

Lessons Learned on Integrated Watershed and Water Quality Management in the Thachin River Basin, Thailand^{*1}

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Introduction

In the year 2000, pollution from non-point sources led to a major water quality crisis in the second most important river catchment in Thailand, the Thachin River Basin. The governing policies on catchment management at the time did not appreciate the importance of non-point source pollution. This was reflected in the absence of diffuse source control in emergency procedures and long-term plans. Moreover, public participation in water quality management was limited. The crisis became a good catalyst for change and resulted in the establishment of the Thachin River Basin Coordinating and Management Sub-committee which was based on the concept of "integrated watershed water-quality management and public participation". A vision and an action plan for protection, remediation, and improvement of water quality in the Thachin River Basin have been developed to increase the effectiveness of management of the entire basin and so in turn, improve the quality of life for its habitants. Thus, a significant environmental mishap has triggered the first step on the road to adapting an integrated basin management approach and presented an opportunity for previously unseen levels of cooperation between the public and private sectors.

Thachin River: Physical Features

The Thachin River is located in the great central basin of Thailand and is the second most important waterway in the country. The Thachin River is actually an effluent tributary of the Chao Phraya River, which is the waterway draining the central basin. The start of the Thachin River is the confluence from the Chao Phraya River some 180 km north of Bangkok and it enters the upper Gulf of Thailand some 60 km east of the city. The basin covers 13,000 km², and has a population of around 2 million. The main channel of the Thachin River is 325 km in length and flows through four provinces (see Figure 1). The two upstream provinces have some of the most fertile agricultural lands in the country while the lower two provinces have some highly industrialized zones. The river uses include water supply, aquaculture, transportation, and recreation as well as a sink for wastewater discharges.

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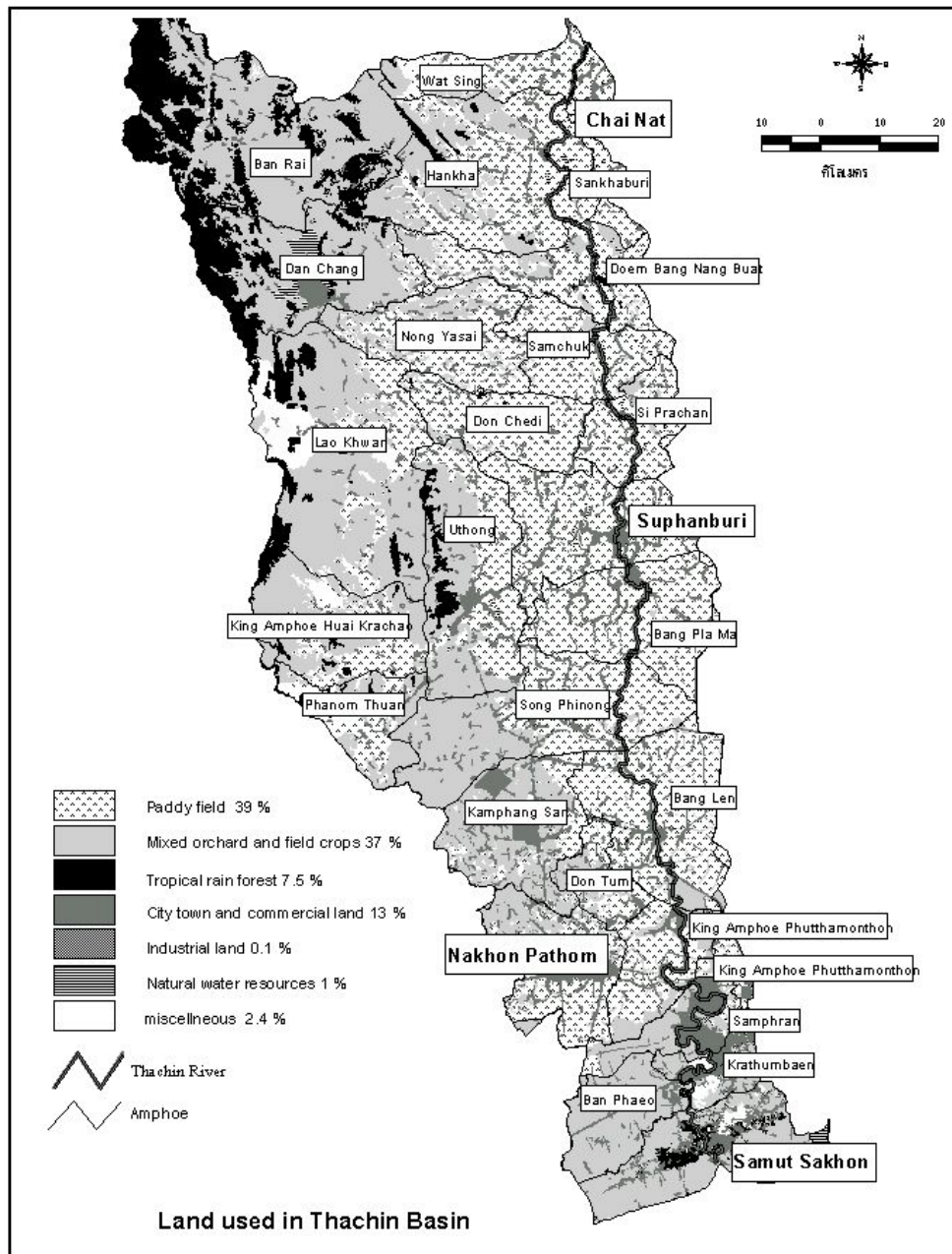


