

Wastewater Production, Treatment, and Use in Thailand

Mrs. Pariyada Chokewinyoo¹ and Ms. Pornsiri Khanayai²
¹Department of Health, Bangkok, Thailand, pariyada.c@gmail.com
²Royal Irrigation Department, Bangkok, Thailand

Wastewater production and treatment: Wastewater is one of a major pollution in Thailand. The main sources of wastewater are from community and industrial sectors. The forecast of the total community wastewater is 14 million cubic meters per day. Approximately, 2.5 million cubic meters derived from 1,687 municipalities, 9 million cubic meters derived from district administration and 2.5 million cubic meters derived from Bangkok Metropolitan Administration (BMA) and Pattaya City. For the pasting two decades, Thai government has been invested in sewerage and treatment systems about 83,000 million Baht to construct 101 community wastewater treatment plants thought out the country. The capacity of all these treatment plants is 3.2 million cubic meters per day. Five different types of community wastewater treatment systems have been used; they are stabilization pond (45%), activated sludge (36%), aerated lagoon (16%), constructed wetland (2%) and rotation biological contactor (1%). The industrial sector produced wastewater about 6.8 million cubic meters per day. The types of treatment systems depend on the characteristic of the wastewater of each industry. The major constraints to wastewater treatment in Thailand are the high cost of investment, lack of continuous operation and maintenance.

Wastewater use/disposal: As mentioned above, community wastewater has been treated only 3.2 million of 14 million cubic meters per day. Most untreated and some treated wastewaters are directly discharged to natural water resources without using.

In order to solve problems of water management may be occurred in the future, BMA has carried out a feasibility study to take advantage of treated wastewater. Objectives of the study are;

- reduce the shortage of water in the future. At present, the demand of water for using in BMA is about 2.37 million cubic meters per day,
- reduce the business cost of industry, agriculture and community and
- reduce directly discharge wastewater to natural water resources.

At present, community wastewater treatment system in Bangkok covers 192 sq.km. or equivalent 992,000 cubic meters per day in capacity. But there are only 700,000 cubic meters of community wastewater treated and only 30,000 cubic meters of treated water used for watering plants in public parks, road cleaning and factory cleaning. Result of the study proposes five alternatives of using treated wastewater, as follows:

- Use for irrigation, agriculture and others involved,
- Use for high building activities, especially in hotels and department stores, i.e. toilet flushing, air condition cooling tower system, floor cleaning or car wash,
- Use for factory activities, i.e. cleaning process, if treated water nearly meet water supply standard,
- Use for vapor heating system or cooling system and
- Use for drinking water, if treated water meet water supply standard.

However, the quality of treated water is still having some problems. Turbidity, BOD and heavy metal residual of treated water do not meet water supply and drinking water standards.

Policies and institutional set-up and needs for wastewater management:

There are 4 ministries involved in the wastewater management in Thailand; i.e.

1. Ministry of Industry is responsible for industrial wastewater management by Factory Act, 1992. Industrial wastewater collection, conveyance, treatment and quality effluent standard are controlled by this act. The monitoring and inspection of factory are also included.
2. Local authority, such as municipality, district administration and provincial administration which belong to Ministry of Interior, is responsible for community wastewater management by Building Controlled Act, 1979. Local authority takes charge on construction of sewerage system and community wastewater treatment plant. The quality effluent standard of all accommodation and building is controlled by this act.
3. Wastewater Management Authority and Department of pollutant Control belong to Ministry of Natural Resources and Environment. Wastewater Management Authority takes charge on national community wastewater management policy maker and gives technical advice to local authority. Department of pollutant Control is responsible for water quality control of natural water resources. Both agencies have implemented to follow the Enhancement and Conservation of National Environmental Quality Act, 1992.
4. The last one is Ministry of Public Health Act, 1992 which is responsible for human excreta collection, transportation and treatment. The wastewater from septic tank of toilet or contaminated by human excreta is controlled by this act.

According to the 11th National Economic and Social Development plan (2012-2016) plan, there is a concern on environmental problems such as air pollution; wastewater and solid waste are prone to further deterioration. The natural disaster such as flood and drought are more frequent and sever. Thus, promote efficient, cost-effective, and environmentally sound water use is proposed on the national development guideline. The principle of reduce usage and recycling should be utilized as water footprint information is gathered including water utilization has become more efficient since farmers were encouraged to grow tolerant plants during summer to alleviate shortage.

Even the principle of reduce usage and recycling is proposed on the national development guideline, The strategy and institutions involved the use of wastewater treatment for agriculture or other purposes need to be established. Moreover the research and cooperation from other country are required to make the use of wastewater in Thailand effective.

Research/practice on different aspects of wastewater: From the research titled “Reuse of Effluent from Domestic Wastewater Treatment Plant in Agriculture” in 1999-2002. The result confirms that it was feasible to use effluent of secondary wastewater treatment plant in crop cultivation. Later, Karnchanawong S. et al. conducted the project on Reuse of Effluent from Domestic Wastewater Treatment Plant in Agriculture between 2003-2006. The study was the continuity with more emphases on irrigation with more polluted water. The research on 5 difference kind of plant has been conducted in two groups of plot, i.e. group 1 as normal plots and groups 2 with transparent plastic sheet covering to prevent rain water and infiltration collection pipes under the plots. The crop cultivation was done by using contaminated water, settled contaminated water and ground water as control plot.

The yields and growth rates were generally not different among plots irrigated with 5 types of water. The contamination levels in vegetable (parasite, bacteria, heavy metals) and soils were also not much different. The contamination levels of harvested products were within permission limit and safe for consumption.

The attitude study indicated that farmers around paddy fields and vegetable plots accepted for effluent reuse at 79.8% and 95% respectively. For wastewater reuse, over 50% rejected according to plant growth, crop contamination, etc. The participating farmers and project’s workers were initially reluctant to accept. After the actual cultivation was finished, they agreed on wastewater reuse concept.

Status and need for the knowledge and skills on the safe use of wastewater: Actually, water demand in Thailand is increasing dramatically due to the increase of population and expand of economic. Water withdrawal of use in the country is primarily in agriculture (85%), domestic sector (7%) and by industry. The requirement of water demand increase from 57,452 million cubic meters in 2008 to 65,452 million cubic meters in 2016. The capacity for water storage for summer use is 74,000 million cubic meters but only about 55,000 million cubic meters may be used annually in irrigated areas because the required minimum storage level is 19,000 million cubic meters. Therefore, the severe water shortage will lead to water conflict in the future.

At present, there are 101 wastewater treatment plants throughout Thailand with a total of treating 3.2 million cubic meters per day. A major portion of the treated effluent is being discharged directly to rivers or canals. In the industrial sectors, since the tariff of treated water has increased, the effluents are being used within the factory for secondary purpose, but the excess is still discharged into water bodies. Many of wastewater treatment plants in Thailand are located in agricultural areas at the outskirts of the urban areas with a high potential of effluent reuse in Agriculture.

However, the knowledge on treatment technique is necessary to make the effluent being sufficient quality including with the investment, operation and maintenance cost. The acceptance of farmers is also one of the importance factors that make the reuse wastewater for agriculture successful

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