



Case Study - Thailand

How Chiang Mai's Wastewater Utility is building Capacity on sustainable and innovative Solutions to reduce its Carbon Footprint

Activity

Using the WaCCliM approach to raise awareness for greenhouse emissions within the wastewater sector

Region

Southeast Asia

Sectors

Wastewater

Challenges

Awareness, pollution and financial resources

Good Practice

Strategic planning towards water quality improvement and reducing emissions

Timeframe

2014–2018

Case Summary

In the city of Chiang Mai, the *WaCCliM* project supports the Wastewater Management Authority (WMA) in assessing opportunities to reduce its carbon footprint. A baseline study identified the leaks of untreated wastewater, caused by fractured pipes in the wastewater collection system, as the main source of greenhouse gas (GHG) emissions in Chiang Mai. A large amount of untreated wastewater is flowing directly into the public canal. Because of this, the city is producing significant amounts of methane (CH₄) and nitrous oxide (N₂O), both gases with a larger global warming potential than carbon dioxide (CO₂). The emissions from direct discharge of untreated wastewater account for 579,900 kg CO₂ per year in the city.

The cooperation between WaCCliM and the WMA in Thailand has raised the local awareness for the challenges in the wastewater sector and the need for improvements in the urban water management in order to achieve resilient water utilities. Therefore, knowledge transfer and capacity building are necessary for long-term success and continuous progress.



Chiang Mai is one of the most scenic regions in the country and used to be the home of the Lan Na Kingdom, which founded the city in 1296. Chiang Mai has a rich cultural history and proud tradition of local craftsmanship. ©pexels

Background

Chiang Mai is located among some of the tallest mountains in Thailand, tucked away in the northern region along the Ping River. The city has a total area of 42.6 km² and a population of around 137,000 registered inhabitants (2017). Chiang Mai has a rich cultural history and a proud tradition of local craftsmanship. It was a large trading destination for goods such as handmade pottery, woodcarvings and umbrellas.

Currently, tourism has come to surpass trade as Chiang Mai's number one economic activity. The tourism rate in Chiang Mai has been growing steadily by 15% annually since 2011. The pressure from this rapid increase in tourism has left the city with emerging environmental issues. The pollution of the Ping River is the current main issue, negatively affecting the activities within the community.

The Chiang Mai utility was chosen by the WMA for this project. Due to it having the highest electric energy consumption in the region, it represents the pilot utility with the best capabilities to introduce capacity building and GHG reduction measures in the wastewater treatment process. Regarding coverage of the utility, 50% of the resident population are connected to the sewers of which only 30% of the collected wastewater is treated in the wastewater treatment plant (WWTP).

Challenges

Awareness:

A large challenge in the Southeast Asian region is that only a few countries are aware of the consequences of climate change on the global scale, including Thailand. This is due to the presence of more immediate problems at the local level, neglecting the implications of climate change in the long run.

Pollution:

Water pollution is a major environmental concern in Thailand. One of the main causes is the discharge of untreated domestic wastewater into the water bodies resulting in the deterioration of water quality and significant GHG emissions. In addition, a growing population along with urbanization, industrial and agricultural expansion led to an increased demand for water and wastewater services. Currently, 70% of the collected wastewater in Chiang Mai is discharged without any treatment.

Financial resources:

Costly infrastructure projects with high overhead and maintenance costs are not feasible at this time, as the utility has to maintain their current service levels.

Activities

Baseline assessment:

WMA used the Energy Performance and Carbon Emissions Assessment and Monitoring (ECAM) Tool to conduct a baseline assessment of Chiang Mai's wastewater utility to identify indirect and direct sources of CO₂, CH₄ and N₂O within the stages of wastewater collection, treatment and discharge. The total GHG emissions for the whole wastewater system were 807.115 kg CO₂-eq per year. The results demonstrated that repairing the sewer system in Chiang Mai and improving the pump energy efficiency will reduce GHG emissions by at least 12%, and will also generate additional benefits such as reducing the cost of energy bills. Building on the success of the first ECAM Tool assessment, the WMA plans to further assess GHG emissions from all their WWTPs.

Policy development:

At the national level, WaCCliM supports the WMA to improve the regulatory and policy framework for scaling up the implementation of climate mitigation measures in the wastewater sector. This includes the development of a 20-year GHG mitigation strategy to reduce emissions. The "Nationally Determined Contribution Roadmap on Mitigation 2021-2030" is Thailand's commitment to formulate strategies on reduction, in which the wastewater sector will reduce emissions by 3.6% by 2030.

