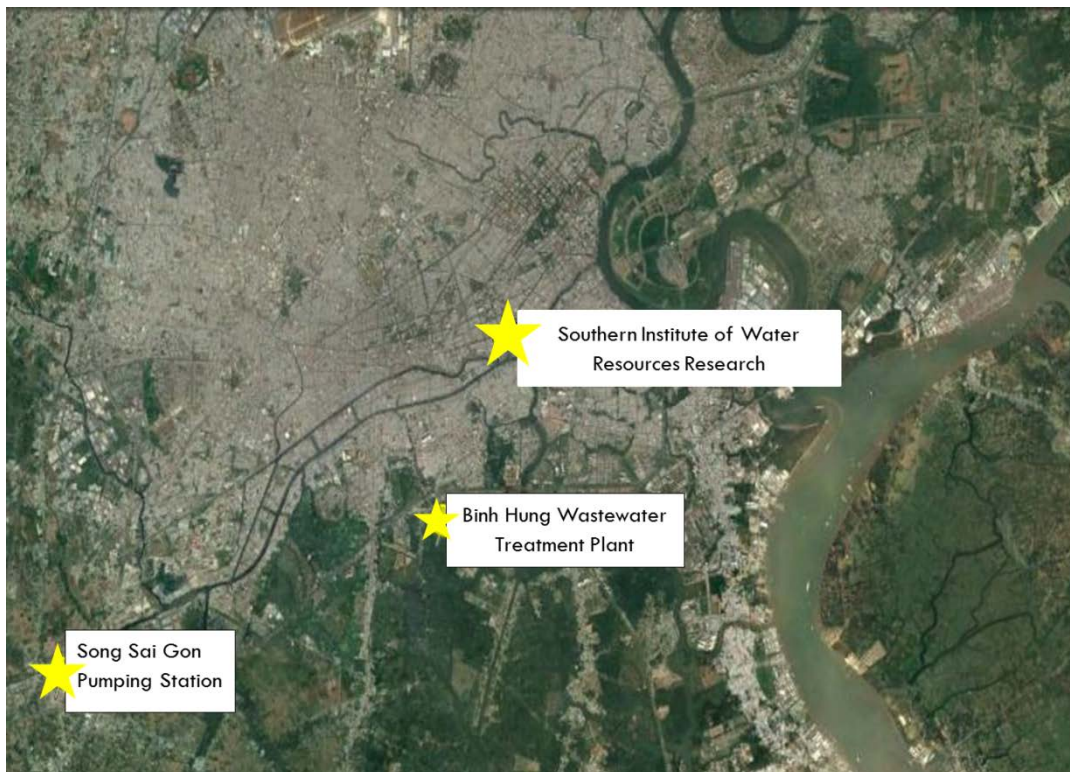




WATER ISSUES IN AN URBAN AREA

FIRST FIELD TRIP SUMMARY



The first field trip on water issues in urban areas was held on March 8, 2017 in Ho Chi Minh City, Vietnam. The three locations were the Song Sai Gon Pumping Station, the Binh Hung Wastewater Treatment Plant, and the Southern Institute of Water Resources Research (SIWRR).

Introduction

The ProSPER.Net Young Researchers' School 2017' participants visited the Song Sai Gon Pumping station, the Binh Hung Wastewater Collection and Treatment Plant, and the Southern Institute of Water Resources Research in Ho Chi Minh City in order to improve their understanding of water issues in urban areas.

Background

Ho Chi Minh City is located in the southern part of Vietnam. The city is a major economic hub as well as a center of technology and education in the country. Ho Chi Minh City is an urban area that has high density population (8.5 million people in 2016). Due to rapid urbanization, domestic wastewater has been illegally dumped into the river and wastewater treatment has not been able to treat the total amount of wastewater in Ho Chi Minh City. Moreover, the city also faces extensive and increasing flooding. Therefore, water resource management in the Sai Gon Delta is of paramount importance.



