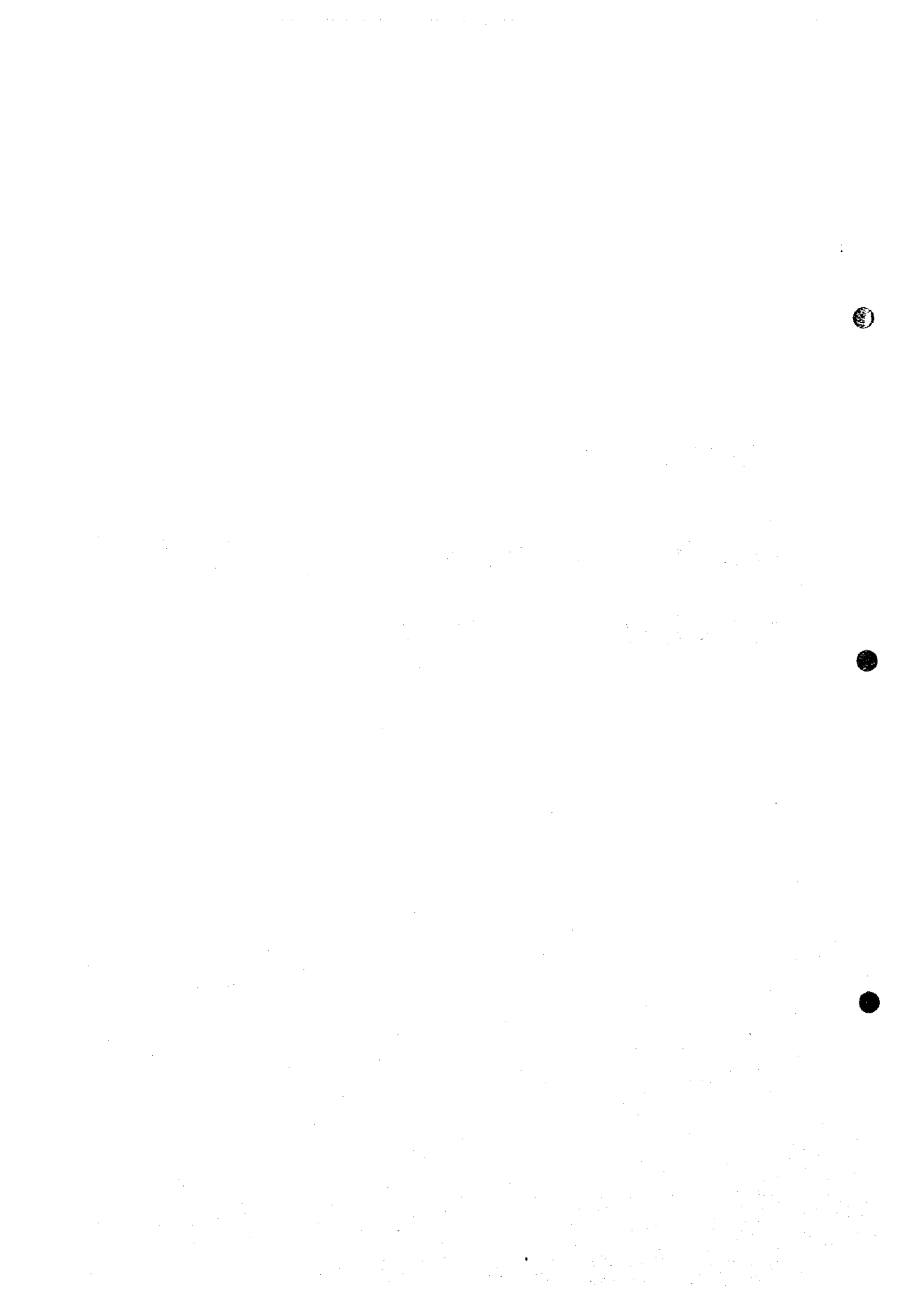


SECTOR XI

INSTITUTION ***AND***
ORGANIZATION



**SECTOR XI
INSTITUTION AND ORGANIZATION**

TABLE OF CONTENTS

1. GENERAL	
1.1 Confirmation of Objectives of the Study and Scope of Work ...	XI-1
1.2 Procedure of the Study	XI-1
2. STUDY ON PRESENT INSTITUTIONAL ARRANGEMENT	
2.1 Outline of Current Institutional Setup for River Management ..	XI-1
2.1.1 Law and Regulations	XI-1
2.1.2 Related Organizations	XI-2
2.2 Issues of Current Institution and Organization	XI-3
2.2.1 Issues and Conflicts of Present Institution and Organization	XI-3
2.2.2 Consideration on Present Status of Institution and Organization.....	XI-4
3. FURTHER STUDY ON INSTITUTIONAL SETUP	
3.1 Outline of the Study.....	XI-5
3.1.1 Possibility of the Realization of Measures within the Present Framework.....	XI-5
3.1.2 Major Contents of the Study	XI-5
3.2 River Basin Committee	XI-6
3.2.1 Examples in Other Countries	XI-6
3.2.2 Present Status for Setup of the River Basin Committee.....	XI-6
3.2.3 Function and Organization of River Basin Committee Stipulated in the Water Resources Act	XI-11
3.2.4 Recommendation of Functions to be Involved in River Basin Committee in Terms of Flood Mitigation	XI-12
3.2.5 Recommendation of Organization of River Basin Committee	XI-16
3.3 Institutional Arrangement for Land Use Control and Guidance.	XI-18
3.3.1 Necessary Items to be Covered by Land Use Control and Guidance	XI-18
3.3.2 Land Use Control and Guidance in Urban Area	XI-19
3.3.3 Land Use Control in Agricultural Area	XI-27
3.3.4 Evaluation of Current Institutional Setup.....	XI-30
3.3.5 Recommendation for Land Use Control.....	XI-32

- APPENDIX 1. STUDY ON INSTITUTIONAL SETUP IN FOREIGN COUNTRIES**
- APPENDIX 2. INTRODUCTION OF FLOOD FIGHTING IN OTHER COUNTRIES**
- APPENDIX 3. INTRODUCTION OF LAND USE CONTROL IN OTHER COUNTRIES**

LIST OF TABLES

Table 2.1.1	Major Laws and Regulations	XI-T-1
Table 2.1.2	Organizations for River Management in Thailand	XI-T-2
Table 2.1.3	Organizations for River Management in the Chao Phraya River Basin	XI-T-3
Table 3.1.1	Possibility of Realization of Measures	XI-T-4
Table 3.2.1	Outline of River Basin Management in Foreign Countries.....	XI-T-5
Table 3.2.2	River Basin Management Organization in Foreign Countries.....	XI-T-7
Table 3.2.3	Organization of Office of River Basin Committee.....	XI-T-8
Table 3.2.4	Necessary Facilities and Equipment	XI-T-9
Table 3.3.1	Comparison between Necessary Arrangement and Current Arrangement for Land Use Control and Guidance.....	XI-T-10

LIST OF FIGURES

Fig. 3.2.1	Work Plan for Water Resources Management	XI-F-1
Fig. 3.2.2	Organizational Chart of Water Resources Management Body	XI-F-2
Fig. 3.2.3	Proposed Organization Chart for River Basin Committee....	XI-F-3



1. GENERAL

1.1 Confirmation of Objectives of the Study and Scope of Work

Thailand has a long history in the management of rivers and water resources. Most of the necessary institutional arrangements have been established together with the setup of necessary organizations. Since topics on institution and organization involve so many subjects, discussion is hardly promoted to identify the issues covering such many subjects, and sometimes the discussion hardly comes to a conclusion. Therefore, it is considered that the topics should be narrowed down to those that will realize a comprehensive flood control plan, as follows:

- To identify any issue of the existing institution and organization, to successfully realize a comprehensive flood control plan consisting of structural and non-structural measures on the basis of current practice of operation and management for flood control.
- To clarify the necessity of supplemental institutional arrangement and organizational setup, to resolve the issues.

1.2 Procedure of the Study

The procedure to conduct the study on institution and organization, in principle, is considered as follows:

- Collection of Basin Data on Present Institutional Setup
- Analysis on Current Situation and Identification of Main Issues of Current Situation
- Study on Improvement of Issues
- Conclusion and Recommendation

2. STUDY ON PRESENT INSTITUTIONAL ARRANGEMENT

2.1 Outline of Current Institutional Setup for River Management

2.1.1 Law and Regulations

The major laws and regulations related to river management in Thailand are presented in Table 2.1.1. Among the major laws and regulations, the People Irrigation Act and the State Irrigation Act are especially for river water utilization.

Although water resources development programs such as irrigation, hydropower and domestic water supply projects are promoted independently by the respective agencies, there is no law for the regulation and coordination of proposed water resources development for multipurpose use, except a coordinating committee composed of members from the related agencies. Moreover, for flood control works, only the State Irrigation Act has some stipulations.

In such a situation, a water act was drafted in 1993 by the Law Section of the National Board of Research to clarify water rights and agencies for water resources

management. The draft was submitted to the cabinet in 1997, but has yet to be enacted pending agreement among the agencies concerned. In this draft bill, the following are stipulated:

- (1) *State Water Resources:* The state is entitled to develop public water resources by changing the size or enlarging the coverage area.
- (2) *Water Rights:* Any person who owns a plot of land whether or not adjacent to water resources shall have the right to draw the water at a reasonable quantity for private use.
- (3) *National Water Resources Board:* The National Water Resources Board shall be set up with authority and duties as follows:
 - (a) To propose to the Cabinet a policy pertaining to the conservation, development, utilization and other related activities of water resources;
 - (b) To suggest, review and coordinate water resources plans and projects with the government agencies and government enterprises;
 - (c) To follow up and evaluate any activity pertaining to water resources; and
 - (d) To guide, follow up and oversee the plans for flood protection and flood mitigation of the various river basin committees.
- (4) *River Basin Committee:* The National Water Resources Board shall designate the River Basin Committee as the body responsible for the work in each river basin taking into account the geographical conditions of the water resources, the water utilization and the appropriate limit of responsibility.

2.1.2 Related Organizations

On the national level, there exist seven (7) ministries and two (2) national institutes for river management, including RID and PWD. To coordinate their management work, the National Water Resources Board was established in 1989.

On the local government level, local offices of RID and PWD and provincial governments are engaged in river management. Table 2.1.2 shows the organizations concerned in river management, while Table 2.1.3 shows those for the Chao Phraya River Basin.

(1) Flood Control

The Royal Irrigation Department (RID) implements water flow control and drainage works for the agricultural areas in consideration of the effect to Bangkok and the provincial urban areas. Drainage works for the Bangkok metropolitan area are executed by the Department of Drainage and Sewage (DDS) of the Bangkok Metropolitan Administration (BMA).

For the provincial governments, the Public Works Department (PWD) provides consulting services and executes the construction of ring dike and pumping stations for drainage works, while the Department of Local Administration (DOLA) manages flood fighting. The Electricity Generating Authority of Thailand (EGAT) and the Meteorological Department (MD) execute flood forecasting in a part of the Chao Phraya River Basin.

2.2 Issues of Current Institution and Organization

2.2.1 Issues and Conflicts of Present Institution and Organization

(1) Structural Measures

As discussed in Sector VI Flood Mitigation, there are several existing and proposed structures aiming at the successful mitigation of flood in the Chao Phraya River Basin. In principle, there is no conflict on the designation of responsible agency to operate and manage these structures, as long as these structures are solely operated in accordance with their purpose. However, to maximize the flood control function of these structures, it is necessary to coordinate their operation and management among the agencies concerned.

In Thailand, there is no single agency or a coordination agency administering river and/or flood basin-widely, and thus such coordination is, in general, not undertaken. Under this circumstance, the following issues and conflicts were identified

(a) Conflict between Protection of Urban Area and Agricultural Land

In the flood plain of the Chao Phraya River, inundation is not avoidable in case of a large scale flood; therefore, each agency tries to minimize the inundation on the area they are concerned. However, the protection works sometimes bring an adverse influence in the form of increase of flood discharge and/or inundation volume in other areas. The conflict between urban area and agricultural land is severe and the existing organization can hardly coordinate this conflict.

(b) Conflict between Protection among Agricultural Areas

Even among the agricultural areas, there is a similar conflict due to the adverse influence of flood protection works. It is also hardly coordinated under the current institution.

(c) Conflict on Operation of Flow Control Structures among Agencies Concerned

In the Chao Phraya River Basin, there are several flow control structures with multiple purposes such as flood control, irrigation, hydropower generation and so on. Control of these structures involves several agencies and conflict is sometimes reported among such agencies.

(d) Conflict on Maintenance of Flood Control Structures

There are several agencies involved in maintaining the flood control structures and conflict is sometimes reported on the responsibility for maintenance works.

(e) Conflict between Flood Control and Water Utilization

It is also pointed out that there is a conflict between flood control and water utilization, when water flow control facilities are operated in flood season and in dry season. This is because operation for flood control requires the release of water stored to assure the flood control capacity, while operation for water utilization reduces the flood control capacity of facilities.

To cope with such conflicts mentioned above and to address the other issues concerned for the realization of comprehensive flood control, it seems to be necessary to set up a coordinating committee among the agencies concerned.

(2) Nonstructural Measures

As for the implementation of non-structural measures including flood plain and watershed management, the issues and conflicts of present institutions and organizations are identified in the following points:

- Regarding control of land use and groundwater extraction, there is a fundamental issue between preservation and development, and coordination of the issue is hardly promoted among the agencies concerned.
- Regarding flood disaster response, the major deficiency is related to budgetary allocation resulting from the prioritization of measures or areas to be protected.
- Regarding financial response, the difficulty of realization arises from equity and implementation problems.

To facilitate implementation of nonstructural measures, it seems to be essential to set up a committee for policy making and policy implementation as well as coordination of issues among the agencies concerned.

2.2.2 Consideration on Present Status of Institution and Organization

Needless to say, it sometimes takes a long time to set up a new organization together with the provision of a necessary law to designate the role of the organization. In the case of Thailand, steps toward setting up a new organization as well as provision of a law have been taken since 1989, and the process to establish the organization and law is still underway.

However, as noted from the contents of the proposed Water Resources Act, most of the present issues on the realization of comprehensive flood control seem to be solved through the establishment of the River Basin Committee. Thus, it is strongly

recommended that the currently ongoing work for the preparation of Act should be continued and the Act should be promulgated as early as possible.

3. FURTHER STUDY ON INSTITUTIONAL SETUP

3.1 Outline of the Study

3.1.1 Possibility of Realization of Measures within the Present Framework

In the Master Plan study, the following measures were proposed:

- **Non-structural Measures:** land use control and guidance, modification of reservoir operation rule, control of ground water suction, flood forecasting, flood fighting, disaster recovery, subsidy, flood insurance and watershed management.
- **Structural Measures:** Distribution system and drainage system improvement, river improvement and heightening of flood barrier at Bangkok or construction of diversion channel.

