

Water Resources Management in Malaysia

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ABSTRACT: The paper traces the development of water resources management in Malaysia. It outlines some inherited institutional problems and the challenges Malaysia faces in implementing Integrated Water Resources Management (IWRM). It looks also at efforts in containing the negative impacts, amongst which are the various policy and institutional developments and initiatives

1. INTRODUCTION

Malaysia, located between longitude 100° and 119° East and latitude 1° and 7° North covers an area of about 330,000 km². Peninsular Malaysia covering 131,598 square kilometers, has its frontiers with Thailand in the north and Singapore in the south, while Sabah with an area of 73,711 square kilometers and Sarawak about 124,449 square kilometers, border the territory of Indonesia's Kalimantan province. About 22% of the land in Malaysia is utilized for agriculture while township, mining activities and other uses take up another 10 percent, leaving 68% under forest cover. Malaysia is a multi racial country with population of over 23 million, currently growing at a rate of 2.4 percent per year.

2. WATER RESOURCES STATUS

2.1. *Climate*

Lying within the equatorial zone, Malaysia has an equatorial rainforest climate. The Northeast monsoon prevails between November and January, bringing heavy rainfalls predominantly to the east coast of Peninsular Malaysia while the Southwest monsoon prevails during April and May for Peninsular Malaysia and between May and July for Sabah and Sarawak.

The average daily temperature throughout Malaysia varies from 21° C to 32 ° C with 80% humidity. The annual average rainfall is 2,420 mm for Peninsular Malaysia, 2,630 mm for Sabah and 3,830 mm for Sarawak, the heavier precipitation being in the east coast of Peninsular Malaysia and the coastal regions of Sabah and Sarawak. The west coast areas are also generally protected from the south-west monsoon by the island of Sumatra. With an average annual rainfall of around 3000 mm, and daily rainfalls that frequently exceed 100mm in the wet season, high tidal ranges and generally flat coastal and river plains, flood occurrences in Malaysia are a natural phenomena. Occurrence of major floods had been recorded in 1925, 1949, 1967, 1971, 1073, 1979, 1983 and 1985

2.2. *Rivers*

Being a peninsula (West Malaysia) and part of Borneo island (Sabah and Sarawak) rivers are numerous and relatively short. Originating from the central highlands, more than 150 river systems traverse the country. Of these, 100 river systems are in Peninsula Malaysia and the rest in Sabah and Sarawak... Although Malaysia is centrally located within South East Asia, and shares international boundaries with Thailand, Singapore, Indonesia and Brunei, there are very few shared international rivers. The most significant of these rivers is the Golok River, bordering Thailand in the north east of the peninsula and flowing into the South China Sea.

Rivers have always played a major and important role in shaping and influencing Malaysia's. Archeological experts discovered that communities already existed beside a riverbank in the upper Perak River more than 30,000 years ago. In the history of Malaysia, its legends and/or myths, rivers always have a role as the national focal points and heritage. Through out history, the rivers provide many essentials and benefits such as transportation and navigation, water supply, irrigation, drainage and waste disposal systems, business focal

points, the provision of ecological and wild life habitats and in later years, power generation. Most major towns in Malaysia are located beside rivers. Rivers have therefore been, and still remains the life veins of the country

2.3. *Availability*

The first National Water Resources Study was completed in 1982. A second National Water Resources Study had been completed in March 2000. This second study had included the assessing and updating of the water resources availability in Peninsular Malaysia. It also included the formulation of a Master Plan for Water Resources Management and Development, and the forecasting of the water demand for all users, up to the year 2050.

The abundant rainfall brings about water resources amounting to some 900 billion m³ annually of which 566 billion m³ appears as surface runoff. The main consumptive water use sectors are irrigated agriculture (rice), domestic and industrial. Based on the average annual usage of about 11.6 billion m³ there is an abundance of water resources compared to demand. Demand is projected to be 30 billion m³ by the year 2020, leaving an overwhelming surplus of water resources in the country.

However, in reality, high seasonal and spatial variabilities in rainfall occurrences leave only 10% of the water resources to be readily available. Water stress situation do arise despite the abundant rainfall and is a fact of increasing concern to the country as it gears towards further development and growth. There are regions in the country facing water stress due to low water resources, while there are other regions where water stress situations arise because of high water demands. In Kuala Lumpur, the capital city of Malaysia, water shortage is due to the increasing population and rapid industrialisation.

