COASTAL POLLUTION MANAGEMENT IN THAILAND

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ABSTRACT

Major pollutant contributors in the Gulf of Thailand come from either land-based or sea-based activities and from both point sources, such as industrial discharge, oil spill incidents, and domestic sewage, and non-point sources like agriculture runoff, all of which can affect coastal water quality, marine sediment conditions, and particular organisms, as well as natural habitats like mangrove, seagrass and coral reefs. Conditions fostering deterioration of the environment in coastal areas of the Gulf of Thailand have accelerated under the pressures of economic expansion, increasing population, and aquacultural and agricultural activities conducted with improper pollution management, which can result in significant BOD and nutrient loading in the Gulf, especially near the four major rivers in the Upper Gulf, and cause water quality problems. Land use for agriculture accounts for more than 60 per cent in Thailand. Non point source pollutants thus became one of the major pollutants in Thailand. Red tide incidents have also increasingly occurred in the recent years when comparing to the past. The incidents occasionally impair marine water quality and affect coastal aquaculture and marine organisms. For sustainable coastal zone management, many projects have been launched to tackle the array of problems by focusing on the entire watershed instead of river by river management. At the same time, to confront problems of increasing pollutant amounts in receiving waters, the maximum loading of a given pollutant has been considered in order to be in compliance with the ambient water quality and effluent standards. An example of such study is the conduct of carrying-capacity and environmental risk assessment. Cooperation among the government, industries, and local population has proven effective in promoting shrimp farm wastewater management. In addition, the coastal environmental sensitivity index for oil spills, the Marine Water Quality Index, and Beach Index have been employed to enhance public awareness on the protection of and quality of the marine environment with a view toward preventing pollution.

INTRODUCTION

Millions of people derive their livelihoods from fish and petroleum harvested from the Gulf of Thailand, and millions more are affected by changes in the environment of the Gulf. The Gulf of Thailand is a semi-enclosed sea which covers an area of about 320,000 square kilometers and a 1,840 kilometer long coastline. Coastal seas support mangroves, coral reefs, sea grass beds and diverse fish stocks. There are four large rivers, the Chao Phraya, Bang Pakong, Tha Chin and Mae Klong, entering the Gulf near its head with a marked seasonal fluctuation of the freshwater discharge that mostly are land-based contaminants from non-point source like agriculture runoff and point source such as domestic sewage, industrial discharge and aquacultural discharge. Meanwhile, sea-based pollution such as oil spill incident is also one of the causes of coastal environment impacts.

Thailand's land use planning is neither centralized nor comprehensive. Rampant land misuse has destroyed the productive function of huge amount of land in Thailand, particularly agricultural and aquacultural production, as well as urbanization, industrialization and infrastructure. Difference of land use activities in four main rivers cause high organic loading in the Gulf. The highest values of BOD, total N and total P loading were from Chao Phraya, Tha Chin, Mae Klong, and Bang Pakong River Basin, respectively. The major sources were domestic (101,000 ton/year), cultivation (94,700 ton/year), aquaculture (42,400 ton/year), and livestock (31,300 ton/year) as shown in Figure 1.

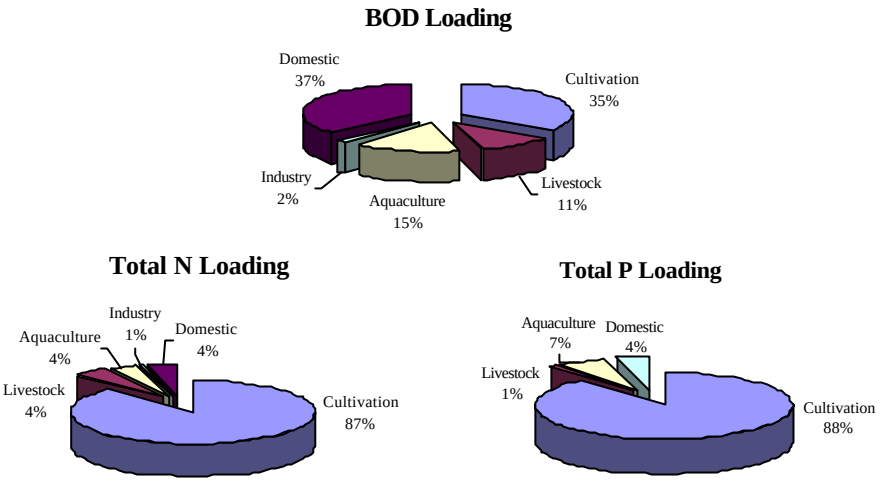


Figure 1: BOD, Total N, and Total P loading from four main rivers to the Upper Gulf of Thailand.