Figure 1 Major Land-uses of the Thachin River Basin, Thailand

The hydrology of the Thachin is no longer characteristic of streams in tropical regions as inflow is controlled by the regulatory structure on the Chao Phraya River just downstream of the diffidence junction. Consequently, the average monthly discharge throughout the year varies from about 50 m³/s to 290 m³/s with the average annual flow being about 75 m³/s. There are several water gates regulating the flow throughout the river's course. As the catchment is mostly a flat plain, the stream gradient is minimal and the water level in most of the lower half of the watercourse is affected by tidal fluctuations.

Water Pollution

Pollutants are discharged into the river from both point and non-point sources. Major point sources of pollutants include domestic and industrial waste discharges as well as some agricultural point sources such as pig, duck, fish and other types of farms. Although non-point sources are also major pollution sources in the basin, they tend to be ignored by government authorities and planners. Non-point sources include agricultural areas (mostly paddy fields) and orchards, which are the dominant land uses in the basin.

From the Year 2000-2002 State of Environment Report, the Thachin River has the dubious distinction of having the worst water quality in Thailand. This situation is mostly due to the excessive discharge of waste into the river, resulting in water quality being far below the standard level set for inland water quality, especially along the lower and middle reaches of the catchment. The capacity of the stream to absorb these pollutants is also constrained by flow regulation which limits the natural flushing of the stream. Another important factor is the ponds and local water storage on the flood plain which are prone to overflow or washout during heavy rainfall periods causing the scenario in crisis experienced two years ago.

In May 2000, the Thachin River experienced a serious contamination event resulting in massive fish kills and critical pollution levels being exceeded. The situation arose following heavy rains in April when trapped putrid waters from the flooded fields were discharged directly to the river almost all at the same time. This event highlighted the lack of coordination between relevant agencies and provided an example of how disastrous its consequences can be. The lack of cooperation between agencies also confused the public about the real causes of the problem.

Water Quality in the Past Decade

Seventy-six percent of the Thachin River Basin is used for agriculture. In general, community, industry and agriculture contribute 30 percent, 33 percent, and 47 percent to the waste load respectively. Pig farms are the major source of pollution in Nakhon Pathom Province while industry is the major source of pollution in Samut Sakhon Province. From 2000 to 2002, the Thachin River was ranked the most polluted river in the country. Communities and effluent from pig farms in Nakhon Chaisri District, Nakhon Pathom Province were significant contributors to poor water quality in the lower part of the basin. DO was below the national standard of 2.0 mg/l and occasionally below 1.0 mg/l. Many canals became sewer lines and experienced rapid growth of water hyacinth.

From April to May of 2000, over 16,000 hectares of rice fields were unexpectedly flooded generating over 100 million cubic meters of wastewater. The discharge polluted a reach of the river over 150 kilometers long with an estimated capital loss of millions of Baht. The cost of the ecological damage was not included.

As shown in Figure 2, the water quality in the Thachin River is declining. Prior to 2000, the problem-solving process in the Thachin Basin was proceeding more slowly than in the Chao Phraya Basin. However, the crisis in 2000 presented an opportunity for collaboration among four provinces within the basin: Chainat, Supanburi, Nakhon Pathom, and Samut Sakhon. PCD and relevant agencies envision the Thachin River meeting the national water quality standards* within the next 10 years.

In 2002, the Royal Irrigation Department proposed two watergates at Banglane District in Nakhon Pathom and Samut Sakhon Provinces for flood control. However, the locals opposed

the project in the public hearing citing the need for further study, especially in regards to the potential environmental impacts. The approach to achieving a tangible solution should also consider all stakeholders and possible alternatives to the watergates.

