

SUSTAINABLE WATER MANAGEMENT FOR RURAL DEVELOPMENT IN THE MEKONG RIVER DELTA, VIETNAM

L.A. TUAN^{1*}, G.C.L. WYSEURE², L.H. VIET¹

¹ *College of Technology, CanTho University, Campus II, Street 3/2, CanTho City, Vietnam.*

** E-mail: latuan@ctu.edu.vn*

² *Laboratory for Land and Water Management, K.U Leuven, Kasteelpark Arenberg 21, B-3001 Heverlee, Belgium*

Abstract:

The Mekong River Delta (MD) in Vietnam has an area of 4 million hectares. The economical production in this region is highly dependent on water from the river and canal system. More than two-third of 17 million inhabitants of the MD live in rural areas and depend totally on the water resources for rice, upland crop irrigation, aquaculture of fish and shrimp, domestic drinking and industrial water supply and for transportation on rivers and canals. In the MD agricultural production consumes around 85% of the total water supply. Approximately 2 million tons of rice, produced in the MD, are yearly exported from Vietnam to the rest of the world. The rapid expansion of intensified agricultural cultivation and urbanization leads to water resources pollution. Shortage of good quality water becomes increasingly a great challenge to the sustainable water management. How to control the quantity and quality of the water efficiently is an important key factor for rural development. This paper will present some data figures and discussion concerning the current problems and strategies to alleviate the bottlenecks in water management.

Keywords: sustainable water management, rural development, water quantity and quality.

1. INTRODUCTION

The Mekong river (see figure 1) with the length of 4,200 kilometers is the 12th longest river in the world, its source originates at an altitude of 5,181 meters on the Tibetan Plateau. The river flows down through Southwest China, passes a part of Myanmar, runs a long the boarder between Thailand and Laos, then goes throughout Cambodia and finally reaches out into the East Sea in Vietnam. From year to year, the Mekong River Delta (MD) of Vietnam have been deposited alluvium by the over bank flooding that this land becomes a typical river delta as a great potential region for agricultural production for the whole country. The Delta accounts only 5% of the total the water basin of the Mekong river, about 4 million hectares, but it supplies for more than 50% of staple food, 60% of fish and shrimp and 70% of tropical fruits. It has contributed approximately 2 million tons of exported rice yearly to the world.

affected simultaneously by 2 different types of complicated tides from the East Sea (irregular semidiurnal tide) and the West Sea (irregular diurnal tide) with a great difference amplitude. These create technical difficulties to drain the excess and polluted water to the East Sea.

2. RURAL DEVELOPMENT IN THE MEKONG DELTA

The MD is affirmed as a biggest agricultural region of Vietnam. It contributes for more than half of Vietnam's total agricultural output, and 27% of Gross Domestic Product (GDP). The MD has 17 million inhabitants (22% of country total), more than two-third among them, farmers and agricultural related workers, are living in the rural and coastal areas where the natural conditions such as lands, water and plants closed density exist. The rest of the MD's population concentrated in the cities, peri-urban areas, mainly along the major roads and waterways. Along the Tien river and Hau river in Vietnam of the Mekong river system every 60 kilometers we have a major city or town. The human settlement points fit a compromise between East Sea tidal effects and the Mekong river flow. The population pressure and the economic development needs have also driven the farmers to increase their income by increasing and diversifying their agricultural and fishery production. Since the past 20 years, the area of cultivable lands have been growing by an expansion the irrigation and drainage canals density system in the Delta. However, parallel with the fast increasing agricultural yields and production, the region is facing more and more water pollution problems by human and animals waste, agro-chemicals as pesticides, herbicides, fertilizers. Flood disasters in the MD led to the loss of more than 1,000 human life and about 1 billion USD damages by in the past decade.

For rural and agricultural development in coming years, water needs for the whole MD will mainly include:

- irrigation water in dry season for 1,8 million hectares of rice fields as roughly 1.1 to 1.2 liter per second per hectare (l/s.ha) and for nearly 200.000 hectares of perennial fruit trees and industrial crops. Water use in the Mekong delta in 1995 was estimated as 210 million m³ as compared to 534 million m³ used by the whole Vietnam (Su, 1996).
- domestic water supply for 11 million people in rural areas with the water rate 60 litres per person per day. The need for the rural population is established as approximately 1 million cubic meter per day.

3. DISCUSSION ON SUSTAINABLE WATER MANAGEMENT

Sustainable water management (SWM) should not only control the water resources towards the present needs but also consider water-related problems in the future. Processes of the urbanization and industrialization parallel to the rapid population growth lead to a greater water demand for upholding and developing the regional economic. This issue in the MD is also unique for whole Vietnam and the water needs of people may be linked the effort of poverty reduction and living conditions improvement as well.

