

Using nuclear techniques to observe coral ecosystems and support climate change research

The challenge...

In Indonesia, coastal reefs are both a source of food and of income, as they attract the attention of tourists who visit the archipelago. Fisherman and merchants rely on the sale of molluscs, seaweed and coral reef fish, in addition to non-renewable resources such as sand and seashells. Unfortunately, a combination of natural disturbances, such as volcanic activity, earthquakes and cyclones, and human pollution have threatened the health and sustainability of coral habitats. Because it affects average water temperatures and ocean currents, climate change has further aggravated matters, leading to coral bleaching and sea grass burning.

Indonesia needed information to understand the risks and threats posed by climate change to marine life, in order to adapt to environmental changes.

The project...

At the request of the Indonesian government, and in support of the country's National Climate Change Adaptation Action Plan, the IAEA launched a technical cooperation project to gather information and analyse ongoing changes in coral ecosystems.

Nuclear techniques were used to allow local experts to better understand nearby coral reefs, and their past, present and future.

Four expert missions were launched to support the training of local Indonesian experts in marine environment and coastal zone management. Four IAEA fellows were trained in Monaco, Australia and Japan, while scientific visits—which focused on the mechanics of the carbon cycle and climate change—further bolstered existing capacities.

In particular, training was provided in using anthropogenic radionuclides. These isotopes act as tracers, allowing specialists to analyse the state of coral reefs and the life they sustain.

The impact...

Today, due in part to the capacity-building efforts of the IAEA and the commitment of the Indonesian government, a Time Series Database has been established. It not only provides an isotopic record of ocean temperatures that goes back centuries, but it can also forecast future changes in coral environments, giving local stakeholders the opportunity to adapt their behaviours in response to climate change. Fishermen, local businesses, and the tourist industry have all benefited from the knowledge provided by these nuclear and isotopic techniques.



IAEA experts and local counterparts prepare equipment for mass spectrometry.