The rapid economic, social, agricultural and industrial development that has taken place during the past three decades in towns along and adjacent to the coast parallel with an inadequacy of suitable management therefore makes the Gulf a zone of ecological stress due to high level of contaminants in the natural media. The most conspicuous pollution impact on the marine environment is nutrient enrichment (in the form of euthrophication and algae bloom), which has become apparent in many areas such as the major estuaries and some coastal provinces in the Upper Gulf of Thailand.

The coastal zone is somewhat sophisticating to manage. However, management tools for tackling coastal environmental problems by increasing the role of private sector as well as public involvement and participation on coastal pollution management have been promoted.

COASTAL MANAGEMENT IN THAILAND

The Policy and Prospective Plan for Enhancement and Conservation of National Environmental Quality 1997-2016 specifies to accelerate the solving of the problems of degradation of coastal natural resources and the quality of water as well as rehabilitate natural resource and decrease conflicts between interest groups including government agencies, commercial fish producers especially over the use of coastal areas for different purposes.

The Marine Environment Division, Pollution Control Department, adopted this policy and have recently tried to solve coastal and marine environmental problems via the application of Geographic Information System (GIS). The GIS has been used as management tools that enable an integrated approach to solve marine environmental problems. The Coastal Sensitivity Mapping Project, the Coastal Environmental Sensitivity Index for oil spill, the Beach Index, and the Marine Water Quality Index are among effective tools to protect and manage the environment and to improve the coastal water quality.

THE COASTAL SENSITIVITY MAPPING PROJECT

In case of oil spill incidents, it was difficult in the past to manage all parts of environment due to the insufficiency of equipment, manpower and knowledge of natural resource sensitiveness. The Coastal Sensitivity Mapping Project with its Application for Pollution Surveillance and Contingency Planning was supported by Swedish International Department Cooperation Agency (SIDA). The coastal environmental sensitivity index map, using the GIS to apply as a tool to query, analyze and display geographically reference information, has been created for environmental planning and pollution prevention in support of decision making process especially for the coastal zone management and oil pollution control. The example for this map is shown in Figure 2.

