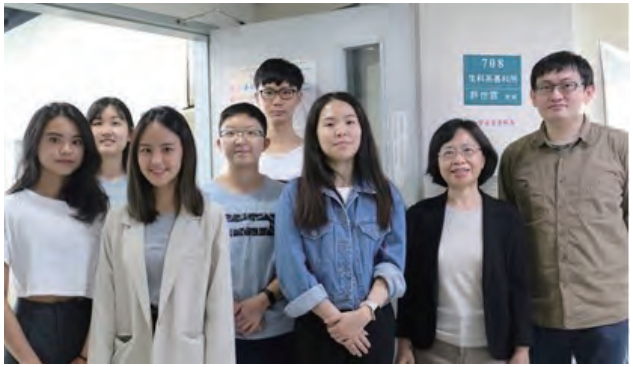
14

LIFE BELOW WATER

2019-2023 Publications	49
2019-2023 Percentage of all Taiwan Publications	2.6%
Course Units	33
Student Engagements with Units on SDG 14	361



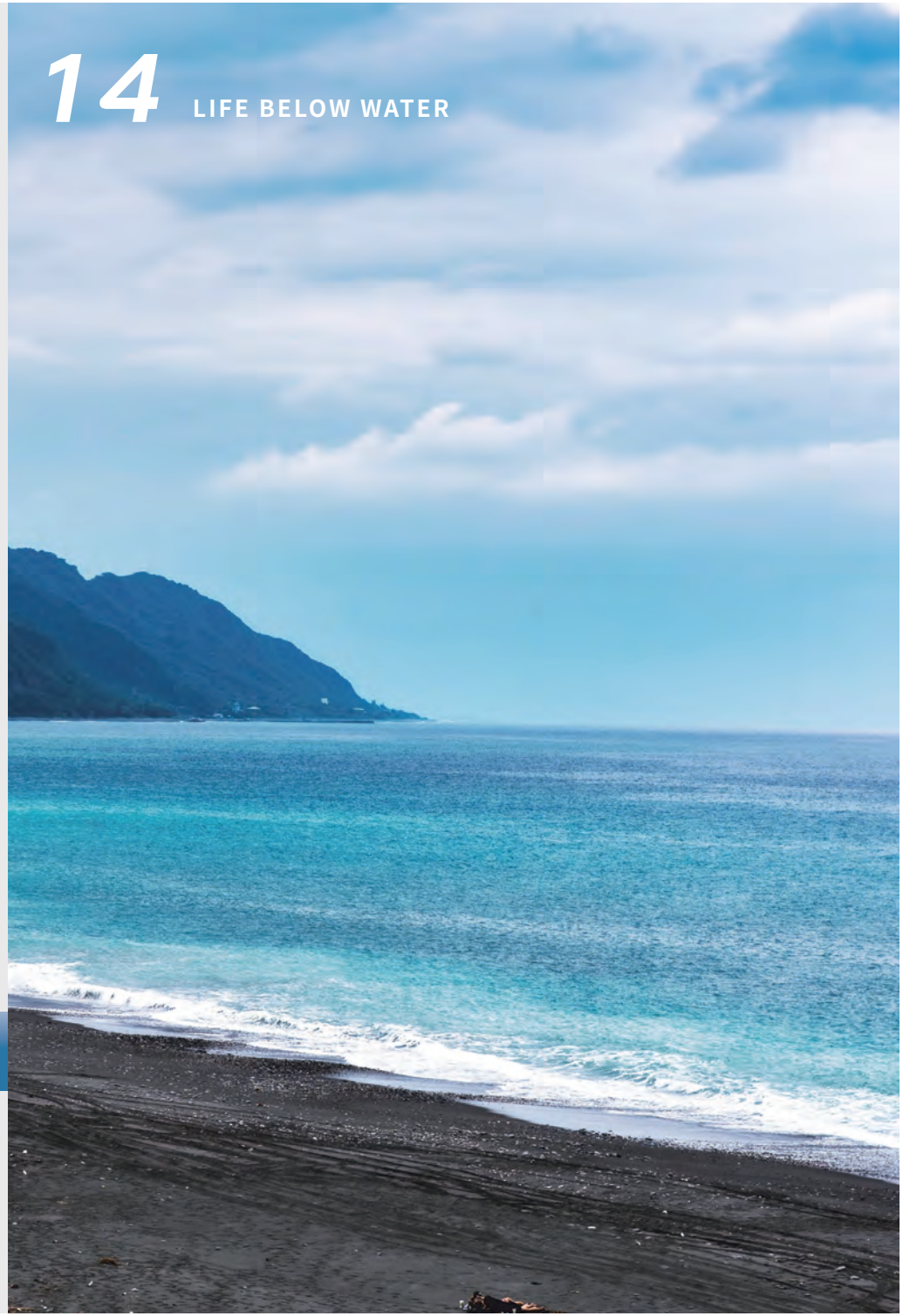
Research

Efficient and Energy-Saving Desalination Mechanism

Taiwan frequently faces water shortages due to the impact of extreme weather, and desalination of seawater is one potential solution. However, current mainstream desalination technologies require substantial electricity and equipment, making it difficult to achieve economies of scale. Professor Shih-Yi Hsu from the Department of Life Sciences and the Institute of Genomic Sciences at our university and her research team have utilized amyloid proteins to filter seawater. This method automatically guides water molecules and increases the hydrophilicity of nanomicrotubes, enhancing the efficiency of separating water molecules from salt ions. This approach can even achieve 100% desalination of seawater. The biomimetic nanomaterial's automatic transport mechanism contributes to the development of a high-yield, low-energy, and low-carbon desalination process. The related research findings have been published in the international journal *Small*.

