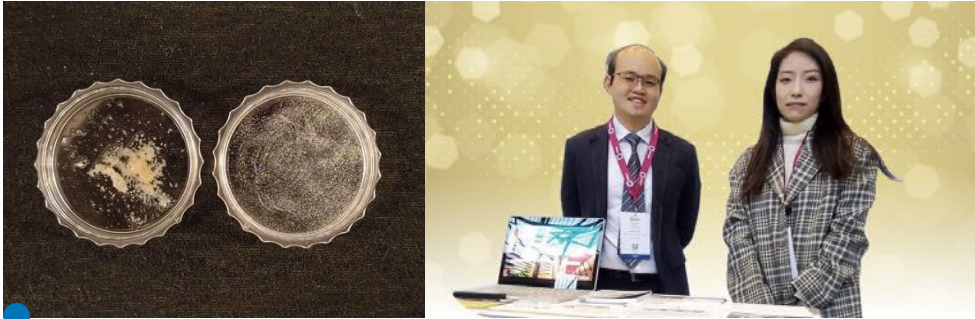


Research & Innovation



Micro Biochips for Detection of Microbial Contamination and Pollutants

As waterborne pathogens can survive prolonged periods in aquatic bodies, infect commercially important seafood in the food supply chain, and resist water disinfection, inadequate access to clean water is detrimental to human health and food security, and damaging to aquatic industries both environmentally and economically. Environmental agencies and research laboratories thus urgently require a portable, and cost-effective platform to monitor microbial pathogens and assess their risk of large-scale infection.

To address mounting concern, the Department of Applied Biology and Chemical Technology has been **granted over HK\$1 million** by the Hong Kong

Science and Technology Parks Corporation to develop a patent-pending microfluidic biochip with fish culture and sensors to monitor water quality on-site and detect microbial contamination and pollutants in water and fish, thereby minimising the potential for fish-associated disease outbreaks and helping to ensure sustainable aquaculture production. The newly established start-up, MicroFish, continues to develop biochip products for animal pathogens detection and on-site environmental factors monitoring.

Making a significant contribution to agriculture, aquacultures, public agencies, and public health, this novel microfluidic chip was **awarded a Gold Medal at the 49th International Exhibition of Inventions of Geneva**.

Microbial-Derived Technology for Removal of Microplastic Pollutants

Seeking a safe, low-cost, and efficient way to remove microplastics from water, a research team from the Department of Applied Biology and Chemical Technology used biodegradable microbial-derived polymers, MicroGlue, to aggregate microplastic contaminants into clumps that can then be easily separated and removed from the environment. The technology can be integrated into the final purification stage of wastewater treatment or used as a standalone solution for polluted sea or fresh water. It is scalable, simple to install into existing processes, and has low operating costs, making it a convenient way to retrieve microplastics for resource recovery and plastic recycling, and mitigate the harmful effects of microplastics on humans and ecosystems. The team was **awarded a Gold Medal with Congratulations of the Jury at the 48th International Exhibition of Inventions Geneva**.

Establishment of China Harbour-PolyU Joint Research Centre for Land Development

PolyU and China Harbour Engineering Company Limited (CHEC) have collaborated to establish the China Harbour-PolyU Joint Research Centre for Land Development to promote sustainable land development, develop a green and low-carbon economy, and improve the urban living environment. Its establishment symbolises joint efforts between PolyU and CHEC to boost research innovation, knowledge transfer, and talent cultivation. The research centre will initially focus on practical research, such as to seek solutions for municipal and marine solid waste treatment, contributing to the realisation of carbon neutrality, and better recycling and reuse of municipal and marine solid waste.



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Teaching & Learning

Subject: The Environmental Impact of the Dietary Culture in China

The Department of Applied Biology and Chemical Technology offers this subject, aiming to introduce students to the traditional dietary culture in Mainland China and food-related chemistry and nutrition, with a particular focus on the sustainability of the live reef food fish trade and the negative effects inappropriate or morally questionable practices have on local, national, and global aquatic ecosystems. By pinpointing the problems of erosion, desertification, and extinction of species due to over-fishing or over-harvesting, students can deepen their understanding of the social and national responsibilities of building a future of rich biodiversity in which humans live harmoniously with nature. Importantly, this subject encourages students to identify alternative food choices and food production practices to minimise environmental and, in particular aquatic, impacts, in order to foster an awareness of responsible dietary habits.

