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CLEAN WATER AND SANITATION

2018-2022 Publications		**136**
Course Units		**26**
Student Engagements with Units on SDG 6		**558**
2018-2022 Percentage of all Taiwan Publications		**4.6%**

Research

Global Water Information: Multi-Satellite Remote Sensing

Professor Tee-Ann Teo of NYCU's Department of Civil Engineering presented his dissertation at the 2022 Taiwan International Water Week (TIWW), introducing the use of multi-sensor remote sensing technology to monitor global water resources and key concepts of satellite remote sensing in water resources monitoring, such as the resolution of satellite images, satellite programs related to water resources monitoring, the development of geospatial big data infrastructure, and satellite remote sensing programs to monitor global water resources. He also presented relevant research results with actual examples, such as freshwater ecosystems, NASA's Global Water Monitor, ESA's lake water quality monitoring, and JAXA's water cycle monitoring, etc.

Improving the Safety of Drinking Water in Taiwan

Global climate change has caused water temperatures to rise, causing rapid growth of algae in the water, leading to algal blooms in reservoirs, which seriously affects the safety of drinking water. The traditional water purification process has always been ineffective in removing domoic acid produced by algae and algae cells. The research team led by Professor Chih-Pin Huang of NYCU's Institute of Environmental Engineering discovered that adding polyaluminum chloride before iron coagulants in the water purification process can effectively improve the removal rate of algae and significantly reduce the amount of aluminum residue in the water. The optimal dosing strategy for double dosing proposed in this study can achieve ideal algae removal and effluent filtration, which will contribute to improving the safety of drinking water in Taiwan. These findings have been published in the international journal *Environmental Science: Water Research & Technology*.

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Social Impact

Outstanding Contributions to the Development of Water Works

Professor Chih-Ping Lin of NYCU's Department of Civil Engineering was awarded the 2022 "Water Works Contribution Award" by the Water Resources Agency of the Ministry of Economic Affairs. The award celebrates those who have made significant contributions to the development of water works. The primary contribution that earned Professor Lin the award is his innovative development and application of sediment transport monitoring and dredging volume management systems, which have been implemented in major reservoirs. Professor Lin has also made concrete contributions providing professional assistance in reservoir safety assessment, the development, application, and promotion of detection and monitoring technology, and the promotion of international exchanges and technology cooperation in water conservancy.

Resilient Cities and Townships and Disaster Prevention and Adaptation Projects

Coping with the effects of disasters caused by abnormal weather related to climate change, to strengthen collaboration between the central and local governments when it comes to disaster information, NYCU's Disaster Prevention and Water Environment Research Center conducted the research project "Township Resilience and Disaster Risk Reduction Adaptation of Extreme Weather Disasters - Hsinchu County," working with local disaster prevention and rescue units with considerable experience and scientific research capacity in local disaster management and facilitating disaster information compilation and scientific research and technological exchanges between the central and local governments to improve the time and spatial resolution of disaster information, maximizing the effect of integrating resources from all sectors across the country.

Research and Industry-Academic Cooperation on Smart Water Affairs

To solve problems with the existing wastewater treatment system, such as excessive dosage and imprecise dosage control, the NYCU Environmental Technology & Smart System Research Center teamed up with Advantech in an industry-academia cooperation project to control the concentration of copper ions starting from the mixing tank of wastewater treatment plants and exercise more accurate dosage control. In addition, the center developed machine learning and deep learning methods, using AI prescriptive decision-making for optimal formulas and establishing an AI chemical precipitation copper removal model through various parameters and cross-system data analysis, to achieve precise dosing and stable water quality, taking into account operating costs and system stability.

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Education & Cultivation

Water Resources and Environmental Seminars

Climate change and the environment are key issues that have prompted the world to pay attention to water resources. NYCU's Department of Civil Engineering and Department of Environmental Engineering organized many seminars in 2022, with topics such as "Establishing the Eco-hydrological Model of the Menghuan Lake Wetlands and the Management and Application of Conservation Areas," "Integrated Water Resource Management Theory and Practice (Response to a Once-in-a-Century Drought)," "Application and Challenges of Marine Geophysical Technology in Offshore Wind Farm Site Surveys and Production of Digital Charts," "Satellite Remote Sensing and the Marine Environment," "Research on Tungsha Island," "Research on the Depth of Ponds and Embankment Maintenance," "SDGs Water Resource Challenges and AI Water Resource Sustainability," etc.

Training Wastewater (Sewage) Treatment Personnel

NYCU Institute of Environmental Engineering handles the "Wastewater (Sewage) Treatment Personnel Training Course" for the Environmental Protection Agency of the Executive Yuan, helping to train wastewater treatment personnel, enhance the professionalism of trainees in wastewater treatment as well as pollution prevention and management, thereby helping to protect the ecosystem and environment. In addition, the NYCU Environmental Technology & Smart System Research Center has been commissioned by the Water Affairs Organization to gather professionals and groups from the industry, government, academia, and research sectors and drive abundant practical experience in smart water affairs, from cooperating with policy implementation to promoting industry upgrading and academic innovation and technological development. The center also held the "Smart Wastewater Management Training Course," providing valuable operational guidance for next-generation smart water systems.

Stewardship

Disaster Prevention and Water Environment Research Center

NYCU's Disaster Prevention and Water Environment Research Center has participated in disaster prevention and relevant planning initiatives by the central government and city/county governments. The center has developed international collaborations on water conservancy and implemented research plans in the engineering community to promote innovate solutions in water conservancy and disaster prevention. The center has also conducted research on several issues, including reservoir water storage safety, river basin protection, and coastal topography and seawall risk assessment. Furthermore, it has continually implemented national-level plans, including key technology R&D and talent training for national reservoir safety assessment operations and the development of a database for water warning levels in rivers and regions managed by the central government.

Diversified Water Supply and Water Conservation Measures

NYCU has set up a rainwater harvesting and storage system. The water used for flushing toilets in various dormitories and buildings is now exclusively supplied by the stored rainwater, which is also used to water plants, improving water efficiency through diverse use of water resources. NYCU has followed the Ministry of the Interior's "Design and Technique Directions of Buildings Sewage Treatment Facilities" in the construction of its dormitories for graduate students from the preliminary design planning, greatly increasing the efficiency of the water usage and conservation efforts of the dormitories through comprehensive water resource management and more widespread use of water conservation equipment. The wastewater produced in graduate dormitories is processed and recycled for toilet flushing. Empty raft foundation boxes are used as a rainwater recovery reservoir, and the treated recycled water is reused to water plants and landscape for greening and beautification.

Clean and Hygienic Environment for Water Usage on Campus

NYCU provides free and clean drinking water to faculty members, students, and visitors. There are cold and hot water dispensers in classroom buildings, administrative buildings, the auditorium and activity center, sports venues, student dormitories, and faculty dormitories. The over 200 drinking water towers across each campus, capable of storing over 10,000 tons of water, are cleaned regularly every year, and regular drinking water quality inspections are also conducted. Public spaces such as activity centers and sports venues have restrooms with complete drainage facilities, providing clean and safe toilets for students, faculty members, and visitors.