Wastewater management systems of Thailand (laws and regulations)

ระบบการจัดการน้ำเสียของประเทศไทย (กฎหมายและข้อกำหนด)

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Abstract

In Thailand, a number of different agencies regulate different aspects of wastewater management under a variety of laws and regulations. To an outsider it is a bewildering system, and it has been criticized for its lack of coherence and coordination. At the national level, regulatory and enforcement responsibility is principally shared by the National Environment Board, Ministry of National Resources and Environment, Ministry of Industry, and Ministry of Publish Health. These various institutions derive their authority from a variety of environmental laws, such as the Enhancement and Conservation of National Environmental Quality Act, Factory Act, Public Health Act. There is no integrated legal framework for wastewater management, and a coordinated set of regulations has not been developed. In fact, different regulatory institutions have different views of wastewater management system. The paper aims to integrate wastewater management system and legislation in Thailand for oversea investors and researchers who are interested in wastewater management system in Thailand.

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บทคัดย่อ

ประเทศไทยมีกฎหมายและระเบียบข้อบังคับที่เกี่ยวข้องกับการจัดการปัญหาน้ำเสียเป็นจำนวนมาก ประกอบกับภาครัฐบาลมีการกระจายภาระหน้าที่ในการจัดการแก้ปัญหาน้ำเสียให้หลายหน่วยงานดูแล ซึ่งแต่ละหน่วยงานต่างมีมุมมองและเป้าหมายที่แตกต่างกันไป ความหลากหลายนี้ทำให้ผู้ที่ไม่มีความชำนาญเกิดความสับสนและทำให้ประชาชนขาดการมีส่วนร่วมในการแก้ปัญหาดังกล่าว ซึ่งหน่วยงานหลักที่เกี่ยวข้องกับการจัดการปัญหาน้ำเสียของประเทศไทย ประกอบด้วย คณะกรรมการสิ่งแวดล้อมแห่งชาติ กระทรวงทรัพยากรธรรมชาติและสิ่งแวดล้อม กระทรวงอุตสาหกรรม กระทรวงสาธารณะสุข หน่วยงานต่างๆ นี้ต่างออกข้อกำหนดของตนเพื่อใช้ในการจัดการปัญหาน้ำเสีย เช่น พระราชบัญญัติส่งเสริมและอนุรักษ์สิ่งแวดล้อมแห่งชาติ พระราชบัญญัติโรงงานอุตสาหกรรม พระราชบัญญัติสาธารณะสุข นอกจากการมีหน่วยงานที่เกี่ยวข้องจำนวนมากแล้วยังพบว่าหน่วยงานต่างๆ ยังขาดการประสานงาน และกฎข้อบังคับต่างๆ ยังไม่เป็นไปในแนวทางเดียวกันทั้งหมด ทำให้ยากต่อการศึกษา บทความนี้จึงทำการรวบรวมระบบการจัดการน้ำเสียและกฎระเบียบข้อบังคับที่สำคัญเพื่อให้นักลงทุนและนักวิจัยชาวต่างชาติที่สนใจระบบการจัดการน้ำเสียของประเทศไทยได้ทำการศึกษา

Background of Thailand's Framework for Water Quality Management

In the past three decades, the Thailand economy has growth rapidly, yielding significant benefit to the country and its people. On the other hand, an economic growth has led to an imbalance in infrastructure, income disparities as well as deterioration of natural and physical resources and environmental quality. An expansion of economic development, industrial activities in particular, has resulted in serious pollution problems such as contaminated rivers and coastal waters. Industrial waste and rapid urbanisation also contributes to water pollution problems, since water pollution is caused mainly from domestic waste and toxic waste is from industrial activities. This has resulted in serious adverse effects on major rivers, especially the Chao Phraya and Thachin Rivers, which have deteriorated below acceptable levels of pollution (see Table 1).

