

## **Cultivating Community Science and Clean Water in Bangkok, Thailand** **Kerry Wong, Scripps College, USA.**

Healthy water quality is vital for sustainable agricultural production, human health, and ecological biodiversity. The deterioration of water quality has become a global problem, especially in the Bangmot Canal region along the Chao Phraya River and for the communities living along the canals. The Bangmot Canals near Bangkok, Thailand has been settled for over 200 years and is significant as a support for agriculture, fisheries, consumption, industries, and transportation. The areas surrounding the canals include low-rise farmhouses, temples, and orchards. Rising salinity levels in the canals have been of concern over recent years, due to the rapid expansion of population settlements, economic growth, and land use. Intrusion of salt water from the Gulf of Thailand due to rising sea levels from climate change is another factor. Salinity has affected local agricultural industries, as less water in the canal has resulted in a decrease in seed germination, plant growth, and fruit yield and quality. High salinity levels also make it difficult for plants to absorb water and sufficient nutrients. The decline of farming has been attributed to the rising salinity and general deterioration of water quality in the canals, which has caused farmers to turn to cultivating crops with a higher tolerance to salinity and poor water quality, affecting the overall health of surrounding biodiversity and ecosystems. Testing of the river water characteristics, such as dissolved oxygen and coliform bacteria, has also been inferior to the standard established by the Pollution Control Department. Although the Chao Phraya River water quality has been studied, either routinely by river management authorities or by researchers for various specific objectives, variations in salinity levels and sustainable bioremediation efforts with mangroves remain an important area of study as evidenced by various investigations in recent years. Thus, there is an urgent need to further investigate the health risks associated with this environmental health problem.

There are few existing studies on water quality and influence from industries along the Bangmot Canal region. Dr. Budthimedhee, chair of the program in Design and Planning at King Mongkut's University of Technology Thonburi (KMUTT) and Professor Chandrangsu, in the Keck Science Department at the Claremont Colleges have been collaborating on research on water quality of the Bangkok Canals for several years. Current water quality analyses suggest high salinity concentrations at certain sampling sites along the canals. While these results are subject to confirmation using a larger data set, they lay the foundation for future study of the water quality in the Bangmot canal. To learn more about the source of salinity, I have been studying how the urban environment may affect salinity in the canals near Bangkok, Thailand and have developed an interactive online map using a geographic mapping software called ArcGIS, as a student researcher in Professor Chandrangsu's lab. In addition to the impacts of land usage, I have been studying the potential of *Avicennia officinalis* mangroves, a mono-dominant species along the Chao Phraya River that is native to the study site regions, to serve as biofilters and bioremediate the water quality in the canals for several months now. Mangroves are salt-tolerant trees that play an integral role in the Chao Phraya River ecosystem, and show promise in reducing salinity and improving water quality. However, they grow expansively, which may pose issues to the narrow canals. Students from the Claremont Colleges and KMUTT worked together to create a mangrove bioremediation proposal last year. With input from the local community, the students proposed a floating platform with mangrove plants as natural filters, as well as the installation of lights to show different water quality levels and increase public awareness that accommodates the landscape. The designs will have minimal impact on usability of the canal by the community. My current work with *Avicennia officinalis* mangroves and the interactive map, where residents can easily contribute and view the collected water quality data, serve to further investigate the source of increasing salinity and explore possible bioremediation solutions, such as the floating mangrove platform.

This project will leverage a long standing relationship between Dr. Budthimedhee, Dr. Chandrangsu, KMUTT, and local community organizers. I propose an initiative to investigate the source of increasing salinity, explore the feasibility of possible bioremediation solutions, and involve impacted communities throughout this process. I hope to not only further research on the environmental conditions,

## **Cultivating Community Science and Clean Water in Bangkok, Thailand** **Kerry Wong, Scripps College, USA.**

but also increase accessibility to environmental education, involve locals in sustainable data collection, and improve water quality in Bangkok, Thailand with the support of our collaborators at KMUTT. In November 2022, Vice President Harris visited Thailand to discuss our shared commitment to sustainable, environment-focused goals and launched numerous initiatives involving the climate crisis, clean energy, and agriculture. This project not only addresses the issue of the lack of access to clean water as a potential cause of unrest, but strengthens the U.S.-Thailand partnership and promotes peace in a global context.

The first part of the project centers citizen science, which involves local knowledge, community-based data collection, and collective action. Our KMUTT collaborators expressed a need for support with science education and data collection in their community. I will run workshops to share our research findings on the salinity levels and water quality and its significance, and also teach residents to collect their own data and interpret it. I will begin by surveying the local community along the sites of the canal where there is the biggest difference in salinity levels and gather input from farmers, monks, and residents on the effects of the water quality. I will incorporate their input in the workshops at the community center and share information about ways the community can be involved with collecting water quality data and be involved in ongoing research. The workshops will take place at a community center Dr. Budthimedhee established for locals to gather and discuss canal issues.

A possible solution to the high levels of salinity along the canals would be to test the feasibility of floating mangrove stations by making small-scale prototypes. I will work with our community partners, Dr. Budthimedhee and KMUTT students, to develop these prototypes to test in the community pond located on a community farm owned by KMUTT alumni, Safetist Farm. This will help us explore sites with significant salinity and microbiome levels, and develop sustainable methods of using mangroves to bioremediate and restore the local ecology. The initiative is intended to take place from the beginning of June to the end of August, spanning about 12 weeks. The desired outcome of this project is to make our research findings accessible to the general public and involve locals in sustainable data collection. I have been in conversation with Dr. Budthimedhee and her students throughout the development of this proposal.

After I leave, the community center will serve as a resource for ongoing research related to the Bangmot Canal between KMUTT and the Claremont Colleges and ways the community can actively be involved with data collection. It is a priority to include locals in conversations about ongoing research and center their experiences in our projects. I am passionate about social disparities in the distribution of health and environmental justice, as well as how policies and politics shape equity and accessibility. I hope to improve public health by implementing community-centered initiatives to give everyone the opportunity to live long and healthy lives and one day become a leader in the health field. I have had the opportunity to be involved with diverse environmental-health justice projects, such as organizing educational workshops for children on plastic pollution. I believe my community-centered experiences have helped me gain an understanding of intentional cultural competence and cultural humility, and has prepared me to carry out this project successfully.

By incorporating input from the local communities and involving them in data collection that can be incorporated into the interactive online map, we will be able to gather a more comprehensive picture of the environmental conditions that influence water quality in the canals. It offers the opportunity to work with and listen to the communities along the canals to not only improve accessibility to environmental education and involve locals in sustainable data collection through the workshops. Accessibility to scientific research is often limited to those working directly with the issue or in academia, and the communities impacted are not involved. Incorporating the local community in the decision making processes will also help address the large disconnect between researchers, policy-makers, and the

**Cultivating Community Science and Clean Water in Bangkok, Thailand**  
**Kerry Wong, Scripps College, USA.**

impacted communities. There must be increased accessibility to scientific findings to empower locals to work with the government to enact action for the overall health and safety of the communities along the canals in Bangkok. It is a priority to include locals in conversations about ongoing research and center their experiences. I believe this educational science program and community engagement initiative will provide local residents a sense of agency and ensure that the canals remain a healthy and reliable source of water for surrounding communities. This would be an invaluable opportunity not only for research purposes and to develop sustainable solutions to complex issues, but also to build meaningful intracultural relationships for social change. This project is a collaboration of communities and canal residents who believe in sustainable development, better grassroots economies, creating healthy communities, and protecting biodiversity and ecosystems.

Thank you for your time and consideration.