In general, most of these measures are currently being executed by agencies concerned, such as RID, BMA, PWD, DTCP and so on (refer to Table 3.1.1). Only the following measures are newly introduced: modification of operation rule, flood insurance and construction of diversion channel.

Judging from the current practices of the agencies concerned, the major issues for realization of these measures are emphasized as follows:

- It is necessary to strengthen or improve the present situation.
- Coordination among agencies concerned is necessary, especially for flood mitigation works undertaken independently by agencies concerned; RID for agricultural area, PWD for major urban areas and BMA for Bangkok.

Among these major issues, the former one will be somehow solved through strengthening the organization of agencies concerned. On the other hand, for the latter one, there is no existing organization except the National Water Resources Committee, which is too high level to cope with the issues on individual river basin.

In this connection, it is necessary to set up a river basin committee to coordinate these issues on flood mitigation.

3.1.2 Major Contents of the Study

In principle, the study on institution and organization is conducted covering the following objectives:

- To recommend the scope of works to be included in the function of River Basin Committee in term of flood mitigation in the Chao Phraya River and to recommend an appropriate composition of the committee.
- To recommend the institutional arrangement to realize the land use control and guidance in the Chao Phraya River Basin.

- To recommend the organization to implement the river improvement works proposed in the feasibility study.

3.2 River Basin Committee

3.2.1 Examples in Other Countries

To set up a new organization, it is desirable to refer the examples in the other countries. The organizations on river basin management in other countries such as Japan, China, USA, UK, etc are summarized in Table 3.2.1 and 3.2.2. Among these organizations, the following features are specified (Refer to Appendix 1):

- Since the historical background for administration as well as river management is different in these countries, the organization for water management is also different.
- However, for management of large-scale river basins, most of the countries such as China, USA and France have a committee for coordination or river management.
- In Europe, a international committee among Netherlands, Germany, France and Belgium is to be set up for discussion on issues on flood mitigation in the Rhine river basin.

3.2.2 Present Status of Setup of the River Basin Committee

As discussed above, the major issues for realization of a comprehensive flood mitigation plan are emphasized with no existence of sole agency handling the flood mitigation comprehensively and basin-wide. So far the government is making every effort to set up a suitable organization to handle the issues, as described below.

(1) Establishment of the National Water Resource Committee

At the Cabinet Meeting on February 7, 1989, the regulation concerning the National Water Resources Management was endorsed by the Cabinet and published in Government Gazette 106. After that, on June 17, 1996, the Royal Decree on the organization of the Office of the Secretariat of the Prime Minister was announced and later on published in the Government Gazette. Pursuant to the Royal Decree, the Prime Minister Office B.E.2539 enforcement stated that the Office of the National Water Resources Committee shall be an organization under the jurisdiction of the Office of the Secretariat of the Prime Minister, with definite power and duty as enumerated below:

- To carry out works on water resources management;
- To carry out secretarial works for the National Water Resources Committee; and
- To cooperate or support the activity of other agencies concerned or the works to be assigned.

(2) Preparation of Water Resources Act

In recognition of the current problems on water related situations such as shortage of water during dry season and flooding during rainy season, the preparation of a water resources act is ongoing. According to the latest version prepared by the Office of the National Water Resources Committee on 23 September 1997, the following statements are included in the draft of the Water Resources Act:

(a) Setup of the National Water Resources Committee

The National Water Resources Committee is to be set up and composed in the following manner:

The Prime Minister is the Chairman, and the following ministries and agencies are involved as members of the committee: Agriculture and Cooperatives, Interior, Science, Technology and Environment, Public Health, Industry, National Economic and Social Development Board, Office of the Juridical Council, Bureau of Budget, Harbor Department, Royal Irrigation Department, Mineral Resources Department, and others.

(b) Responsibilities and Functions of the National Water Resources Committee

The National Water Resources Committee shall have the following major responsibilities and functions:

- To propose to the Cabinet a policy pertaining to conservation, development, utilization and other activities related to water resources.
- To suggest, review and coordinate with the government agencies and government enterprises the water resources plans and projects so as to make them comply with the National Economic and Social Development Plan and the Environmental Management Plan as well as the Policy mentioned above for use as guideline for the preparation of fiscal budget proposals.
- To follow up and evaluate any activity pertaining to water resources.
- To advice, suggest and oversee the work of river basin committees.
- To resolve any undertaking in connection with the water resources activity of government agencies concerned.
- To provide guidance to the work of river basin committees and to provide a forum for hearing public opinion.
- To provide guidance to river basin committees regarding the prioritization of water utilization for various purposes and consideration of water distribution.

- To guide, follow up and oversee the plan for flood protection and flood relief of various river basin committees.
- To collect and provide data and information on state water resources.
- To undertake any activity stated in the Act or activities empowered by other laws.
- To undertake other duties assigned by the Cabinet or the Prime Minister.

(c) Designation of River Basin Committee

The National Water Resource Committee shall designate the River Basin Committee to perform its function in each specific river basin, taking into account the geographical conditions of water resources, water utilization and appropriate limit of responsibility.

(3) Consideration on Present Status of Institution and Organization

Needless to say, it sometimes takes a long time to set up a new organization together with the provision of a necessary law to designate the role of the organization. In the case of Thailand, steps toward setting up a new organization as well as provision of a law have been taken since 1989, and the process to establish the organization and law is still underway.

However, as noted from the contents of the proposed Water Resources Act, most of the present issues on the realization of comprehensive flood control seem to be solved through the establishment of the River Basin Committee. Thus, it is essential that the works for the preparation of Act should be continued and the Act should be promulgated as early as possible.

(4) Related Movement to Establish River Basin Committee

In parallel with the movement to enactment of the Water Resources Act, some related movement to establish the river basin committee is reported as shown below:

- (a) National Consultative Meeting on Policy Framework and Strategies for National Water Resources Development Beyond Year 2000**

The Office of the National Water Resources Committee, secretariat of National Water Resources Committee, organized the National consultative Meeting on "Policy Framework and Strategies for National Water Resources Development Beyond Year 2000" on January 1998, with support of the RID and Global Water Partnership and others.

In this meeting, the following contents were agreed:

(i) Institutional Framework

There are a number of agencies dealing independently with water resources management resulting in work duplications and lack of cooperation among themselves. The establishment of the Central Water Organization with full and precise authority is recommended.

(ii) Legal Principles

There is no principal and comprehensive law on water resources management. The existing laws are out of date and scattered over various agencies. The enactment of Water Resources Act is advised for immediate results.

(iii) Policy and Plan

There is no unity in policy setting by all agencies concerned. The existing plans do not systematically cover all development aspects and lack of participation from related parties at all levels. The formulation of Master Plan for a systematic water resources management on river basin basis is recommended. Moreover, there should be policies for proper financial charges on water use and the need for a pilot project to bring about a systematic water resources management in a river basin.

(iv) Data System

The existing information on water resources is scattered and not uniform in formats. Dissemination of information is also limited. We also lack analytical approaches to assess data for decision making process. It is advisable to set up the uniform measures and analytical methods to assess data and establish a data network system for possible exchanging and disseminating of information through the Central Water Organization.

(b) Movement for Formulation of the Master Plan on Integrated Water Resources Management

The Office of National Water Resources Committee has also taken an action for formulation of the Master Plan on "Integrated Water Resources Management" in the following Manner:

(i) Objective

The objective is to formulate the master plan that determines strategy and approach for the integrated management of water resources and other related resources. It will be the plan that practically blends such resources together into a coherent system in each river basin. The aspects to be considered are as follows:

- Water development,

- Water allocation and utilization,
- Water conservation,
- Flood mitigation, and
- Polluted water treatment.

The master plan will be a guideline to manage water resources and other resources which states exact activities in exact river basins/ sub-basins. This approach will respond to present and future water demand in accordance with existing potentiality and in the most effective manner.

(ii) Scope of Work

For the formulation of the master plan, the scope of works includes the following items:

- Study and collecting data of water resources potential, water demand and allocation, nature of problem and methods derived for solving it in each river basin and so on.
- Analyzing of data in order to derive information of overall picture in present and future situation of water resources and other related resources; and
- Studying and analyzing of the information in order to derive plan and project for each river basin.

(iii) Details of Plan

Among the scope of works, the details of plan for master plan on flood mitigation are as follows:

To formulate a master plan on flood mitigation in flood-prone area where flood causes loss to life/property of the people and to the economy, one can derive it by studying and analyzing of related data. After a study of geography, rainfalls, run-off in each basin and data of previous flood, analyzing for approaches which are appropriate to different areas will be formulated. It will be generated into short-term and long-term plans and considered the priority of each area.

(iv) Work Plan

The work plan for formulation of the master plan covers 25 river basins and the study period is scheduled for 7 years from 2000 to 2006. As for the Chao Phraya River basin, the whole basin is divided into 6 basins, Pasak, Ping, Wang, Yom, Nan and Chao Phraya river basins and expected to finish by year 2004.

The work plan is shown in Fig. 3.2.1.

(c) Project of Study on Establishment of Chao Phraya Basin Organization

Recognizing the significance of prompt enactment of the Water Resources Act, Office of National Water Resource Committee (ONWRC) put the a high priority for the works and the establishment of river basin organization or river basin committee is one of the contents. In this context, ONWRC is planning to conduct the study on establishment of Chao Phraya Basin Organization to examine the most effective way in operating the organization within the system of river basin management.

The project of "Study on Establishment of Chao Phraya Basin Organization" has been submitted to World Bank with the support of Ausaid. At present ONWRC and NESDB initiate related activities in two pilot area: Ping River Basin and Pasak River Basin.

As the next step, it is expected that ONWRC will set up of river basin committee for these two rivers: Ping River Basin Committee and Pasak River Basin Committee.

These two committees will carry their work as stated in the draft Water Resources Act and ONWRC will work as their secretary. Training program will be set up for these river basin committees. If their performance are acceptable, they will automatically turn into river basin commissions and perform their duties according to the law, when the draft Water Resources Act is enacted.

3.2.3 Function and Organization of River Basin Committee Stipulated in the Water Resources Act

In the draft Water Resources Act, the following statements are made regarding the designation of function and organization of River Basin Committee:

(1) Nomination of River Basin Committee

The National Water Resources Committee shall appoint the River Basin Committee to perform its function in each specific river basin, taking into account the geographical conditions of the water resources, the water utilization and the appropriate limit of the responsibility.

(2) Responsibilities and Duties of the River Basin Committee

In principle, the responsibilities and duties of the River Basin Committee follow those of the National Water Resources Committee. Among those, the following responsibilities are specified:

- To submit to the National Water Resources Committee the policy on conservation, development, utilization and other undertaking related to the state water resources.

- To advise the agencies concerned means to solve the problem related to the state water resources.
- To Prepare plans for flood protection and for flood relief operation.
- To undertake any activities assigned by the National Water Resources Committee.

3.2.4 Recommendation of Functions to be Involved in River Basin Committee in Terms of Flood Mitigation

Considering the responsibilities and duties of the River Basin Committee, functions to be involved in the River Basin Committee in terms of flood mitigation are emphasized in the following points:

(1) Setup Strategy for Integrated Flood Mitigation

To successfully achieve the target of integrated flood mitigation in accordance with the national development policy, it is necessary to set up the strategy with short-term and long-term integrated flood mitigation considering the potentiality of development of the basin.

For that purpose, the river basin committee should have function of formulation of a master plan for comprehensive and basin-wide flood mitigation in a manner of short term and long term and also execution of feasibility study. Such master plan and contents of feasibility study are composed of structural and non-structural measures.

In the Chao Phraya River Basin, the Master Plan consisting of several project components including implementation program is formulated in this study and feasibility study for the some project components is conducted. In this connection, the River Basin Committee for the Chao Phraya River Basin, when it is established, the Master Plan, if necessary, be reviewed and renewed from time to time considering the basin development conditions and the feasibility study for the remained project components would be undertaken.

(2) Nomination and Coordination of Agencies Concerned for Implementation of Flood Mitigation Projects

In accordance with the Master Plan formulated, the flood mitigation projects are to be implemented. The River Basin Committee should have a function to nominate the implementation agency/agencies for the projects and to coordinate, follow up and evaluate the implementation of the projects.

As for the flood mitigation projects currently implemented by agencies concerned for their own responsibility, the River Basin Committee should coordinate among agencies concerned, since these projects are sometimes provided without any coordination among agencies concerned. Besides, the basin development plans such as road project and large scale housing projects, which may affect the flood condition in the basin, should be coordinated by the committee.

(3) Flood Disaster Management

Flood disaster management is currently undertaken by each agency individually for its own purpose. For achievement of more efficient flood disaster management basin-widely, it is desirable to integrate the flood disaster management function into one suitable organization (refer to Appendix 2). Thus, the River Basin Committee should function as the flood disaster management center in the following flooding stages:

(a) Pre-flood Management and Preparedness

Before flood season comes, the Committee should take the following action as the works on pre-flood management and preparedness.

- To study and review the progress of flood protection works through the collection of information and site inspection and identify the necessary emergency measures when flood comes.
- To check the operational readiness against the potential magnitude of flood.
- To prepare measures and implementation plans (action plans) to cope with potential flood.
- To conduct the simulation of flood mitigation works such as flood fighting and evacuation.
- To promote public awareness to deepen the understanding for flood damage conditions and to receive the cooperation from inhabitants.

(b) Flood Management during Flood Time

To minimize the flood damage at the time when flood disaster is expected and comes out, the River Basin Committee should play the following role:

- Execution of flood forecasting through the operation of flood forecasting system.
- Dissemination of flood information to agencies concerned and its publication to people including those affected.
- Also issue of warning and taking necessary actions for evacuation of people expected to be affected to flood shelters.
- Instruction of flow control through the operation of flow control structures such as dam and barrage as well as mobilization of drainage facilities.
- Implementation or instruction of flood fighting to the agencies concerned in the areas, where serious flood damage is expected.
- Execution of emergency relief activities including distribution of food, fuel and other daily necessities to the affected people.

(c) Flood Management, Post-Disaster Action

To restore communities suffering from the severe flood damage to the normal condition as early as possible and to prepare the expected next flood, the River Basin Committee should play the following functions:

- Survey of damage by flood and to implement or instruct flood restoration works including restoration of damaged structures such as dike and flow control gates.
- To provide relief activities to the people affected by the flood in a manner of emergency supply of food, cloths and medicines.
- To compile the flood damage report including flood damage conditions, cause of flood and relief activities.

(4) Other Functions to Enhance the Flood Mitigation Capability

(a) Flood Information Center

In general, the existing information relating to flood control is scattered and not uniform in formats, and the dissemination of information is limited. To effectively promote the function of flood mitigation, it is essential to systematically collect the basin wide information relating to flood and establish data network system. Thus, the River Basin Committee should play a role as a flood information center.