Source: National Statistical Office, 2004

Rivers	1998	1999	2000	2001	2002
A. Chao Phaya river					
- Dissolved Oxygen (DO)(mg/l)(?2)	1.0	1.8	2.0	NA	NA
- Biochemical Oxygen Demand (BOD) (mg/l) (?4.0)	2.8	3.3	2.6	NA	NA
- Total Coliform Bacteria (TCB) (MPN/100ml) (-)	14,500	44,156	63,000	NA	NA
B. Thachin river					
- Dissolved Oxygen (DO)(mg/l)(?2)	1.3	1.0	1.0	NA	NA
- Biochemical Oxygen Demand (BOD) (mg/l) (?4.0)	2.0	4.1	4.0	NA	NA
- Total Coliform Bacteria (TCB)(MPN/100ml) (-)	2,400	97,846	100,000	NA	NA
C. Bang Pakong river					
- Dissolved Oxygen (DO)(mg/l)(?2)	4.7	4.8	3.9	NA	NA
- Biochemical Oxygen Demand (BOD) (mg/l) (?4.0)	0.9	1.6	1.7	NA	NA
- Total Coliform Bacteria (TCB) (MPN/100ml) (-)	195	8,945	6,200	NA	NA

Source: National Statistical Office, 2004

The framework which governs management of environmental quality in Thailand, consists of five policy documents – the National Economic and Social Development Plan (NESDP); the Enhancement and Conservation of the National Environmental Quality Act, 1992 (EQA, 1992); the Factory Act 1992; Industrial Estate Authority of Thailand Act 1996; and Public Health Act 1992. Whether implementation of the Acts and Plans is effective depends mainly on the structure of the Thai administration as mentioned above and provision of policy measures to deal with an environmental pollution. Since 1992, the fundamental role of the government has generally shifted from "controller and regulator" to "supporters, promoters, and facilitator" of development.

In this paper, the Thai framework for river water quality management system is outlined and analyzed into three parts. The first part deals with sustainable development of natural resources including quality of river water. The second part deals with three stages in the planning process provided by the Thai framework - pre-implementation, implementation, and post-implementation stages. The pre-implementation stage consists of planning at national and local levels. The implementation stages consists of measures employed or provided as a guideline in implementing plan in order to cope with river water pollution. Typical measures include the regulatory approach (e.g. permit system, water quality standards, effluent standards), zoning, economic instruments, and other measures. The Post-implementation stage comprises of monitoring and enforcement systems.

Sustainable Development of Water Resources

Sustainable development is not explicitly expressed as an individual objective in the Acts of the Thai framework, except in the objectives of the Ministry of Natural Resources and Environment (MONRE), and the National Economic and Social Development Plan, which are to increase attention to income distribution and protection of the environment to ensure sustainability of future development. However, in defence of the framework some clues about the importance of achieving stainable development are provided by the framework, because objectives and aims of the principle Acts and plans reflect the criteria for sustainable development identified by the International Conference on Water and Environment (ICWE). ICWE lists four principle criteria to determine sustainable development.

Criteria One "to conserve and enhance the resource base" is expressed in the purpose of the EQA, 1992 in that the government wishes to enhance and conserve national environmental quality by promoting the public and NGOs to get involved in enhancement and conservation of environmental quality.

Criteria Two is "to take into consideration the need of present and future generations". It is clearly specified in two of the objectives for the development of human resources, quality of life and environment of the NESDP

as to reduce negative impacts on the quality of life from environmental degradation caused by rapid urbanization, industrialization, and deterioration of natural resources.

Criteria Three is "to integrate environmental and economics in decision-making process at all levels of administration". One of the purposes of enactment of the EQA, 1992 is to promote co-ordination and co-operation among government agencies, state enterprises and local governments in order to enhance and conserve environmental quality. It is not exactly aimed at integrating environmental and economic considerations into decision-making process.

Criteria Four, which is "to analyze the whole water resource cycle" from upstream freshwater to coastal water is implicit expressed in the Thai framework expect in the tourist destination where severe pollution occurred. The NESDP provides targets for environmental development for better quality of life by reducing BOD loadings discharges into coastal areas and tourist destinations such Phuket, Pattaya.

Therefore, it seems that the Thai framework does not provide a clear, integrated framework to achieve sustainable development of water resources based on four criteria. Although, it implicitly includes similar general objectives.

