the suspended ones, as a part of the integrated water management in Bulgaria and to meet the challenge of global climate change.</td><td>
Not implemented yet

Not implemented yet

On going</td></tr>
<tr><td>• Enhancement of public awareness and establishment of coordination systems among stakeholders in the basins</td><td></td></tr>
<tr><td>• Maintenance and update the decision support and managing tools:
・ GIS data model (Core portion, WFD portion and local portion)
・ Integrated Water Management Models (MIKE 11 model, Simple Model)
・ Monitoring system</td><td>
On going

On going</td></tr>
</table></td><td>A, B</td></tr>
<tr><td>Contribution towards the strengthening of water resources management abilities</td><td>• Proposed and implemented projects in the Integrated Water Management M/P are as follows:
・ By preparation and introduction of the decision support and management tools (GIS data model, Integrated Water Management Models and Monitoring system) the management capacities of staff have been strengthened.</td><td>A, B</td></tr>
<tr><td>Development of basic information</td><td>• Proposed and implemented projects in the Integrated Water Management M/P are as follows:
• Development of GIS data model (Core portion, WFD portion) for the whole country
• Development of GIS data model (Local portion) for EABD and WABD
• Development of monitoring plan</td><td>A, B</td></tr>
<tr><td>Contribution towards the capacity development</td><td>• During the Integrated Water Management M/P staff of deputy minister level of related ministries is participated the steering committee.
• By continued activities of GIS working group, the proposed GIS data model has smoothly been introduced.</td><td>A, B</td></tr>
</table>

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Outline of National Water Resources M/P and its Contribution & Tasks
The Study on Integrated Water Management in the Republic of Bulgaria (2008) (3/3)

Item	Facts	Source
Contribution towards the environment and social consideration	• The Government of Bulgaria, aiming to join EU, conducted the arrangement of organization and laws to meet EU standards • Effect to the enhancement of participation of stakeholders for guidelines of environment and social consideration	A, B
Application of Japanese technology and knowledge	• The Integrated Water Management M/P was prepared based on EU-WFD, but consulted with River and Sabo Technical Standards (Japan) • Japanese Law and river management were introduced	A
Comparison with other donors	• Teams from Germany and Netherlands conducted technical assistances by EU Funds, but assistances based on the technical guidelines of EU-WFD.	A
Decentralization and the entry of private capital into water resources development and management project	• As for water resources management the country has promoted decentralization and privatization like Irrigation Systems Company (IS) and Water Supply and sewerage Companies (WSS). • Though the water resources management has not been outsourcing yet, the water supply and sewerage of Sofia, the capital city has already been privatized.	A
The manner of handling International rivers	• The rivers in the study area are international rivers, but no special consideration has been taken. • The countries in EU have been formulating nationwide river basin management plan based on the EU-WFD, they are to discuss with the neighboring countries, in case of conflicts.	A
Coping with IWRM	• The New Water Act was enacted in 2000, and revised in 2006 in order to introduce the concept of integrated water resources management.	A
Coping with measures against climate change	• Not prepared for adaptation measures against climate change	A
Request for JICA	• Bulgaria has already joined EU since 2007, and become an ineligible country for JICA assistances. • Due to the study scope it is necessary to consider the optimum study period and the input (experts and total M/M). In case of IWRM for a nationwide, it is necessary to grasp the conditions of a wide area and coordination with numerous government organization, and necessary study period and M/M will be necessary to attain the target. • Report should be prepared in English and in the official language of the aid receiving country in order to be utilized widely the results of the Study. • For implementation of the M/P, following up by technical assistance	A

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