Subject: Environmental Health and Food Sustainability

The Department of Food Science and Nutrition offers this subject to introduce students to the concepts of food sustainability and its interrelationship with environmental and ecological processes. By focusing on fishery practices from environmental, ecological, nutritional, and social sciences perspectives, students can broaden their understanding of aquatic ecosystems, which comprise interactions among food species, other species, and the environment. Students are then able to discuss the impacts of fisheries and particularly of over-fishing on the environment, and thus develop an awareness that food production is part of the ecosystem services and is largely dependent on environmental health. Ultimately, students are prompted to evaluate the current fishery practices to ensure the sustainable development of food growing, processing, and supply, whereby they can appreciate the importance of environmental and biodiversity conservation to food sustainability.

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Training of sustainable fisheries and mariculture

Outreach & Engagement

Sustainable Fisheries and Mariculture Research and Training

The Research Institute for Future Food (RiFood) has conducted a study at a demonstration farm in Tung Lung Chau and found that fish kept in steel truss cages that offer better water flow have better growth and survival rates and a significantly higher level of omega-3 fatty acids than their counterparts in wooden rafts. In collaboration with the Hong Kong Agriculture Fisheries and Conservation Department (AFCD), hands-on training and knowledge sharing was provided to mariculturists and prospective mariculturists, equipping apprentices with useful skills and techniques related to fish feeding and illness detection, as well as helping them build a professional fishery network.

Meanwhile, the RiFood and the Department of Food Science and Nutrition have **received over HK\$6.5 million in funding** from the Sustainable Fisheries Development Fund, and **more than HK\$1.5 million** from the Fisheries Enhancement Fund to conduct several projects and collaborate with local communities on improving sustainability and product

quality of mariculture. This will include working with AFCD on the first offshore mariculture facility in Hong Kong to spearhead this technology that will be applied exclusively to four new local mariculture zones.

Using this platform, the researchers have developed standard practices that produce fish of better nutritional quality in shorter times while ensuring environmental conservation, marine resources preservation, and overfishing prevention. They also offered ocean-focused education and training to **around 100 local prospective mariculturists**. Importantly, the team has developed a patented chitosan-selenium nanoparticle technology that can effectively improve fish immune system and resilience to environmental changes, enhancing non-polluting mariculture production efficiency and food safety, reducing the use of antibiotics and vet drugs, thereby minimising antimicrobial resistance in the marine environment.

Governance & Operations

Environmentally Conscious Food Consumption and Plastic Waste Reduction on Campus

To fulfil its role in communicating best sustainable practices within and beyond the University community, PolyU pledges to espouse eco-conscious food consumption for official entertainment functions, actively demonstrating its commitment to promoting green living and sustainability, as well as echoing international and local conservation initiatives. To this end, the University supports WWF-Hong Kong's Sustainable Seafood Week and has signed the "Say No to Shark Fin" Pledge, wherein shark fin, bluefin tuna, humphead wrasse, wild-caught Hong Kong grouper, sturgeon caviar, and black moss are examples of food items excluded.

In addition, No Straw Every Day is a waste reduction programme targeting catering outlets on campus and at student halls of residence, having banned single-use plastic straws since 2018. This arrangement casts light on the importance of minimising the reliance on all kinds of plastic disposables, prompting the University to strategise for a long-term collective goal to fight plastic pollution.

In order to help conserve the marine environment, the University has, since 2017, discontinued the sale of water in any single-serving plastic bottle less than one litre in vending machines, the convenience store, and catering outlets, nor have they been offered at university activities and events. This initiative helps reduce the amount of plastic entering the oceans which eventually breaks into small pieces harmful to marine life.



"No Straw Every Day" Programme

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