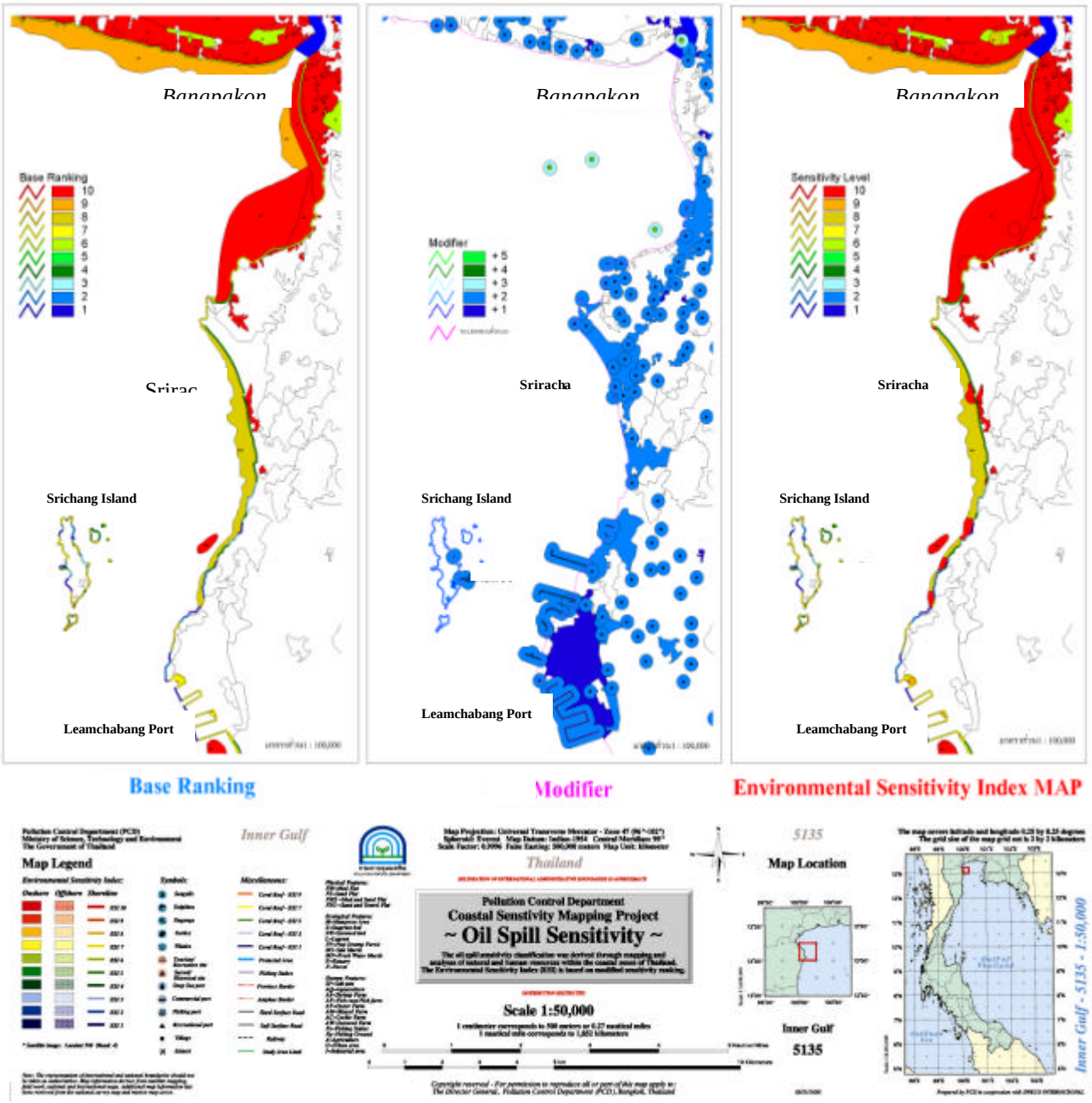


Figure 2: Environmental sensitivity map in the scale of 1:50,000.

THE MARINE WATER QUALITY INDEX AND THE BEACH INDEX

The Marine Water Quality Index has been developed and intended to give the general pubic a better idea of the state of the marine water quality by measuring overall situation of coastal water quality. Professional judgement was applied for integrating small group of valuables into Coastal Water Quality Index. The assessment results are classified into 5 levels: excellent, good, fair, deteriorated, and extremely deteriorated, as presented in Figure 3. In addition, the Beach Index is further initiated to assess tourist beach status and boost local income, as illustrated in Figure 4. Annually, the beach index has been provided to local coastal authorities as a tool to address the problems. The authorities shall take action in restoring and maintaining good environmental condition to improve beaches and gain a better index in the following year.

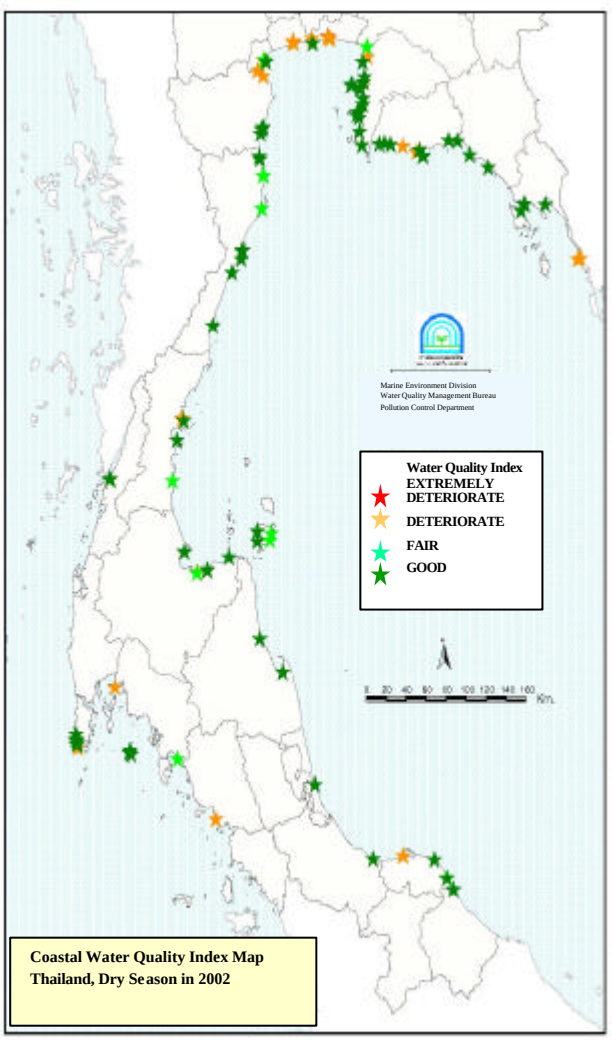


Figure 3: Coastal Water Quality Index map.