Pre-Implementation Stage- Planning Process

This stage consists of general process of planning and understanding the appropriate level of planning. The first part deals with initial phase of the planning process where programs are developed. Strategic environmental assessment provides at this stage a tool to assess policies, plans, and programs. The subsequent part deals with planning at three different levels - national, regional, and local, since details in plans may differ slightly at each level. The National Economic and Social Development Board, MONRE, and other government agencies respond to the national level plans. At the provincial level, some provinces are required to prepare the plan while some provinces may volunteer for the provincial action plans. Provincial level plan is the responsibility of all the government agencies as stated by the NESDP and the EQA, 1992. There is no regional plan in the Thailand's water quality

management. Planning at local level in Thailand mainly applies to the jurisdiction area of provinces and localities established in the National Public Administration Act 1991. Planning at this level is the responsibility of the governor of each province. Some areas may be designated as environmentally protected areas according to section 43, section 59 concerns pollution control, and the responsibility for the plan is in section 37 of the EQA, 1992. However, if the province fails to get the approval of an action plan such as Changwat (Province) Action Plan (CAP), then MONRE has to prepare a plan under the Prime Minister's order. In any province where no locality is designated the governor may also prepare a CAP within the national framework of, and in conformity with, the requirement of the EQA.

It is compulsory to formulate an action plan for environmental quality management at the local level for any area designated as an environmentally protected area according to section 43, or as a pollution control area according to section 59. While any province in which no locality is designated as mentioned above may also prepare a CAP. Public participation is not explicitly provided for in the Thai framework for water resource management. Pressure groups exist and campaign for improvements informally. These campaigns may lobby at provincial or national level.

Implementation Stage

the plan has been implemented, Thai framework provides for various types of policy instruments to be employed. These are mostly regulatory techniques, economic instruments, and other measures.

Regulation Approach

There are many types of regulatory measures that are provided for by the Thai framework. These measures are a permit system, water quality standards, and effluent standards. Water quality standards and effluent standards are well developed by the Thai system, while a permit system is not well developed.

The permit system for discharging wastewater into the environment in Thailand is governed by the Factory Act, 1992 and the Public Health Act, 1992. Water quality standards and effluent standards in Thailand are controlled by the EQA. Freshwater in Thailand is classified into five classes depending on purpose of water use such as human consumption, fisheries, industrial uses.

Moreover, the Chao Phraya River, Thachin River, Bangprakong River, and Maklong River all have an individual range of classification. Different sections of rivers may be classified based on different uses as mentioned above. The standards of the river water quality in all major Thai rivers are show in Table 2. The standards of surface water quality are set with most precise, technical and

River	Control areas (Km. From river mouth)	Water quality classification	Remarks
ChaoPhraya	7-62	Class 4	
	62-142	Class 3	
	142-379	Class 2	
Thachin	0-82	Class 4	
	82-202	Class 3	
	202-325	Class 2	
Maklong	0-140	Class 3	
Bangpakong	0-122	Class 3	From river mouth to Ban Sang, Prachinburi Province.
Nakornnayok	0-77	Class 3	From Ban Sang, Prachinburi to Muang Nakornnayok
Prachinburi	0-62	Class 2	From Ban Sang, Prachinburi to Muang Prachinburi

quantitative terms, except colour, odour, and taste; or the temperature of the water.

1) conservation, not necessary pass though water treatment processes require only ordinary process for pathogenic destruction

2) ecosystem conservation where basic organisms can breed naturally Class 2 = Very clean fresh surface water resources used for:

1) consumption which requires ordinary water treatment processes before use

2) aquatic organism of conservation

3) fisheries

4) recreation

Class 3 = Medium clean fresh surface water resources used for:

1) consumption, but passing through an ordinary treatment process before using

2) agriculture

Class 4 = Fairly clean fresh surface water resources used for:

1) consumption, but require special water treatment process before use

2) industry

Class 5 = The resources which are not classified in Class 1-4 and used for navigation

Source: Notification of the Ministry of Science, Technology and Environment, 1994

Economic Instruments

Since the Seventh National Economic and Social Development Plan (1991 - 1996), the Thai government imposed and enforced the Polluter-Pays principle to ensure that polluters are responsible for polluting the environment. There are two main types of economic instruments, charges and financial assistance, provided for in the Thai framework. The framework allows charges to be applied as administrative charges or user charges, while the NESDP provides a guideline for the government to levy effluent charges on agricultural and industrial activities.

Administrative charges are set at both central and local levels of government. The Factory Act; section 43 mentions that annual administrative charges are levied on factory businesses in group two and group three types of factories. Public Health Act: section 63 allows a local authority to determine administrative charges as appropriate but it may exceed the rates fixed in the Public Health Ministerial Rules for administrative charges. The revenues rising from the charge can be used as an income for that authority.

On the other hand, user charges are specified in the EQA: section 88 that the national organization - the National Environmental Board may fix the rate of service fee for central wastewater treatment facilities by the EQA. These user charges can be levied on polluters who discharge wastewater to the central wastewater treatment plant in the pollution control areas, or to that locality being served by the facilities. The user charges can be varied as appropriate.

