NON-STATE ACTORS AND LOCAL AUTHORITIES IN DEVELOPMENT -
ACTIONS IN PARTNER COUNTRIES (MULTI COUNTRY) FOR NON-STATE ACTORS

DELGOSEA

Best Practice Udonthani: Constructed Wetland for Municipal Wastewater Treatment

- short version –

Thematic Area: Inclusive Urban Public Services

Country of Origin: Thailand

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This project is co-funded by the European Union.

A Project implemented by the consortium: Konrad-Adenauer-Stiftung e.V., Thailand Environment Institute (TEI), Local Government Development Foundation Inc. (LOGODEF), United Cities and Local Governments for Asia and Pacific (UCLG-ASPAC), Association of Indonesian Regency Governments (APKASI), Association of Cities of Vietnam (ACVN), and National League of Communes/Sangkats of the Kingdom of Cambodia (NLC/S).

ABOUT DELGOSEA

The Partnership for Democratic Local Governance in Southeast-Asia (DELGOSEA) was launched in March 2010 and is co-funded by the European Commission and the Konrad-Adenauer-Stiftung (KAS) of Germany through the German Ministry of Development Cooperation.

DELGOSEA aims to create a network of cities and municipalities to implement transnational local governance best practices replication across partner countries: Cambodia, Indonesia, Philippines, Thailand and Vietnam. It supports the role of Local Government Associations (LGAs) in providing and assisting the transfer and sustainability of local governance best practices replication by local governments. Most importantly, through the exchange of best practices in the region, DELGOSEA intends to contribute to the improvement of living conditions of disadvantaged groups in Southeast-Asia by helping increase their participation in local planning and decision-making.

In the first phase of project implementation, an intensive research was done to determine Best Practices (BP) in local governance in each of the five participating countries. A consortium of international local governance experts and representatives from the LGAs reviewed and selected 16 BPs out of the submitted 27 BPs.

The project concentrated on the following four thematic areas while selecting best practice examples from the five countries:

1. Peoples' participation in planning and decision-making;
2. Institutional governance;
3. Inclusive urban public services;
4. Fiscal management and investment planning.

The following short descriptions BP is one of the selected 16 BPs in the area of inclusive urban public services, provided by Udonthani in Thailand.

Starting in January 2011 through August 2012, DELGOSEA will continue to collaborate with LGAs and local governments to transfer best practices replication. The pilot cities/municipalities could modify or improve the original best practice to their local context. The LGAs in the five participating countries will closely consult and guide the selected pilot local governments on the transfer and implementation of BP replication.

Country	Thailand
Local Government:	Udonthani City
Type:	Municipality
Best Practice:	Constructed wetland for municipal wastewater treatment
Aspect of Governance:	Inclusive urban public services
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Summary

As a response to growing population and urbanization, leading to an increase of urban sewage and contamination, the municipality of Udonthani initiated a wastewater treatment system by turning existing waterways from municipal sewers into natural treatment systems (constructed wetland). This Best Practice model has been set up as supplementary system to the existing municipal wastewater treatment. Udonthani is facing loads from 47,828 households, 11 markets, and 400 industrial plants that discharge a total of 50,000 cubic meters per day. With the constructed wetland Udonthani managed to reduce organic compounds, nitrogen, phosphorus, metals, and germs from the water and at the same time to create a recreation space for the people along the riverside.

The advantages of this best practice model are self-explaining:

- It is easy to set up and can be adapted to different environmental conditions and purposes;
- It is cost effective due to its natural capacity to treat water efficiently, yet with high affordability, low maintenance cost, and minimum technical dependency;
- It is sustainable by making use of natural resources to treat urban sewage and reduce contamination;
- Through the transformation into a constructed wetland, a public space with an enjoyable landscape (parks, green areas) and recreational space for the people has been created.

The urban water treatment works in Huay Mak Khaeng creek was a joint effort between Udonthani Municipality, Faculty of Engineering, and Faculty of Architecture of Khon Kaen University to survey, study, and design the construction plan, under the supervising/coordinating role of Sanitary Work Division of the municipality. The work also engaged Social Welfare Office, which coordinated efforts with local communities, and the Public Health and Environment Office, which oversaw health and environmental quality in the municipal area.