3. DEVELOPMENT IN THE COUNTRY

3.1 *Trend and impacts*

The pattern of development in a country can be traced in the development within a river basin. The Klang River Basin, where Kuala Lumpur is, is the most densely populated river basin in the country, with population of about 4 million. More than a hundred years ago, Kuala Lumpur at the confluence of the Klang and Gombak River, only had a small settlement with only dirt tracks leading away from the river into the then mostly forested hinterland

The Klang Valley has since developed too rapidly that, some of the much needed infrastructures and utilities can only follow slowly behind. Emerging problems in the Klang Valley include

- i. in-migration from rural and other urban areas and the emergence of squatter colonies
- ii. high water demand and the need for inter-basin transfers.
- iii. problem of transportation resulting in traffic congestion and air pollution
- iv. inadequate social amenities and recreational activities resulting in emergence of socially related problems
- v. inadequate management of solid waste, resulting in unhealthy and polluted water ways
- vi. discharge of untreated waste water resulting in polluted water ways, unhealthy environment and increase cost in treated water supply
- vii. excessive erosion, sedimentation, increase in runoff, lost of wetlands and riparian areas resulting in escalating occurrences of flash floods in the flood plains
- viii. lost of bio-diversity in the hills, wetlands and riparian areas

Other urban centers in the country followed closely the pattern of development of the Klang River basin. The economic growth of 10% for at least 10 years running in the 80s and 90s has brought with it tremendous amount of development, but has inadvertently exacerbated the deteriorating negative impacts as follows

3.1.1 *Water Shortages*

Malaysia is endowed with abundant rainfall, but with variation in seasonal distribution in both time and space. The concentration of population in certain regions/basins and the periodic occurrence of droughts have brought the problems of water imbalance into sharper focus. The 1998 water shortage hit many of the urban areas including the Klang Valley.

3.1.2 Flooding

Flood occurrences in Malaysia are natural phenomena. It is estimated that around 29 000 sq. km. or 9% of the total land area in the country is prone to flooding. With the rapid pace of industrialization and urbanization, the occurrences of flash floods in urban areas have been on the rise. The average annual flood damage has been estimated to reach RM 1 billion per annum (*DID Institutional Study, 2003*) and with economic drag effects, can reach as high as RM 3 billion annually.

3.1.3 Pollution and Sedimentation

River water quality deterioration in Malaysia seems to be synonymous with development. The sources of organic pollution are domestic and industrial sewage, effluent from palm oil mills, rubber factories and animal husbandry. In the Klang Valley alone, an estimated 50-60 tons of solid wastes end up in the river system daily. The lower stretches of rivers are characterised by heavy silt loads, the direct consequences of poorly managed land clearings for housing, industry and highways and the subsequent severe erosion caused by heavy rains. Studies have shown that in urbanised areas, 90% of sediment load to rivers come from land cleared for construction. In the Klang Valley, it has been estimated that erosion averages 2950 tons/sq km/yr for the whole catchments which is about 3 mm of soil loss a year. About 1 million m³ of silt is removed from the Klang River annually.

3.1.4 Squatters

The presence of squatters within river reserves is detrimental to the river in a number of ways as without proper sewerage and rubbish disposal facilities, the sewage and sullage water generated within the area, flows directly into the rivers. Surveys carried out in 1997 and 1998, estimated that between 20,000-40,000 squatters population occupy river reserves in the Klang Valley. Assuming an average discharge of 150 l/day per person, the total sullage and sewerage water generated by squatters channeled directly into the Klang River is estimated at 4.5 million litres daily. Solid waste within the squatter areas is generally disposed to a common dumping area on the banks of the river, which invariably gets washed down to the river.

3.2.5 Loss in Biodiversity

The opening and clearing of new areas for development, has allowed the natural drainage system to carry all the pollutants and additional discharge from the excesses of these developments, to the river channels, causing stresses to the river environment and loss in its biodiversity. Ultimately these stresses to the environment are being return to the people living in the various basins in the form of hardships from flood waters and water shortages as well as health risks from the polluted water bodies. These issues have direct relevance and impact to all of us living in Malaysia, as each and every one of us live in a river basin

4. EXISTING POLICY AND REGULATORY FRAMEWORK

4.1 Legislative Complexities

The Government is primarily responsible for the planning, development and management of water resources projects in this country through both the State and Federal governments.

With reference to the land and water sectors, the Federal Constitution (revised 1998) – which provides guidelines for the policy and regulatory framework for all areas including the water sector, laid out the relations between the Federal and State Governments on land and water. In general, land and water are under the state jurisdiction. There are exceptions such, as military, protected areas and others. Areas such as town and country planning, public health, sanitation, drainage, irrigation, rehabilitation of mining land, etc are on both state and federal lists. Shipping, navigation, fisheries, federal works on water supplies, rivers and canals (except those wholly within one state or regulated by an agreement between all states concern), production of waterpower are under federal jurisdiction.

