

Towards Integrated Water Resources Management Approach in Malaysia: A Case Study in Pahang River Basin

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Abstract

Pahang River Basin (PRB) is an important watershed for agriculture and aquaculture, and commercial and smallholder aquaculture projects that are scattered throughout Pahang State. There are more than 200 ha. has been identified as suitable for further projects in the western part of Pahang. This study aims to identify the existing management system of water resources in the PRB. This paper discusses the status of water resources management in PRB by using thirteen IWRM components, which have been suggested in "GWP toolbox for IWRM 2004". The findings show that most of the IWRM components are available in the water resources management system of PRB but they are not comprehensive. The implementation of IWRM needs acceptance and commitment from all related stakeholders. This study shows that the participation level of non-governmental groups is low in the current system. It could be a hindrance for IWRM implementation in PRB. Commitment and conviction from all related stakeholders are essential to implement IWRM successfully in PRB.

Key Words: Integrated Water Resources Management/ Sustainable Development/ Institutional Framework/ Legislation/ Pahang River Basin, Malaysia

1. Introduction

Fresh water resources are essential components on the earth and are needed in all aspects of life. Water resources management has become critical as the consequences of growth of population and increased economic activities are bringing an increasing demand for fresh water. Due to indiscriminate development through various human activities, much water resource is being wasted, polluted and abused (Mokhtar, 2003). As pressure on water resources increases, traditional water resources management, which is based on sectoral approach will lead to fragmented and uncoordinated development and management of the water resources. Therefore, an integrated approach for water resources management

such as Integrated Water Resources Management (IWRM) is important to be implemented to manage this vital fresh water and its related resources (Dungamaro et al., 2003).

Global Water Partnership (GWP) defined IWRM as a process which promotes coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems (GWP, 2000). World Summit on Sustainable Development (WSSD) also called for countries to develop Integrated Water Resources Management and Water Efficiency Plans by 2005 to support

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countries for their sustainable development. Except for some developed countries and a few developing countries, achievement in the adoption and preparation of IWRM and Water Efficiency Plan is far behind the stipulated target (GWP, 2004a). According to the report of Global Water Partnership, Malaysia is in the process of preparing national strategies or plans but still require further work to live up to the requirements of an IWRM approach (GWP, 2006). The United Nations Environmental Program (UNEP) has produced Malaysian National Report in 2006 in which lessons learned in implementing IWRM in Malaysia was documented in accordance with three pillars of enabling environment, institutional role and management instruments and is the main basis for this case study. Based on key change areas, a further assessment is carried out to link it to the National Vision 2020 target to attain the status of developed nation by 2020. Developed nation status cannot be achieved without sustainable development which is heavily anchored on successful IWRM implementation at least right from the river basin level.

This study aims to identify the existing management system of water resources within context of IWRM in the Pahang River Basin, Malaysia. The findings of this study can be useful reference among decision-makers and future researchers in ensuring good water resources management in the State of Pahang. The information generated from this study also could be used to facilitate the social change required to improve the public awareness for the successful implementation of IWRM in Pahang River Basin as well as other river basins in Malaysia.

2. The Study Area

The Pahang River Basin in Peninsular Malaysia is one of the most important basins in Malaysia. The main river in Pahang River Basin is Pahang

River, which flows for a length of 440 km and is the longest river in Peninsular Malaysia. The Pahang River Basin (PRB) is a catchment area of about 27,000 km², with longitude of 101° 30' E - 103° 30' E, latitude 3° 00' N - 4° 45' N (Goh, 1999). It consists of five sub-basins and they are Pahang River Basin, Bertam River Basin, Bekapor River Basin, Mentiga River Basin and Bera River Basin. The catchment's area spans seven districts in Pahang which are Maran, Jerantut, Bentong, Lipis, Temerloh, Bera and Cameron Highland and one sub district in Kuantan, eleven sub districts in Pekan and also two districts in Negeri Sembilan State which are Jelebu and Kuala Pilah (Government of Pahang, 1973).