In this connection, the flood forecasting system should be established in the River Basin Committee.

(b) Training

To enhance the capability of flood mitigation works, it is essential to provide the training program for experts engaged in the work and public affected by flood. Although such training program may involve several subjects, the measure ones will be emphasized in the following points:

(i) Flood Management Training

The training is undertaken in order to equip the experts for flood management tasks and to orient them to various aspects of flood disaster management.

(ii) Skills Training

The training is undertaken to enhance the technological skills for planning, implementation and operation and management for flood damage mitigation and flood disaster management.

(iii) Co-ordination Training

The training is undertaken to enhance the capability of co-ordination among agencies concerned to promote smooth coordination.

(iv) Public Education

In parallel with the training for the experts engaged in the tasks, it is also necessary to enhance the public capability to cope with the flood problems. In this connection, training programs of flood mitigation should be provided to the public such as local communities and schools.

(c) Public Awareness

(i) Necessity of Public Awareness

Needless to say, public awareness on flood risks are essential for the agencies concerned to smoothly promote the flood mitigation works and to receive the support from the public for implementation of flood mitigation works in the following aspects:

- A good public knowledge and understanding of flood and vulnerabilities.
- Public awareness of the kind of mitigation measures which can be applied.
- Public participation in community preparedness program.

(ii) Expected Effectiveness

Through the public awareness for these matters, public, especially local communities vulnerable to flood will positively participate flood mitigation works as described below:

- Knowing what the government has planned to do cope with the flood problems, the local community also has a broad understanding of the scope and limitations of government responsibility. This results in involvement of public to the flood mitigation works.
- The public and local community involvement in cooperation with the government facilitates to overcome the flood problems and ensure a rapid return to normal condition.
- The local community is able to implement certain measures of self-preparedness and post-impact relief when needed.

(iii) Basic Measures for Public Awareness

As the basic measures for public awareness, the followings are conceived:

- Periodical advertisement in a manner of publication of activities undertaken by the committee through issue of pamphlets and reports
- Distribution of education materials to local community and schools
- Holding seminar and workshops to local communities and agencies concerned
- others

To promote the public awareness in emergency cases, the following items should be clarified:

- The information which needs to be communicated to the public.
- The format in which the information is to be communicated.
- The medium (or channel) which is to be used to convey the information to the public.

(d) Research

To enhance the capability for flood mitigation works, it is necessary to pursue the research works for mainly such items as meteorology and climatology, analysis of flood characteristics, identification of flood vulnerable areas and methodology to cope with the flood and so on.

3.2.5 Recommendation of Organization of River Basin Committee

In principle, the organization for flood mitigation will be set up as a sub-committee in the River Basin Committee as shown Fig. 3.2.2.

In the case of Chao Phraya River Basin, the following agencies should be included as members of the sub-committee:

- Office of National Water Resource Committee
- Royal Irrigation Department
- Bangkok Metropolitan Administration
- Public Works Department
- Harbor Department
- National Economics and Social Development Board
- Office of Environmental Policy and Planning
- Electricity Generating Authority of Thailand
- Department of Town and Country Planning
- Representative of Local Government Officials
- Representative of Local Organization

- Representative of Non-Governmental Organization
- Others

Most of the functions discussed in Subsection 4.2.4 will be handled in the sub-committee for the decision making. However, to support and substantially pursue the functions, it is necessary to set up the Office of the River Basin Committee as well as the Office of National Water Resources Committee.

The organization of the Office of the River Basin Committee will be composed of divisions similar to the Office of National Water Resources Committee, as follows:

- Policy and Planning Division
- Coordination, Operation Division and Flood Disaster Management Division
- Flood Information Division
- Training, Research and Public Awareness Division
- Legal and General Administration Division

The main functions of the above divisions, except the Legal and General Administration Division, are briefly described as follows:

(1) Policy and Planning Division

In this division, basic materials regarding setting up strategy for integrated flood mitigation are examined and prepared in order to provide for the committee meeting. The basic materials include an updated master plan for flood mitigation and feasibility study results including implementation plan and also the development plans as well as flood mitigation plans prepared by agencies concerned.

(2) Coordination and Operation Division

In this division, basic materials regarding the nomination and coordination among agencies concerned for implementation of flood mitigation projects are prepared. The materials include reports of progress on implementation of flood mitigation projects, any conflicts raised from the implementation of projects and necessary arrangements to harmonize them with the master plan.

Also the materials for disaster management are arranged and analyzed.

(3) Flood Information Division

In this division, all relevant data and information on flood disaster are collected, analyzed and filed in the database. Flood forecasting is also handled in this division. Therefore, communication system to collect the meteorological data basin-widely through agencies concerned and data management system as well as data dissemination system have to be set up in this division. The necessary data to take actions for flood disaster management and information are arranged and provided to the committee meeting.

(4) Training, Research and Public Awareness Division

In this division, training and research to enhance the agency capability for flood mitigation is undertaken and also activities to promote the public participation are enforced.

The organization chart of the office of the river basin committee is shown in Fig. 3.2.3. To establish the organization, number of the necessary staff and items of required equipment are as shown in Table 3.2.3 and 3.2.4.

3.3 Institutional Arrangement for Land Use Control and Guidance

From the aspect of flood damage mitigation, the necessity of land use control and guidance is emphasized in the following points:

- To minimize the increase of flood damage potential due to land development for urbanization in habitual inundation areas.
- To preserve the present retarding function in the area, where the land development is expected.

To cover the scope of works, first, it is significant to confirm the necessity of the land use control and guidance from the technical point of view, including confirmation of flood prone area, evaluation of flood risk in the area, zoning of the area by magnitude of flood risk, etc. Then the necessary institutional arrangement should be examined.

As for the confirmation of necessity of the land use control and guidance from the technical point of view, discussion is made in Section 3, Study on Land Use Control and Guidance. In this section, the institutional arrangement for land use control and guidance is examined in the following procedure:

- Consideration of necessary items to be covered by land use control and guidance
- Confirmation of present arrangement on land use control and guidance
- Identification of issues for current institutional arrangement through the comparison between the above two items; necessary items to be covered and present arrangement situation.
- Recommendation of manner of land use control and guidance

The land use is broadly categorized into urban, agricultural and forests areas. Among these, discussion is made putting emphasize on land use control of urban and agricultural areas, which are much concerned with flood mitigation. While the forest area tends to be reserved by the governmental efforts of strict control for deforestation after the Cabinet Resolution of December 3, 1985, which aims to keep 40% as the forest area through reforestation.

3.3.1 Necessary Items to be Covered by Land Use Control and Guidance

As mentioned earlier, the necessary items to be covered by institutional arrangement for land use control and guidance are examined from the following aspects:

(1) To minimize the Increase of Flood Damage Potential due to Land Development

When the land development is undertaken in the flood prone area, it is expected that flood damage potential after land development in such flood prone area will naturally increase unless some measures are provided. To minimize such increase of flood damage potential, the following points should be considered in institutional arrangement:

- To publicize areas which are vulnerable to flood damage
- To guide land use so as to be endurable to flood damage
- To control or discourage land use in the area vulnerable to flood damage
- To guide provision of measures to minimize increase of flood damage potential

(2) To preserve Present Retarding Function

As another factor, which needs land use control and guidance, preservation of present retarding function is conceived. To consider the factor, the following arrangement is necessary:

- To publicize areas to preserve retarding function
- To discourage land use development in such areas
- To control the activities which may drastically change the flooding condition such as filling of land and embankment
- To guide provision of measures to preserve retarding function, when the areas are developed

(3) Authorization of Agencies Responsible

To assure the effectiveness to control and guide the land use in these factors, it is necessary to designate the agencies responsible together with the authorization of role through institutional arrangement. Also, measures for penalty and encouragement need to be provided.

3.3.2 Land Use Control and Guidance in Urban Area

Considering the necessary factors included in the institutional arrangement, the current institutional arrangements are discussed hereafter.

At present, there are several laws enacted for land use control for urban areas. Based on such legal arrangement, agencies concerned take actions for land use control as discussed below:

(1) Legal Arrangement

Among several laws enacted for land use control for urban areas, the following laws, which seem to be concerned in this study, are specified:

(a) The Town and Country Planning Act (1992)

The Town and Country Planning Act (Rev.3), which was enacted in 1992 replacing the Town Planning Act in 1982, was promulgated to promote the effective and ordinal land use in accordance with the future expansion of local communities in the context of national economic and social development plan.

The Act is featured with provision of two component plans: General Plan and Specific Plan.

(i) General Plan

The General Plan is a plan, policy and control measures used as guideline for developing, and maintaining a town and related areas or the country in respect of property use, communication and transportation, infrastructure, public service and environment in order to achieve the objective of town planning.

As the output of the General Plan, the following plans are provided:

- Plan prescribing classified land use
- Plan of open space
- Plan of communication and transportation network
- Plan of public utility
- Implementing measures

Practically, the General Plan is formulated and enacted in the following procedure:

1. According to the stipulation of Article 18 in the Act, the local administration such as the Department of Town and Country Planning Department (DTCP) or Bangkok Metropolitan Administration initiates the preparation and making of the Plan.
2. Every Plan is sent to Board of DTCT (BOTCP) for approval.
3. In case the Plan is completed by the local administration, it would be submitted to DTCP for review. If there are conflicting opinions between the local administration and DTCP, such opinions and the Plan would be submitted to BOTCP for consideration.
4. On the other hand, if the Plan is provided by DTCP, the local administration concerned would have to be notified and given an opportunity to express its opinion according to the stipulation of article 19.
5. According to the article 19, at least one public hearing is required in preparing and making the Plan undertaken by the

local administration or DTCP. Also, the representative from the community may be invited to attend the meeting of DTCP if necessary.

6. After approval of the Plan, the local administration or DTCP has to exhibit the map showing the Plan for the duration at least 90 days and invite people to examine the plans and prescriptions.
7. Within such a time, any interested person may send a written request of modifying and revoking some prescriptions concerning land use to agencies concerned, DTCP or the local administration. The request accompanied by the comments of such an authority would be submitted to BOTCP. In case BOTCP agreed with the request, DTCP and/or local administration will have to take actions accordingly (Article 24).
8. After the procedure, DTCP would submit the Plan and relevant documents to the Minister of Interior and Judicial Council for considering the issuance of ministerial regulation enforcing the Plan which would be valid for five years as stipulated in Article 26.

Finally, once the plan is enforced through the issue by the ministerial regulation, no one shall use the land in such a manner as to conflict with its prescriptions according to Section 27 in the Act. A person violating the Plan would be punished with imprisonment of not more than six months or fine of not more than 10,000 baht, or both according to article 83.

Thus, land use can be controlled under the Town and Country Planning Act.

(ii) Specific Plan

The Specific Plan is a plan and project for developing or maintaining a specific area or related activity in a local community. As noted the name of the Plan compared with the General Plan, it shows the more specific and detailed contents as shown below:

- Plan showing the prescriptions of land use classified into types of activities with delineation of land into types and zones,
- Plan of communication and transportation projects showing the direction and size of public ways,
- Plan showing the details of public utilities,
- Plan showing the open space,
- Plan showing the prescription of land level,

- Plan showing the locations of places or objects having an artistic, architectural, historical or archaeological value which should be repaired and preserved, and
- Plan showing an area having valuable natural resources and beautiful landscape including tree or a group of trees which should be preserved.

The procedure to enactment of the plan is similar to that of the General Plan in principle.

Once the act enforcing the Specific Plan comes into effect in any particular area, no one therein shall use land, modify or alter immovable property differently from what is prescribed by the act or its ministerial regulations.

A person violating the Plan would be punished with imprisonment of not more than six months or fine of not more than 10,000 baht, or both according to article 83.

In comparison with the General Plan, the Specific Plan would be more effective for land use control and guidance, since the Specific Plan includes more details of prescriptions. On the other hand, the preparation and announcement of Comprehensive Plan would face little opposition forces from affected landowners because the residents in the area would be governed with fewer prescriptions. As a result, there is still no Specific Plan for the urban centers including Bangkok. Only two areas, parts of Rayong and Chon Buri are provided the Specific Plans.

To formulate the General Plan or Specific Plan, a royal decree, which specifies the objective, planning officer, the objective area and duration of the decree, can be issued to delineate the area to be surveyed.

(b) The Building Control Act (1979)

As identified from the name of the act, the Building Control Act is also concerned with land use control in urban centers, and thus it may be effective for flood mitigation in urban areas. When the construction of houses are planned in a habitual inundation area, it may be used to control and guide for construction of houses minimizing the flood damage due to inundation.

The Act is primarily intended to control the construction, alternation, removal, demolition and use of buildings, which could affect, to a certain extent, types of land use and the density of population.

In the Act, it is authorized that the Minister of Interior with the instruction of the Building Control Committee issues ministerial regulations concerning a number of matters related to buildings for the purposes of security, strength, safety, fire prevention, sanitation, environmental quality protection, town planning, architecture, traffic

facilitation and other matters necessary for compliance with the Act (article 5).

Among the number of matters, the following stipulation in article 8 is mainly related to flood mitigation:

- Installation of facilities for such as lighting, drainage and garbage.
- Delineation of the area, where the activities such as construction, demolition and renovation, removal and utilization of certain types of buildings are prohibited.

Although the stipulation is not specified for the types of buildings which are vulnerable to flood inundation, it may be used for such a purpose.

So far a large number of ministerial regulations have been issued under the Act, but the one that may affect land use including flood protection and drainage systems is the ministerial regulation No. 33 in 1992. The regulation No.33 is mainly concerned with High Rise and Specially Large Buildings. A High Rise means a building with the height of at least 23 meters and a Specially Large Building is a building with the total area of at least 10,000 m². In the Regulation No. 33, the following stipulations are related to land use control for flood mitigation:

(i) Article 5 and Article 6

In the Article 5, it is stipulated that the total floor area per land area ratio of the building in this regulation must not be more than 10:1. At the same time, the building must have an open space on its land as required by Article 6 according to the following proportions:

- The open space of dwelling building must amount to at least 30% of its land.
- The open space of commercial, public and factory buildings as well as non-residential ones must account at least 10% of its land. However, if that building is also used for dwelling, the 30% ratio would have to be applied.

(ii) Article 31

When wastewater treatment and drainage system are considered, their operation could affect water quality and the effectiveness of flood protection and drainage systems of urban centers. Article 31 states that rain water may be drained from the High Rise and Specially Large Building to unwanted-water receiving areas, which include public sewers, ditches, canals, rivers, sea and public water sources as long as the drainage does not cause harm to health, life, body and property, or adverse effect upon the protection of environmental quality.

This provision is supposed to prevent damage caused by drainage, especially in large volumes, but in practice it is quite difficult to determine which drainage causes or would cause damage if the quantity of drained water is relatively small when compared with the water in canals, rivers or sea. It should however be noted that the aggregation of water legally drained from a large number of buildings could cause severe damage. The content of Article 31 may need revision if the effectiveness of flood protection and drainage systems are to be improved.

