

## ***Using nuclear techniques to address coastal zone risks and vulnerabilities in Cuba***

### ***The challenge...***

Coastal ecosystems are Cuba's main natural resource, and are associated with over 70% of the national gross domestic product. Tourism, fisheries and transport are of fundamental importance for national development. The deterioration of coastal ecosystems, reflected in the depletion of their living resources, habitat modifications, increased pollution, erosion and the impacts on coral reefs, has a significant detrimental effect on the economy – over the past 20 years, for example, fishing catches have fallen by around 40%.

Nuclear techniques can be used to understand ocean processes and to gather data for related environmental databases. Cuba's National Vulnerability and Risks Group required support in carrying out environmental evaluations to help reduce the vulnerability of the Cuban coastal zone to threats that include natural and manmade disasters and climate change.

### ***The project...***

Nuclear and isotopic techniques are unique tools for building databases of environmental variables and helping understand oceanographic processes, as they allow spatial and temporal components to be included in environmental evaluations. With the support of the IAEA's technical cooperation programme, the analytical infrastructure of Cienfuegos Environmental Studies Centre for testing heavy metals (arsenic, cadmium, lead, mercury, and nickel), radionuclides and persistent organic pollutants in the marine environment has been improved. Several scientists and technicians from the Centre and from the Higher Institute of Technologies and Applied Science were trained on various nuclear techniques for sample preparation, treatment, analysis and reporting, as well as in the operation of laboratory instrumentation.

### ***The impact...***

The project has contributed to establishing the analytical capabilities needed for assessing the environmental quality of coastal ecosystems. As a result, various assessments have been carried out, involving over 4000 laboratory assays in environmental matrices of heavy metals, radioactive substances and organic compounds in key coastal ecosystems in the country as well as in areas of industrial discharge to the marine ecosystem from power plants, refineries and aquaculture industry. The evaluations have allowed policy makers and environmental authorities to design and implement management actions that minimize environmental risks.

These actions include significantly reducing mercury discharges to the Santa Clara Bay, providing analysis for monitoring programmes in protected marine areas with high biodiversity, reducing the environmental impact of the petrochemical facility in Cienfuegos Bay, and increasing the quality of beaches and tourist areas.

Also as a result of the project, a national laboratory for Isotopic Environmental Geochemistry will be operational by the end of 2013.



*CEAC staff operating a gas chromatograph coupled with mass spectrometer to survey petroleum hydrocarbons in marine samples.*