Figure 4: Beach Index map.

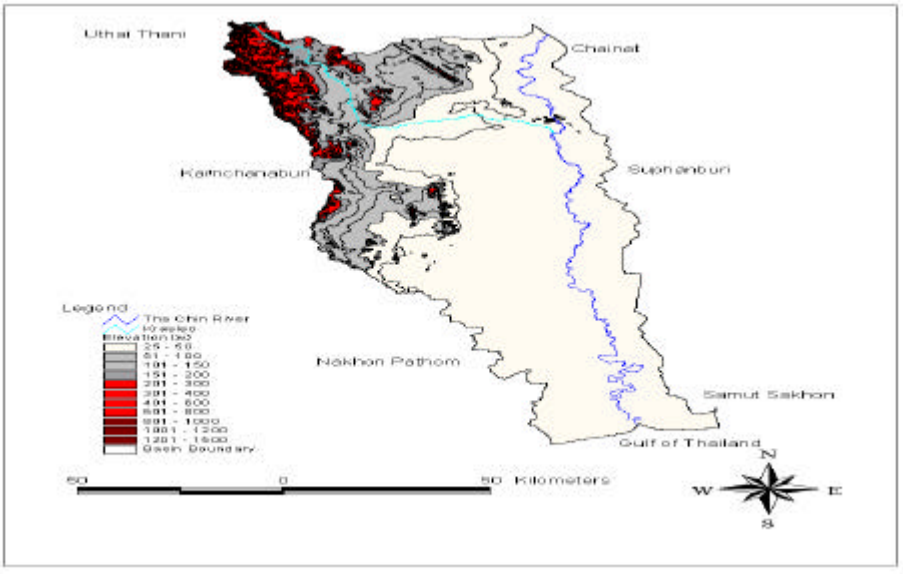
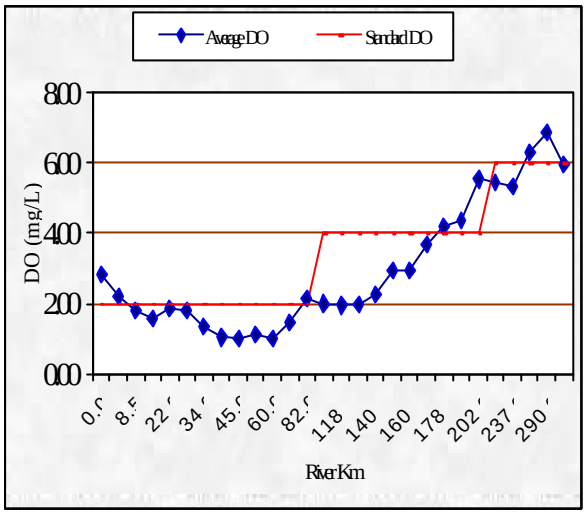


Figure 5 The Tha Chin River Basin




Bangkok Post

Thus, June 19, 1997

HEALTH

Conflicting views after scores of fish found dead

Ratri Phetkit, a villager from Ban Tab Tee Lek, with a dead fish.

Toxins used to catch fish in Tha Chin

Figure 6: DO depletion in the Tha Chin river in 2000.

WATERSHED MANAGEMENT

Case by case pollution management has not been proved us an effective tool to diminish environmental problems as a whole. The entire watershed management has thus been focused to tackle problems. One of the programs is "Integrated Watershed Water Quality Management of the Tha Chin River Basin"(Figure 5). This project was initiated in order to solve the problems from non-point sources resulting in DO depletion, and death of fish in Tha Chin River Basin in 2000 (Figure 6), which is the second most important river catchment in Thailand.

The basin covers 13,000 square kilometers, and has a population of 2 million. The main channel of the Tha Chin River is 325 kilometers in length and flows through four provinces (Chainat, Suphanburi, Nakhon Pathom, and Samut Sakhon). The basin supplies water, supports fisheries, transportation, and recreation, and receives wastewater discharges. Major point sources of pollutants to the river include non-point sources from agricultural areas (paddy fields), and orchards, which constitute the main land uses in the basin, some agricultural and aquacultural point sources such as pig, duck, fish and other farms, domestic and industrial waste discharges. The organic (BOD) and nutrient (Total P and Total N) loading of Tha Chin River Basin is shown in Figure 7.

