# Research in Action: Understanding the coastal wetlands

Humans have significantly altered the global biogeochemical cycles of nitrogen and carbon through industrialisation, land use and climate change. These elements impact soil health, food security, greenhouse gas emissions and ecological resilience, and so understanding our ecosystems and how we can alleviate our impact upon them is crucial.

Coastal wetlands, including mangroves and melaleuca forests, are of particular significance due to their capacity in sequestering carbon and nitrogen, and intercepting pollution from vast, nutrient-rich tropical riverine networks. These wetlands are crucial in both mitigating the harmful effects of climate change and improving water quality. Despite this, the environmental drivers controlling soil biogeochemistry in these ecosystems remains poorly understood. This lack of understanding hampers our ability to assess the response of greenhouse gas fluxes and nitrogen reduction and to minimise emissions through effective management.

A team of IGI-IAS researchers, led by Professor Sami Ullah, are investigating these environments in Vietnam.

They first visited colleagues at Vietnam National University and Can Tho University to facilitate co-design of a project that would inform sustainable land use and ecosystem management strategies to help local communities benefit from the wetlands for aquaculture and agriculture without detracting from the beneficial role of the ecosystems in mitigating climate change.

This collaboration continued throughout the fieldwork in Xuan Thuy National Park and U Minh Thuong National Park, lab-based work, and into the dissemination of the findings - including to the directors and staff of the national parks to help inform their management priorities.

The study informed academic papers, which investigated the impact of restoration of mangroves and melaleucas. It found that disturbance, and subsequent recovery, of these forest wetlands did not have a significant detrimental effect on key aspects of soil biogeochemistry, speaking to the resilience of the ecosystems.

It also detailed how a mangrove system may remove excess nitrogen and improve water quality, whereas melaleucas process nutrients at a cost of nitrous oxide and carbon dioxide emissions. They do, however, have the capacity to act as a significant methane sink, at least partially balancing these emissions.

The outcomes of the research will improve management strategies in Vietnam regarding restoration practises and human activities, while mitigating climate change through decreasing greenhouse gas emissions. The team are now looking to expand this research into other countries with coastal wetlands.