



searching for pollution in the Caribbean

by Rodolfo Quevenco

*An IAEA-supported project delivers know-how
and insight to solve an environmental problem.*

The hot Caribbean sun bore down on a Honduran naval boat as it criss-crossed the waters of Puerto Cortes, Honduras' main port and one of Central America's most important seaports.

Aboard the vessel, Miguel Gomez Batista, a young radioecologist from Cuba, stared out at the distant horizon with a hint of concern on his face. The ship's depth-measuring instrument had been acting up and the last few readings were definitely off.

Miguel, along with a team of five Honduran biologists, had been up at the crack of dawn. They had spent the last few days preparing supplies and equipment for collecting surface and sediment samples on the coastal waters of Puerto Cortes. Puerto Cortes is a mere 55km drive from San Pedro Sula, where the team was based. But despite their early start, the morning traffic from San Pedro Sula and the unexpected mechanical problems with the boat's diesel engine meant the expedition had to start much later than they had originally anticipated. And now this...

Miguel had other reasons to be concerned.

As a regional expert with solid training and experience in sediment sampling, Miguel had been tasked to lead and train a team of young biologists from Honduras' Center for the Study and Control of Pollutants (CESSCO) in sediment sampling. He flew to San Pedro Sula from Cuba over the weekend; then spent the past couple of days teaching the team proper procedures in the use of sampling tools and sample treatment in the laboratory. The two men and three women from CESSCO were eager and quick to learn, yet largely untested. Up until now, their only practice had been on mock-ups in the laboratory. Today, they would need to prove they could do as well in the field.

And, as if this was not pressure enough, a two-man team from the International Atomic Energy Agency (IAEA) in Vienna had also recently joined the group to observe and record the exercise.

The IAEA, through its Department of Technical Cooperation, had been supporting this regional project since 2007. Docked officially under the code RLA/7/012, the formal title of the project is *Use of Nuclear Techniques to Address the Management Problems of Coastal Zones in the Caribbean Region*. Twelve Caribbean countries participate in the project — Colombia, Costa Rica, Cuba, Dominican Republic, Guatemala, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama and Venezuela. France

and Spain provide additional technical and financial support. The United Nations Environment Programme (UNEP), as well as the Global Environment Facility (GEF) are also active partners in the project.

Concern over the growing incidence of pollution in the Caribbean has been on the rise, as it has the potential to affect livelihoods dependent on fishing and tourism. The UNEP's regional centre in the Caribbean extensively studied pollution in the Caribbean Sea, compiling a list of sites in the Caribbean having high pollution levels. UNEP's list served as the basis for identifying the project's study areas. Puerto Cortes, as one of Central America's major seaports, was among the sites selected.



Role of Nuclear Techniques

Tracking and understanding the sources of pollution in the Caribbean requires a high degree of scientific experience and know-how. The IAEA operates one of the world's leading centres for marine environmental protection, the Monaco-based Marine Environment Laboratory (IAEA-MEL). The laboratory applies nuclear techniques to research, document pollution and other marine problems, and technically assists States facing threats to their seas and coastal waters. With its involvement, the Caribbean project was underway.

"Nuclear techniques are effective diagnostic tools for tracing sources of contaminants," says Joan Albert Sanchez-Cabeza, a physicist who heads the Radiometrics Laboratory in the IAEA's laboratories in Monaco.

Biologists from Honduras Center for the Study and Control of Pollutants (CESSCO) aboard a naval vessel en route to several sampling sites along the coastal waters of Puerto Cortes. (Photo: D.Calma/IAEA)

The analysis focusses on three types of contaminants, Dr. Sanchez-Cabeza elaborated. "We use techniques to measure the concentration of trace metals (like lead or mercury), hydrocarbons and pesticides. For example, x-ray fluorescence easily reveals the trace metals present in the sediment."

These techniques also bring a deeper historical perspective to the nature and causes of pollution.

