


<b>Case Study</b>		
<b>Country:</b>	<b>City:</b>	<b>Key Sectors:</b>
Thailand	Chiang Mai	Innovative Wastewater Management
<b>Local Partner Organization</b>		<b>Geography and Population</b>
<b>Chiang Mai Municipality</b>		Area 40.22 km <sup>2</sup> Population 148,477 registered 250,000 unregistered  The city is subdivided into four wards: Nakhon Ping Srivijaya Mengrai Kawila
<b>Contact Information</b>		
Chiang Mai Municipality:  Manupan Pluangplub  Contact: <a href="mailto:cmcity_cleanwater@hotmail.co.th">cmcity_cleanwater@hotmail.co.th</a> Tel: +66 (0)8 1992 1531	Project Coordinator:  Benjarus Wattanapichedpong  Contact: <a href="mailto:benjarus.wattanapichedpong@giz.de">benjarus.wattanapichedpong@giz.de</a> Tel.: +66 (0)8 1006 6992	

## Summary

Chiang Mai is a growing city of roughly 150,000 inhabitants but the metropolitan area which also uses the resources of the city has a population of nearly one million people. Additionally, as a tourism destination, the city attracts 5 million visitors each year. With the ASEAN Economic Community (AEC) opening up in 2015 and the Chinese influx, the city will continue to grow. This growth brings strain and pollution to the water resources, and wastewater management has become a critical problem of many communities in Chiang Mai. The problems especially in Chiang Mai walled city range from clogging of the combined drainage system, lack of effective sewerage infrastructure, the uses of inadequate septic tanks resulting in contaminated groundwater and water wells and finally contamination to water streams including Mae Kha and its tributaries.

The Nexus approach is to implement a pilot project of vacuum sewerage system, which could alleviate the above problems. The project will introduce state of the art technology, improving municipality-community relationship through community participation and finally reduce wastewater problems. The institutionalization of the Nexus approach locally and nationally will be established along the project implementation.

The scaling up of the vacuum system coverage to the whole Municipality will be feasible to the exploration of biogas production, treated wastewater for Chiang Mai walled city's moat and remaining residues as organic fertilizer and night soil.

## Rationale

While officially Chiang Mai Municipality only covers most parts of the Muang Chiang Mai district with a population of roughly 150,000, which is about 10% of the Chiang Mai Province, the urban sprawl of the city extends into several neighboring districts. This Chiang Mai metropolitan area has a population of nearly one million people, more than half the total of Chiang Mai Province.

The largest industry of the city is tourism and its directly and indirectly related jobs. The city has

been attracting over 5 million visitors each year, of which 1.4 - 2 million are foreign tourists. In 2013, Chiang Mai Tourism Business Association had a plan to connect Northern Thailand with Laos, China and Myanmar for boosting the local trade and tourism. Additionally, for the national goal to achieve an annual tourism income of THB 2.2 trillion in 2015, the Association is confident that Chiang Mai and other provinces in the North will be able to contribute up to THB 80 billion of the amount. Chiang Mai has also recently positioned itself to become a “Creative City” and “World Heritage”, and is considering applying for Creative City Status as well as World Heritage Award with UNESCO.

This growth causes strain and contamination to environmental resources. For Chiang Mai, one of the major problems is ineffective wastewater management.

Mae Kha canal, once a clean and clear main stream in Chiang Mai providing water for agriculture as well as being a major transport route for people in the city, is now a heavily polluted sewer line. Other water stream tributaries (e.g., the streams which pass through the Ratanakosin bridge and Kanjanapisek garden) to the Mae Kha canal face the same pollution problems.

Many areas of the Municipality which are not close to or related to the Mae Kha canal, such as Chiang Mai walled city, are also suffering from blocked (combined) drainage system, bad odor, and flash floods. Geographically, the walled city is a basin which receives water from the surrounding mountains. Therefore, during heavy rain, Chiang Mai is susceptible to flood. Additionally, water wells which are commonly found at the premises of the households in the walled city, are no longer usable as the water inside the wells is contaminated.

The Chiang Mai Municipality's Wastewater Treatment Plant (WWTP) (rehabilitation recently completed by Wastewater Management Authority as of 1st October 2014) is located south of the city in Pa Dad sub-district. However, the system is inefficient due to several reasons; there are less than 50% of the households connected to the main sewer collection system, and if they are connected, usually those households will have septic tanks. The WWTP has not been running to its full designed capacity, treating only 6,000 m<sup>3</sup>/day instead of 55,000 m<sup>3</sup>/day and it is treating diluted wastewater. The treatment of the diluted water at the plant costs up to THB 100,000 per month for electricity and up to THB 300,000-THB 400,000 per month additionally for electricity costs of running the pumping stations.