There are three issues to be noticed for SWM in the MD:

- Water quantity and quality control
- Water distribution and use
- Water-related health and environmental needs

3.1 Water quantity and quality control

Water resources in the MD should be monitored and controlled both in their quantity (discharge, water level, ...) and quality (pH, TSS, turbidity, BOD, COD, DO, total nitrogen, total phosphorus, total coliform number, ...) according to the economical and environmental development requirements. The changes in space and time their characteristics need to be recorded for making a necessary balance analysis. The water quality monitoring routines may be suggested as figure 2:

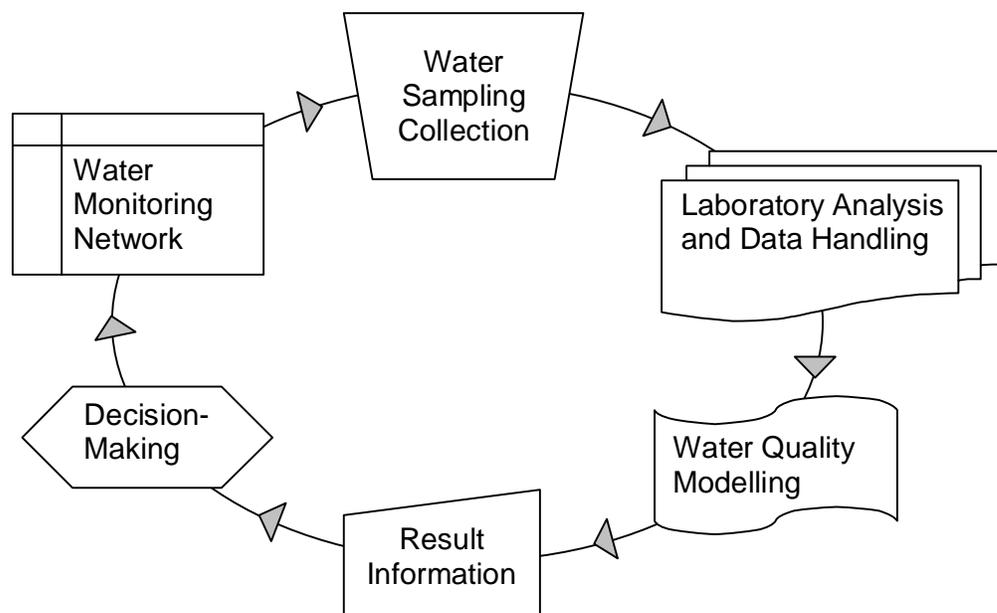


Figure 2: Suggested water quality monitoring routines

3.2 Water distribution and use

Water in the MD flows through natural and artificial streams by gravity and open channel flow. In principle, we could try to distribute water according to the human demands by solving the water balance problems and by building a water resources distribution system, which includes pumping stations, sluices, canals, pipelines networks... (see figure 3). As every place has in their close vicinity open water a water distribution solvency is not an economic option. In some cases, shift into less water demanding crop cultivation or a resettlement of the rural living and production into less water consumption is imposed.

3.3 Water-related health and environmental needs

In the rural areas of the MD, farmers access water directly from rivers, canals, ponds or shadow wells (Tuan, 2003). By lack of adequate water sanitation facilities the increase and prevalence of *Anopheles* and *Dengue* mosquitoes together with other disease vectors is observed. The seasonal transition periods are mostly affected. Some going-on industrial projects have caused pollution of freshwater, intrusion of salinity, water logging of agricultural land, destruction of wetlands and loss of biodiversity in mangrove forest and coastal areas. These negative impacts are slowing the rural development in the MD down in the present and future. It is necessary to assess the economic development benefits with the health and environmental impacts in early planning stages. Each result should be presented fully for the entire

population by the public media. Consideration and feedback is required in order to establish a balance of good quality water with sufficient quantity (figure 4).