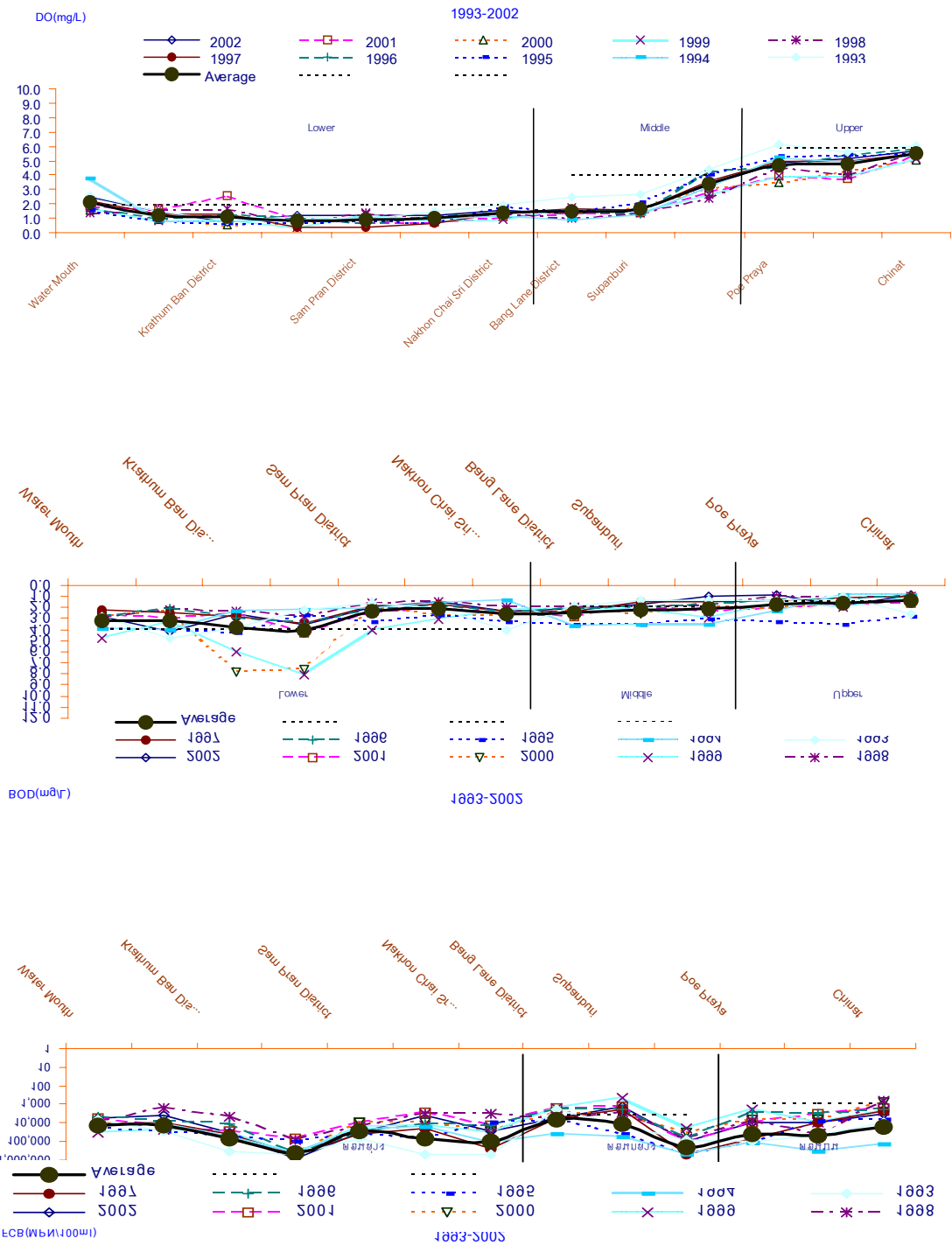


Figure 2. Thachin River Water Quality 1993-2002

Basin Management

Currently, local municipalities carry out the role of stream and catchment management. There is no single administrative body that takes responsibility for the planning and management

of the basin as a whole. Consequently, watershed management and planning is typically uncoordinated and generally carried out without due consideration for upstream and downstream effects. Up to now, integrated water resource management, such as basin management, has not yet been put into practice in Thailand. The Pollution Control Department has been taking a leading role by firstly developing a water quality improvement master plan for the Thachin basin as a whole in 1996 and then initiating implementation of the action plan since the year 2000. However, the Department is limited in what it can do due to the constraints and inadequacies of existing regulations.