(iii) Article 35

In case the unwanted-water receiving area is not capable of accepting unwanted water discharged from the High Rise or Specially Large Building at its peak hour, Article 35 requires the provision of storage area for keeping the surplus water before being released into the unwanted-water receiving area.

The concept of providing a storage area for water in the previous paragraph in fact could be adjusted and then used to enhance the capacity of flood protection and drainage system since more water could be stored and regulated.

(c) The Revolutionary Council's Announcement No. 286 in 1979

The Revolutionary Council's Announcement No. 286 was issued on 24 November 1972 to create the Land Allocation Control Committee, which has the following functions and powers:

- Prescribe rules for land allocation,
- Issue and transfer land allocation permits,
- Monitor compliance with land allocation permits,
- Call land allocators or relevant persons to testify or present relevant documents to the Committee.

In the Announcement, the Article 9 states that the power of the Committee in prescribing the rules for land allocation, the Committee shall set up criteria for preparing the plan of project and methods of land allocation for the purpose of sanitation, transportation, safety and town planning. The Committee would also have to prescribe conditions concerning a drainage system and public utilities and services.

In practice of the announcement, the Committee issued Prescriptions Concerning Land Allocation in 1992, which addresses the issues of plan and project preparation, land allocation method, size of land plot, roads and footpaths, drainage, wastewater treatment and so on. In this connection, provision concerning the drainage and wastewater treatment systems will be discussed, since they may have some impacts upon the flood protection and drainage systems in urban centers.

(i) Article 31

In Article 31 of the Prescriptions, it is stipulated that wastewater from dwelling buildings, stores and workplace, and rainwater from the land allocation project would have to be drained out through sewers or ditches properly constructed and able to drain all water to prevent flooding or impoundment of water in the project except in a wastewater treatment area or a place designated for that purpose.

(ii) Article 32

Article 32 states that the drainage system would have to be able to handle the specified amount of rainwater and wastewater from the project.

(iii) Article 34

Article 34 states that the smallest sewer allowable must have at least 40 cm diameter unless a rainwater drainage system is separated from that of wastewater. In this case, the Prescriptions fail to specify the size of sewer allowable. The size of sewer in practice sometime causes problems, if it is small and unable to drain all water in a proper time which is the cause of flooding.

Thus, the Land Allocation Control Committee could play a significant role in assisting urban centers in improving the flood mitigation and drainage systems.

(d) The Industrial Estate Authority of Thailand Act in 1979

The Industrial Estate Authority of Thailand Act, 1979 is intended to promote industry in Thailand through the designation of a certain area as an "Industrial Estate" within which all necessary infrastructure and public utilities are provided or constructed by the Industrial Estate Authority of Thailand (IEAT). It should be noted that the Act does not state clearly what the details of such infrastructure and public utilities are. It therefore means that this matter is subject to the discretion of IEAT. If the local government would have to deal with problems caused by the discharge from industrial estates, a contact should be made to IEAT responsible for the operation of factory within its jurisdiction.

(e) The Enhancement and Conservation of National Environmental Quality Act in 1992

The Enhancement and Conservation of National Environmental Quality Act in 1992 is referred to for controlling land use in a sensitive area.

(i) Article 43

Article 43 of the Act states that the Minister of Science, Technology and Environment with the instruction of the National

Environment Board may issue a ministerial regulation designating an area possessing the following characteristics as an "environmentally protected area". It may be headwaters, or have a distinguishing or fragile ecology, or have a natural or artistic value, and this area has never been designated as a conservation area.

(ii) Article 44

Article 44 states that the ministerial regulation may issue the following prescription:

- Land use prescriptions for the conservation of nature or prevention of adverse impact upon an ecological system or artistic environment,
- Prohibition of activity harmful to or likely to alter the ecosystem or adversely affecting the value of an artistic environment,
- Specification of types and sizes of project or activity having the environmental impact with assessment report, which would have to be prepared before its construction or operation begins in that area,
- Determination of method for managing the area including the determination of scope, duty and responsibility of relevant government agencies for the purpose of cooperation and coordination in increasing their performance and protecting the ecosystem and value of artistic environment,
- Prescription of other protective measures as necessary and suitable for that area.

(iii) Article 45

Article 45 stipulates that in case of designating a particular locality as a conservation, comprehensive town planning, specific town planning, building control, industrial estate or pollution control area, if it faces a critical environmental problem which urgently needs remedy and could not be effectively handles by the relevant government agencies, the Minister of Science, Technology and Environment with appropriate of NEB would be able to issue the protective measures to regulate land use and some activities in order to assist the proposed flood protection and drainage project.

Although these articles are not directly concerned with the flood damage protection, preservation of environmental sensitive areas such as swampy areas, lakes and ponds are essential to preserve the natural retarding functions for flood. Thus these articles can be adopted to preservation of natural retarding effect.

(2) Activities taken by Agencies Concerned

Based on the legal arrangement, the agencies concerned have been taking the following actions:

(a) Department of Town and Country Planning (DTCP)

The department has been providing the city plans to the major urban centers covering the whole country. In the Chao Phraya River Basin, most of major urban centers have been provided such as Bangkok Metropolitan Area, Chainat, Nakon Sawan, Ayuthaya, and so on.

These city plans are now examined by the local administration and some of them are notified and given an opportunity to hear the public opinion for finalizing the plan.

(b) Bangkok Metropolitan Administration

Receiving the city plan provided by the DTCP, BMA has drawn up the modified city plan and the plan is now being exhibited to hear the public opinion.

(c) The Other Local Administrations

Local administrations such as Nakon Sawan, Chainat and Ayuthaya are also taking the same action as BMA.

3.3.3 Land Use Control in Agricultural Area

Compared with the land use control in urban areas, institutional arrangement of land use control in Agriculture area is not optimistic; there exists no law to substantially control land use control in agricultural area, but some laws related to land use in agricultural area. The present situations for the land use control in agricultural area are summarized as follows:

(1) Laws related to Land Use

Among the laws related to the agricultural sector, only the following laws are concerned with the land use, but not for land use control: Land Apportion for Agricultural Act (2517) and Agricultural Land Reform Act (2518).

The former stipulates mainly concerning the land holding rights and the latter was provided for improvement of rights and holdings in agricultural land, as well as provision of dwelling places on such agricultural land and thus, these laws are not concerned with the land use control.

According to the information from Land Development Department (LDD) responsible for land use in agricultural areas, at present, there is no law to control the land use plan in agricultural areas. The LDD is now participating the revision works of the Land Development act to utilize the land use control for agricultural areas. The current Land Development which was enacted for the land development but not for land control, stipulates the following:

- Establishment of Bord of Land Development with the powers and duties (Article 4 and 5)
- Duty to survey and analyse the soil or land for utilization, classification, development, etc, which is under taken by the Land Development Departmen. (Article 20)
- Arrangement of survey of land and publication of the area to be surveyed (Article 11)
- Punishment for obstruction to the competent official in the performance of his duty for survey of land (Article 16)

For the time being, Article 9 of the Enhancement and Conservation of National Environmental Quality Act. B.E. 2535 is used by LDD to support its land use plan, though the article 9 is not specified the land use control but in general, as described below.

“In case there is an emergency or public danger arising from natural disaster or pollution caused by contamination and spread of pollutants which will, if left without any remedial actions, seriously endanger the safety of life, body or health of the people, or aggravatedly cause damage to the properties of the people or the State, the Prime Minister shall have the power to order, as deemed appropriated, government agencies, state enterprises or any persons, including the persons who are or may be the victims of such danger or damage, to take prompt action, individually or jointly, in order to be able to control, extinguish or mitigate the adverse effects of such danger of damage.

In case any polluters are known and can be identified, the Prime Minister shall be empowered to enjoin such persons from any acts which may aggravate the adverse effects of pollution during the occurrence of such endangering incident.

The Prime Minister may delegate the power to give orders pursuant to the first paragraph to the Changwat Governor to exercise such power and act on his behalf within the territorial jurisdiction to that Changwat. The said delegation of power shall be made by a written order and published in the Government Gazette.

When any order is given by the Prime Minister by virtue of the first paragraph, or by the Changwat Governor acting on behalf of the Prime Minister by virtue of the first paragraph, such order shall be published in the Government Gazette without delay.”

(2) Activities taken by Agencies Concerned

LDD, which is as the agencies responsible to the land use in agricultural areas, has been taking the following activities:

(a) Preparation of Land Use Plan

During period between 1993 to 1995, the LDD has prepared land use plans for agricultural areas for Chainat, Angthong, Singburi, Ayuthaya, Pathumthani and Lopburi provinces presented in form of document and the map at a scale of 1/100,000. Although these land use plans are not obligatory, the provincial governments use the plan as the guideline to formulate their development plan. The activities by LDD is now covering all the Central Regions.

In this connection, the cooperation between LDD and DTCP was started this year in form of technical data and information exchanges. There is a memorandum of understanding (MOU) between the two agencies to avoid duplication of works. The cooperation was started at Nakornsawan and being continued at Pak Phanang of Nakhon Si Thammarat Province.

(b) King's Project for Land Use

As the up-dated and comprehensive land use plan, the project in Pak Phanang of Nakhon Si Thammarat Province as H.M. the King's Project is ongoing and will finish the study within this year and implementation works is scheduled to complete by 2001. The project is aiming at flood control and irrigation. The improvement of the acid sulfate soil areas will be carried out up to the 9th National Development Plan. Concentration will focus especially in the areas used to be the Tiger Prawn Farms before. The project is scheduled to completion in 2003. The seminar on this study will be held on November, 1998.

(c) Joint Study with Australian National University (ANU)

As for the study on land use planning, "Integrated Water Resources Assessment and Management for Sustainable Development" will be initiated by LDD in cooperation with ANU, RID and the Kasetsart University in this year in the Ping River Basin as the pilot study.

The outcome is a Decision Support System(DSS). The study is funded by the Center for Resources and Environmental Study of Australia and the Thai Government, and is scheduled for three years for the study.

(d) Revision Works of Land Development Act

The present Land Development Act is being revised by the Sub-committee of the Administration of the House of Representatives. LDD, as a member of that sub-committee, participates for the revision works and made the following recommendation as the necessity of protection of agricultural area to the Sub-committee as shown below.

- Land suitable for agricultural activities in the country is quite limited. Without measure to protect such area, there might be some food deficit in the future for consumption in the Kingdom of Thailand.

- Labour for agricultural sector amounted to 58% of the total workforce of the country. Other sectors such as industrial and services are not capable to absorb the workforces from the agricultural sector. Also the major incomes of the country derives from agricultural sector.

The revised act after promulgation will include the land use control and penalty on any violation.

3.3.4 Evaluation of Current Institutional Setup

(1) Evaluation of the Land Use Control in Urban Areas

As discussed in sub-section 2.2.1, the institutional arrangement for land use control in urban areas at present seems to cover all the necessary items in principle as emphasized with the Town and Country Planning Act and the Building Control Act.

For the current arrangement, however, the issues are pointed out from the following view points: for minimization of the increase of potential on flood damage and for preservation of retarding effect to minimize the adverse influence resulting from the reduction of retarding function (refer to Table 3.3.1).

(a) For Minimization of Increase of Flood Damage Potential

Needless to say, for minimization of increase of flood damage potential, it is essential not to promote the land development in the habitual flood area and to encourage the land use, in a manner of which the flood does not cause damage. In case land development is promoted such flood prone area, the measures to minimize the flood damage should be considered.

In this context, the current institutional arrangement may involve the following issues:

- The current institutional arrangement in general can cover the function to discourage promotion of land development in habitual flood area by applying the town and country planning act and the building control act. However, it may not be enough to cope with the case when the land development is promoted in habitual flood area; namely it does not discuss the necessity of provision of the measures to minimize the flood damage in the habitual flood area.
- At present, the General Plan has been prepared to several urban centers. As the General Plan covers only general items for land use, it is necessary to provide the Specific Plan to produce more effective land use control. However, the Specific Plan is hardly provided due to opposition, and so far only in two areas Specific Plans are provided. Thus, the current act may involve the deficiency in enforcement.

- Besides, the current act may not cover the control of construction activities which may drastically change the flooding condition such as filling of land, embankment and placing of pavement. These activities may alter the flood behavior and result in increase of flood damage to unexpected areas, but any stipulation are not provided in the current acts.
- The current act stipulates the penalty to discourage the illegal action. However, the penalty itself may not heavy burden against the illegal action. Also, it is necessary to provide an article to encourage people, who will be affected by the act, in a manner of compensation such as tax exempt and reduction.

(b) For Preservation of Retarding Effect

In general, land development in flood prone area results in reduction of retarding function for flood, which cause the increase of flood discharge in the down stream. In this connection, it should be obligatory to provide measures to preserve the present retarding function after land development.

The current institutional arrangement covers the issues by mainly applying the following acts or announcement:

- Building control act, article 31: Rainwater may be drained from the High Rise and Specially Large Building to unwanted water receiving areas as long as the drainage does not cause harm or adverse effect upon the protection of environmental quality.
- The Revolutionary Council's Announcement, Prescriptions Concerning Land Allocation, article 31: Rainwater from the land allocation project would have to be able to drain all water to prevent flooding or impoundment of water in the project.
- The Industrial Estate Authority of Thailand Act: Within the Industrial Estate, all necessary infrastructure and public utilities are provided or constructed.

As noted from the stipulations, it may cover the necessary items to preserve the retarding function after land development in a certain range. However, it may be necessary to stipulate more clearly or to supplement the stipulation to strengthen the function of land use control.

(2) Evaluation of Land Use Control in Agricultural Area

The deficiency for the land use control in agricultural area is emphasized with the fact that there is no specific law to control the land use in agricultural areas.

In this connection, it is necessary to promote a movement to land use control preparing the land use plan in agricultural areas and studying the introduction of Land Use Act.

3.3.5 Recommendation for Land Use Control

(1) Land Use Control in Urban Areas

As discussed earlier, the issue of for land use control in urban area is in principle covered by the present institutional arrangement, but seems to be necessary to supplement in some points as emphasized below:

- To facilitate the application of the Town and Country Planning Act and Building Control Act, it may be preferable to introduce the statement on tax exemption or reduction to people, who will be affected by enforcement of these acts.
- To add the statements in the Town and Country Planning Act to make it obligatory to provide the facilities or measures to minimize the flood damage in the area, when the land is developed in the flood prone area.
- To make the statement more clear in article 31 of the Building Control Act, Ministerial Regulation No.33 in 1992, to protect the property in unwanted water receiving areas from increase of flood damage.
- To make the statement more clear in Industrial Estate Authority of Thailand Act on all necessary infrastructure and public utilities to be provided not to cause the adverse influence in the downstream.

