University : National Chin-Yi University of Technology
Country : Taiwan
Web Address : www.ncut.edu.tw

[SDGs 17] Partnership for the Goals

[17.3.14] Please indicate if your university publishes progress against SDG14

NCUT is committed to protecting aquatic ecosystems and advancing sustainable marine-related practices through research, education, and community engagement. In line with SDG 14: Conserve and sustainably use the oceans, seas, and marine resources, NCUT combines innovative aquaculture technologies with student-led environmental initiatives such as beach cleanups and plastic reduction campaigns.

1. Sustainable Aquaponics Research

NCUT's Aquaponics Research Program integrates aquaculture (fish farming) with hydroponics (plant cultivation) to create a closed-loop, resource-efficient agricultural system.

- **Symbiotic Ecosystem**:
    - Fish waste produces ammonia, which is converted into nutrients for plants.
    - Plant roots absorb nutrients, purifying the water before it is recirculated back to the aquatic environment.
- **Benefits**: Reduced water use, natural nutrient recycling, and minimized environmental impact.

Innovative Features

- **IoT and Smart Monitoring**:
    - Bluetooth and IoT-based sensors track pH, temperature, and water quality in real-time.
    - Data are integrated into the Lewei IoT Platform for remote access and control.
    - Automated systems regulate nutrient levels, water flow, and environmental conditions.
- **Sustainability Practices**:
    - Efficient waste management turns fish by-products into fertilizer.
    - Closed-loop water recycling enhances conservation.
    - Eliminates the need for chemical fertilizers, supporting eco-friendly agriculture.

Continuous Development

- Testing of new plant and fish species combinations.
- Upgraded filtration processes and IoT controls.
- Student and faculty collaboration for innovation in circular economy applications.

System Component	Technology Used	Impact
Fish Tank	Ammonia waste	Nutrient base
Hydroponic Bed	Plant roots absorb nutrients	Water purification
Sensors	pH, temp., O_2	Stable growth conditions
IoT Control	Lewei IoT	Remote management

2. Educational and Community Impact

- **Hands-on Learning**: Aquaponics research is integrated into NCUT's curriculum, offering students practical experience in smart farming and sustainable food systems.
- **Knowledge Transfer**: NCUT shares aquaponics innovations with local farmers and urban growers, encouraging adoption of low-impact, resource-efficient practices.
- **Resilience to Climate Change**: Controlled systems operate year-round, ensuring food security despite climate variability.

3. Marine Conservation – Beach Cleaning and Plastic Reduction

- NCUT student associations lead beach cleanup initiatives to address marine pollution caused by plastic waste.
- Activities involve waste collection, classification, and awareness campaigns, fostering stronger environmental responsibility among participants.
- Beyond cleanup, these events emphasize education, encouraging participants to reflect on daily consumption habits and the human-nature relationship.
- The beach cleanup serves as a starting point for long-term marine stewardship, inspiring students and communities to cherish and protect the ocean.

Year	Location	Participants	Waste Collected (kg)
2022	Taichung Coast	120	350
2023	Daan Beach	140	420
2024	Qingshui	150	500

4. Cross-SDG Integration

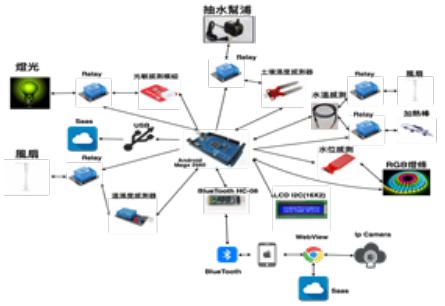
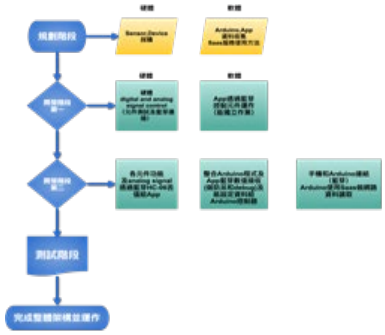
- **SDG 12** (Responsible Consumption): links aquaponics & food systems.
- **SDG 13** (Climate Action): water/energy efficiency + resilience.
- **SDG 15** (Life on Land): links campus composting & fertilizer reuse.

5. Key Achievements

- Established Taiwan's first IoT-based aquaponics lab in a technical university.
- Significant water savings vs. traditional farming (~80% less water used).
- Over 400+ students engaged annually in marine/environmental volunteer activities.
- Public outreach: shared aquaponics model with schools & SMEs.

Through cutting-edge aquaponics research and active marine conservation projects, NCUT demonstrates a holistic approach to SDG 14. The university not only innovates in sustainable food production systems but also fosters ecological awareness and marine stewardship among students and communities.

By merging technology, education, and action, NCUT contributes to healthier aquatic ecosystems and offers scalable solutions for sustainable development in Taiwan and beyond.

		
Architecture Diagram	Development flow chart	System Entity Diagram

Aquaculture research, fish and vegetable production and research and development

NCUT conducts Beach cleaning and plastic reduction activities

Beach cleaning

Photo of Beach cleaning

Clean up surrounding waste

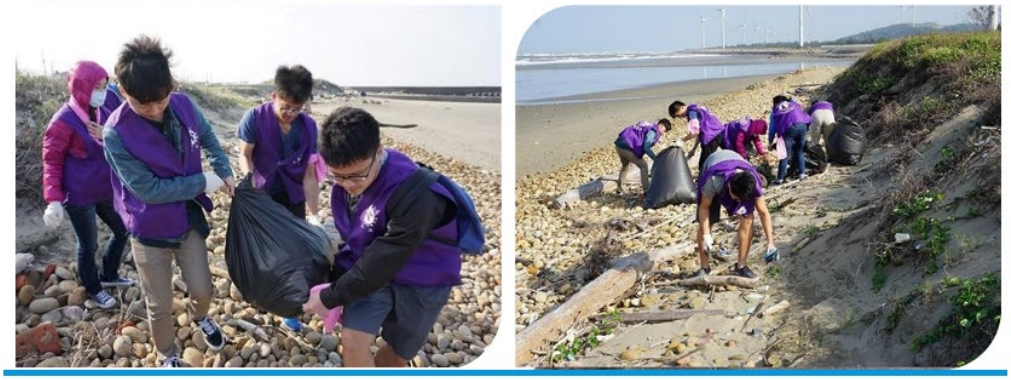
Students divide the work to clean the beach

Students experience beach cleaning

Waste classification

Beach cleaning activities of student associations

▲Beach cleaning in Yuguang Island, Tainan



▲Process of Cleaning and Transporting Trash from the Taixi Shoreline