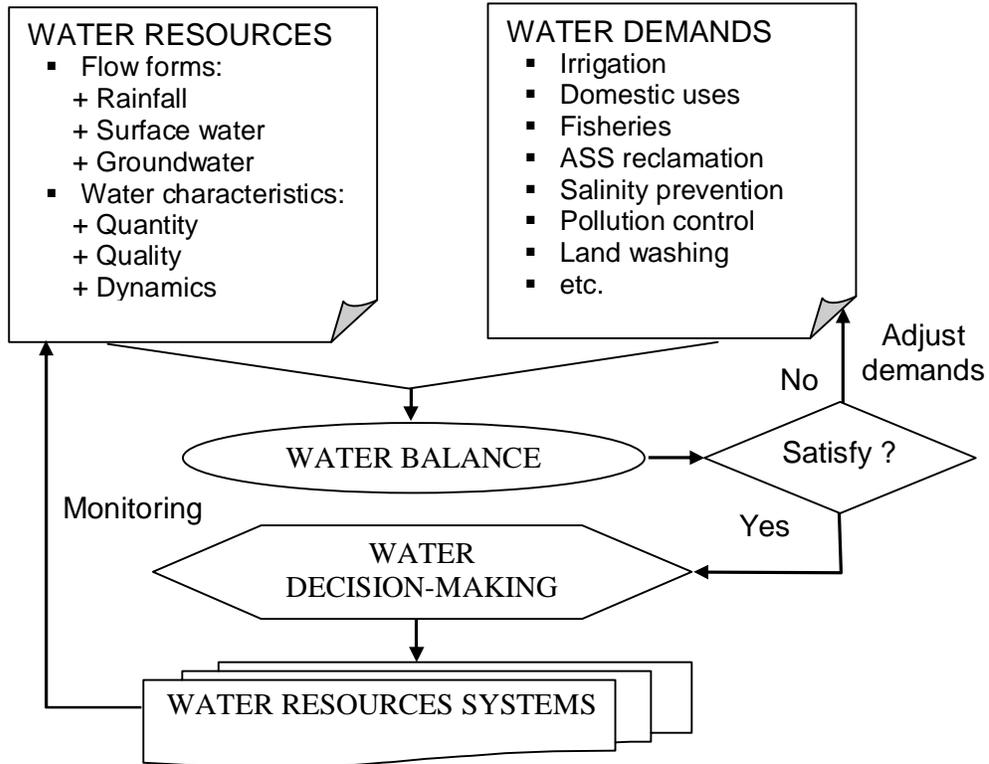


Figure 3: Establishing water resources systems in the MD

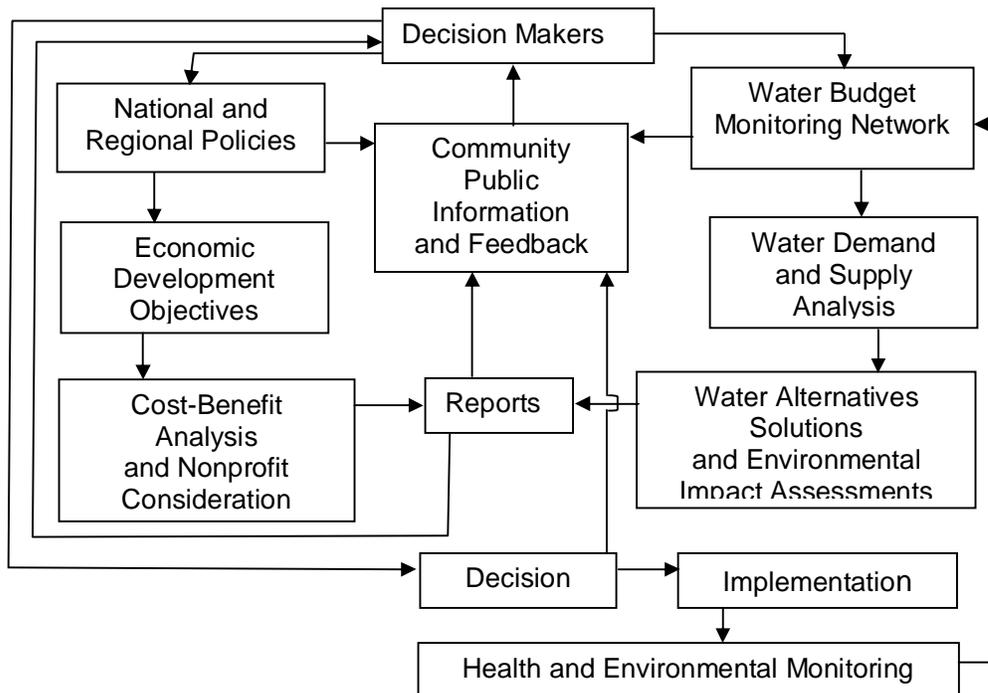


Figure 4: Relationship concerned health and environmental needs

4. CONCLUSION

Some past rural development projects concerning water management in the Mekong River Delta are evaluated as non-sustainable. Some projects only considered the single objectives advantages and did no study human health, environmental impacts, water quantity-quality relations. The decision-making process was top-down with little or no public involvement of the different stakeholders.

Water in the MD is important factor in all future planning activities. Although the quantity of water in the delta is large, the sufficient good quality could become a bottleneck as pollution increases along with a higher demand. So a sustainable water management should be interpreted with the targets of the rural development as meaning water resources system has used to be efficient.

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