Water resources in this PRB is also important for agriculture and aquaculture, and commercial and smallholder aquaculture projects that are scattered throughout Pahang, and more than 200 ha has been identified as suitable for further projects in the western part of Pahang. In the Pahang State, there are many areas, which are possible to be established as large estates for the cultivation of fruits or vegetables on commercial scales (Economic Planning Unit, 1992a). The climate of PRB generally is hot and wet with an average annual rainfall between of 2,000 - 3,000 mm. Central Mountain Range bounds PRB along its western side and East Coast Range in the North-East. Pahang River Basin has three main wetlands; and these are Tasik Bera, Tasik Chini and a series of lakes on the Lepar. Bera Lake is a lowland freshwater swamp system with an area of approximately 6,150 ha of wetland with a watershed of some 61,383 ha (Furtado et al., 1982). The swamp drains northwards into the Bera River, which continues to flow northwards to join the Pahang River, which discharges into the South China Sea. At present, the Semelai community is living in the area within the Bera River Basin, which is a sub-basin of Pahang River Basin. Besides,

another popular lake basin - Chini Lake, it is the second largest freshwater lake in Malaysia with an area of 20 ha in the district of Pekan and 700 ha of fresh

water and swamp forests (Economic Planning Unit, 1992b). Figure 1 shows the location of Pahang River Basin and its' river system.

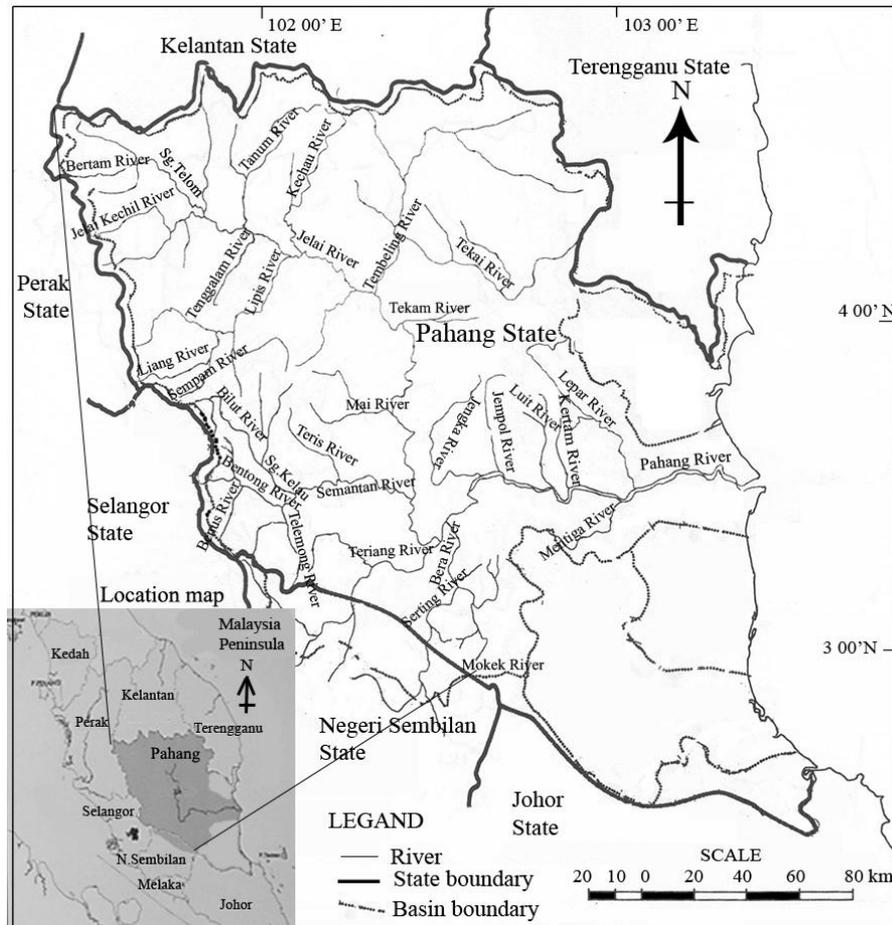


Figure 1: Location of Pahang River Basin and its' river system (Source: Government of Pahang State, 1973)

3. Data Sources and Analysis

This study was conducted via four levels which were the (i) literature review, (ii) field research (interview session), (iii) information and secondary data synthesis, (iv) discussion and recommendation.

