

With regard to flood mitigation and urban drainage, the Constitutional and legal bases for the assignment of responsibilities to existing agencies need to be established by law. In addition, there is no law governing groundwater abstraction and management.

8.4 Need for a National Water Resources Code

Present and future water resources development and management would require a series of integrated and coordinated actions by the Federal and State Governments in the planning, construction and operation stages. The existing legislation is inadequate to define the functions and responsibilities of the Federal and State Governments and there are no procedures and rules in relation to the actions to be taken by the Federal and State Governments in this respect.

The entire range of water matters cannot be dealt with by States alone. In practice, many of these require coordinated actions by the Federal, State and Local Governments in terms of jurisdiction, institutional arrangements as well as financing arrangements. Since law is an indispensable instrument for the efficient implementation of water resources policies and plans and since there is a need to promote uniformity among the water-related laws enacted by State Governments it is recommended that a comprehensive national water resources code be enacted.

8.5 Proposed Framework of National Water Resources Code

The proposed framework of the national water resources code comprises the following:

- (1) policy statement, relationship to other public policies and responsibilities of Federal, State and local Governments;

- (2) institutions for coordination of planning and integrated management of water resources projects;
- (3) planning system, procedures and criteria for planning and coordinating multipurpose/inter-state water resources development projects;
- (4) setting up of the National Water Resources Development and Management Corporation;
- (5) guidelines and basic rules for river water management;
- (6) policy in relation to the well-being of people who are adversely affected by water resources development projects; and
- (7) financing arrangements.

9. FURTHER STUDIES

9.1 Need for Further Studies

The National Water Resources Study has been organised to address cardinal water issues and their implications based on an overview of water resources, present and future needs and problems rather than dealing with specific projects. The Study has been directed to formulate a framework for the development of water resources in an orderly and timely fashion, to solve water shortage problems and to meet future needs. The Water Resources Development and Use Plan presented in volume 2 of the Report gives a notional program for water resources development and use, which is based on the National Water Policy and assumed targets as discussed in Chapter 3, future problems and needs and availability of resources. In order to develop this notional program into firm, medium-term water resources development programs at national and regional levels further studies need to be conducted. The objective of such studies is to formulate water resources master plans, prepare specific water resources development programs, identify projects, carry out pre-feasibility studies of these projects, determine their priority ranking for implementation, and implementation schedule.

The studies should be undertaken by the proposed Federal Water Resources Division and State Water Resources Divisions together with the departments and agencies concerned as a continuous exercise. The National Water Resources Master Plan and Regional Water Resources Master Plans in particular should be updated regularly in response to changing conditions and requirements in development.

9.2 Immediate Studies

In the course of the study, a number of pressing water shortage problems and other issues have been identified and these require early solutions. Immediate studies in respect of these should be undertaken with a view to formulating specific programs and projects or measures for early implementation.

9.2.1 Regional water resources master plans

The Study has identified four major water-stress regions and these are the Perlis/Kedah/Pulau Pinang region, the Klang valley region, the Melaka/Muar region and the south Johor region. Regional water resources studies should be initiated to develop specific programs and projects to resolve present problems and to meet future needs in these regions.

The Perlis/Kedah/Pulau Pinang region is facing a serious water shortage problem at present. As a result of the large acreage of paddy brought under intensive cultivation, irrigation water demand takes up the major share of the water resources in the region. In addition, population increase and industrial expansion, particularly in the State of Pulau Pinang have created heavy demand for water. Periodical water shortage is being experienced in this region and the problem will continue to grow with increasing demand. Irrigation water demand in the region has been projected to increase from 2,780 million m³/y in 1980 to 3,050 million m³/y in 2000 and the domestic and industrial water demand in the region has been projected to increase by 3.5 times from 1980 to 2000, that is from 180 million m³/y to 630 million m³/y.

The Klang valley region is the most densely populated and industrialised region in the country. Within the region are the city of Kuala Lumpur, the capital of Malaysia, Shah Alam, the capital of Selangor State, Petaling Jaya and Port Klang which are respectively one of the largest industrial

areas and one of the largest ports in the country. The total population of the above 4 urban centres was about 1.5 million and the gross value of manufacturing output amounted to M\$6 billion in 1980. As such, the demand for domestic and industrial water supply is naturally high and is rapidly increasing. Thus, the water demand has been projected to increase from about 370 million m³/y in 1980 to about 1,090 million m³/y in 2000.