In case of flood mitigation in the Chao Phraya river basin, land use control is basin wide issues and as well as the strengthening of the institutional arrangement, enforcement based on the present institutional arrangement is essential. In this connection, strengthening of the present organization of DTCP, which is responsible to the formulation of urban planning, is also necessary through the increase of number of staff and experts together with introduction of training program to enhance the personal capability.

(2) Land Use Control in Agricultural Area

In Thailand, it is said that enforcement of land use control and guidance act is rather difficult, because the introduction of such law may have some conflict with the present Institution from a legal point of view. However, needless to say, it is necessary to minimize the increase of flood damage potential of their properties and the adverse influence to the other areas resulting from land development.

As the first step to successfully promote the land use control in agricultural area, it is necessary to provide the law for land use plan and control as well as the case in land use control in urban area. The law for land use plan and control should at least cover the following items:

- Authorization of land use plan in agricultural area, including the designation, function and scope of works for responsible agency
- Definition of composition and contents of land use plan
- Prescription of process for formulation of land use plan
- Prescription of effectiveness and application of land use plan

- Prescription of control of provision of structures which may cause alternation of flooding behavior such as embankment, filling of land and placing of pavement
- Prescription of restriction of the land use with other purpose except land use plan and penalty for illegal action
- Prescription of taxization to encourage person affected by application of land use plan.
- others

While such land use plan and control law is not enacted, it is considered to actively exercise and enforce the existing laws which ever applicable, and also the existing laws or acts should be revised or updated whatever appropriate.

Examples of land use control in foreign countries are shown in Appendix 3.



Tables

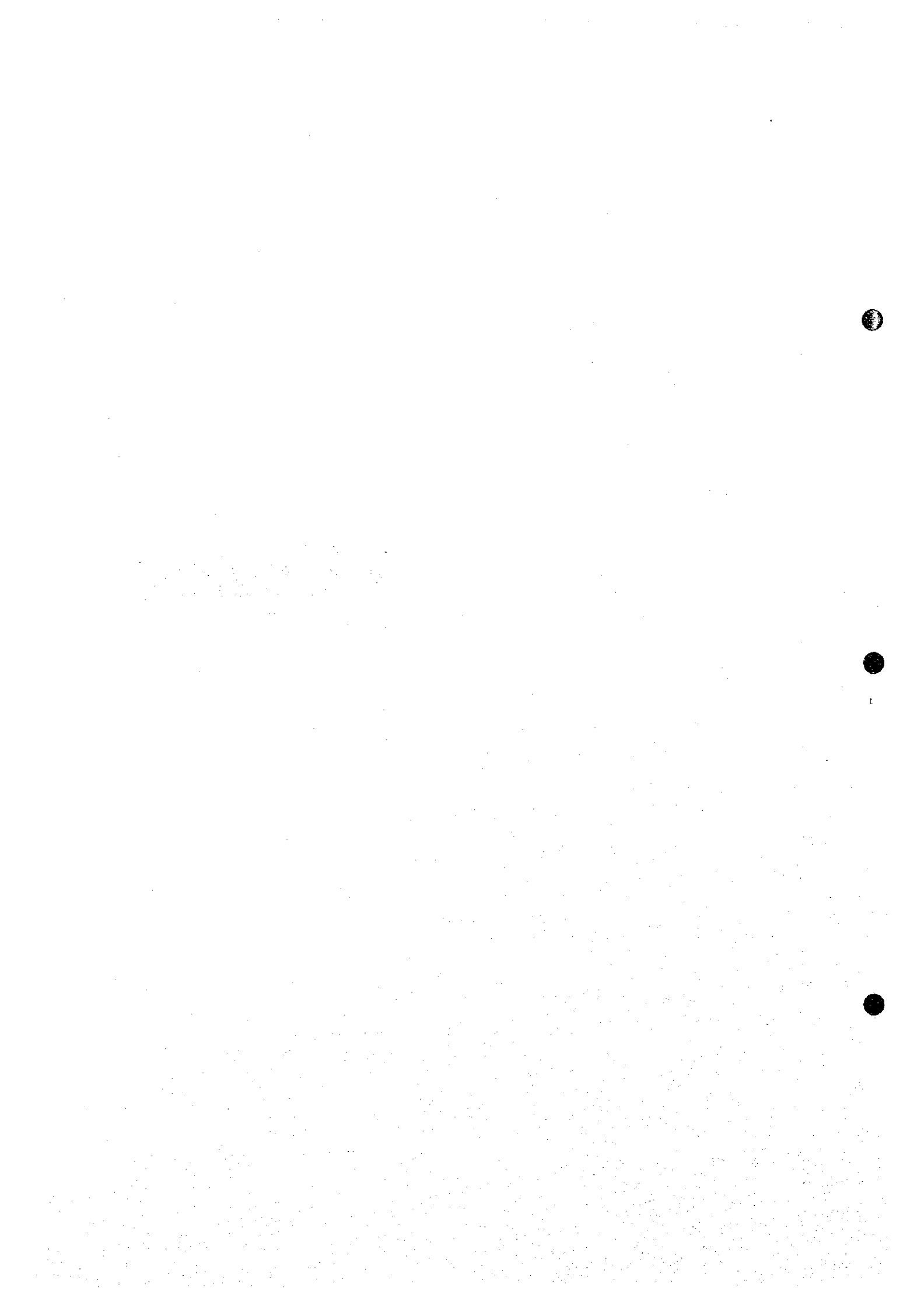


Table 2.1.1 MAJOR LAWS AND REGULATIONS

Laws and Regulations	Year Established
Constitution of Thailand	1932
Civil and Commercial Code of Thailand	1932
Act on Conservation of Public Water Supply Canal	1913
Act on Conservation of Canal	1902
People Irrigation Act	1939
State Irrigation Act	1942
Dikes and Ditches Act	1962
Grand Water Act	1978
Electricity Generating Authority of Thailand Act	1968
Improvement and Conservation of National Environmental Quality Act	1975

Table 2.1.2 ORGANIZATIONS FOR THE RIVER MANAGEMENT IN THAILAND

ACTIVITIES	ORGANIZATION	M.A.C				M.O.I				M.O.C				M.I.N				M.S.T.E		MOD	MPH	B.M.A
		RID	ALRO	DF	RFD	EGAT	LAD	DPW	OARD	MWA	PWA	MD	HD	PAT	DIW	DMR	NEA	NBB	H ₂ D	DOH	DDS	
DATA COLLECTION & RESEARCH	Flood Control	○					○														○	
	Irrigation	○						○														
	Hydropower					○																
	Navigation											○										
	Water Supply								○												○	
	Environmental Control									○											○	
PLAN & DESIGN	Fisheries																					
	Flood Control	○																			○	
	Irrigation	○																				
	Hydropower					○																
	Navigation																					
	Water Supply								○												○	
CONSTRUCTION	Environmental Control	○																			○	
	Fisheries																					
	Flood Control	○																			○	
	Irrigation	○																				
	Hydropower					○																
	Navigation																					
OPERATION & MAINTENANCE	Water Supply								○												○	
	Environmental Control	○																			○	
	Fisheries																					
	Flood Control	○																			○	
	Irrigation	○																				
	Hydropower					○																

Note : ○ Major Organization ◦ Minor Organization

Table 2.1.3 ORGANIZATIONS FOR THE RIVER MANAGEMENT FOR
CHAO PHRAYA RIVER BASIN

ORGANIZATION	Hydrological Observation & Analysis	Flood Forecasting	Flood Fighting	River Improvement & Water Flow control of Mainstream	Drainage Works
Royal Irrigation Department	○	○	○	○	○
Meteorological Department	○	○			
Electricity Generating Administration	○	○			
Bangkok Metropolitan Administration	○		○	○	○
Harbour Department	○				
Port Authority of Thailand	○				
Local Administration Department			○		
Department Public Works					○
Provincial government			○		○

Note : ○ Major Activity ◊ Minor Activity

Table 3.1.1 Possibility of Realization of Measures

Category	Measures		Agencies concerned	Present Situation	Issues	Remarks
	Land use control and Guidance	Modification of Operation Rule				
Non-structural Measures	Control of Ground Water	Control of Ground Water	DTCP, Local Government, LDD	Currently executing	Needs to strengthen	Additional Legal arrangement is necessary
	Subsidiy	Subsidiy	EGAT, RID	Newly introduced	Coordination is necessary	-
	Flood Forecasting	Flood Forecasting	DMR	Currently executing	Need to strengthen	-
	Flood Fighting	Flood Fighting	EGAT, RID, BMA, MED	Currently executing	Need to improve	ONWRC is to establish a flood forecasting system.
	Disaster Recovery	Disaster Recovery	Civil Defence, BMA, RID and Provincial Gov.	Currently executing	Coordination is necessary	-
	Flood Insurance	Flood Insurance	RID, BMA, PWD, Provincial Gov. and Min. of Health	Currently executing	Coordination is necessary	-
	Watershed Management	Watershed Management	MOAC, RID	Currently executing	Need to strengthen	-
	Preservation of Retarding Area with Flood Mitigation*	Preservation of Retarding Area with Flood Mitigation*	MOAC, RID	Newly introduced	-	To be introduced in 8th Agricultural Development Plan
	River Improvement	River Improvement	RFD	Currently Executing	Need to strengthen	-
	Heightening of Flood Barrier at Bangkok	Heightening of Flood Barrier at Bangkok	RID	Currently Executing	Need to improve	-
Structural Measures	Construction of Diversion C	Construction of Diversion C	BMA	Currently Executing	Need to improve	Establishment of new organization is necessary
	Construction of Diversion B	Construction of Diversion B	RID, BMA and PWD	Newly introduced	Coordination is necessary	-
	Construction of Diversion A	Construction of Diversion A	RID, BMA and PWD	Newly introduced	Coordination is necessary	-

* : Distribution system and drainage system improvement in the agricultural area

Table 3.2.1 (1/2) OUTLINE OF RIVER BASIN MANAGEMENT IN FOREIGN COUNTRIES

Countries	Historical Background of Flood Mitigation	Present Institutional Setup for Flood Mitigation
Japan	<p>Since the beginning of history, the Japanese people has struggled against floods and the Government has had the responsibility for flood mitigation.</p> <p>The occurrence of major floods between 1885 and 1893 prompted a demand on the new regime to carry out measures for flood control.</p> <p>This led to the enactment of the "River Law" in 1896, whereby the central government was made responsible for the administration of rivers.</p> <p>Since 1945, the occurrence of floods prompted the construction of flood control reservoirs throughout Japan. Recent years have seen the planning and construction of diversion tunnels as a flood control measure in urban areas.</p>	<p>The basic policies for river administration in Japan today may be summarized as "flood control," "water use," and "conservation and creation of river environments."</p> <p>The River Law, the basic law governing matters relating to the administration of rivers, was enacted in 1964. The River Law lays down the types of rivers to be governed.</p> <p>River administration of central government for major rivers falls under the jurisdiction of the River Bureau of Ministry of Construction.</p>
USA	<p>Flood mitigation has been under the responsibility of local people living along riverside areas and not under the responsibility of Federal, State and local governments.</p> <p>The Federal Government has been concerned with flood mitigation only in such case as the works are related to commerce over state borders.</p> <p>In the USA, historically, the Army Corps of Engineers and the Bureau of Reclamation have contributed to flood mitigation works.</p>	<p>In prefecture governments, river administration falls mainly under the jurisdiction of the River Division of the Public Works Department</p> <p>Flood prone area management including land use control, flood forecasting, post-flood response, etc., is undertaken by state governments and local autonomous bodies.</p> <p>The Federal Government is concerned with flood mitigation in the manner like provision of flood insurance.</p> <p>At present, the Federal Government is concerned with the flood mitigation of large-scale rivers, while the State and local autonomous bodies are concerned with the other rivers.</p>
UK	<p>Flood mitigation has been under the responsibility of local people living along the riverside areas.</p> <p>Traditionally, livestock farming has been the basic agricultural industry, and land development in the flood prone areas has recently been promoted.</p>	<p>Flood control and water resources management for major rivers are undertaken by the National River Authority (NRA)</p> <p>The flood control union (IDBs) and the local governments undertake projects on flood control under the financial support of MAFF.</p> <p>Operation and maintenance of flood control projects in major rivers are the responsibilities of NRA, while those of minor rivers are under the responsibility of IDBs and municipalities.</p>
France	<p>Since 1800's, flood mitigation has been under the responsibility of local people living along the riverside areas</p> <p>Such a situation has not changed at present, and the local government or community undertake flood mitigation works</p> <p>The central government provides financial support for the works.</p> <p>The basic concept for flood mitigation is emphasized on localized protection works for urban centers and utilization of agricultural lands as natural retarding basin.</p>	<p>For the major six (6) river basins, the River Basin Committee consisting of the Water Management Bureau, the local governments and the riverside landowners' union are involved in water management providing the comprehensive plan (SDAGE).</p> <p>As for flood mitigation, the inhabitants along the riverside have responsibility</p> <p>The central government does not have responsibility on flood protection works, while local governments are concerned in a manner of land use control and guidance.</p>

Table 3.2.1(2/2) OUTLINE OF RIVER BASIN MANAGEMENT IN FOREIGN COUNTRIES

Countries	Historical Background of Flood Mitigation	Present Institutional Setup for Flood Mitigation
Germany	<p>Flood mitigation has been under the responsibility of local people living along the riverside areas under the jurisdiction of provincial governments, and the Federal Government is not concerned.</p> <p>The flood mitigation system is mainly attributed with less population in flood prone areas. Residence in flood prone areas has been recently started.</p> <p>In case of the Rijn River, a retarding basin has been provided upstream and downstream. To provide the retarding basin, Federal and local Gov. share the cost.</p>	<p>The rivers are classified into Federal Channel and others, which are further ranked from one to three classes</p> <p>The framework of water management including flood mitigation is designated by the Federal Water Management Act</p> <p>The management of federal channels and first class rivers is undertaken by the provincial government, while that for second and third class rivers is by counties, municipalities and dike unions</p>
Netherlands	<p>Water Board has been organized since 1600's as a local autonomy organization to cope with the flood mitigation.</p> <p>The central government has a responsibility for planning and management for flood mitigation, while the responsibility for implementation and management of facilities is burdened by the Water Board.</p>	<p>The former zone is fully managed by the central government from planning to implementation. The former zone is fully managed by the central government from planning to implementation</p> <p>The management of the latter area depends on the scale of river basin. For a large scale river basin, the central government has a responsibility for planning, but implementation and management are undertaken by provincial government or Water Board.</p> <p>For the other river basins, provincial government or Water Board has the responsibility from planning to implementation</p>
Republic of China	<p>Until the enactment of the Water Law of the People's Republic of China in 1988, there had not been any law to stipulate the overall management of river water</p> <p>The Water Law was enacted for the effective utilization of water resources, mitigation of flood damage</p> <p>In 1997, the Flood Protection Law, which specified the role of central and local governments on flood mitigation, was enacted</p> <p>After the 1998 flood, the Central Gov. decided to return the area of about 1,000 km² to the retarding area in Chang Jiang Yangtze River.</p>	<p>The Ministry of Water Resources (MWR) undertakes water management including flood control.</p> <p>The water management of seven major river basins is undertaken by the central government. Tributaries of major rivers that flow in two provinces is undertaken by the river basin authority like a water committee.</p> <p>Flood mitigation is undertaken by the National General Command of Flood Protection under the command of the Vice Prime Minister</p> <p>In the local government the flood control authority provided in each local level</p>
Thailand	<p>Since 1903, several large-scale projects were carried out, as multi-purpose projects including reservoir construction for flood control purpose.</p> <p>Since 1970's, river basin development focused more on medium and small-scale projects mainly for single purposes</p> <p>Through the past experiences, a new system of water resources management in the country was introduced classifying all the river basins into 25 river basins.</p>	<p>Royal Irrigation Department (RID) has been mainly engaged in the flood mitigation works in major rivers, while BMA has been concerned with the flood mitigation works in Bangkok Metropolitan Area</p> <p>Flood protection works of major urban areas are undertaken by Public Works Department (PWD)</p> <p>There is no law enacted to comprehensively manage the river basin</p> <p>To comprehensively manage the river basin including flood mitigation, enactment of Water Resources Act is under process</p>