4.2 Sectoral development

In the early years, the, development of each water sub-sector e.g. irrigation, drainage, municipal and industrial water supply, river conservancy were planned and carried out unilaterally by each agency concerned. As the

country prospered the issues became more complex and challenging and more water related laws were passed. While some gaps remain this has also resulted in many overlaps.

To date Malaysia has an abundance of sectoral-based water laws at both federal and state levels but lack comprehensiveness and integration in these laws. Many of the legislations are outdated, redundant or ambiguous. They are focused on limited aspects of water resources that are directly related to the responsibilities of the respective agencies and are enforced by these agencies. With the current and new challenges, they are difficult to be enforced effectively. The overlaps and gaps as a result of sectoral focus has become more apparent, and resulted not only in negative impacts on the environment but has created conflict areas and added confusion.

Generating from the concept of sectoral development is the formation of multifarious agencies base on water sub-sectors to regulate, manage and provide services of each water sub-sectors. These agencies carry out planning; implement projects; operate, maintain and manage schemes; extract river water; discharge wastes and effluents; issue licenses; formulate rules and regulations; enforce regulations and laws; prosecute; either individually or in co-operation with other agencies. Some agencies are responsible for more than one such function. It is also not unusual to find agencies having technical expertise but no legislative or enforcement powers; and vice-versa. Many agencies suffer from inadequate funding, lack of expertise and shortage of manpower..

The main constraint currently faced by federal agencies is the absence of legal jurisdiction due to the fact that water is a State matter. The existing institutional linkage mechanisms between these agencies at the state level are also generally weak as there is no single specific authority as yet that has been made responsible for river and water resources in the state. At the state level the related state agencies are mostly plagued by the problem of inadequate personnel with sufficient expertise to handle the water issues effectively. Their existing standards, guidelines and tools may also be inadequate and where available may not be up-to-date.

5. RECENT POLICY INITIATIVES

5.1 *Integrated River Basin Management and Integrated Water Resources Management*

The concept of integrated river basin management was introduced in Malaysia as early as the late 1980s to early 1990s. An International symposium on Management of Rivers for the Future was held in Kuala Lumpur in 1993. Of late, the acceptance have gain greater momentum.

In 1997, an inaugural meeting among water related agencies were organized that led to formation of the Malaysian Water Partnership (MyWP), the local chapter of the GWP. The group convened an inaugural 67 members and proceeds to articulate the National Water Vision. Inaugural members of MyWP include agencies such as EPU, other central agencies, related Government agencies, NGOs and the universities and other interested parties. Today this vision has been recognized as one of the very few Technological Road Maps (TRM) developed for a specific sector in Malaysia.

The Malaysian Water Vision 2020 state that:-

"In support of Vision 2020 (towards achieving developed nation status), Malaysia will conserve and manage its water resources to ensure adequate and safe water for all (including the environment)."

Factors considered in the formulation of the Malaysian Water Vision include demographic, social, economic, environmental, technology and governance. The Vision was accompanied by a Framework for Action that contained a set of initiatives, which amongst others include, managing the nation's water resources efficiently and effectively (both quantity and quality), and moving towards integrated basin management, and sustainable development of water resources.

5.2 *National Policies*

The Economic Planning Unit (EPU) in formulating the Third Outline Perspective Plan (OPP3) for the years 2001-2010 have described development thrusts for a sustainable environmental development as:-

"A major environmental and natural resource concern includes improving water quality, efficient management of solid waste and toxic and industrial waste, developing a healthy urban environment and the conservation of natural habitats and resources. During the OPP3 period, emphasis will be placed on addressing environmental and resource issues in an integrated and holistic manner. These approaches will, among others, be geared towards addressing the challenges of providing access to clean water, providing adequate food

and energy services without environmental degradation, developing healthy urban environments, and conserving critical natural habitats and resources."