As more than readily available portion of water resources within the Klang Valley itself has already been committed for use, additional sources, initially outside the valley and later outside the state will have to be developed. Plans should be prepared now to firm up the development programs to avoid the problem of a major water shortage in the near future.

The Melaka/Muar region has been identified as one of the region having the most severe water shortage problem. Due to increasing water demand and the lack of suitable storage dam sites, the State of Melaka will face serious water shortage by 1985. As all the available water within the State has been developed, the future water demand has to be met from the Muar river flowing through the States of Pahang, Negeri Sembilan and Johor. In addition, within the Muar river basin, there are 3 main urban demand centres namely Kuala Pilah, Segamat and Muar as well as about 7,000 ha of minor irrigation areas.

In order to meet the water requirements in the region, a notional plan has been proposed, whereby water would be diverted from the Muar river for use in Melaka, and the construction of two storage dams for supplementing the flow in the Muar river. This proposal should be studied at the earliest possible date to avoid a water crisis in the region.

Under the existing agreements between the State of Johor and the Government of Singapore, about 198 million m³/y of water is being supplied to the latter from rivers in the south Johor region. The maximum quantity to be abstracted as stipulated in the agreements is 414 million m³/y. Water demand in the region within the State of Johor has been increasing rapidly as a result of population growth and industrialization, and has been projected to increase from about 65 million m³/y in 1980 to about 270 million m³/y in 2000, an increase of about four times.

The present supply from three existing storage dams and the natural flow in the rivers are insufficient to meet future demands, and as such, four additional storage dams plus two barrages have been proposed for construction by 2000 in the region and they should be investigated as soon as possible.

9.2.2 Groundwater exploration for Sarawak coastal area

The Sarawak coastal region, especially the rural areas, suffers from serious water shortage problems, particularly during the dry season. The rivers along the coastal zone are all affected by sea water intrusion and cannot be used as fresh water sources for water supply. As such, collection of rain water and water from small streams are the only means of obtaining fresh water for domestic use, but even these are not available during the dry season. The region was badly affected by droughts in 1972, 1979 and 1981 when over 100,000 persons suffered from lack of water. The drought situations were further aggravated by outbreaks of cholera and dysentery in the region as a result of lack of safe water supply.

Groundwater exploitation has been identified as a possible measure for the development of a reliable domestic water supply system in the region and is recommended for early detailed study.

9.2.3 Power development master plans for the States of Sabah and Sarawak

The existing power development plans of SEB and SESCO can meet the power demand in the States of Sabah and Sarawak up to the end of this decade. Overall hydroelectric potential in Sarawak has been estimated to be over 20,000 MW and the Upper Rajang Hydroelectric Development Project is being studied to develop hydropower of 4,550 MW in the upper Rajang river. Since there will be a long lead time before the Upper Rajang Hydroelectric Development Project is operational, the power demand for the period from late 1980s to the commissioning of the Upper Rajang Project in Sabah and Sarawak will not be met. There is therefore a need to extend the existing power development plans to cover up to 2000. Potential hydropower dam sites have been identified, but they have not been studied in sufficient detail for inclusion in the development program. It is recommended that power development master plans for the States of Sabah and Sarawak be formulated.

9.2.4 Basin plans and feasibility studies

Apart from those included in the recommended regional master plans in Sub-section 9.2.1, there are 12 river areas where source facilities should be implemented for the commission by 1990. Among them, the following 3 areas need immediate action for feasibility studies including basin water resources master planning.

Rivers in the vicinity of Port Dickson are too small to meet the town's water demand which will grow to 65 million m³/y by 1990 and 104 million m³/y by 2000, even if water intensive industries do not expand beyond 1985. Possible water source will be the Teriang river, a tributary of the Pahang river.

Population in Kota Kinabalu including its suburbs is growing high and will reach 211,000 by 1990 and 364,000 by 2000. The existing intake in the Moyog river and a diversion system from the Tuaran river to be completed by 1983 will be insufficient to supply the increasing population in the dry season. Storage development in the Papar river and diversion of water to Kota Kinabalu is necessary. If this storage and diversion project is implemented, power generation can be included for more stable and reliable power supply to Kota Kinabalu.

Total exploitable water resources within Labuan island are 11 million m^3/y including 7 million m^3/y of groundwater and 4 million m^3/y of surface water, while domestic and industrial water demand within Labuan island will grow to 12 million m^3/y by 1990 and 24 million m^3/y by 2000. Diversion of water from the Padas river by submarine pipeline is necessary.

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