Furthermore, the WMA released a sustainability report for the year 2017, which outlines the climate goals and continuing progress in the region as well as the steps the utilities took in collaboration with the WaCCliM project.



Surachet Nokham, WMA utility manager of Chiang Mai, is working on improving the wastewater treatment processes in his utility. WMA has signed a mutual agreement with the Chiang Mai municipality to effectively improve wastewater management. ©GIZ

Capacity development:

Training workshops are being held to ensure the knowledge exchange between the WaCCliM project and utility staff on GHG mitigation opportunities and monitoring. A paradigm shift towards carbon neutral, climate resilient water systems needs to take place across all wastewater companies in Thailand.

Institutions Involved

The WaCCliM project, which aims to transition to low-carbon urban water utilities, is working with the Wastewater Management Authority, a state-enterprise under the Ministry of Natural Resources and Environment (MNRE) to improve the pilot utility of Chiang Mai. The main objective of the WMA is to efficiently manage existing wastewater treatment systems for local administrative organisations and provide administrative and management services, within and outside the wastewater management areas.



The WaCCliM project is implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and the International Water Association (IWA) on behalf of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) as part of the International Climate Initiative (IKI).

Financing

Most of the 101 WWTPs in Thailand are funded by their municipalities. However, the Chiang Mai utility is one of the 26 WWTPs, which are funded and operated by WMA. Changes within the wastewater treatment system have to be discussed with the municipality according to the mutual agreement previously signed. This is a limiting factor and makes WWTPs that are directly operated by the municipalities more flexible, since they can implement measures without coordinating with another entity. In addition, financial resources are limited and budgeted for the maintenance of the operation system, making the implementation of improvement measures or new projects a more difficult task for the Chiang Mai utility.

A goal of the *WaCCliM* project is to address and facilitate solutions which are both financially feasible to the utility's current situation and relevant to unlock outside climate financing, thereby streamlining the financing procedure.

Impacts

The initiative to raise **awareness** and build **capacity** towards progress has been largely successful and it is currently growing, in the region and within the utility of Chiang Mai.

The **involvement** of the WaCCliM project is a step in the right direction. The awareness amongst decision makers and stakeholders involved in the water and wastewater sector is critical to the success of any project hoping to bring improvements into a given system. Following involvement with the project, there is now a better **understanding** of both

the immediate needs of the partner utility and the pathways which may be best suitable to reach implementation of low carbon measures in the long term.

Success Factors

The willingness to engage and learn makes Thailand a pioneer in the region: The country has a positive attitude towards finding solutions to their current environmental issues and is a team player in the global climate agenda.

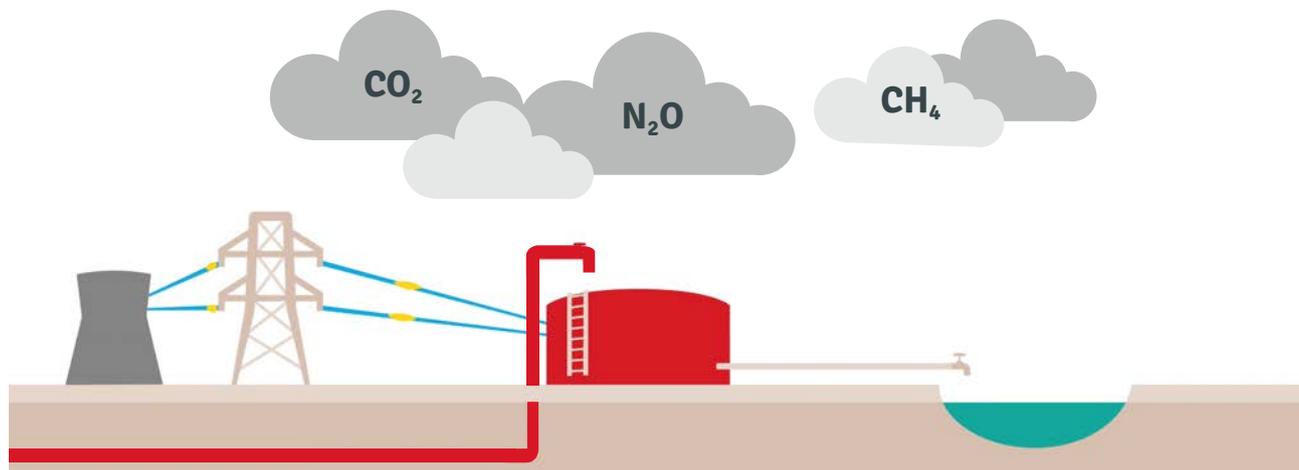
The cooperation with the WaCCliM project allowed a successful partner collaboration between the wastewater utilities in Thailand. These utilities are better prepared to transform to sector leaders, seizing the opportunity to become more resilient, efficient and effective in an uncertain future.