Background and Objectives

Udonthani municipality is located in Udonthani province, which is considered the center of northeastern Thailand. Based on January 2010 statistics, Udonthani has 141,953 residents in 100 communities. The transportation networks include air, railway, and highway.The municipality has two creeks: Huay Mak Khaeng and Huay Mung. They serve as natural drainage. There are two reservoirs for producing public water: Nong Prajak Silpakom and Nong Sim.

With an annual income of about 1 billion baht, Udonthani is the third largest municipality in northeastern Thailand in terms of economic growth. According to the National Economic and Social Development Committee, Udonthani has the potential to become a greater Mekong sub-region service complex. It can serve as the financial and commercial hub linking with Laos, China, and Vietnam. It can also become an export-oriented aviation link to the Indochina region. The municipality of Udonthani initiated the model to restore waterways and turn them from municipal sewers into natural treatment systems. The municipality sought the assistance of Khon Kaen University's Faculty of Architecture.

A. Innovative Elements

A constructed wetland imitating natural ecosystems can be used either alone or integrated with other water treatment systems to improve the quality of water. The constructed wetland is a supplementary system to the existing municipal wastewater treatment system to be able to deal better with fluctuating loads, variable quality of wastewater intake, and the variation of the weather.

This municipality's effort introduced an innovation of using three ponds for low-cost wastewater treatment:

- Shallow pond (one pond) is cultivated with sedge, screw pine, cattail, Indian shot, etc. to reduce water speed and get rid of organic matters in the water. Protein compounds are transformed into ammonia.
- Deep pond is cultivated with lotus and submerging plant to transform the ammonia from the previous shallow pond into nitrate (a process called nitrification).
- Shallow pond (two ponds) is cultivated with sedge, screw pine, cattail, Indian shot, etc. to transform nitrate to nitrogen (denitrification process) and disperse into the air. The discharge from this part is used for fisheries purposes.

The cost of the implementation is relatively low, but the rewards are satisfying:

- Constructed wetland as a wastewater treatment system is an initiative that uses the wisdom of nature to improve wastewater quality. It uses

the knowledge in aquatic ecological system and carrying capacity in accordance with load quantity. It is low cost but effective.

- People can enjoy more green areas and bigger parks. Putting aquatic plants in and along both sides of the creek makes space for elongated parks. People can use this developed areas for recreational activities.
- Constructed wetland is a supplementary system to the existing municipal wastewater treatment to make the wastewater treatment of the municipality more efficient. The load comes from 47,828 households, 11 markets, and 400 industrial plants that discharge a total of 50,000 cubic meters per day. The constructed wetland can help reduce organic compounds, nitrogen, phosphorus, metals, and germs.

B. Involvement and Activities

Residents living on both sides of the creeks took part in public hearings conducted before the commencement of the project. Now, they are the same people who help maintain and benefit from the adjacent area of the creeks for recreational purpose. Other Udonthani residents help by not littering, dumping, or discharging garbage or wastewater into the creek. They also benefit from the new parks, where they come for recreation, like jogging and cycling). They also come to the parks for occasional socio-cultural activities, such as the Loy Kratong festival, an art and music performance.

The practical operation of the model as follow:

- Before discharging water from urban areas into the creeks, it is partially treated by a constructed wetland, using aquatic plant plots such as cattail, sedge, and Indian shot. This pre-treatment component also serves ornamental purposes. Gravitational cascades are added to oxygenate the water and alos make for a beautiful landscape.

- The capacity of a natural system for water treatment has a certain limit. To address this, the creek and the aquatic garden flows are separated. It was also designed to prevent inundation in the rainy season.

C. Sustainability and Replication

The constructed wetland tries to imitate natural systems using indigenous aquatic plants to absorb chemicals, while a well-designed hydrological scheme ensures circulation of the water. Diversified aquatic plants not only help absorb heavy metals and get rid of organic compounds, but also support the larger system in stability and resilience.

More than just a water treatment system, the creeks and waterways help increase green area and beautify urban landscape. They can be used as recreational and exercising area for urban people.

This system requires very low maintenance cost because no sophisticated equipment is used. There is no need for technical assistance or repairs either. The only requirement is to keep the optimal quantity and diversity of plants and prevent blockage in it. This model is sustainable and can be adopted on a larger scale in the future.

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