Table 3.2.3 Organization of Office of River Basin Committee

Organization	Number of Persons			
	Director General	Director	Chief	Staff
Office of River Basin Committee	1			1
Policy and Planning		1	3	10
Coordination, Operation and Disaster Management Division		1	3	10
Flood Information Division		1	2	15
Training, Reserch and Public Awareness Division		1	3	10
Legal and General Administraion Division		1	2	10
Total	1	5	13	56

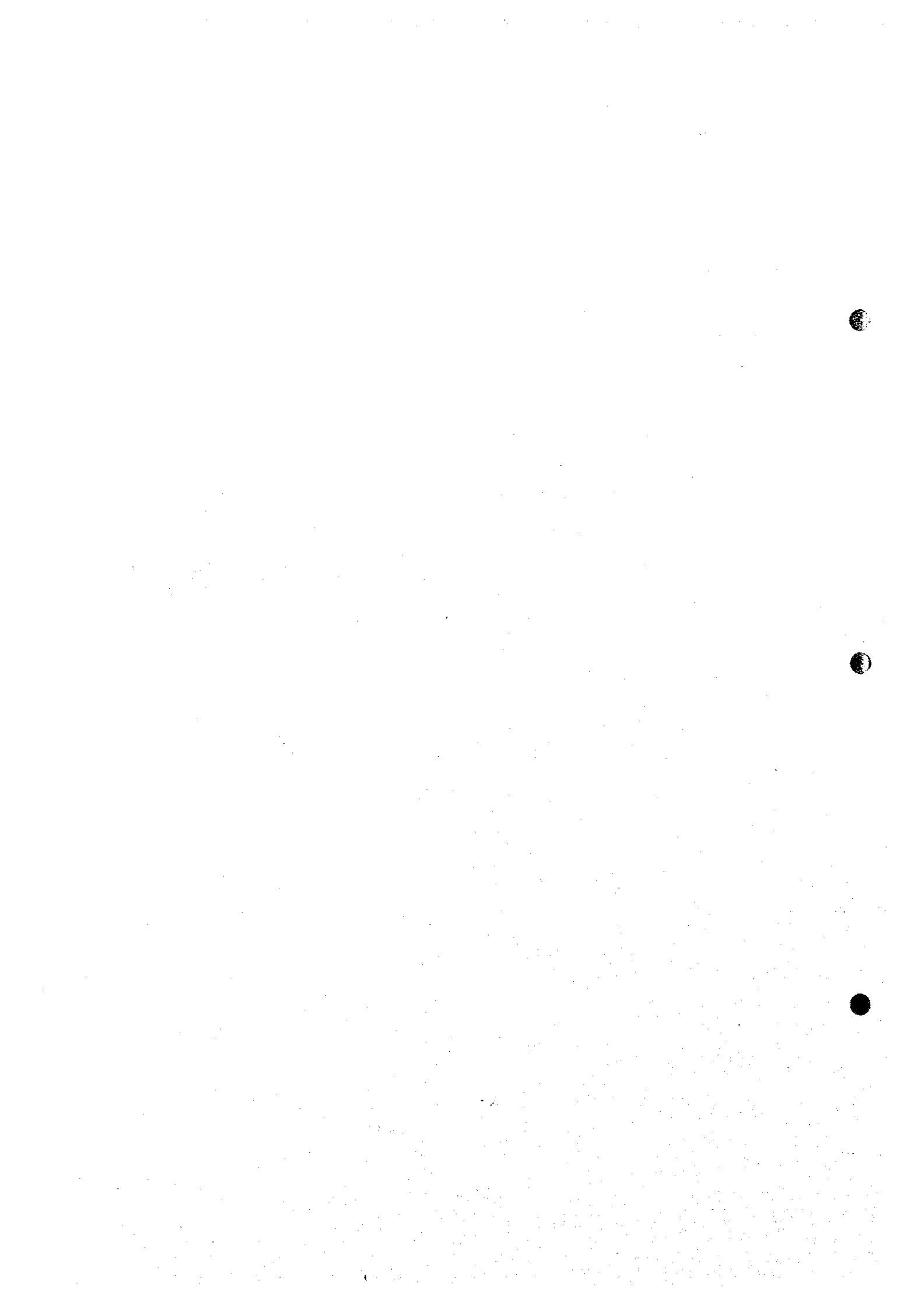
Table 3.2.4 Necessary Facility and Equipment

Items	Break Down	Unit	Nos.
Office Space including Facilities	Office Space	Lump	1
	Desk, Chair and Cabinet	Lump Sum	1
	Meeting Table with Chairs	Lump Sum	1
	Telephone/Facsimile	Set	20
	Copy Machine	Set	2
	Miscellaneous	Lump	1
	Data Management Facilities	Computer	Set
Display Equipment		Set	2
Data Filing		Lump	1
Miscellaneous		Lump	1
Installation of Data Transmission System	Transmission Equipment	Lump Sum	1
	Rental of Transmission Line	Lump Sum	1
Training and Public Advertisement Equipment	Audio Equipment	Set	3
Transportation Facilities	Sedan	Nos.	3
	4 W/D		3
	Micro-Bus		2

Table 3.3.1 Comparison between Necessary Arrangement and Current Arrangement for Land Use Control and Guidance

Category	Aspect	Necessary Items	Current Arrangement	Consideration	
Land Use Control and Guidance in Urban Area	Authorization	Designation of Responsible Agencies and Authorization of Agencies Designated	Town and Country Planning Act, Building Code, Revolutionary Council's Announcement, the Industrial Estate Authority of Thailand Act, Enhancement and Conservation of National Environmental Quality Act	Stipulation for penalty is provided, but not for encouragement	
	To Minimize Increase of Flood Damage Potential	Penalty and Encouragement	Town and Country Planning Act and Building Code	Needs to provide	
		To publicize the area	Town and Country Planning Act	No provision	(Not directly be stipulated, but enforcement)
		To guide land use so as to be endurable	Town and Country Planning Act	No provision	Needs to provide
To Preserve Retarding Function	To discourage land use in vulnerable area	To discourage land use in vulnerable area	Town and Country Planning Act	Needs to provide	
	To guide Provision of Measures	To guide Provision of Measures	No provision		
	To publicize the area	To publicize the area	Town and Country Planning Act		
	To discourage Land Use Development	To discourage Land Use Development	Town and Country Planning Act	Needs to make more clear	
Land Use Control and Guidance in Agricultural Area	Authorization	Designation of Responsible Agencies and Authorization of Agencies Designated	Building Control Act, Revolutionary Council's Announcement and Industrial Estate Authority	Needs to provide	
	To Minimize Increase of Flood Damage Potential	To control activities for drastical Change	No provision	Needs to provide a new law, but for a time being, strengthening current act and laws is considered.	
		Penalty and Encouragement	No provision	To actively use the existing enforcement	
		To publicize the area	No provision	Promotion awareness	
To Preserve Retarding Function	To guide land use so as to be endurable	To guide land use so as to be endurable	- do -		
	To discourage land use in vulnerable area	To discourage land use in vulnerable area	- do -		
	To guide Provision of Measures	To guide Provision of Measures	Reallocation of the land for dwellers		
	To publicize the area	To publicize the area	No provision	Promotion awareness	
To Preserve Retarding Function	To discourage Land Use Development	To discourage Land Use Development	- do -	Promotion awareness	
	To guide Provision of Measures	To guide Provision of Measures	(Reforestation Program)	(Preservation and control)	
	To control activities for drastical Change	To control activities for drastical Change	No provision		
			- do -		

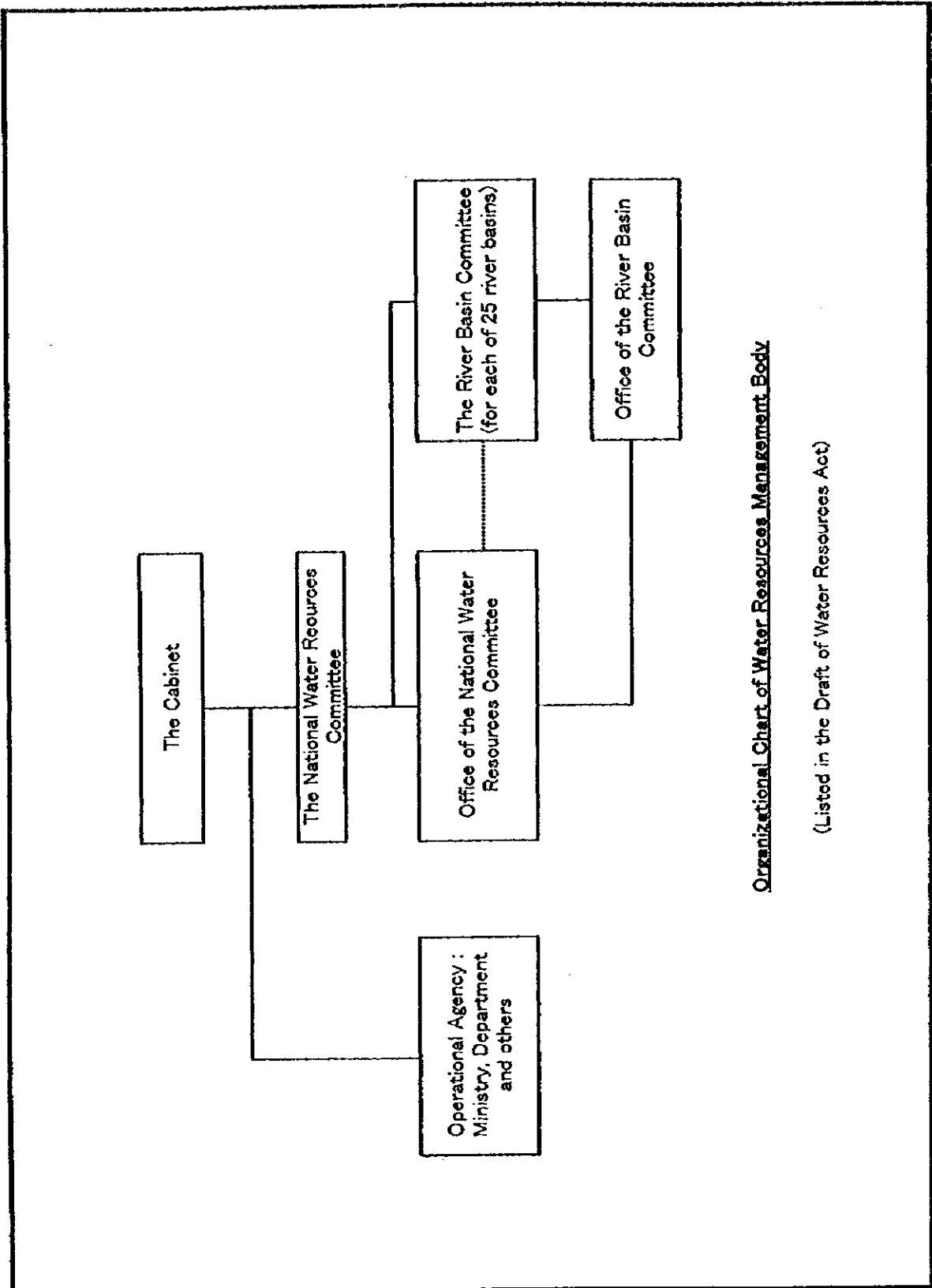
Figures



Work Plan
The Study of Master Plan for Water Resources Management
Office of the National Water Resources Committee

No.	Study Area (Basin)	Catchment Area (Km ²)	Budget (US \$)	Period (month)	Work Plan (Budget year)								
					2000	2001	2002	2003	2004	2005	2006	2007	
1	Pasak (12)	16,292	493,440	15									
2	Bang Pakong (16), Prachin Buri (15)	18,459	460,790	15									
3	Mae Khong (02)	57,422	893,340	24									
4	Ping (06)	33,898	668,430	20									
5	South East Coast (21)	26,353	578,950	18									
6	Kok (03), Wang (07)	18,686	496,470	15									
7	Yom (08)	23,616	554,260	18									
8	Nan (09)	34,330	670,360	20									
9	Tapi (22)	12,225	374,350	15									
10	Chi (04)	49,477	937,310	24									
11	Chao Phraya (10), Tha Chin (13)	38,998	796,370	24									
12	Sakae Krang (11)												
13	Mae Klong (14)	30,837	550,090	18									
14	Phetchaburi (19), West Coast (20)	12,348	374,460	15									
15	Salawin (01)	17,980	392,560	15									
16	Mun (05)	69,700	1,124,370	24									
17	South West Coast (25)	21,172	494,400	18									
18	Tonle Sap (17), East Coast (18)	17,980	464,000	15									
18	Songkhla Lake (23), Patani (24)	12,353	398,950	15									
Total 25 River Basin			10,723,100										

Note : The budget calculation of consultant expense bases on local rate of payment, (Oct. 1997) with exchange rate of US \$ 1 = 38 Baht.

