by Peter Kaiser

An Ocean of Knowledge

On 10 March 1961, the IAEA concluded with the Principality of Monaco and the Oceanographic Institute, then directed by Jacques Cousteau, their first agreement on a research project on the effects of radioactivity in the sea. Fifty years later, that cooperation expanded significantly through collaboration with international and regional organizations, as well as national laboratories. The Laboratories that grew from this initial agreement comprise the only marine laboratory in the United Nations system that undertakes research, while providing training and support services for the study of the oceans and marine environments.

Initially, the Laboratory was hosted in Monaco's Oceanographic Museum. The Laboratory's subsequent, and its current permanent premises, were also provided by the Principality of Monaco, considerably expanding and enhancing the quality of laboratory space over this period, now named the Environment Laboratories. The Laboratory began its work by studying radioactive substances in the marine environment and their effects on marine life.

Unique data derived from the application of nuclear and isotopic techniques improve scientists' knowledge of oceanic processes, marine ecosystems and support pollution impacts assessments. These studies support the sustainable development of the ocean. The research is buttressed by strategic partnerships with other UN ocean agencies such as the Intergovernmental Oceanographic Commission, which also celebrates this year its 50th anniversary, as well as the United Nations Environmental Program, the United Nations Development Program (UNEP), the United Nations Educational, Scientific and Cultural Organization, and the International Maritime Organization.

Many Member States' national laboratories rely upon the Laboratory's accurate analyses of sea water, sediment and marine life samples. These analyses help assure the quality of the research conducted by collaborating laboratories engaged in joint environmental studies, utilizing the IAEA's reliable reference materials at an affordable cost.

In Monaco, the Radiometrics Laboratory uses radionuclides as environmental tracers, in collaboration with leading research centres around the world, to quantify ocean circulation, the transport of pollutants in coastal ecosystems, sedimentation and submarine groundwater discharge.

The Radioecology Laboratory studies the impacts of contaminants on seafood safety (including Harmful Algal Blooms), of climate change and ocean acidification on marine organisms, as well as the ocean's ability to sequester CO_2.

Two years after UNEP was founded in 1972, the Laboratory provided the essential scientific and analytical support for a landmark study of radioactive and non-radioactive pollutant levels in all principal seas. The Laboratories have undertaken worldwide radioactivity baseline studies of the Atlantic, North and South Pacific, Indian, Arctic and Antarctic Oceans and the Far Eastern, Mediterranean, and Black Seas. Regional studies have been conducted in the Gulf, the Irish, Kara and Caspian Seas, New Caledonia and the Mururoa and Fangataufa Atolls.

By 1986, the Marine Environmental Studies Laboratory was established in Monaco. This Laboratory is concerned mainly with non-radioactive pollutants such as pesticides, polychlorinated biphenyls (PCBs), petroleum hydrocarbons, polycyclic aromatic hydrocarbons (PAHs), antifouling paint booster biocides, and recently also dealing with radioactive contaminants. In cooperation with regional laboratories, the Laboratory provides training and implements marine monitoring programmes, while acting as the analytical support centre for regional organizations protecting marine environments.

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By 1986, the Marine Environmental Studies Laboratory was established in Monaco. This Laboratory is concerned mainly with non-radioactive pollutants radioactive contaminants. (Photos: IAEA)

by Maureen MacNeill

Unlocking Rain's Secrets

In March 1960, the World Meteorological Organization (WMO) and the IAEA began their cooperation: WMO meteorological services and other national agencies started collecting rain water over 50 years ago and continue to send samples to the IAEA and other cooperating laboratories, where the samples' isotopic content is determined.

Naturally ocurring isotopes in water help researchers trace the sources, movement and history of water molecules in the water cycle. Isotopes in precipitation are particularly useful tracers since precipitation recharges — directly or indirectly — all freshwater systems. Already in the late 1950s, the IAEA recognized that countries with limited water resources would need reliable and comprehensive hydrological information to be able to plan drinking water supplies as well as agricultural and industrial water consumption.

The resulting database, the Global Network of Isotopes in Precipitation, or GNIP, helps scientists profile the characteristic isotopic signature of precipitation, which is the key to interpreting environmental isotopes when assessing water resources. The database provides unique information and tools to understand atmospheric circulation processes and to verify and improve atmospheric circulation models, the study of climate change over different time periods, as well as for ecological research. The database is now routinely used in palaeontology, landscape ecology, anthropology, plant physiology, animal migrations, food webs, food authentication and forensics.

Today, the network contains isotope data for more than 900 stations, with over 120 000 monthly records. GNIP is the world's largest database of isotopes in atmospheric waters, available to all Member States to support isotope techniques for hydrological and atmospheric research, while the IAEA laboratory assists countries in determining the isotope composition of water samples to assess present and future water supplies.

This newsletter offers more information on GNIP's history: www-pub.iaea.org/MTCD/publications/PDF/Newsletters/WE-NL-26.pdf

Today, GNIP includes about 900 stations, producing over 120 000 monthly records. Below: Map of WMO stations contributing GNIP data, 1964, IAEA.