It took the environmental disaster of 2000 to prompt the government into action and led to establishment of the Thachin River Basin Coordinating Management Subcommittee to coordinate water quality management in the Thachin Basin. The primary objective of the subcommittee, which includes representatives from the four provinces in the catchment, relevant central government departments, NGOs, local academics and civil societies, is to clean up and manage the catchment as a whole. The subcommittee is progressing slowly but steadily to achieve its water quality goal.

Additionally, the Pollution Control Department has also organized a number of workshops to accelerate implementation of the action plan for the protection, remediation and improvement of water quality in the Thachin River Basin, which includes more than 100 proposed projects. The draft plan required the cooperation of 21 agencies under the Agriculture, Industry and Interior Ministries, together with local participation under the vision:

"Water quality in Thachin River Basin is targeted to meet the standards by the year 2010, with public participation and collaboration among stakeholders to effectively manage the basin as a whole for a better quality of life."

The key elements of the strategic plan are summarized below:

- Reduction of pollution discharged from point sources (domestic, industrial, and agricultural sources such as pig farm, fish/shrimp farms), a target reduction of at least 70% of current levels
- Efficient control of water discharged through watergates and canals
- Reduction of pollution from non-point sources such as paddy fields, orchards, etc.
- Promotion and support of public participation in pollution prevention and remediation in the Thachin River Basin
- Systematic water quality monitoring for the basin as a whole
- Increasing water flow and volume in Thachin River and its tributaries
- Water resources conservation and proper land-use planning
- Systematic coordination of water quality management plans in the Thachin River catchment, such as the establishment of the Thachin Subcommittee
- Maximise the effectiveness of enforcement of existing laws and regulations
- Systematic research and developments of the Thachin River Basin by local universities and institutes

These are the initial steps of the basin management and an opportunity for real cooperation and coordination between the government and private sector as well as the public.

For the Thachin River Basin, new directions for wastewater controls are being considered based upon the assimilative capacity of receiving waters, budget availability and prioritized projects within a basin-wide approach. Simple wastewater treatment systems based on natural conditions are also being planned such as wetland applications, stabilization ponds and crop irrigation systems. Treated wastewater will be reused and recycled, especially in arid and seasonally arid areas. Flexible means of wastewater management are being put into practice such as simulation models, geographic information systems and database management systems.

On the regulatory side, waste load allocations are being considered depending on the assimilative capacity of the receiving water body and guidelines to attaining receiving water quality standards. The latter while the effluent standards of major point sources have been

established and implemented since 1995. Best management practices would be considered as a tool for water quality management especially for non-point source pollution control.

Thachin Partnership Agreement

On July 29, 2002, the Director General of Pollution Control Department, and the Governors from four Provinces: Chainat, Suphanburi, Nakhon Pathom, and Samut Sakhon agreed to cooperate to restore the basin by signing The Partnership Agreement of the Thachin River Basin, 2002. Its aim is as follows:

We recognize that waters in the Thachin River Basin have been severely polluted for years. Pollution is particularly significant in the Thachin River and its tributaries in the lower portion of the Basin. The pollution in the river and its tributaries impacts aquatic organisms, the coastal ecosystem, public health, and recreational and economic opportunities. Thus, this Partnership Agreement is formed between Chainat Province, Suphanburi Province, Nakhon Pathom Province, Samut Sakhon Province and the federal Pollution Control Department, herein after called the Partnership, to cooperate in restoring, protecting and conserving water quality in the Thachin River Basin. Accordingly, the Partnership agrees to take action for restoration of the Thachin River Basin as follows:

- Cooperating to dramatically reduce pollutant loads in the receiving waters in the Basin with a goal of fully achieving water quality standards.
- Monitoring ambient water quality and effluent discharges from critical pollution sources, measuring progress and distributing the information to relevant agencies and the public.
- Establishing an Information Centre for the Basin in each province and the Centre of the Basin Information in the Pollution Control Department.
- Promoting and supporting public participation in water quality management and decision making.
- Supporting implementation of the Thachin Rehabilitation Plans.
- Meeting of the Partnership at least once a year to evaluate, to review the progress of the implementation plan and to establish new goals when appropriate. The Pollution Control Department will serve as a coordinator and the secretariat of the Partnership Agreement.

This is the first agreement in Thailand among the federal government and governors in the basin to cooperate in a mutually beneficial manner to restore the Thachin River Basin as a whole.

Conclusion

Integrated water resource management is proving to be an effective means of water quality control for the Thachin River. The system is gradually being put in place, but once the initial difficulties in getting the various stakeholder organizations and local groups to cooperate and coordinate has been overcome progress is accelerating. The lessons learnt from the Thachin Basin experience will provide a positive model for use in other watersheds.

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