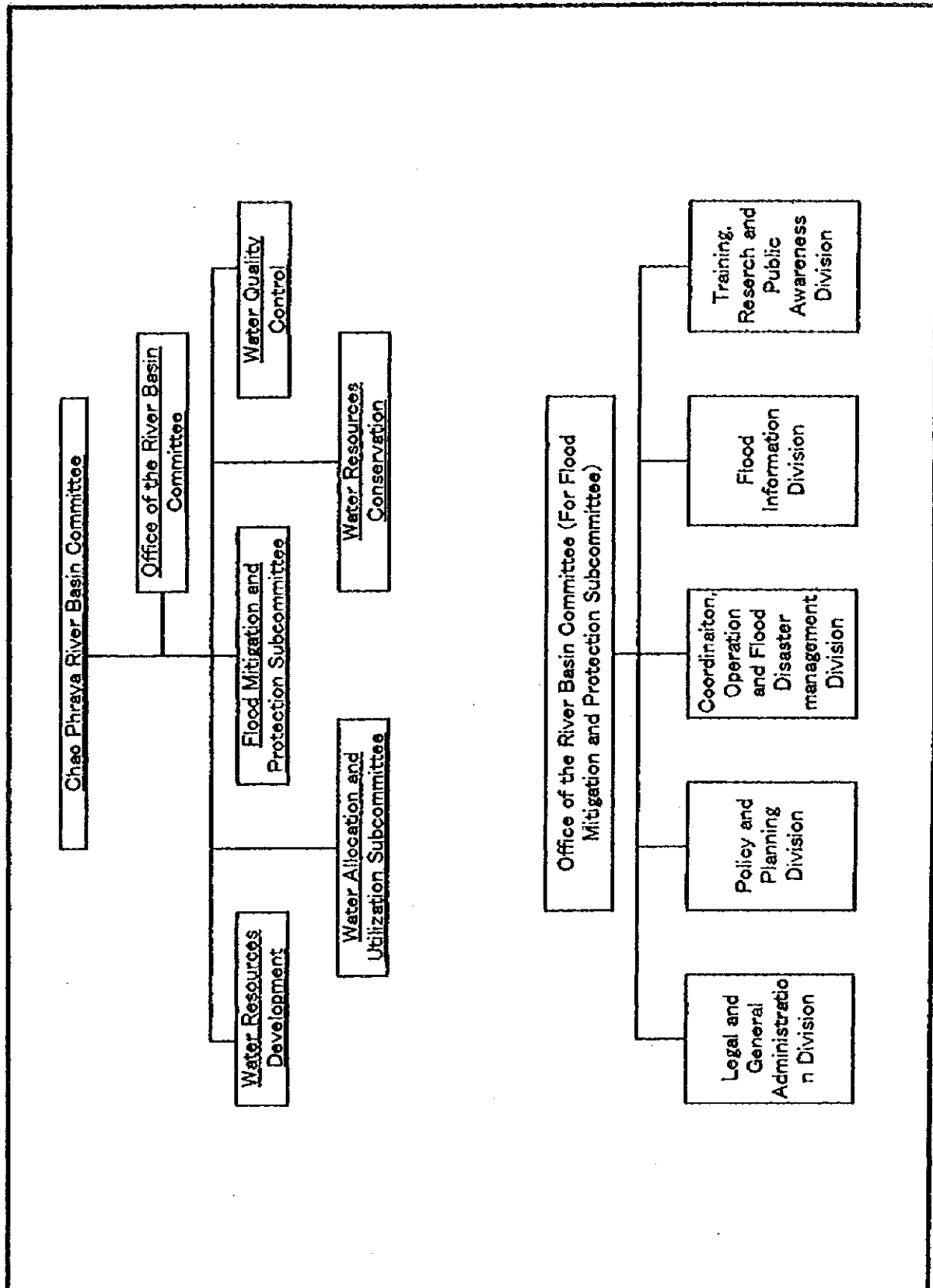


Organizational Chart of Water Resources Management Body

(Listed in the Draft of Water Resources Act)

STUDY ON INTEGRATED PLAN FOR FLOOD MITIGATION IN CHAOPHRAYA RIVER BASIN
 CII ENGINEERING CO., LTD. AND INA CORPORATION

Fig. 3.2.2
 ORGANIZATION CHART OF WATER RESOURCES MANAGEMENT BODY

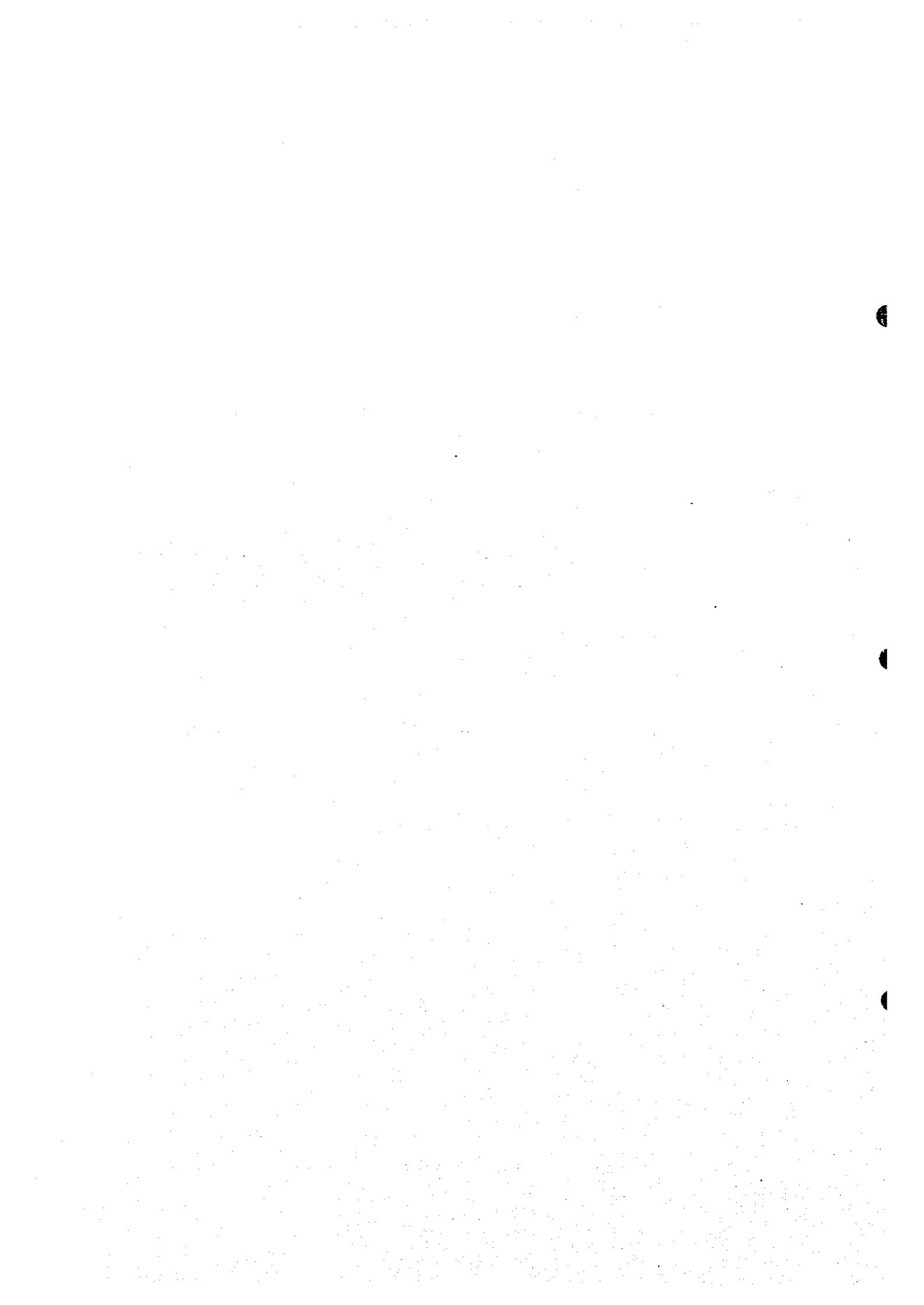


STUDY ON INTEGRATED PLAN FOR FLOOD MITIGATION IN CHAOPHRAYA RIVER BASIN
 CTI ENGINEERING CO., LTD. AND INA CORPORATION

Fig. 3.2.3
 PROPOSED ORGANIZATION CHART FOR RIVER BASIN COMMITTEE



Appendices



APPENDIX 1 STUDY ON INSTITUTIONAL SETUP IN FOREIGN COUNTRIES

1.1 Outline

The institutional setup in foreign countries such as Japan, USA, UK, France, Germany and China is outlined below under the following items:

- Governmental Framework
- Historical Background of Flood Mitigation
- Current Institutional Setup for Flood Mitigation

1.2 Japan

1.2.1 Governmental Framework

The governmental setup in Japan has changed as follows:

- After the establishment of the Meiji government in 1867, power became centralized to strengthen the military and to enhance industrial productivity.
- Before and after World War II, the central government led in the management of the nation.
- Through the period of high economic growth rate in the 1960's and 1970's, improvement of the governmental as well as the financial and political system began.
- Receiving criticisms against the then governmental system concerning vertical decisions, the improvement of institutional setup was promoted.
- The Decentralization Promotion Act was enacted in 1995, and the movement for decentralization followed.
- Also, improvement of the political system was promoted resulting in the introduction of small electoral district system. It is therefore expected that the current governmental system improvement for decentralization will accelerate.

To summarize, the governmental framework in Japan has evolved as follows:

- Previously, governmental power was centralized under the central government.
- Recently, system improvement toward decentralization is being promoted.

1.2.2 Historical Background of Flood Mitigation

(1) Before 1870

Since the beginning of Japanese history, Japanese society has depended on rice cultivation, and villages and paddy fields were formed where water was most readily available. Areas where it is easy to procure water, however, are

also the areas that are liable to flooding in the event of heavy rain, and the history of the Japanese people has, as a result, been one of a long struggle against floods. The oldest records of flood control work go back to the fourth century, and irrigation using reservoirs has been implemented throughout the country by the eighth century (Nara Period).

It was during the age of the samurai warlords in the 16th century that one began to see the implementation of large-scale flood control projects. The warring feudal lords promoted the implementation of flood control works in conjunction with the development of new paddy fields to increase rice production in their domains. Some of the dikes and groins constructed during this period can still be seen today.

In addition to the improvement works on rivers and irrigation channels aimed at the development of new paddies, the age of the Tokugawa Shogunate (Edo Period, 17th to 19th century) saw the implementation of river improvement aimed at the promotion of fluvial navigation for transportation of goods.

(2) 1870 to 1945

The years around 1870 were a period of transition when Japan was transformed from a feudal society into a modern state. At first, the work on rivers tended to take the form of low-water channel work for promotion of navigation as in the period immediately preceding those years. The occurrence, however, of major floods on a number of large rivers between 1885 and 1893 prompted a demand on the new regime to carry out measures for flood control. This led to the enactment of the "River Law" in 1896, whereby the central government was made responsible for the administration of rivers and the national treasury was made the source of funds for flood control projects. Flood control plans were then drawn up, at first for several tens of major rivers and later for all rivers in Japan, and work began to be implemented in accordance with these plans for dike construction, riverbed excavation and short cutting.

Besides such flood control projects, dams were constructed in mountainous areas for power generation, and the storage capacities of these dams were also utilized for flood control and water supply.

(3) Since 1945 (Post-War Period)

Typhoons caused serious damage in various parts of Japan in the 1940's. The floods due to a typhoon in 1947, in particular, breached the dikes along the Tone River and caused severe human and physical damage in Tokyo and neighboring prefectures.

Damage due to Flood on Tone River (1947)

- Inundated area: 440 km
- Persons affected: approx. 600,000
- Damage estimate: ¥7.0 billion (1947 prices)

- Death: 88 (Tokyo and Saitama)

The occurrence of these floods prompted the construction of flood control reservoirs throughout Japan. Recent years have seen the planning and construction of diversion tunnels as a flood control measure in urban areas. The vast majority of habitable land in Japan, however, is found on floodplains and it is in fact still the case that vast majority of the population live in such areas in danger of damage due to floods.

1.2.3 Current Institutional Setup for Flood Mitigation

(1) Basic Policies

The Japanese people have since time immemorial had close dealings with rivers in the form of "flood control," aimed at the preservation of the national land and protection of lives and properties from floods and other forms of river-related disasters. Their close association with rivers was also in the form of "water use," aimed at the utilization of river water for people's daily and productive activities.

The progress of urbanization in recent years has given an increasing importance to the aspect of conservation and creation of river environments in administration of rivers especially in urban areas. The basic policies for river administration in Japan today may thus be summarized as "flood control," "water use," and "conservation and creation of river environments."

(2) Enactment of River Law

The River Law, the basic law governing matters relating to the administration of rivers, was enacted in 1964 as a greatly revised version of the old River Law originally enacted in 1896. The River Law lays down the types of rivers to be governed and the people responsible for their administration, as well as provisions concerning the use of rivers and restrictions on their use.

(3) Outline of River Law

(a) Rivers Covered, Classes of Rivers and River Administrators

(i) Class A Rivers (13,798 rivers in 109 river systems)

These are rivers deemed to be of particular importance in the conservation of the national land and for the economic activities of the Japanese people, which have been designated as such by the Minister of Construction. The person responsible for their administration, in principle, is the Minister of Construction. The administration of those sections of Class A rivers deemed to be of lesser importance is entrusted to prefecture governors.

(ii) Class B Rivers (6,959 rivers in 2,691 river systems)

This category covers rivers other than Class A rivers which are of major importance for public interests and which have been so

designated by prefecture governors. The administrators are the prefecture governors. The administration of rivers is primarily a responsibility of the national government, and in administering Class B rivers, prefecture governors act as agents of the national government.

(iii) "Equivalent" Rivers

This category covers rivers other than Class A and Class B rivers, which have been designated as such by heads of municipalities. These rivers come under basically the same regulations as Class B rivers. The administrators are the heads of municipalities, and as in the case of Class B rivers, mayors act as agents of the national government.

(b) Use of Rivers and Restrictions on their Use

Rivers are public properties, and as such they are open, in principle, to "free use" for such activities as swimming, angling, walking and washing, but the permission of the river administrator is required for such activities as the following:

- Occupancy of river water (River Law, Article 23)
- Occupancy of land within river areas owned by river administrator (River Law, Article 24)
- Quarrying on land within river areas owned by river administrator (River Law, Article 25)
- Construction, renovation and removal of artificial structures on land within river areas (River Law, Article 26)
- Alteration of the shape of land within river areas through excavation, filling, etc., and cutting of trees and bushes in river areas (River Law, Article 27)

(c) River Works

"River works" is understood to refer to such work as construction of dikes and flood control reservoirs, which is carried out to increase the public benefit derived from river water and to remove or reduce the public harm, and is carried out, in principle, by river administrators. The river administrators are responsible for laying down the basic items relating to river works in "master plans for implementation of work."

(4) Organizations Responsible for River Administration

(a) Ministry of Construction (National Government)

The organizational structure of the Ministry of Construction is shown in the attached organization chart. River administration falls under the jurisdiction of the River Bureau.

(b) Prefecture Governments

In prefecture governments, river administration falls mainly under the jurisdiction of the River Division of the Public Works Department.

