Research & Innovation

Advancing Urban Forestry through Smart Analytics

PolyU start-up LeafIoT Technology has developed LiFY-T, a deep-tech solution for advanced tree health monitoring and green asset management. This innovative system integrates Internet of Things sensors, artificial intelligence analytics, and tree "heartbeat" monitoring to provide continuous, real-time assessment of tree stability and environmental conditions. By tracking critical parameters such as tilting angles and soil moisture, LiFY-T enables early detection of potential tree failures, supporting proactive maintenance and risk mitigation.

The system's blockchain integration ensures transparent and verifiable reporting, allowing green asset managers to monitor carbon sequestration and align their operations with sustainability goals. LiFY-T also offers insurance support to mitigate economic and physical risks associated with extreme weather events, helping governments, property managers, and businesses safeguard urban environments while protecting communities.

By providing accurate and timely insights into tree health, LiFY-T not only enhances urban safety but also contributes to greener, more resilient cities. The technology empowers stakeholders to make informed decisions, reduce liability, and promote the sustainability of urban green spaces, demonstrating a practical intersection of digital innovation and environmental stewardship.

Converting Industrial Waste into Sustainable Building Materials

PolyU researchers from the Department of Civil and Environmental Engineering have developed an innovative method for solid waste management and reutilisation via carbon dioxide mineralisation, addressing the dual challenges of waste accumulation and carbon emissions. This approach involves crushing concrete and other solid waste, then promoting reactions between the crushed aggregates and carbon dioxide, which not only improves the surface characteristics and internal microstructure of the materials but also transforms them into valuable construction products, providing an alternative to natural aggregates and cement. By integrating carbon dioxide mineralisation, the method simultaneously sequesters carbon dioxide and mitigates greenhouse gas emissions.

The technology supports sustainable resource use, reducing dependency on natural materials and decreasing pressure on landfill sites. It also enables the production of construction materials that maintain structural integrity while contributing to environmental goals. The research also supports Responsible Consumption and Production (SDG12) by promoting circular economy practices in construction and to Climate Action (SDG13) through carbon capture and emission reduction.

Teaching & Learning

Bringing Ecotourism from Classroom to Community

The School of Hotel and Tourism Management (SHTM) partnered with KOPEL Kinabatangan, a community-based organisation in Sabah, Malaysia to strengthen local ecotourism through the service-learning subject "Ecotourism in the Community". By engaging in the classroom training and guest lectures, PolyU undergraduate students evaluated the impact of deforestation on habitats, promoted tree-planting as part of ecotourism, and created marketing materials to boost visitor numbers in low seasons. They also delivered hands-on training in areas such as coffee-making, spreadsheet skills, and social media strategy, helping local community members improve operational efficiency and reach new markets.

At the same time, another SHTM's subject "Tourism Policy and Development" enables postgraduate students to acquire a deeper understanding of how tourism policies influence planning and development of sustainable tourism. They also explored topics such as ecotourism, rural tourism, and sustainable land use, of which foundation equips them to critically analyse challenges and propose practical, responsible solutions.

By adopting field-based service learning and case studies, these subjects enable students to apply theories in real-world contexts while supporting communities to enhance livelihoods and protect natural resources. Both initiatives also contribute to promoting Decent Work and Economic Growth (SDG8), ultimately fostering stable income opportunities through sustainable ecotourism development.

External Engagement

Restoring Ecosystems through Collective Climate Action

The Department of Land Surveying and Geo-Informatics hosted the public seminar "The Nexus between Climate, Nature and People", bringing attention to the urgent challenges posed by climate change and nature loss. With extreme weather events and shifts in Earth systems identified by the World Economic Forum as the world's greatest concerns, the discussion highlighted how these global risks are already affecting Hong Kong through record-breaking rainstorms, prolonged heatwaves, and rising temperatures.

The seminar underscored the importance of sustainable living and environmental restoration in building resilience. It showcased how WWF-Hong Kong partners with corporations and communities to reduce carbon emissions, restore ecosystems, and protect public health. For instance, the Low Carbon Manufacturing Programme has already avoided over 280,000 tonnes of carbon emissions, exemplifying the positive impact of targeted initiatives.

A key theme was the promise of nature-based solutions, which harness healthy ecosystems to safeguard biodiversity, mitigate climate risks, and create more liveable communities. By connecting climate, nature, and people, the seminar highlighted how collaborative approaches can also drive meaningful progress towards Climate Action (SDG13) while enhancing urban well-being and environmental sustainability.

Promoting Urban Resilience through Nature-Based Solutions

The "International Conference on Nature-Based Solutions (NbS) for Urban Infrastructure" brought together **more than 200 participants**, including researchers, professionals, and policymakers, to explore how cities can better integrate nature into planning and development. Co-organised by the Research Institute for Land and Space, the conference promoted the conservation and sustainable use of terrestrial ecosystems such as forests, wetlands, and drylands.

By focusing on NbS, the discussions highlighted how urban infrastructure can be designed and managed in ways that protect biodiversity, mitigate climate change, and safeguard ecosystem services. Participants exchanged practical knowledge on applying NbS to enhance urban resilience, offering innovative approaches to challenges ranging from climate adaptation to sustainable growth.

The conference also emphasised that NbS are not only tools for environmental restoration but also strategies for building healthier and more liveable communities. Through interdisciplinary collaboration and knowledge exchange, the event provided a valuable platform for translating research insights into actionable solutions. Ultimately, it reinforced the importance of conservation and biodiversity protection in shaping sustainable cities, underscoring the role of NbS as vital pathways towards harmonising urban development with ecological well-being.

Governance & Operations

Balancing Campus Development with Biodiversity and Conservation Priorities

PolyU's campus outdoor open space is designed not only to connect buildings but also to foster conservation and sustainable living through careful landscape planning. Guided by the Landscape Master Plan, the University is introducing new plant species that complement the distinctive brick-red campus while enhancing biodiversity. At the same time, irrigation systems are being optimised to support environmental restoration and create healthier green areas that benefit the entire campus community.

Concurrently, PolyU continues to protect biodiversity through the conservation of amphibian species. During the development of the Kowloon Tong Student Hostel site, the University safeguarded the Lesser Spiny Frog, a species of conservation importance, by conducting a translocation exercise. **Around 100 adult frogs and over 400 tadpoles** were safely relocated to suitable watercourses, ensuring land management practices that balance environmental protection with the creation of additional hostel space for students.

Further underscoring its dedication to environmental stewardship, PolyU received the prestigious **Platinum Award in the Tree Management Award 2023**, which reflects the University's excellence in tree preservation and land management, while also raising awareness of the importance of tree care in promoting environmental restoration and sustainable living.