Therefore, a holistic and integrated approach is required to solve the wastewater management problems in Chiang Mai. Through a pilot project at a mutually agreed upon location (by the community, the municipality and GIZ Nexus) within the Municipality, GIZ Nexus approach will address the following topics:

- Feasibility of innovative wastewater management through vacuum sewerage system
- Capacity building for staff of Chiang Mai Municipality on urban wastewater management
- Community participation in the pilot project

To implement the pilot project of the innovative wastewater management in Chiang Mai Municipality, the following activities are required: Wastewater testing by SGS (Thailand) Ltd. (March 2014)

The locations of the samples were: Ratanakosin Bridge, Kanjanapisek Garden, Maharaj Hospital, and the merging point of Mae Kha Canal and Mae Ping River.

Household survey on wastewater management and effects of wastewater pollutions in Aun Ari, Pa Pao, and Chiang Yuen communities nearby Mae Kha canal (August 2014)

Site visit of the Chiang Mai walled city to identify possible community(s) to implement vacuum sewerage system: Chiang Yuen and Ngen Meum Kong communities (September 2014)

Public consultation on the wastewater management and the vacuum sewerage system with community leaders representing communities within the Chiang Mai walled city (14 October 2014)

Feasibility study of implementing vacuum wastewater collection system in Chiang Mun and Lam Chang communities of the Chiang Mai walled city (July 2015)

National-provincial-local dialog to create awareness and mobilize funds

Additional activities to support the South/South dialogue:

GIZ Nexus team's site visit to Bantan Sanitary Landfill to learn about Chiang Mai's efficient 'Waste to Energy' management (October 2014)

Workshops on 'Waste to Energy' at Bantan Sanitary Landfill attended by delegations from Vietnam, Philippines, Indonesia and Thailand (Korat) to explore possibilities of applying the "Waste to Energy" model to their countries (October 2014 and February 2015)

### Stakeholders / Target groups

The key stakeholders include:

- Chiang Mai Municipality
- Chiang Mai Provincial Office
- Office of Natural Resources Policy and Planning (ONEP)
- Wastewater Management Authority (WMA)
- Community leaders and residents in Chiang Mai walled city
- Inhabitants in Chiang Mai Municipality

### Costs / Financing

Cost calculations of the proposed vacuum sewerage system in Chiang Mun and Lam Chang communities prepared by WATERCOURSE amount to THB 241,042,215 (EUR 6,343,216) for investment costs and THB 1,622,180 (EUR 42,689) per year for operation and maintenance costs. Funding mobilization for implementation is in process.

### Studies / Reports / Training

Wastewater Quality Reports by SGS, March 2014

Household Survey Report: Aun Ari, Pa Pao, and Chiang Yuen Communities, August 2014

Feasibility Study on Vacuum Sewerage System in Chiang Mun and Lam Chang communities of Chiang Mai walled city, July 2015

Sources:

[http://www.lanna.com/travel-info/about-chiang-mai/general-](http://www.lanna.com/travel-info/about-chiang-mai/general-information/population.html)

[information/population.html](http://en.wikipedia.org/wiki/Chiang_Mai)[http://en.wikipedia.org/wiki/Chiang\\_Mai](http://en.wikipedia.org/wiki/Chiang_Mai)

[http://www.boi.go.th/tir/issue/201401\\_24\\_1/TIR-201401\\_24\\_1.pdf](http://www.boi.go.th/tir/issue/201401_24_1/TIR-201401_24_1.pdf)

<http://www.impactglobalemissionsolutions.com/climate-change/thailand-carbon-reduction-project/>

### Results (Impact)

The Mayor of Chiang Mai Municipality and other relevant decision makers have been made aware of the critical levels of water contamination of various streams in Chiang Mai. The alarming fact is that the total Coliform Bacteria at Ratanakosin Bridge and Kanjanapisek garden exceed 1.6 Million MPN/100 ml, which is at least 320 times over the standard of the surface water quality regulation. (Notification of the National Environment Committee, Issue No.8 (1994)

Through the household surveys conducted by GIZ Nexus team, the Sanitation Engineering department as well as Vice Mayors of Chiang Mai Municipality have been made aware of the sanitation deficiencies in the communities adjacent to the old city (Aun Ari, Pa Pao, and Chiang Yuen communities), as well as the communities inside the old city (Chiang Mun and Lam Chang communities).

The awareness of the sanitation issues inside the old city prompted the management and the officers of Chiang Mai Municipality to explore feasible solutions, especially as the city is determined to be a UNESCO recognized 'Creative City' and 'The World Heritage' city, after the application was submitted on 9<sup>th</sup> February 2015.

In addition, community participation in Chiang Mai Municipality has been strengthened through the activities of the household surveys in the aforementioned communities. A clear understanding of what GIZ Nexus team and Chiang Mai Municipality do to improve the sanitation facilities was an important first step in making valuable links between the communities and its local government. And a stronger understanding about community groups also helped the Municipality to make the most of these partnerships. Consequently, the communities are willing to get involved and work with the Municipality to alleviate the problems.