In the past, the installation of wastewater treatment plants was believed to solve water quality problems. However, in Tha Chin River Basin, water quality management decisions intended to reduce wastewater could not focus exclusively on domestic loadings due to the fact that pig farms are the major sources of pollution in the upper-lower portion of the river particularly around Nakhon Pathom Province. Moreover, nutrient loads from agricultural areas must be considered integral to future planning strategies, even though farms have made only minor contributions to waste loadings in recent years. A widespread tendency to increase these intensive agricultural practices can be concerned throughout the region.

Currently, PCD has tried to manage the river basins as a whole system since 2000 but there are some limitations due to existing regulations. Thus, the Sub-committee on water quality management in the Tha Chin basin was established because of the critical condition of the basin in 2000. The Sub-committee comprises relevant agencies from central and regional agencies, NGOs, and experts from the basin's institutions. The Sub-committee process is in its infancy. PCD is looking to partner with the US environment agencies to assist it as the Sub-committee moves forward to achieve its water quality goals.

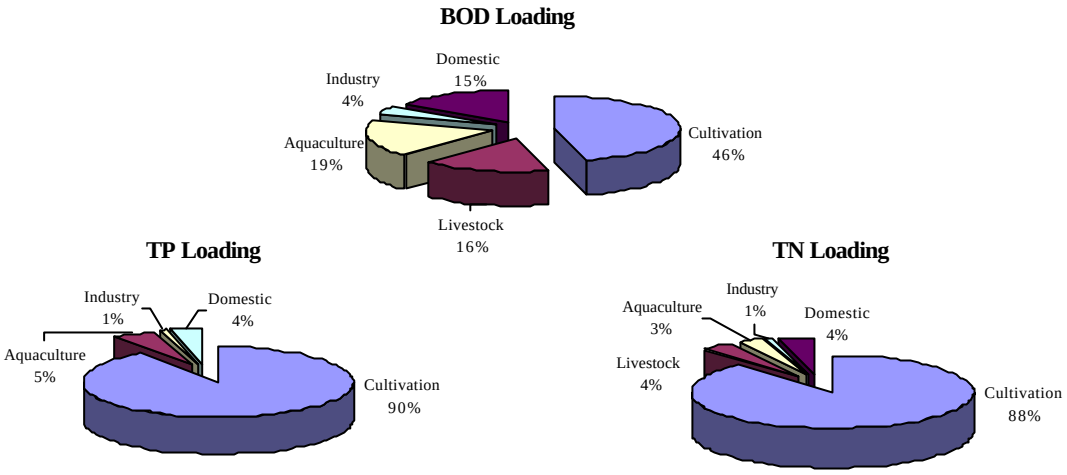


Figure 7: BOD, Total P and Total N loading in Tha Chin River Basin.

The government has been in the first stage on catchment management for non-point source pollution although this has been reflected in the absence of diffuse source control in emergency procedures and long-term plans. The crisis increased an awareness on proper environmental management and resulted in the establishment of the Tha Chin River Basin Coordinating and Management Sub-committee under the Pollution Control Committee, which was based on the concept of "integrated watershed water quality management". The vision and the action plan for protection, remediation, and improvement of water quality in the Tha Chin 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 habitats. Thus, a significant environmental mishap has brought about the first step to set up an integrated basin management to be taken and presented an opportunity for the better cooperation between the public and private sectors. Action plan for 2000-2004 (Phase I) has been set up, which are domestic wastewater control focusing on lower portion of the river, industrial waste control, pig waste control for large farm size (>500 pigs). In addition, the plans for setting up treatment plants at upper part of the river, pig waste control for medium farm size (200-500 pigs), and the waste control for large fish and shrimp farms (>8 hectares) have also been focused as the action plan for 2005-2009 (Phase II), while the Coastal Aquaculture Effluent Standard has been recently drafted.

CONCLUSION

As anthropogenic land-based activities are major pollutants discharging into major rivers and coastal areas, and resulting in coastal environment deterioration, Thailand is in the process of delegating responsibility for environmental management, including water quality, to its provinces and municipalities, as part of the effort to decentralize the federal government and give local government the responsibility and opportunity to manage local issue despite the fact that the country has suffered environmental management problems due to the non-strict enforcement and inefficient coopeation among public institutions and private sectors. Meanwhile, more comprehensive coastal rehabilitation programs, for example, carrying capacity of the coastal environment, have also been initiated. The ultimate goals are to increase water quality management capacity, enhance public participation into the basin management activities, and increase awareness, knowledge and understanding on sustainable development and resources conservation.

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