Documents reviewed included national development plans and policies (8th and 9th Malaysian Plan, National Environmental Policy, National Biodiversity Policy, National Forestry Policy and National Agricultural Policy); local

development plan (Pahang State Structure Plan); provincial laws and related technical agencies annual reports (e.g Department of Environment, Department of Irrigation and Drainage, Town and Country Planning Department, Forestry Department, Wild life and National Parks Department, Mineral and Geosciences Department, and Pahang Water Supply Department). These documents were analysed for the evaluative criteria of IWRM components, which were extracted from by Global Water Partnership IWRM Guideline

(GWP 2004b). Analyses included objectives, practices and procedures of water management in PRB.

Besides, the formal interview sections were conducted with seven officers from government technical agencies and four knowledgeable individuals from Non-governmental Organizations. These interview sessions were conducted around the evaluative criteria questions for selected IWRM components which are (i) Related policies to the water resources (ii) Legislative framework (iii) Financial structure of water resources management (iv) Institutional framework (v) Institutional capacity development (vi) Water resources assessment and monitoring (vii) IWRM implementation plan and initiatives (viii) Water demand managements (ix) Social change instruments (x) Conflict managements (xi) Regulatory instruments (xii) Economic instruments (xiii) Information management and exchange mechanism.

4. Discussion

4.1 *Related policies to the water resources*

Policies are the frameworks in which fresh water and other related resources can be managed to ensure good co-ordination between agencies of water management such as in managing surface water, ground water and waste water throughout the entire basin. Appropriate policies such National Policy on the Environment, National Policy for Biodiversity, and National Policy for Forestry, are currently available to address complex issues that are related to water resources, including assessing the relative environmental, economic and social values of water; assessment of social impact; restoring and protecting the quality of fresh water.

There is lack of comprehensive policy on water resources development

and planning in Pahang River Basin but it is covered by sectoral policies such as the National Policy on Environment (NPE), Third National Agriculture Policy (NAP), National Policy on Biological Diversity (NPBD) and National Forestry Policy (NFP). Although there are no water resources policy is available at local level but the goals for water use, protection and conservation have been covered by several related national policies. The main objective of these policies is to conserve and protect water resources and related resources in a sustainable manner. Overall, environmental and natural resources management has been guided by the National Policy on Environment which is formulated to aim at promoting social-economic and cultural progress through sustainable development. The main factors for degradation of biodiversity in catchment's area are human activities, pollution, habitat destruction and over harvesting. In order to maintain animals and plants in their original habitats, Malaysia Cabinet had endorsed the National Policy on Biodiversity in the Year 1995 to ensure the long-term food security and conservation of the unique biological heritage. Besides, 3th NAP (1992-2010) was formulated to transform the agriculture sector into a modern, profitable sector with sustainable natural resources use.

4.2 *Legislative framework*

In Malaysia, Federal Constitution 1957 is ranked supreme all over the nation. The relationship between Federation and State governments are stipulated in the Federal Constitution. The water resources related laws and the enforcement agencies are not exceptional and they function within the constitutional framework. There are three lists under the existing Ninth Schedule of the Federal Constitution 1957. They are Federal List,

Concurrent List and State List. These lists distribute the legislative power between Federal and State Government. Generally, 'water' is a state matter, which is enumerated in the State List. The water activities such as watershed management, water resources development and management, navigation, fisheries and mining are enumerated in the State List.

In the State of Pahang; there are overlapping functions and enforcements between government agencies and Local Authorities (Local Government). The problem is further aggravated, as there are 13 Local Authorities working independently within Pahang River Basin and each has its own needs and political influence. There is no water resources act in Malaysia, however, the Environmental Quality Act, 1974 (EQA, 1974) which was formulated to protect the environment, is enforced through inspection, monitoring and reporting by Department of Environment. Local authorities can play an important role to implement IWRM activities such as awareness and monitoring programmes within local watersheds and promoting water security at local level. Although existing comprehensive legislation framework in Malaysia, there lack of provision such as Selangor Waters Authority Management Enactment to establish a state level water resources management organisation in Pahang State.