"Some of the nuclear techniques we are using provide a new specific approach to the analysis," he said. "We call this dating."

In this project we are not only pinpointing which are the polluted areas but we are also telling society and decision makers what are the pollution trends.

"We use the natural radioactive element lead-210," he clarified. "By looking at that radionuclide we can tell what is the age of a particular sediment layer. We can go back in time to tell how a country's ecosystem was 100 years ago, and what is the status now."

Under the project, scientists collect sediment cores — or vertical pieces of sediment — at the pre-selected sites. Then the different layers of the sediment are examined and analyzed in the laboratories.

"Each layer is actually like a page of history," Dr. Sanchez-Cabeza said. "Nuclear techniques allow us to read that book, and the story written in the sediment."

"In this project we are not only pinpointing which are the polluted areas but we are also telling society and decision makers what are the pollution trends. Are we doing things better? Are things improving or not?"

"We provide them with tools to see if that is the case and, if it is not the case, to correct them if possible. That is the core of IAEA-MEL's contribution," he said.

Learning the Science

Manpower development is one of the essential elements of the project, according to Dr. Jane Gerardo-Abaya, the project's Programme Management Officer in the Latin America Division of the IAEA's Technical Cooperation Department. It is also an area that has shown the most progress, two years into the project implementation.

"We have trained about 40 counterparts from 12 Caribbean countries in core sample collection and over 20 more in data processing and interpretation," she said.

This corps of well-trained scientists forms the regional network of individuals, institutes and laboratories that are actively collaborating - sharing information, expertise and existing capabilities in the participating countries.

"For example," Dr. Gerardo-Abaya pointed out, "laboratories in Cuba, Mexico, Nicaragua, Spain and IAEA-MEL are supporting the sample analyses taken from all 12 Caribbean countries."

The IAEA has furthermore provided substantial field and laboratory equipment to the participating Member States in the Caribbean.

"This would allow these countries to collect samples and analyze certain elements important for the project like lead-210, caesium-137, for sediment dating; and pollutants like heavy metals, hydrocarbons and pesticides," she explained.

"We train the scientists (in the region) to collect, prepare and analyze the samples," Dr. Joan-Albert Sanchez-Cabeza added. "If they do not have the means to analyze for a specific substance, we either provide the means or ask them to send the samples to other laboratories in the region."

"So it is actually a network that is already working - about 15-16 laboratories are continuously collaborating with each other, sending samples and meeting with one another. It is actually a very successful project," he said.

A Regional Approach

In early March 2009, the main counterparts of countries participating in the project RLA/7/012, as well as representatives of Spain, GEF, UNEP, and the IAEA, met in Panama to review the overall status of the project. The review meeting assessed progress

made so far and plotted the steps ahead. With its recent field sampling in Puerto Cortes, Honduras became the ninth country to provide core sediment samples, some of them with support from regional experts. These samples have been processed and are currently being analyzed by various participating laboratories. Other core sampling missions in 2009 also took place in Costa Rica, Panama, and Guatemala.

Two reference publications have been published, through the IAEA. One is a technical document that serves as guide for the collection, processing and analysis of samples. Another is a guide on sediment dating based on lead-210.

The review meeting particularly noted the improved regional capacity in the Caribbean in the use of nuclear techniques to reconstruct the history of pollution in coastal ecosystems. This included more field and laboratory instruments to support sediment collection and preparation of samples, and more counterparts trained in various analytical techniques.

To ensure the quality of results from laboratories, basic standards are provided to the laboratories, and intercomparison exercises are organized.

Project Impact

A core project objective is to get the results into the hands of decision-makers of the countries involved and of relevant regional authorities on the environment. This would be in the form of technical reports, scientific papers, brochures and reports to be published in leading journals or presented at major conferences and symposia.

"The main results will really be of interest for decision-making," states Dr. Jane Gerardo-Abaya. "That is why we need to reach out to stakeholders and decision-makers through existing regional channels. Unless these groups know about the project results, know about the situation and know about the capabilities in the region through this project, the impact will not be reached."

