Case Study

<table>
<thead>
<tr>
<th>Country:</th>
<th>City:</th>
<th>Key Sectors:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thailand</td>
<td>Chiang Mai</td>
<td>Innovative Waste Water Management</td>
</tr>
</tbody>
</table>

Local Partner Organization

<table>
<thead>
<tr>
<th>Chiang Mai Municipality</th>
</tr>
</thead>
</table>

Geography and Population

Chiang Mai Municipality

Area 40.22 km²
148,477 population registered
about 250,000 unregistered
The city is subdivided into four wards:
Nakhon Ping, Srivijaya, Mengrai, and Kawila.

Contact Information

Chieng Mai Municipality:
Manupant Pluangplub
Contact: cmcity_cleanwater@hotmail.co.th
Tel.: +66819921531

Project Coordinator:
Rashane Sala-Ngarm
Contact: rashane.sala-ngarm@giz.de
Tel.: +66817022955

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 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 waste water management has become the number one problem of many communities in Chiang Mai. The problems range from inadequate and unavailability of septic tanks, contamination to water streams including Mae Kha and its tributaries, contaminated ground water and surface water wells, clogging of the combined drainage system, and finally floods and odor problems. The Nexus approach is to implement a pilot project of Vacuum Waste Water Collection, which could alleviate the above problems. The project will promote community participation and support the Municipality, introducing state of the art technology and improving Municipality/Community relationship. Reduced waste water problems and consumption, the scaling up of vacuum system coverage and exploration of biogas production feasibility, and finally the institutionalization of the Nexus approach locally and nationally will be the medium term results.

Rationale

While officially the Municipality only covers most parts of the Muang Chiang Mai district with a population of roughly 150,000 (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 is tourism and its directly and indirectly related jobs. The city has been attracting over 5
million visitors each year, of which between 1.4 million and 2 million are foreign tourists. In 2013, Chiang Mai Tourism Business Association had plans to connect Northern Thailand with Laos, China and Myanmar and help boost the local trade and tourism even further. Additionally, for the national goal to achieve an annual tourism income of 2.2 trillion baht in the year 2015, the association is confident that Chiang Mai and other provinces in the North will be able to contribute up to 80 billion baht 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 waste water 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 (eg. the streams which pass through the Ratanakosin bridge and Kanjanapisek garden) tributaries 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 the Chiang Mai Old Town, are also suffering from blocked (combined) drainage system, bad odor, and flash floods.

Geographically the city is a basin which receives water from the surrounding mountains. Therefore, during heavy rain, Chiang Mai is susceptible to flood. Additionally, surface water wells which are commonly found at the premises of the households in the Chiang Mai Old Town, are no longer usable as the water inside the wells is contaminated.

The Waste Water Treatment Plant (WWTP) (rehabilitation recently completed by Waste Water Management Authority on October 1st 2014) is located south of the city in Pa Dad Municipality. 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 m3/day instead of 55,000 m3/day and it is treating diluted waste water. The treatment of diluted water at the plant costs up to Baht 100,000 per month (electricity costs) additionally to Baht 300,000–400,000 payment per month for electricity costs for the pumping stations.

Therefore a holistic and integrated approach is required to solve the waste water 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 project’s approach will address the following topics: surface drainage and community involvement, waste water collection with vacuum technology, and capacity building for the Municipality and community to manage and maintain the new vacuum system.

Project Description

- The drainage cleanup campaign, which is a joint effort between the community, the municipality, and GIZ Nexus will yield the following results: reduced drainage clogging in the community, no more odor complaints, enhanced relationship between community and municipality, and opens up the opportunity to educate and propose Vacuum Waste Water Collection system to the community.
- The Feasibility study on Vacuum Waste Water Collection will provide evidence whether the vacuum sewer is a feasible system for the Old City of Chiang Mai and will indicate the funds required if so. The Vacuum Waste Water Collection is a closed systems with no leakages or smell, no contamination of groundwater, no infiltration of external water and lightweight small diameter sewer pipes.
- If the results of the feasibility study are positive, a source for financing the project is to be found to install the vacuum system in the community. The waste water would be collected and send to the nearby pumping station. The waste water is then pumped to the WWTP in Pa Dad – resulting in higher amount of water with fecal matter entering plant, which is appreciated by WMA.
- After the successful implementation of the pilot project, the City plans for two dimensions of scaling up.
First dimension is the scaling up of the Vacuum Sewer system coverage in the Municipality (including the feasibility study on producing biogas and electricity from the more concentrated waste water). The second is the scaling up of Nexus approach to the city’s administrative and planning level, as well as the national level.

To implement the pilot project of “Innovative Waste Water Management” in Chiang Mai Municipality, the following activities are required to obtain baseline information regarding waste water management situation.