1.3 United States of America (USA)

1.3.1 Governmental Framework

The governmental framework in the USA is outlined as follows:

- The history of the USA is still new considering the year it became independent, and autonomy of people is a basic concept, that is, land newly obtained can be used freely by the owners under their own responsibility.
- Thus, autonomy by local governments is practiced, not relying on the Federal or State governments.
- The Federal Government, which is a sort of soft unity of state governments, is concerned with the provision of infrastructure relating to commerce along state borders.
- Federal Government Policy is formulated in accordance with the request from the state government.

To summarize, the governmental framework in the USA is featured as follows:

- The Federal Government is composed of state governments and acts independently of the State.
- Decentralization has almost been completed, and even some administration works of the Federal Government are to be transferred to state governments due to budget cut in the Federal Government.
- At present, the Federal Government is composed of 50 states, which are divided into 3,043 counties and further divided into 19,273 municipalities, 16,656 townships and 44,253 special wards.

1.3.2 Historical Background of Flood Mitigation

The historical background of flood mitigation in the USA is summarized as follows:

- Flood mitigation has been under the responsibility of local people living along riverside areas and not under the responsibility of Federal, State and local governments.
- The Federal Government has been concerned with flood mitigation only in such case as the works are related to commerce along state borders.
- Land use development and restriction, the necessity of which have recently emerged, have been undertaken by local autonomous bodies with support from the state governments.
- Flood insurance is being provided under the Federal Government.

- Local autonomous bodies have been undertaking restoration works for large-scale swampy areas in cooperation with Federal Government: in Kisiny River basin, the restoration projects of previous floodplain, which was once reduced for flood mitigation project, is ongoing. Also, in Mississippi river basin, over 25,000 homes have been relocated from the floodplain since 1993 and thousands of hectares of marginally productive bottomland habitat have been transferred from agriculture to natural uses.
- In the USA, historically, the Army Corps of Engineers and the Bureau of Reclamation have contributed to flood mitigation works. However, after the 1970's, planning and implementation related to flood mitigation projects were transferred to the State governments and local autonomous bodies.

1.3.3 Current Institutional Setup for Flood Mitigation

The present institutional setup for flood mitigation in the USA is outlined as follows:

- There exist several levels of institutional setup for river management; federal and state governments and local autonomous bodies.
- The agencies concerned in the Federal Government level include various agencies such as the Departments of Agriculture, Commerce, Defense, Interior, TVA, etc., but river management is not undertaken by single agency.
- Further, in order to promote the water conservation, utilization and development through the coordination among the Federal and State governments, local autonomous bodies and the private sector, the National Water Resources Committee was established as an independent agency in 1965.
- Water resources management is under the jurisdiction of the Provincial Government, while flood mitigation is under the Federal Government on the ground that flood mitigation is an overall issue beyond the state territory.
- In addition to the provision of structural measures for flood mitigation, flood prone area management including land use control, flood forecasting, post-flood response, etc., is undertaken by state governments and local autonomous bodies.
- The Federal Government is concerned with flood mitigation in the manner like provision of flood insurance.
- At present, the Federal Government is concerned with the flood mitigation of large-scale rivers, while the State and local autonomous bodies are concerned with the other rivers.

1.4 United Kingdom of Great Britain and Northern Ireland (UK)

1.4.1 Governmental Framework

The governmental framework in the United Kingdom is outlined as follows:

- The United Kingdom of Great Britain is composed of England, Wales, Scotland and North Ireland. England had conquered the other kingdoms and put them

under its control. With this background, the government organization is so complicated that features are hardly distinguished.

- In England, the institutional system is mainly based on practical basis, which has been historically and traditionally adopted, though specific laws and acts are not enacted.
- The governmental institution has changed year by year, under political influence.
- After the Thatcher government, the policy towards a small government and privatization has been promoted, and centralization of power rather than decentralization to local governments as well as restructuring of local government has been initiated.

1.4.2 Historical Background of Flood Mitigation

The historical background of flood mitigation in the United Kingdom is summarized as follows:

- Flood mitigation has been under the responsibility of local people living along the riverside areas.
- Traditionally, livestock farming has been the basic agricultural industry, and land development in the flood prone areas has recently been promoted.
- Coastal line protection like high tide protection works have been undertaken by local communities.

1.4.3 Current Institutional Setup for Flood Mitigation

The present institutional setup for flood mitigation in the United Kingdom is outlined as follows:

- The Department of Environment (DOE) and the Ministry of Agriculture, Fisheries and Food (MAFF) undertake water management in England and Wales.
- Flood control and water resources management for major rivers are undertaken by the National River Authority (NRA) established in 1989 through the revision of the Water Act. The NRA was integrated into the Environment Agency (EA) in 1996.
- In England, NRA, the flood control union (IDBs) and the local governments undertake projects on flood control and high tide under the financial support of MAFF.
- DOE is involved in the flood control by NRA in a manner of urban planning and environment preservation policy.
- Operation and maintenance of flood control projects in major rivers are the responsibilities of NRA, while those of minor rivers are under the responsibility of IDBs and municipalities.

- In Wales, the Ministry of Wales engages in flood control projects.

1.5 French Republic (France)

1.5.1 Governmental Framework

The governmental framework in France is outlined as follows:

- France has been a typical centralized nation, as proven by the condition that governors of local governments were nominated by the central government.
- Trust on government officials has been high, as noticed from the fact that there were a number of officials of more than 100,000 working in the Ministry of Construction and there also exists a university to train the government officials.
- In 1982, through the Decentralization Act, the French government system based on centralization has started changing into decentralization.
- At present, the decentralization has settled down, so that cooperation between the central and local governments is being smoothly promoted.
- The local administrative divisions consist of 22 provinces, 95 prefectures and 36,551 municipalities.

1.5.2 Historical Background of Flood Mitigation

The historical background of flood mitigation in France is summarized as follows:

- Since 1800's, flood mitigation has been under the responsibility of local people living along the riverside areas that had less population in flood prone areas due to the vast land area, and industry relied on livestock farming. Thus, flood mitigation was not under government responsibility.
- Such a situation has not changed at present, and the local government or community undertake flood mitigation works in accordance with the stipulation in a country code, while the central government provides financial support for the works.
- Consequently, the history of flood mitigation is different by river basin.
- The River Basin Committee composed of the representative from the central government, the chief of the local government, beneficiaries and affected people has been established for six (6) major basins to decide the strategy of water management based on the River Basin Master Plan (SDAGE).
- In France, the basic concept for flood mitigation is emphasized on localized protection works for urban centers and utilization of agricultural lands as natural retarding basin.
- In this context, land use control and guidance are adopted for flood mitigation in a manner of nonstructural measures.

1.5.3 Current Institutional Setup for Flood Mitigation

The present institutional setup for flood mitigation in France is outlined as follows:

- On the national level, there are 13 ministries concerned in water management. For coordination among these ministries, a coordination committee including the Ministry of Environment as secretariat has been established.
- For the major six (6) river basins, the River Basin Committee, the Water Management Bureau, the local governments and the riverside landowners' union are involved in water management.
- As for flood mitigation, the inhabitants along the riverside have responsibility in accordance with the stipulation in the Civil Code of 1807. Thus, the central government does not have responsibility on flood protection works, while local governments are concerned in a manner of land use control and guidance.

1.6 Federal Republic of Germany

1.6.1 Governmental Framework

The governmental framework in Germany is outlined as follows:

- For a long time in the past, Germany has been a gathering of small independent provinces, and was united in the Bismarck and Hitler periods. Under such circumstances, the people still hold the feeling of resistance against centralization.
- Through the historical process, the federal government composed of independent provinces was established.
- In the fundamental law enacted after World War II, the role of the Federal and provincial governments was clarified, so that decentralization has stabilized.
- At present, the administrative division consists of 16 provinces (Land) and 3 urban provinces (Stadtland), 114 special cities (Kreisfreie Stadt), 426 counties (Kreis) and 13,031 municipalities (Gemeinde).

1.6.2 Historical Background of Flood Mitigation

The historical background of flood mitigation in Germany is summarized as follows:

- Flood mitigation has been under the responsibility of local people living along the riverside areas under the jurisdiction of provincial governments, and the Federal Government is not concerned.
- The flood mitigation system is mainly attributed with less population in flood prone areas. Residence in flood prone areas has been recently started.
- In case of the Rijn River, a retarding basin has been provided upstream to cope with the increase of flood discharge resulting from river improvement. In the downstream, a retarding basin has been adopted to mitigate the flood discharge and to preserve the ecological environment.

1.6.3 Current Institutional Setup for Flood Mitigation

The present institutional setup for flood mitigation in Germany is outlined as follows:

- In Germany, the rivers are classified into Federal Channel and others, and are further ranked from one to three classes by the Federal Water Management Act.
- The framework of water management including flood mitigation is designated by the Federal Water Management Act.
- On the other hand, details of water management are provided under the provincial law in each province, based on which the province manages the river water.
- Flood mitigation works are under the management of the provincial government that formulates the flood mitigation plan. The management of federal channels and first class rivers is undertaken by the provincial government, while that for second and third class rivers is by counties, municipalities and dike unions.

1.7 Kingdom of the Netherlands

1.7.1 Governmental Framework

The governmental framework in Douche is outlined as follows:

- The governmental framework has been based on the constitutional monarchy.
- The present governmental administration is divided into central government administration and local government administration by provincial level and municipality level.

1.7.2 Historical Background of Flood Mitigation

The historical background of flood mitigation in Douche is summarized as follows:

- Historically, in Douche, Water Board has been organized since 1600's as a local autonomy organization to cope with the flood mitigation.
- The central government has a responsibility for planning and management for flood mitigation, while the responsibility for implementation and management of facilities is burdened by the Water Board.

1.7.3 Current Institutional Setup for Flood Mitigation

The present institutional setup for flood mitigation in china is outlined as follows:

- Flood mitigation is undertaken divided the areas into coastal zone and river line areas.
- The former zone is fully managed by the central government from planning to implementation.
- The management of the latter area depends on the scale of river basin. For a large scale river basin, the central government has a responsibility for planning,

but implementation and management are undertaken by provincial government or Water Board. For the other river basins, provincial government or Water Board has the responsibility from planning to implementation.

- The responsibility of flood forecasting is burdened by the central government.

1.8 People's Republic of China

1.8.1 Governmental Framework

The governmental framework in China is outlined as follows:

- After the establishment of the nation in 1949, China has experienced several periods of change: transition period to Socialism, great leap forward, cultural revolution decade, post Mao period and China modernization.
- The framework of the present organization was set up through promulgation of the constitution in 1954 and modified by the National People Representative Conference in 1988. The Central Government is composed of 41 departments and committees. The director of department corresponds to minister and chairman of committee broadly corresponds to vice-minister class.
- The local government is divided into 4 levels; China is divided into 30 administrative divisions in total, consisting of 22 provinces, 5 autonomous districts, and 3 direct control cities.

1.8.2 Historical Background of Flood Mitigation

The historical background of flood mitigation in China is summarized as follows:

- Until the enactment of the Water Law of the People's Republic of China in 1988, there had not been any law to stipulate the overall management of river water, while water management had been undertaken individually by agencies concerned, applying their own records.
- The Water Law was enacted for the effective utilization of water resources, mitigation of flood damage, fulfillment of people's demand as well as national economic development.
- In 1997, the Flood Protection Law, which specified the role of central and local governments on flood mitigation, was enacted in the Standing Committee of the People's Representative Conference and was in force in 1998.
- By the enforcement of the Flood Protection Law, flood mitigation works were successfully conducted for the 1998 flood mitigation in the Chang Jiang Yangtze River.
- As in case of Yangtze River, related Provinces shall remove lake embankment so as to increase lake area for 2,900 km² and 1.9million people will be moved to a place for building new towns.

1.8.3 Current Institutional Setup for Flood Mitigation

The present institutional setup for flood mitigation in china is outlined as follows:

- The Ministry of Water Resources (MWR) which is composed of 14 agencies and departments in the Central Government level undertakes water management including flood control.
- The MWR has branch offices throughout the country: seven (7) institutes of design and seven (7) work bureaus for supervision. Construction work is undertaken by bureaus of construction.
- The water management of seven major river basins is undertaken by the central government, while that of tributaries of major rivers that flow in two provinces is undertaken by the river basin authority like a water committee.
- The other rivers are managed by the agencies concerned in each local government: agency of water resources in the provincial level and department of water resources in the prefecture level.
- Flood mitigation is undertaken by the National General Command of Flood Protection under the command of the Vice Prime Minister with the support of the Director of MWR and other officers concerned. Though the Command is officially an ad-hoc committee, it functions as a permanent committee in practice.
- In the local government the flood control authority provided in each local level such as province, town and city undertakes flood mitigation. The chief of the local government plays the role of commander of flood mitigation works.

1.9 Kingdom of Thailand

1.9.1 Governmental Framework

The governmental framework in Thailand is outlined as follows:

- After the constitutional revolution in 1932, the governmental framework has been based on the constitutional monarchy.
- The present governmental administration is mainly divided into central government administration and local government administration.
- The central government, which is featured with centralization, composed of 14 ministries and several agencies. The ministry of Interior, which is one of the key ministries concerned with local government and local autonomy body, has a huge power to general national administration.
- The local government is classified into three levels: the branch office of the central government under the administration of the governor such as province and local autonomy body such as BMA and autonomy municipality called Tethabaan.

1.9.2 Historical Background of Flood Mitigation

The historical background of flood mitigation in Thailand is summarized as follows:

- River basin development in Thailand has a long history when the first master plan for the lower Chao Phraya was established in 1903.

- Since then, several large-scale projects were carried out, as multi-purpose projects including reservoir construction for hydropower generation, agricultural development and flood control purpose.
- Since 1970's, river basin development focused more on medium and small-scale projects mainly for single purposes, many of which were designed for irrigation and some for flood control.
- Through the past experiences, a new system of water resources management in the country was introduced; all the river basins were classified into 25 hydrological units called "river basins" for better management.

1.9.3 Current Institutional Setup for Flood Mitigation

The present institutional setup for flood mitigation in china is outlined as follows:

- So far the projects implementation and operation and maintenance works in the major rivers have been undertaken by several agencies concerned amounts to 7 ministries and 30 departments.
- Among agencies concerned, Royal Irrigation Department (RID) has been mainly engaged in the flood mitigation works in major rivers, while BMA has been concerned with the flood mitigation works in Bangkok Metropolitan Area.
- Flood protection works of major urban areas are undertaken by Public Works Department (PWD).
- RID manages the river basin dividing the whole country into 12 districts, in each of which branch offices are provided.
- There is no law enacted to comprehensively manage the river basin, and major law to manage the water in the river basin is State Irrigation Act which stipulates the river management from the irrigation aspect.
- To comprehensively manage the river basin including flood mitigation, enactment of Water Resources Act is under process. In the water resources act, establishment of the river basin committee is stipulated.