The Panama review meeting showed that, as the project starts on its third year, sufficient data has been gathered that could be provided to decision makers and to society within the next few years.

"At the end of the project, we want to tell the decision-makers this is what happened (in your country) for the last 100 years," Dr. Joan Albert Sanchez-



Cabeza said. "We see that in certain countries environmental policies are working well, though not in others, and this should get them thinking. The results that are now starting to be produced will influence decisions that would have a positive impact on the environment."

Tracking and understanding the sources of pollution in the Caribbean requires a high degree of scientific experience and know-how. (Photo: D.Calma/IAEA)

Building on Regional Collaboration

Project results to date are already beginning to have significant impact in other ways. In an effort to strengthen cooperation and synergies, the IAEA has established its relationships with key institutions in the Caribbean, particularly with UNEP and the Association of Caribbean States (ACS). This would not only enable optimization of resources and efforts but would also help in the wider dissemination of the project's final results.

Several significant offshoots are also being realized from data gathered so far and the technical and analytical capability available in the region are

enhanced, particularly in the use of nuclear techniques for environmental studies.

For example, an IAEA project on the early detection and evaluation of the toxicity of harmful algal blooms (HABs) in the Caribbean region benefits from work already done. Launched in 2009, the four-year project is using the results, as well as capabilities already obtained by participating countries. Another offshoot will probably be a project in 2012, which will assess the effects of submarine ground-water discharges — or waters coming from the continents — on coastal pollution levels, using radon and radium to detect the phenomenon.

All things considered, the work they all just did under this project may be exactly what the Caribbean needs. A *Salva Vida*. A lifeline. A promise of cleaner, clearer waters in the Caribbean for the future.

Project experts agree that the network established through this project, and the collaboration as well as technical capabilities that have been built in the past two years are what makes the project so special.

Dr. Joan-Albert Sanchez-Cabeza sums it up.

“From my point of view, the most important achievement is that we have 12 countries working together looking at pollution. They are helping each other and samples from one country are going to another country. Under this project, they are getting to know each other and collaborating.”

All in a Day's Work

It was just shortly before 4pm, the Honduran naval boat slowly maneuvered its way back into port again. Fifteen minutes later, the team of biologists successfully unloaded their cargo. With one last pull, Messi and Carlos, two members of the team,

secured the metal cask containing the core sediment samples to the back of a Toyota pick-up truck that would take the team back to San Pedro Sula.

Miguel, who had also led similar teams in Haiti and Jamaica, was clearly satisfied with the result of the day's work, and the performance of the team.

“Today we went to several highly contaminated sites, and took samples in areas where sampling has not been done before. This is a very good team,” he smiled, “and I am really impressed by their work today.”

Though tired and with mud splattered all over his shirt, Dennys Canales-Cruz, leader of the Honduran team was equally pleased.

“This has been a very good experience for us to learn how to take samples and use the equipment,” he summed up for the rest of the group. “We are confident that the knowledge we gained will be very useful for each of us and for Honduras, in general, to understand the causes and history of pollution so that necessary conservation measures can be taken.”

In the days to follow, Miguel and the team will be working in CESSCO's laboratory in San Pedro Sula to weigh, label, code, and prepare the core sediment samples for shipment to the network of laboratories participating in the project. They would also be doing more field work to collect samples at different other sites along the Honduran coasts, and those, too, would need to be prepared for the laboratories.

But for now, a round of fine Honduran beer, maybe *Salva Vida*, to toast a good day's work was probably in order.

All things considered, the work they all just did today under this project may be exactly what the Caribbean needs. A *Salva Vida*. A lifeline. A promise of cleaner, clearer waters in the Caribbean for the future. 

Rodolfo Quevenco is a public information officer at the IAEA News and Information Section. E-mail: r.quevenco@iaea.org