However, domestic households, in particular, can be classified as small-scale users, which is exempt from the payment of charges. At the local level, the National Plan provides that the local authority can manage user charges for the central wastewater treatment plant in an independent manner, which means decentralization of the management system towards local government and also the Polluter-Pays principle can be imposed.

Financial assistance in Thailand is mainly provided for developing wastewater treatment facilities both in forms of grants for the public facility and loans for a local authority or state enterprise, which can make its own profit by building a treatment facility and charging users. The EQA provides that grants may be given to a government agency or local authority for investment in and operation of the central wastewater treatment plants. This type of grant requested by the local authority should be specified in the Changwat Action Plan. Moreover, grants may be provided for NGOs in order to support environmental management in local area in which community has participated and there is an urgent need to enhance and conserve environmental quality.

Loans may be provided to local authorities or state enterprises for making available wastewater treatment facilities and private sector to make available and install an on-site wastewater treatment plant. Rules and conditions of the loans are determined by the national organization, which is called "the Environmental Fund Committee". In addition, the owner or possessor of wastewater treatment facilities may request tax exemptions on the following matters:

a) Import duties for imported necessary machinery, equipment and other materials which are not available in Thailand

b) Incomes tax for foreign experts whose work concerning installation, monitoring, control, and operation of wastewater treatment facilities.

Other measures

There are still other measures concerned with wastewater management such as Best Management Practices (BMP), advocacy and provision of information, Environmental Impact Assessment (EIA). The Thai framework provides mainly for public works dealing with wastewater treatment facilities. The national plan also provides the guideline for Best Management Practice (BMP) in

industrial activities and land management practices based on a voluntary approach while advocacy is provided by both statutory and the guidelines of the provision of education to the public.

Post-Implementation Stage

The framework provides for monitoring and enforcement plans and policies as outline in the following subsections.

Monitoring System

There are two main criteria for monitoring systems which are to monitor three types of matters - administrative and legislative measures, water and ecosystem, and social impacts; together with the provision of a systematic monitoring system with clear objectives, sound system of data collection and analysis, regular reports to decision-makers and the public, also to provide a training program. However, the Thai framework does not provide for monitoring administrative and legislative measures, water and the ecosystem, and social impacts, and training programs for the officials concerned. The framework only provides a data collection system and analysis and regular reports to decision-makers and the public. The NESDP (1992) provides a guideline and measures for the management of water resources by encouraging setting up a water resources information system support planning and policy formulation with respect to water allocation, as well as prevention and alleviation of flood problems. Also, the EQA states that the National Environmental Board (NEB) must submit reports on the national environmental quality situation to the Cabinet at least once a year.

Moreover, the owner or possessor or the Monitoring Control Operator or the Service Contractor of the point source of pollution is required to collect statistics and data showing the daily function of the wastewater treatment facilities and keep the records at the site, and shall submit a report summarizing the functions of the results of the facilities to the local official at least once a month. Consequently, the local official shall gather the reports and send them to the pollution control official, who has the jurisdiction over that locality at least once a month, and the local official may make comments for consideration of the pollution control official.

Enforcement System

The enforcement system in the Thai water quality management framework is tough with increasing penalties both in term of fines and terms of imprisonment for polluters. However, there are various institutions, which derive their authority from a variety of environmental legislations such as EQA, Factory Act, Public Health Act, Industrial Estate Authority of Thailand Act. The

Figure 1: Criteria for Monitoring System

A management framework should provide for:

1) Methods of detecting violations e.g. consent conditions, water quality standards;

2) Severe penalties including fines for violations, compensation for environment damage, cancellation of consent, imprisonment;

3) Provision of public participation;

4) Provision of authorization e.g. immediate access and inspection when environmental pollution occurs.

