IAEA Technical Cooperation Programme

Strengthening regional capacities in monitoring marine pollution and assessing related risks in Africa

The challenge

Despite major efforts to invest in building capacities for the monitoring and assessment of marine pollution in the African region, a technical gap exists between African Member States with relevant capacities and those without. In addition, for countries that have a history of collecting data on marine pollution, capacity gaps remain, and integrated physical, chemical, biological and geological data is often unavailable.

The transboundary nature of marine pollution demands an integrated, regional approach to marine monitoring, in order to enable the reliable evaluation of marine pollution and its impact on marine resources and human health. Moreover, capacities for extensive and comprehensive monitoring of radioactive and non-radioactive pollutants in the marine environment are also needed.

The project

Building on assistance provided through an earlier IAEA technical cooperation project that started in 2012, a new regional project was established in 2016 to develop and implement an integrated approach to monitoring marine pollution and assessing related risks. In order to address emerging issues, to ensure the sustainable use of marine resources and to enhance socioeconomic benefits, the project was designed to build capacities to apply new isotopic and nuclear techniques.

IAEA assistance was delivered through expert services, training courses and fellowships, and relevant equipment was also provided. The project built capacities in the use of nuclear and isotopic techniques including radiometric measurements, X-ray diffraction, neutron activation analysis, radiometric geochronological dating, isotopic measurements and accelerated mass spectrometry.

Marine pollution in Senegal. (Photo: Michel Warnau/IAEA)

18-04796

The impact

Three Member States (Egypt, Morocco and Tunisia) have strengthened their monitoring capacities, and five others (Côte d'Ivoire, Ghana, Kenya, Nigeria and the United Republic of Tanzania) have developed capabilities to use nuclear and nuclear-related techniques for environmental monitoring. Twelve Member States (Algeria, Benin, Cameroon, Congo, Djibouti, Gabon, Madagascar, Mauritania, Mauritius, Namibia, Senegal, Sudan) joined the project more recently and are already very active in developing or strengthening expertise.

All participating Member States are now actively performing marine pollution monitoring for radionuclides (including historical reconstruction of pollution through geochronological dating), trace metals and organics. The eight Member States participating in the project since its start now have marine pollution databases, of varying levels of comprehensiveness, and are regularly producing national reports in the field of marine pollution.

The participating institutions have also published 88 peer-reviewed articles in international scientific journals, which contain national datasets on coastal pollution. As a result of the project, 30 additional scientific manuscripts are in preparation for publication.

The regional project has contributed substantially to marine resources conservation and management, and has greatly enhanced capacities in the region to safeguard the environment and human health.

Collecting samples for marine monitoring. (Photo: Louise Potterton/IAEA)

PROJECT INFORMATION

Project No: RAF7015

Project title: Strengthening Regional Capacities for Marine Risk Assessment Using Nuclear and Related Techniques

Duration: 2016-2019 (4 years)

Budget: €1 200 000

Contributing to: 14 LIFE BELOW WATER

Facts and figures

- Since 2012, 76 students, supported by their home institutions, completed their degrees (32 PhDs and 44 MScs) on topics related to the project;
- 283 people were trained through regional training courses or through 34 fellowships;
- 20 200 analyses on samples from the region have been conducted between January 2012 and December 2017 (7600 trace metals, 2900 organics, 5700 nutrients and 4000 radionuclides).

The science

The project is designed to develop Member State capacities to perform high quality environmental measurements using alpha and gamma spectrometry (to measure levels of alpha- and gamma-emitting radionuclides such as polonium-210 and lead-210); X-ray fluorescence, atomic absorption spectrometry and inductively coupled plasma mass spectrometry (to measure levels of heavy metals such as cadmium, mercury, lead and silver); and gas chromatography (to measure levels of organic contaminants such as hydrocarbons and pesticides). Measurement of these contaminants in marine organisms allow the assessment of risks related to acute or chronic environmental pollution. Risks can be assessed for different purposes, for example evaluating impacts on ecosystem sustainability or biodiversity, or on seafood safety and related risks for human consumers.

In addition, measuring polonium-210 and lead-210 in sediment enables geochronological dating of the successive layers of sediment. By measuring pollutants at different depths of the same sediment a history of past local pollution can be reconstructed, possible risks associated with dredging can be assessed, and the impact of measures taken to reduce the release of pollutants can be examined.

www.iaea.org/technicalcooperation