Fig. 1 Map of main rivers and canals in Ho Chi Minh City

1. Song Sai Gon Pumping station

The Song Sai Gon Pumping station is located in the Binh Thanh District near Ho Chi Minh City. The main system includes an electricity distribution system, a garbage and drainage system, a pumping system, a deodorizing system, and a monitoring, control and data



Fig. 2 Song Sai Gon Pumping station

acquisition system (SCADA). The station covers the removal of domestic wastewater in 7 districts of Ho Chi Minh City and consists of 12 pumps in the plant with diameter of about 3000 millimeters and an effluent slightly lower than 64,000 m³/h. This station is primarily used for collecting domestic garbage in household wastewater. After the physical treatment, wastewater is chemically treated in order to reduce the odor. The odor from the wastewater (H₂S) is treated through a deodorizing system so that when the gas is released into the environment, it will be guaranteed to be free from smell by using a solution of 32% NaOH and 12% NaOCl, with the following reaction: $2\text{NaOH} + 4\text{NaOCl} + \text{H}_2\text{S} = \text{Na}_2\text{SO}_4 + 4\text{NaCl} + 2\text{H}_2\text{O}$. Finally, the treated water is discharged into the river.



Fig. 3 Flood Prevention Gate

The flood prevention gate (NhieuLoc – ThiNghe), prevents flooding in 7 districts of the city, which cover around 3.393 ha on the NhieuLoc – ThiNghe channel. This gate is used for controlling the water level during flooding caused by either high tide

from the sea or overflow from the Sai Gon River, improving drainage efficiency of the public water system, and maintaining water levels during the dry season.

2. Wastewater Collection and Treatment System

Wastewater treatment systems in Ho Chi Minh City are divided into 12 sewage catchment areas. Wastewater is collected and treated in each area on a small scale. The Binh Hung Wastewater Treatment Plant was the first one built in Ho Chi Minh City, located in the Binh Hung, Binh Chanh



Fig. 4 Wastewater Treatment

District. The construction period was during 2004 -2008. The total area is about 47 ha and has the capacity of 141,000 m³/day. The technology used for treating water is a simple technique for general wastewater treatment: 1) a settlement area is provided for settling particles in the water, 2) next, water is sent to an aeration area for increasing the biological process, 3) a disinfection area is next, where bacteria in the water are killed by a chloride compound. Finally, the treated water is released into the river. Currently, only 10% of the domestic wastewater is treated properly in the city. Next, the city plans to construct 7 additional plants, of which 3 will be complete next year. The goal is to have over 80% of wastewater treated after the construction of the additional plants.

3. Southern Institute of Water Resources Research (SIWRR)

The Southern Institute of Water Resource Research was founded in 1978. The institute is the leading organization in developing water resource technology in the southern part of Vietnam. Its main functions are carrying out scientific research for public interests, for example, research on irrigation for soil improvement, mathematical modeling (flood flow, salinity intrusion, etc.), tidal inundation, and impact assessments. SIWRR's researchers also provide contextual background information on the topic of water issues in Vietnam, especially in the Mekong Delta - an area of about 3.9 million ha, of which 2 million ha are used for rice cultivation. Problems in the Mekong delta include flooding, salinity intrusion, acid sulphate in the soil and water, drought, river bank erosion, sedimentation, and general water pollution. Therefore, the Institute has instigated several projects to solve these problems.

Observations on water resource quality assessment

- Water from the pumping stations should be checked regularly in terms of biological pollution before discharging into the river.
- Facilities with infrastructure for back up storage, localized storage etc. should be considered for future development.
- Water properties (e.g. temperature, pH, and conductivity) should be checked in discharged water in order to avoid effects on aquatic organisms/ecosystems in and around the river.
- Improved monitoring facilities must be taken into account.

Conclusion

Ho Chi Minh City is one of the important cities in Vietnam and has urbanized a lot during this past decade, with the population in this city is sharply increasing. Moreover, several rivers pass through the city and discharge into the sea. This kind of situation can cause many problems (e.g. flooding during rainy season, salinity intrusion, and water pollution). Several organizations are trying actively to solve these problems and protect the city, such as the places visited by the YRS's participants. Our observation from visiting these sites is to take an integrated approach to design the future water management facilities rather than isolated ones, which can be a crucial first step to achieve sustainable water management for the city in future. Local communities who live along rivers are the key factors for our sustainability. The education and involvement for these communities can acknowledge their responsibility for own quality of life.

Group Members

1. Siriphat Sirikunpitak (Prince of Songkla University)
2. Md. Mostafizur Rahman (Hokkaido University)
3. Supanad Hensawang (Chulalongkorn University)
4. Hung Pham (Ho ChiMinh University of Technology)