Successful training sessions are key to raise awareness for GHG emissions coming from urban water systems. The trained staff will be able to spread the knowledge inside their utility and at the same time, work as trainers for their or other utility staff members.

Obstacles Overcome

In the case of Chiang Mai city, the success of addressing their challenges lies in overcoming the 'business-as-usual' and considering options, which require a different set of knowledge and skills. This is not an easy task when there are preexisting limiting factors such as financial feasibility, as well as knowledge gaps. Throughout the process of being involved with the WaCCliM project, the utility staff has become better prepared to address their utility's current objectives while preparing to meet the nation's sustainability goals.

This is a case of policy initiatives at the national level, trickling down and instigating development at the regional level. Being better prepared to meet national objectives is also a goal of the WaCCliM project – to better prepare utilities for the future and finding tangible pathways to the improvement of services, which align with GHG reduction goals.





Aerated lagoons (AL) in Chiang Mai. This treatment method is typical for this region. ALs are easy and inexpensive to construct and operate. With this method, waste is degraded by various microbiological populations and pathogens can be effectively removed by aeration or exposure to sunlight. ©GIZ

Lessons Learnt

Knowledge transfer is indispensable for shifting the mind-sets within the water sector. Raising awareness as well as gathering the necessary information to begin the targeted capacity building and the eventual strategic measure implementation are the key points.

In order to have a successful implementation of the WaCCliM approach inside other utilities, a good **understanding of the objectives and the capacity** of the utility is necessary. This will allow an adequate strategic planning. Moreover, a further coordination between the stakeholders and governing bodies is essential in order to reach appropriate suggested measures later on.

The main lesson for similar projects worldwide is that the initial process of **information gathering, strategizing and understanding the partner organisation's needs** is critical to identify not just feasible implementation measures, but those which are also practical and relevant to the utility's specific context. The process has been a relevant learning experience not just for the parties involved in this initiative, but for all organisations worldwide who seek to develop similar capacity building projects, in the water sector or elsewhere. The precursor for success is to focus on identifying the most feasible projects given the starting conditions and desires of the partner utility. Then, realistic objectives can be set, which can also develop naturally, as it did in this project.

However, this utility can undertake more practical paths in the future, based on a further developed holistic and strategic approach. **Aligning their objectives more closely with specific policy outcomes** can assist the utility in finding further resources to plan and complete projects. Likewise, going through this process highlights which specific areas of the utility's operations need the most attention. This can help in addressing one objective at a time and setting realistic goals.

Replication

Following the example of the pilot utility in Chiang Mai, the WaCCliM approach is already being replicated in other cities. Since 2016, additional utilities in Hat Yai, Sansuk and Krabi have been trained and are applying the ECAM Tool to assess their carbon footprints. The WaCCliM project has supported the additional utilities in developing option studies to reduce GHG emissions and improve their energy efficiency.

Best Practice

This case demonstrates the possibility to successfully transfer knowledge and to support a utility undergoing the transition to low-carbon water utilities. The WaCCliM project is aware of the global dominant mind-set shift towards climate awareness and action, and that many utilities will need to adjust their strategies going forward. This is where trainings and the identification of critical areas for improvement are necessary in enabling the implementation at a later stage. Additionally, this is an example of a partnership, which benefitted a utility already facing a challenge to address pollution and policy-motivated improvements from the national to regional level.

Next Steps

The utility of Chiang Mai is now aware of its need to address water pollution in the region by improving treatment processes. In the future, capacity development needs to be continued so that the participants of the project develop further skills and knowledge within the wastewater management.

Furthermore, there is the possibility for cooperation between the Chiang Mai municipality and the WMA, since the municipality's focus will lie on wastewater for the upcoming two years. Most likely, the municipality will provide financial support, while the WMA will contribute with their existing knowledge in GHG reduction, lowering electrical energy consumption and improving wastewater treatment processes.



Participants of an Energy Performance and Carbon Emissions Assessment and Monitoring (ECAM) Tool training in Thailand 2016, including Chira Wongburana (front row, fifth from left), Acting Director General of the Wastewater Management Authority. ©GIZ

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