4.3 Financial structure of water resources management

In the State of Pahang, federal government is the main financial provider to the state government for development, operation and maintenance of infrastructures of water resources. Under the Federal Constitution Article 96 to Article 107, all revenues and moneys received by the federation and state government shall be paid through the Federal Consolidated Fund and State Consolidated Fund for any

development projects. Normally, the development budget is arranged through the Malaysia Five-Year Plans, which are coordinated every five years by the Ministry of Finance through National Finance Council.

Within these funds, development projects which are related to water resources development can be categorized into seven groups such as (i) Federal Direct Project (rural water supply, drainage and agricultural irrigation, water resources quality control); (ii) Federal Loan Project (urban water supply, rural drainage, hydropower generation, and sewerage); (iii) Federal Grant Project (rural water supply); (iv) State Direct Project (urban water supply, drainage and agricultural irrigation), (v) State Loan Project (hydropower generation); (vi) State Grant Project (water resources quality control); (vii) Federal Reimbursable Project (drainage and agricultural irrigation). The existing long-term commitment from Federal Government to Pahang State Government providing major financial resources helped to ensure the successful implementation of the IWRM approach.

4.4 Institutional Framework

Federal and several state government agencies are carrying out water resources management tasks in Pahang River Basin. 'Water' is a matter under the state agencies; they are responsible on operation and maintenance, and water supply infrastructure development. The Federal agencies are responsible for research, planning and development of water resources. These activities are being performed by Department of Environment (to monitor water resources, to develop, review and document related guideline, to process the license along the EQA 1974); Department of Irrigation and Drainage (to develop water resources for irrigation); Department of Agriculture (to

land use); National Parks and Wildlife Department (to protect flora and fauna of the reserved forests); Malaysian Meteorological Services Department (to generate hydrological data); Forestry Department (to safeguard water resources and environment quality of the protective forest); Local Government (to protect water resources within local area); Town and Council Planning Department (to develop local development plans) and Ministry of Energy, Green Technology and Water (to supervise water services along the Water Services Industry Act 2006). These departments and agencies have been given power under certain provisions to take action for water resources management activities in PRB.

This study found that the current PRB water resources management system was not involving related community based organization (CBOs) and non-governmental organizations (NGOs) in planning and development of water resources. The community based organizations especially local community associations and indigenous communities were seldom involved in government decision making. Although some programs were giving opportunities for participation but CBOs and NGOs were not involved in decision making for water resources planning and development. These stakeholders were only involved to implement awareness programmes that are related to importance of water resources. An effective management practice requires a strong organisation framework, which involved various stakeholders. This is important to ensure or improve effectiveness of co-ordination mechanisms between Federal and State Government agencies, CBOs, NGOs and water management authorities. Hence, responsibilities of various stakeholders should not be ignored with in an appropriate institutional framework.

4.5 Institutional Capacity

Building institutional capacity is an integrating concept to combine policy, legal, institutional and human resource issues in a holistic manner towards sustainability of water resources management (Hartvelt, 1999). The categories of capacity building should include awareness programs, educational and training courses, to improve the capabilities and skills of institutions, in order to develop skillful decision makers, water managers and professionals towards a sustainable development (Babel et al., 2001). Currently, several activities which are related to IWRM were held by government in cooperation with various institutions e.g. Malaysian Water Partnership (MyWP), Global Environment Centre (GEC), World Wide Fund for Nature Malaysia (WWF), Wetlands International Malaysia (WIM) and South East Asia Technical Advisory Committee (SEATAC). These agencies are playing the important role for capacity building in Malaysia through conferences and workshops such as the Malaysian Water Week; Environment Week Malaysia and IWRM Study Workshop for Kelantan, Terengganu and Pahang States.

The insufficiency of manpower in the enforcement and monitoring section is the main hindrance towards integrated approach in water resources management in PRB. Cases such as illegal logging activities in PRB were indicated the problems of manpower in the enforcement and monitoring section, Forestry Department. Besides, the Department of Environment (DOE) Pahang State branch also is lacking of enforcement officer that is charged with the management and enhancement of the water resources. Without sufficiency of manpower and personnel, the water resources system led to an inefficiency level. Such inefficiency could wear down the public confidence and support in

governmental agencies. Finally, sustainable and integrated management would not be implemented in PRB.