- Waste Water samples were taken and analyzed by SGS (Thailand) Ltd. The locations of the samples were: Ratanakosin Bridge, Kanjanapisek Garden, Maharaj Hospital, and the merging point of Mae Kha Canal and Mae Ping River. (March 2014)
- House hold survey was done in three communities nearby Mae Kha canal to obtain information about waste water management and effects of waste water pollution in Aun Ari, Pa Pao, and Chiang Yuen communities. (August 2014)
- Site visit of Chiang Mai Old town to identify possible community(s) to implement Vacuum Waste Water Collection system: Chiang Yuen and Ngen Meum Kong communities. (September 2014)
- Public consultation on waste water management and Vacuum Waste Water Collection with 11 community leaders representing communities within Chiangmai old city. (14 October 2014)
- Feasibility Study of implementing Vacuum Waste Water Collection system in one of the Chiang Mai Old Town communities. (To be done)
- Joint campaign between the identified community (for vacuum system implementation), the Municipality, and GIZ Nexus, to clean up the drainage channels. (To be done)
- Financial sourcing for the pilot project implementation. (To be done)
- Scale up the Nexus Approach, via Nexus Task Force, to the Administrative/Planning department at Municipality level and National level. (To be done)
- Scale up Vacuum Waste Water Collection System coverage for the whole municipality. (To be done)

Additional activities to support the South/South dialogue:

- GIZ Nexus team visited Sanitary Landfill in Bantan District to learn about their efficient ‘Waste to Energy’ project (25 October 2014)
- A delegation from Vietnam, Philippines, and Indonesia visits the Sanitary Landfill and explore possibilities of applying the “Waste to Energy” model to their countries. (To be done, 28 October 2014)

**Stakeholders / Target groups**

The key stakeholders include

- Municipal Sanitation Engineering Department
- Financial and Planning Department
- Community leaders of Chiang Mai Old Town
- Chiang Mai Old Town Community(s)
- Waste Water Management Authority (WMA)
- Office of Natural Resources Policy and Planning (ONEP) under MONRE will assist to scale up the nexus approaches via the exchange of visit and organizing national workshops
- The 150,000 people living in Chiang Mai Municipality
<table>
<thead>
<tr>
<th>Costs / Financing</th>
</tr>
</thead>
<tbody>
<tr>
<td>A cost estimation will be available after the feasibility study on vacuum sewer in Chiang Mai Old Town has been completed in December 2014.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Studies / Reports / Training</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Waste Water Quality Reports by SGS, March 2014</td>
</tr>
<tr>
<td>- Household Survey Report: Aun Ari, Pa Pao, and Chiang Yuen Communities, August 2014</td>
</tr>
<tr>
<td>- Feasibility Study for Vacuum System in Chiang Mai Old Town, (To be done)</td>
</tr>
</tbody>
</table>

Sources:

<table>
<thead>
<tr>
<th>Results (Impact)</th>
</tr>
</thead>
<tbody>
<tr>
<td>- The Mayor of Chiang and other relevant decision makers of Mai Municipality have been made aware of the level 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))</td>
</tr>
<tr>
<td>- The Household Survey of the communities (Aun Ari, Pa Pao, and Chiang Yuen) nearby the Mae Kha canal further emphasizes the water management as well as social problems. About 80% of all the households in the 3 communities installed concrete septic tanks out of which 64% have never been emptied. While the other 20% of the households either do not know if they have septic tanks or do not know what septic tanks are.</td>
</tr>
<tr>
<td>- The site visits (together with the community leaders and a Municipality officer) of Chiang Mai Old Town communities revealed drainage problems. The drainage channels which drain both surface water and waste water into the municipality main pipes are clogged due to sedimentation, discharged solid waste, vegetation, and construction over the drainage. The clogging produces disturbing odors and makes the community susceptible to flood. It was also found that the once (40 to 50 years ago) drinkable and usable surface water wells (commonly found near the household in Chiang Mai old town communities) are now contaminated and have disturbing odor.</td>
</tr>
<tr>
<td>- Both the Household Survey and Chiang Mai Old Town site visits confirm that several communities in the Municipality consider waste water management as one of their biggest concerns, and that the communities are willing to get involved and work with the municipality to alleviate the problems.</td>
</tr>
<tr>
<td>- South/South dialogue started between Chiangmai Municipality and a delegation from Vietnam, Philippines, and Indonesia – on ‘Waste to Energy’ project. The delegation visited Sanitary Landfill in Bantan District, Chiangmai, where appropriate technology was applied to produce electricity from methane. GIZ Nexus partner cities from the above countries were able to start intensive dialogue in Chiang Mai to build beneficial mutual learning environment.</td>
</tr>
</tbody>
</table>