Development of Maritime Risk Assessment Technology

As a hub for maritime traffic between Northeast and Southeast Asia, Taiwan is critical in the region's shipping routes. Although the Automatic Identification System (AIS) provides real-time information on vessels in the sea area, maritime accidents still frequently result in significant personal and property losses. To reduce the likelihood of such incidents, Professor Hsien-Kuo Chang and his research team from our university's Department of Civil Engineering collected historical data on past maritime accidents. They analyzed these incidents' categories and spatiotemporal distribution to understand the hotspots and risk factors better. After quantifying the risk factors, they established a preliminary risk assessment model for navigation around a specific major port. Additionally, the research team collected relevant applications and technical documents of the VHF Data Exchange System (VDES) from domestic and international sources, summarizing the benefits of VDES for maritime safety and communication. This information is provided for reference to domestic port management authorities.



Social Impact

Raising Public Awareness of Marine Environmental Protection

Our university's Department of Industrial Engineering and Management collaborated with the TTY Environmental Sustainability Foundation to organize a beach cleanup activity. The event took place at the Fish Scale Ladder in Nanliao, Hsinchu, and emphasized the concepts of sustainability and environmental protection. The initiative aimed to raise public awareness of the impact of garbage and pollutants on marine environments and ecosystems. During the event, students cleaned up trash and marine debris on the beach, contributing to protecting the marine environment and promoting public awareness and marine conservation actions.

Beach Cleanup Education and Practice

Our university’ s Service Learning Center organized beach cleanup lectures and activities, integrating marine education into the cleanup process. The aim was to make beach cleanups more than just trash collection but also a learning experience about marine environmental issues. Through these lectures, students and the public gained a deeper understanding of the importance of marine resource conservation. They took practical actions to care for the marine ecosystem, embodying the concepts of sustainability and environmental protection. With collective efforts, more than 900 kilograms of trash were removed, fulfilling the mission of marine environmental protection and inspiring societal concern and action for environmental issues, allowing for sustainable ecosystems.

14 LIFE BELOW WATER

Education & Cultivation

Series of Activities on Marine Issues

The Liberal Arts Academy at our university hosted a series of five activities under the theme "Living on the Island: Our Distance from the Sea," including two lectures, two field trips, and a workshop, attracting 341 participants. The themes of these events included:

- "Fake Real People Library: Two Fish Vendors, Three Lives": Fish vendors were invited to share their observations on marine sustainability and tips for sustainable seafood consumption, helping students better understand and respect marine workers while changing perceptions of the fish vendor's life.
- "Extreme Eastern Seaside: One-Day Experience of a Magang Village Female Diver": A field trip to the adjacent fishing villages of Mao'ao and Magang, where students visited "stone houses" that reflect local natural and cultural characteristics, learned to wear straw sandals with the female divers, and explored the tidal zone to understand algae and mollusks. The trip also delved into the issues of coastal development and village relocation.
- "Satoumi Action: How Can Fishing Villages Promote Marine Sustainability?": This event advocated for the Satoumi concept, aiming to balance production, life, and ecology. The current stage results and challenges of Satoumi projects were introduced, providing students with a new perspective on sustainability that combines economics and ecology.
- "The Sea Has a Tomorrow: Marine Issues Cafe x Future Design Workshop": Discussed three major marine issues: marine debris, marine energy development, and sustainable fisheries. The workshop used bycatch as material and applied future design methods to brainstorm creative solutions.
- "Summer Night Fishing Lights: Two-Day Experience of Sulfur Fire Fishing and Pulling Net Fishing Methods in Jinshan": Students boarded a boat to observe the sulfur fire fishing method and participated in the "pulling net" fishing method, which requires collective effort. This experience allowed students to feel the vitality of marine life and the wisdom of coastal residents living by the sea.

Stewardship

Ocean Talent Development Model

Our university's Department of Civil Engineering has implemented an innovative ocean talent cultivation plan driven by engineering projects. The department established the Hydrology and Ocean Engineering Program, offering a solid and broad knowledge base. The course topics include hydrology, hydraulic engineering, coastal processes, marine renewable energy, introduction to hydrological modeling, channel hydraulics, and more, providing a foundation for students pursuing research or careers in hydrology and ocean engineering. The department aims to cultivate talents that will contribute to the sustainable preservation of Taiwan's maritime resources while making tangible contributions to national land conservation and economic development.