4.6 Water Resources Assessment

In Malaysia, any development project or activity which has been prescribed in Environmental Quality (prescribed Activities) (Environmental Impact Assessment) Order 1987, needs an EIA study. This EIA study is to assess the overall impact on the environment by development prescribed activities. The EIA report has to be submitted to the Director of General of Environmental Quality for approval before implement the development project. According to EIA guideline (DOE 1994), there are nineteen prescribed activities in the schedule and the EIA generally determine the significant residual environmental impact and benefit of the project to the community, as well as the necessary environmental control and mitigation measures.

A successful water resources management requires a comprehensive water resources assessment to identify and assess existing and potential future water resources problems. Water resources assessments include Environmental Impact Assessment (EIA), Social Assessment, Demand Assessment and Risk Assessment. Besides that, monitoring and gauging systems are needed for assessment of water resources availability, quality and long term changes in water use, climate and land use, in order to indicate the need of resources to be allocated for the investment, operation and maintenance. These must be based on up-to-date data and knowledge to avoid any unnecessary delay of implementing management improvement. Without reliable information systems, the impact of environment and necessary mitigation measures could not be implemented effectively.

4.7 IWRM Implementation Plan

At national level, IWRM approach has been promoted in Eighth Malaysia Plan (2001-2005) and Ninth Malaysia Plan (2006-2010). The main purpose of the promotion is to manage water resources in a sustainable and equity manner. Although the IWRM action or strategy plan was not formulated in the PRB, but the Study on Effective Implementation of IWRM in Malaysia was conducted by DID in cooperated with Dr. Nik & Associates Consultant and Pacific Environmental Consultants (DID, 2008). The objectives of this study were (i) to identify the package and information modules for the stakeholders; (ii) formulate the action plan for capacity building; (iii) to identify the pilot project/river basin and propose the IWRM implementation plan. IWRM implementation plan is very important which includes vision and mission, objectives and series of activities, which were proposed to implement IWRM in a river basin.

4.8 Water Demand Managements

This study found that Pahang is one of the state has reached a high percentage of non-revenue water (NRW) in Malaysia which is 38% in 2000, 43% in 2001, 48% in 2002 and 47% in 2005 (MWA, 2003; Malaysia, 2006). These data are a significant and show insufficiency water demand management in Pahang. In the Ninth Malaysia Five Plan, water demand strategies have been promoted to overcome the NRW problem in Malaysia. The national NRW reduction program includes strict enforcement against water stealer; pipe and water meter replacement; Geographical Information System mapping of distribution network; rehabilitation of distribution systems and upgrading of existing water treatment plants. Besides that, water users would be

encouraged to use water saving devices and appliances such as dual flushing system, 6 liters toilet flushing systems in building, and tax rebates for industries that recycle water. These activities are expected to reduce water demand and towards water resources protection.

Demand management is a major activity in the IWRM approach, which shift to an improvement in efficiency of water uses, protection and recycling. This activity seeks at a change in demand and the way of water users. However, many strategies for water demand were promoted in national level but the effectiveness of these strategies still has not been reviewed yet. In addition, water demand policy and guideline for water users should be established to improve the efficiency of water demand management.

4.9 Social Change Instruments

Various programmes and campaigns have been launched since 2000 by Malaysian Government Agencies and NGOs. For example, MyWater Voice forum, which was launched on 2004 in the Ministry of Energy, Green Technology and Water's official website were put up online for discussion. The purpose of this forum is to ensure that coordination has been guaranteed between the government and local community in water service matters and it provides a platform for the public to state out their opinion in water supply and sewerage services in Malaysia. Besides, the Malaysian Environmental Week (MEW) in Pahang State is a major awareness program that has promoted the importance of environmental conservation to private sector and local community. Moreover, the *Bandar Lestari-Anugerah Alam Sekitar* programme (Sustainable City Award) was launched in 2005 to encourage local authorities to adopt environmentally friendly practices, and Kuantan, capital of Pahang emerged as

the first recipient. Other activity such as *Sekolah LESTARI* (Sustainable School Award) program is major event for school administration officers and students, in order to deliver the concept of sustainable development and importance of water resources to this group of stakeholders.

