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Conserve and sustainably use the oceans, seas and marine resources for sustainable development.
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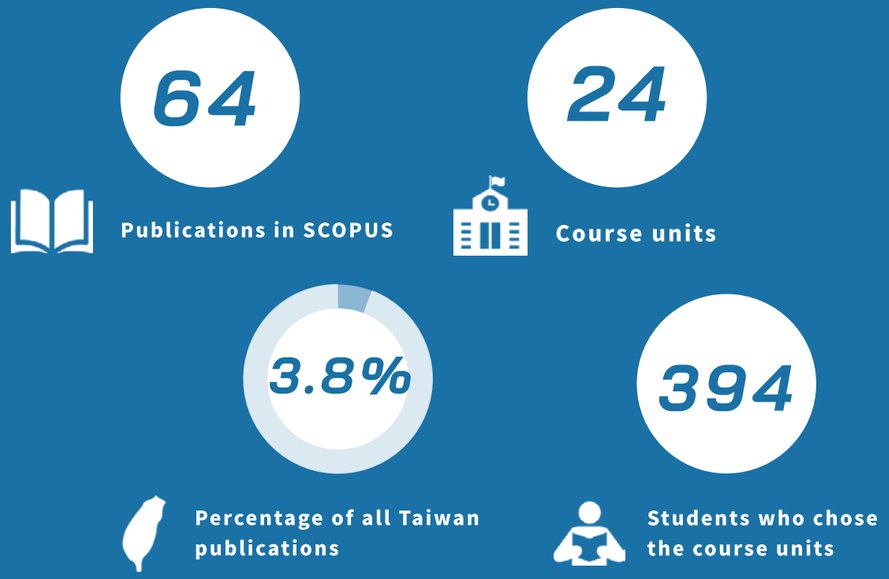

Research

Using Satellite-Based Radars to Investigate Land Subsidence in Chiayi County

Chiayi County is located in the largest alluvial plain in Taiwan, with aquaculture sustained by water extracted from groundwater. The research team led by Chair Professor Chein-way Hwang of NYCU's Department of Civil Engineering used satellite-based radar measurement data to monitor land subsidence in Taiwan and found that the subsidence rate in the coastal area of Chiayi was 4.5 cm per year. Subsidence in Chiayi's coastal area has led to sea level rises at rates up to 15 times larger than the global rate. Subsidence also leads to water salination, which can destroy the ecosystem, affecting aquaculture and land use. Professor Hwang's research team has provided important geographic information for sustainable aquaculture and land management. Furthermore, its research findings have been published in the international journal *Remote Sensing*.

Reference: Hung, W. C., Hwang, C., Chen, Y. A., Zhang, L., Chen, K. H., Wei, S. H., ... & Lin, S. H. (2017). Land subsidence in Chiayi, Taiwan, from compaction well, leveling and alos/palsar: Aquaculture-induced relative sea level rise. Remote Sensing, 10(1), 40.

Using Machine Learning to Identify the Scope of Marine Oil Pollution

In recent years, there has been a rise in the number of marine pollution cases caused by oil spills; however, the scope of pollution can be hard to identify due to the similar color of the pollution and the ocean. Overcoming that challenge, Professor Jun-Wei Hsieh and his research partners in NYCU's College of Artificial Intelligence and Green Energy and the Pervasive Artificial Intelligence Research Labs used deep learning to conduct image segmentation and identify polluted areas. Such information, along with data gathered by drones, can detect the scope and direction of marine oil pollution and help conserve marine ecology. These research findings were published in the *International Computer Symposium*.

Reference: Wu, C. H., Hsieh, J. W., Wang, C. Y., & Ho, C. H. (2020, December). Marine pollution detection based on deep learning and optical flow. In 2020 International Computer Symposium (ICS) (pp. 376–381). IEEE.