One of the key strategies of the Eight Malaysia Plan (8MP) for the years 2001-2005, include 'Adopting an integrated and holistic approach in addressing environmental and resource issues to attain sustainable development.' The Plan recognizes the need for the formulation of a National Water Policy to ensure adequate and safe drinking water, as well as clean rivers and minimal flooding. This policy will provide the framework for water conservation and management. It addresses several challenges, including managing water resources and floods effectively and efficiently, and the need to keep development to a level that is within the carrying capacity of river basins while protecting and restoring the environment. In formulating the National Water Policy, two guiding principles were recognized:-

Water must be managed holistically. *Water resources planners must consider interdependencies among sub-sectors and uses; and they must at the same time conserve aquatic ecosystems and the wider biophysical environment. This requires coherent policies, consistent laws and regulations, collaboration among water sector institutions and carefully targeted government actions.*

Water must be managed efficiently. *Water is an increasingly scarce resource in several regions in Malaysia and the best available management tools are needed to use it efficiently. In the final analysis, water sector management must be business-like, while observing the standards of integrity and transparency expected by the public at large*

There are also other national policies and plans developed for respective sectors which will have impact on Water Resources management such as the Industrial Master Plan, the National Agriculture Policy, the National Environmental Policy, the National Energy Policy, the National Forestry Policy and the National Spatial Plan. Within each individual agencies and departments are various plans and initiatives to support Integrated and Sustainable Development for Water Resources (ISDWR) management.

6. MAJOR CONSTRAINTS IN ACHIEVING IWRM

The major constraints in achieving Integrated Water Resources Management in Malaysia are the public mindset and awareness, governance structure and the need for capacity building. The importance and the handling of these challenges may not necessarily be in this order of priority and may also differ from state to state within the country

6.1 *Mindset and awareness*

Mindset and awareness regarding water must be considered from all perspectives, public-at-large (including the private sectors), NGOs and civil societies, as well as the public sector agencies... Public at large opined that Malaysia is a country of abundance water and that the government should managed it well. Malaysia is truly a country of abundance water.

But what needs to be understood, beside the spatial and temporal distribution and inconsistencies, is that, traditionally villages developed along the bank of rivers and draw its household needs from the river direct. The current population not only spreads all over the river basin but the river in many cases is too polluted to be of much used. Currently the urban population in Malaysia exceeds 60% and about 20% reside in the Klang River Basin. This has necessitated the basin transfers for domestic and industrial water supply from the Langat River Basin, the Selangor River Basin and soon the Pahang River Basin.

Traditionally (and still prevalent in many parts of the rural areas), the rivers are not only sources of drinking water and food (they provide fishes), important for household needs, transport but concurrently also served as a convenient waste disposal conduit. Traditionally we have been disposing our household wastes, sanitary wastes directly into the river. Buildings have been built with the fronts away from the rivers. And the rivers had done their job, then, effectively, carrying away the pollutants and waste, with the excess rain-water subsequently, washing the river clean. But this service is no longer possible. The highly dense population in urban centers has converted rivers into open sewers. Not only is the solid waste contributing to the pollution of water bodies, it also creates constriction in the waterways. This constriction is further amplified by sedimentations from land clearance and construction areas. Not only is the waterways constricted, the excess water from rainfall have increase multifold due the substantially increase paved and impermeable areas as a result of construction of

impermeable pavements, roads and buildings. When previously rain water can seep through into the ground and be attenuated, they now flow above impermeable surfaces at rapid velocity. This has resulted in escalating flood occurrences.

What is the need to high profiled not only the importance of water and water bodies but for public-at-large to accept it as a national heritage, something that is inherited from the fore-fathers, to be passed to the next generation in good if not pristine condition, and for all and everyone to claim and recognized ownership on it. Concurrently, it is also of economic relevance and importance for Malaysia to manage her water resources well.

6.2 Capacity Building

While there is the need to buy in supporters for the concept of Integrated Water Resources Management, to allow and enable its implementation, sufficient knowledge and know how in all the relevant fields will be required. Thus capacity building in relations to all aspect of IWRM must be carried out in tandem. The need of all areas: technical, governance, etc; all levels: local, state and federal governments, all sectors: public, public sector agencies, NGOs, must be looked into and a plan devised

The knowledge on Integrated Water Resources Management in Malaysia is still fragmented. Focus for capacity building should not only be within the current serving generation of policy makers and implementers but also to future generations. Syllabuses and courses in primary, secondary and tertiary educations should be reviewed and where necessary new courses introduced.

7. CONCLUSION

While there is definitely a need to come out with a comprehensive and integrated legislation for managing water resources in the country, there must be buying in of the IWRM concept by all relevant macro planning, land, water and implementation agencies such as Economic Planning Unit (EPU) of the Prime Minister's Department and The Town and Country Planning Department, all the Local Authorities and many others. This task has been made easier as at the apex of these public sector agencies, the EPU, sensitive and receptive to the current challenges as can be seen by the new policies formulated.

When redressing the equity distribution of economic projects in the National Spatial Planning, it is hoped that the Town and Country Planning Department will take into cognizance of water availability and its attendant constraints within each river basin

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