This IWRM component is important to change the attitude of policy makers, water managers, water users and local community association. A holistic approach always involves the pertinent stakeholders. The successful forums of discussion and awareness programmes are opportunities for stakeholders to be involved and this can be a step towards integrated and sustainable water resources management.

4.10 Conflict Managements

Integration between land and water resources in watershed management is important in managing water allocation conflict. Various water-related stakeholders were identified in present water resources development and management systems. This requires suitable mechanisms or institutional platforms to overcome water resources competition issues or conflicts. Consensus building and conflict management are important components to implement IWRM successfully. Conflicts can occur in many areas such as responsibilities, functional overlaps; ambiguous jurisdiction; incompatible objectives and methods. Five existing coordination systems in PRB have been adopted, such as (i) committee systems, (ii) council system, (iii) bilateral consultation, (iv) specific coordination unit and (v) statutory system.

At national level, different aspects councils have established under the Federal Constitution and examples are the National Finance Council (NFC) and National Council for Local Government (NCLG). The main function of NFC is to be consulted for financial matters by Federal Government. The Ministry of

Housing and Local Government is the secretariat to the NCLG, which is concerned with the matters pertaining to Local Government. Beside these two constitutional councils, several councils were established for planning and implementing water-related development projects at national and local levels. These councils such as the National Development and Planning Council (NDPC), and National Action Council (NAC), Implementation and Coordination (ICU), were formulated to discuss and approve proposed water-related development plans at national level. Besides that, Pahang State Government have established the State Planning Council, State Action Councils, State Security Council and various committees or steering committees which responsible for planning and policy formulation, plan and review the relevant environmental issues such as drainage and irrigation, river basin study, water supply and sewerage, and hydropower generation project. In Malaysia, the Committee of Ministers and State Executive Councilors Responsible for the Environment (MEXCOE) was formulated and the secretariat by DOE. MEXCOE is a committee to coordinate the competition and conflict in water resources related matters between Federal Government and State Government or between State Governments.

4.11 Regulatory Instruments

Three types of regulation are common as regulatory instruments, which are Regulation for Water Quantity; Regulation for water Quality and Regulation for Water Services. In this research, some of the legislations were identified as important for Regulatory Instruments. The Water Act 1920; Sewerage Services Act 1993; Street, Drainage and Building Act 1974; Environmental Quality Act 1974, and

Local Government Act 1976 are the main legislations for the water quality. These legislations were formulated to prevent, control of pollution of the atmosphere, soil, inland waters and sea; and enhance the environment and improving sanitation of public. In addition, the Sewage and Industrial effluents Standard; Malaysia Water Quality Standard; EIA guidelines 1987, Malaysia Sewerage Industry Guideline (under review), and Storm-water Management Manual (MASMA) were promoted in order to assess the private sector and public in related water quality matters (DOE 2000).

Besides, the Irrigation Areas Act 1953; Drainage Works Ordinance (E.M. Ord1) 1954; and Water Act 1920 were formulated to regulate the water uses in Pahang State. These legislations have provided the power of State Authority in provision of water allocation for domestic, industrial and agricultural purposes and to control the interference of irrigation work. Water Services Industry Act 2006 is only one regulation to supervise the water industry. This legislation was formulated to that ensure water service providers are subjected to the water quantity and quality regulations and meeting up to the specified standard.

Direct regulation can work if the capacity of enforcement is sufficient and this depends on Institutional Capacity. Regulatory Instruments could not be implemented individually and the efficiency of this component cannot be guaranteed without having a sufficient capacity of enforcement agencies.