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Social Impact

Discussing Ocean Sustainability at the NYCU Law Faculty Workshop

The NYCU School of Law organized the “NYCU Law Faculty Workshop” in April 2021. Dr. Wen-Ning Chang from the University of Washington School of Law was invited to give a lecture titled “Achieving Sustainable Marine Fisheries: A Legal Analysis of the Settlement of International Fishing Disputes.” The lecture revolved around the “United Nations Convention on the Law of the Sea,” laying out Taiwan’s fishing rights in various ocean areas and discussing mechanisms for settling fishery disputes, while taking into account how the vision for marine resource conservation and sustainable development will affect the long-term development of the fishing industry in Taiwan.

Co-Organizing the Ministry of the Interior’s Reference Measurement Workshop - Promoting Marine Education

For years, NYCU’s Disaster Prevention and Water Environment Research Center has co-organized the Ministry of the Interior’s Reference Measurement Workshop. In 2021, Professor Tian-Yuan Shih, Professor Tee-Ann Teo, the Central Weather Bureau, and the National Museum of Marine Science and Technology conducted full-day lectures, tours, and career exploration activities at the National Museum of Marine Science and Technology for students from vocational high schools across Taiwan, giving them a better understanding of reference measurements, geodesy, and tidal observation, as well as their application and impact on daily life.

Student Cultivation

Marine Talent-Cultivation Courses

Over the past five years, NYCU has offered a variety of courses related to marine education, such as: “Coastal Processes,” “Marine Renewable Energy,” “Marine Surveying,” and “Navigation Meteorology.” The courses not only give students a preliminary understanding of coastal and marine environments but also allow them to see the current situation of marine resources and encourage them to pursue a career in marine resources or marine conservation after graduating.

Organizing Seminars on Marine Issues to Raise Awareness

As Taiwan is surrounded by the ocean, all Taiwanese people should be equipped with knowledge of marine environments and their conservation. To that end, NYCU has organized multiple seminars to raise awareness among faculty members and students regarding the conservation of marine environments. For example, the Department of Civil Engineering holds regular seminars focusing on relevant topics such as “Sustainable Development in Ports and the Water Environment,” “Research on Meteorological Tsunamis Through Atmospheric-Ocean-Geophysical Data,” and “Development of Marine Renewable Energy in Taiwan.” Furthermore, the Service-Learning Center recently invited Azure Alliance founder Cheer Chen to talk about how to protect marine ecosystems, promote environmental issues, and advocate for social sustainability. She proposed the concept of “cleaning the ocean with knowledge” and talked about the process of developing a floating garbage collector for ports to help solve environmental issues.

Voluntary Beach Cleanups to Protect Marine Ecosystems

The NYCU ChongDe Young Volunteers student club organizes many environmental conservation activities such as mountain and beach cleanups each year. In 2021, the club organized four beach cleanups in March, May, October, and December at Taoyuan’s Yongan Fishing Harbor, Green Tunnel, and Guanxin Algal Reef. Determined to protect the special marine life in the local area, student volunteers chose to clean the areas with the special “algal reef” ecology. Algal reefs are plant-based reefs that are adaptable to changes in the water quality and temperature but grow slowly. The reefs have carbon fixation capabilities, which can help reduce carbon dioxide levels in the atmosphere. Therefore, the cleaning efforts of student volunteers will significantly contribute toward the sustainable development of the local marine ecosystem.

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Stewardship

Plastic Reduction Policies

Starting from July 2019, in line with the government's plastic reduction policy, NYCU banned the use of single-use straws and plastic bags on campus, reduced the use of single-use utensils, implemented waste sorting, and made use of recycled PET bottles. NYCU also urges food providers on campus, such as the Student Cafeteria, to prioritize policies such as banning single-use plastic utensils and straws, to raise teachers' and students' awareness of the need to reduce plastic. To encourage teachers and students to bring their own utensils, NYCU also offers discounts for those who bring their own food containers. Anyone who brings their own eco-friendly tableware can enjoy a discount of NT$1–5.