Table 3: Summary of Penalties in the Thai Framework

Cause	Penalty	Source
Refraining from sending wastewater to central treatment plants; illegally discharge wastewater into central treatment plant; refuse to pay for service charges.	Fine for 4 times of such service fee employed at the time of violation.	s. 90,91,92 EQA
Refuse to observe the order issued by s.9 (relating to pollution caused by pollution and may cause adverse effect on health and their property, or any act done in compliance with such order.	Imprisonment not exceeding 1 year, or fine not exceeding 100,000 Baht, or both. If the violator is the person who cause damage, imprisonment not exceeding 5 years or fine not exceeding 500,000 Baht or both.	s. 98 EQA

Cause	Penalty	Source
Illegally enter into public land and cause damage to natural resources or the environment in environmentally protected area.	Imprisonment not exceeding 5 years or fine not exceeding 500,000 Baht or both.	s. 99 EQA
Violators dealing with ministerial regulation according to s.44 and 45 (dealing with EIA).	Imprisonment not exceeding 1 year or fine not exceeding 100,000 Baht.	s. 100 EQA
Spreading false information about the danger from any point source pollution.	Imprisonment not exceeding 1 year or fine not exceeding 100,000 Baht or both. If the dissemination of information are through mass media, the imprisonment will be not exceeding 5 years or fine not exceeding 500,000 Baht or both	s. 101 EQA
Violators dealing with treating wastewater (s.71, 72, 74, 75), and gathering data dealing with wastewater treatment (s.80); any person who operates wastewater treatment without license according to s.73; Monitoring Control Operator who reports false information; any Service Contractor breaches the closing down order of wastewater treatment plant.	Imprisonment not exceeding 1 year or fine not exceeding 100,000 Baht or both	s. 104, 105, 107, 109 EQA
Failure to collect statistical data dealing with wastewater treatment.	Imprisonment not exceeding 1 month or fine not exceeding 10,000 Baht or both	s. 106 EQA

Cause	Penalty	Source
Any owner of point source of pollution who employs the revoked license Monitoring Control Operator.	Fine not exceeding 50,000 Baht	s. 110 EQA
Breaching the Ministerial rules or notification issued under s.8(1) (relating to area of factory and their environment), s8(5) (relating to effluent standards and methods of control and pollutants from factory).	Fine not exceeding 200,000 Baht	s. 45 FA
Breaching the Ministerial issued under s.8 (6) (relating to necessary document which should be kept at the factory), and s.8(7) (data which requires to report regularly).	Fine not exceeding 20,000 Baht	s. 46 FA
Group 2 factory undertaking their business without informing authority concerned.	Imprisonment not exceeding 6 month or fine not exceeding 50,000 Baht or both	s. 48 FA
Group 3 factory operating their business without consent.	Imprisonment not exceeding 2 years or fine not exceeding 200,000 Baht or both	s. 50 FA
Group 3 factory operating their factory without permission.	Imprisonment not exceeding 2 years or fine not exceeding 200,000 Baht or both, if such factory is controlled under s.32 – imprisonment 4 years or fine not exceeding 400,000 Baht	s. 52 FA

Cause	Penalty	Source
Breaching a closure order.	Imprisonment not exceeding 2 years or fine not exceeding 200,000 Baht or both and 5,000 Baht per day of continue breaching.	s. 55 FA
A factory does not comply with this Act and may cause adverse impact on the people and their property.	Imprisonment not exceeding 1 year or fine not exceeding 100,000 Baht or both and 5,000 Baht per day of breaching	s. 57 FA

variety of these legislations is one of the main problems that can argue between government agencies and business operators. Table 3 presents a summary of penalties in the Thai framework. Figure 1 shows the ideal criteria gains, which the Thai system may be evaluated.

Moreover, a pollution control official may recommend that the official who has the legal power to control the point source of pollution, may close down the operation, to suspend or revoke the license of its owner or operator, or to bar its use or utilization in any way, especially in connection with the point source of pollution under section 68, section 69, or section 74, where the polluter has no intention of treating the wastewaters and illegally discharges the untreated waste into the environment outside the limits of the site and the premises.

Conclusion

Although, provisions are contained in a variety of Acts and Plans, the Thai framework of wastewater quality management provides for implicit consideration of sustainable development objectives in that it is provides a strategy to conserve and enhance natural resources by advocating that the public and NGOs get involved. The system of management is slowly being upgraded taking into consideration the needs of present and future generation, and aims to improve the quality of life of Thai people. However, integration of the environmental and economic in the

decision-making process and to analyze of the whole water cycle are not explicitly mentioned in the Thai framework. One of the weaknesses of the wastewater management in Thailand is that the wastewater management system is under the responsibility of various institutions and variety of legislations. There is no integrated legal framework and lack of coordination among agencies, and there is inadequate manpower, insufficient resources, and a lack of environmental equipment. Government agencies, and businesses could become confused with the regulations.

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