4.12 Economic Instruments

Based on the MWA (2003), the water pricing system for Pahang state was set according to three basis approaches, (i) Higher rates for higher of volume water consumption to discourage wastage; (ii) Cross-subsidy for domestic water users by industrial water users; and (iii)

minimum lifeline rate, which meet the ability to pay by lower income users for covering basic need of water for domestic purposes. In the State of Pahang, the average domestic water tariff is RM0.57 m⁻³ (for the first 35 m³), and average for industrial water tariff is RM 1.45 m⁻³ (for the first 500 m³). Pahang State Government has not reviewed these water rates since 1983. According to Lim (2006), Pahang State is one of the top three states having heavy debt to Federal Government in the matter of water industry, which is RM 10,534,306. Pahang River Basin is a catchments' which is rich of water resources (80 thousands million m³ annual rainfall) in Peninsular Malaysia but the water debt may reveal the ineffectiveness of water management in Pahang State.

According to the provision of Environmental Quality Act 1974 (section 35A), DOE is the main enforcement agency to monitor and charge to any person who contravenes any sub-regulations under EQA 1974. License fee and fine for illegal offences are saved in a fund called the Environmental Fund, which is operated as a Trust Fund Account within the Federal Consolidated Fund. This fund is used in three main ways, (i) to conduct or coordinate a research in relation to pollution and prevention; (ii) to recover, remove of pollutant; and (iii) to encourage conservation measures.

In order to ensure the success of application of economic instruments, appropriate standards, effective administrative, monitoring and enforcement bodies, institutional coordination, and economic stability are required (GWP 2004b), therefore this IWRM component will be effected or effect directly to other components such as Institutional Capacity; Conflict Management; and Regulatory Instruments. The notable examples for economic instruments are tariffs and subsidies, water prices and taxes, fees and

fee structures, and water market. Full supply pricing of water supply should be followed and full economic costs should be recovered in industry sectors to ensure sustainability and survivable of investment of service providers. Moreover, the subsidy system should be transparent and financial linkages between water users and management agencies. The required taxes should be applied in a sustainable way to reflect environmental consideration. Fee structures should be based on higher unit cost prices for high volume users and this can contribute to a sustainable financial capacity of water authorities.

4.13 Information Management and Exchange

Various Federal Government agencies are involved in collection and documentation of data, which is related to water resources management in Pahang River Basin. The Department of Irrigation and Drainage developed the National River Basin Decision Support System (NRBDSS) and part of the system is to support the Malaysia Geospatial Data Infrastructures (MyGDI). NRBDSS was developed to integrate river basin (include PRB) information in Malaysia into an effective decision support system. The Rio statement on sustainability has emphasized the importance of information to facilitate decision-making in water resources management (GWP 2004a). An openness and transparent information sharing between national territories is a key to achieve a successful IWRM approach. The availability of information on hydrological, biophysical, economic, and environmental characteristics are able to make better policy decisions and predict important responses in the basin. In order to achieve an effective participatory process, the availability of relevant information such as up-to-date records and data for all water aspects is an essential precondition. The failure of this

component would effect to other IWRM component such as Water Resources Assessment and resulting in an ineffective decision-making.

5. Conclusions

Increased water demand from population and economic growth, environmental needs, uncertain climate changes, and deterioration of water quality will continue to be important water issues in river basins. Holistic approaches and integrated management principles such as IWRM are needed to develop a sustainable environment. During the implementation of IWRM, the non-governmental stakeholders such as NGOs and CBOs should not be excluded in any decision making of water resources development planning. In Pahang River Basin (PRB), the elements of IWRM are already in place but not comprehensive for sustainable development of water resources and other related resources. The insufficient institutional capacity is the major gap in IWRM framework. Building capacities of institutions and public are the key to successful translation of IWRM from fragmented approach. Therefore, upgrading the management skills of core stakeholders and increasing the human resources for regulatory bodies are initial steps before implementation of IWRM in PRB.

The mechanism for decision-making of the water resources planning and development should involve all stakeholders. In order to succeed in collaborative decision-making, any proposed development plan for PRB should be thoroughly discussed by all stakeholders including indigenous community. Commitment building and collaboration among government agencies, NGOs, CBOs, private sector and public can be encouraged by establishing the Pahang River Basin Advisory Committee (PRBAC). This committee is a Pahang River Basin

management organization, which maintains community interest, participate and support in water resources planning and development program.

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