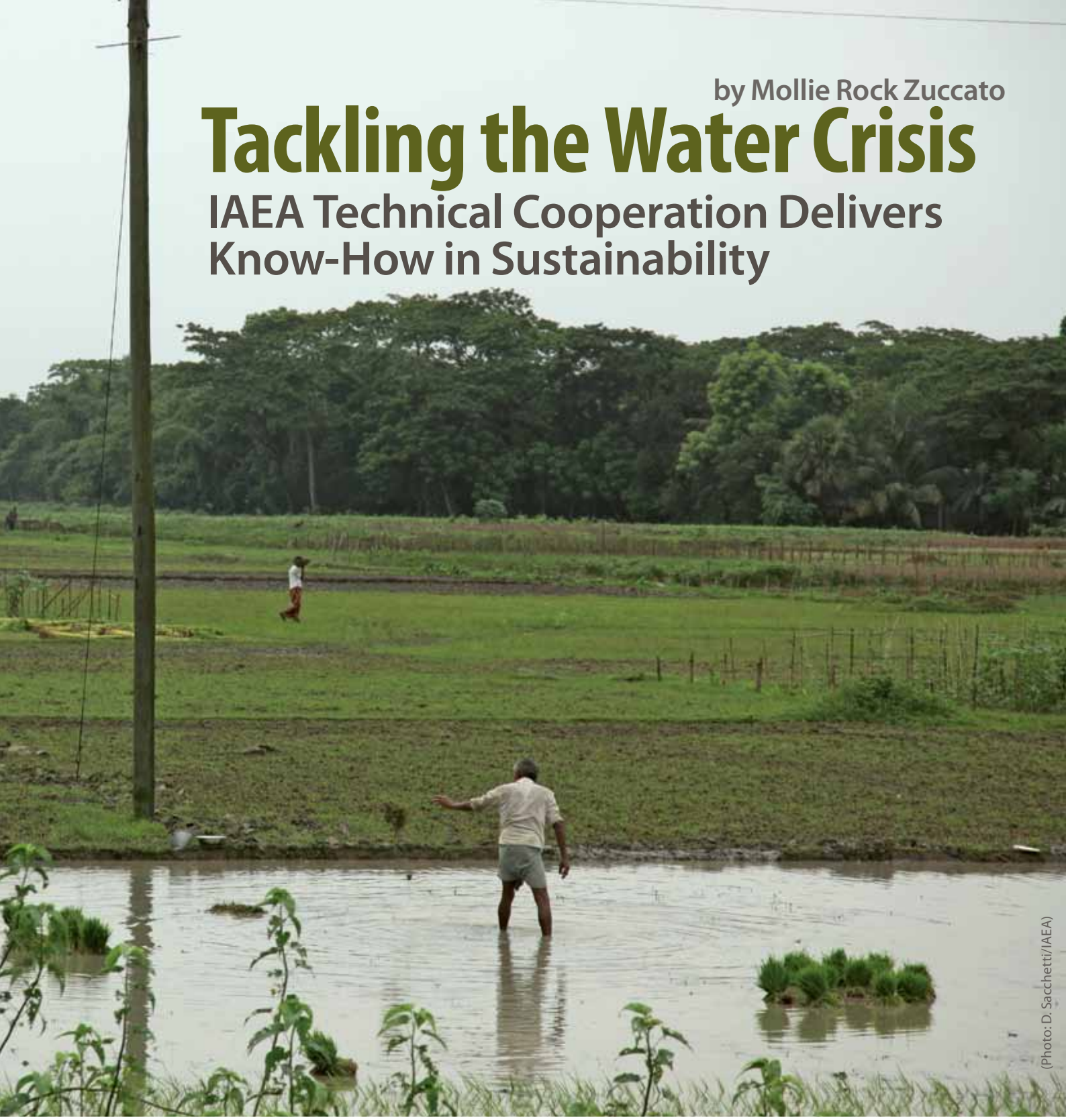
by Mollie Rock Zuccato

Tackling the Water Crisis

IAEA Technical Cooperation Delivers Know-How in Sustainability



(Photo: D. Sacchetti/IAEA)

In a world facing severe challenges to water resource availability, nuclear technology helps manage and make the most of natural resources. Environmental degradation and a lack of clean water pose fundamental challenges to sustainable development. Socioeconomic advances cannot be sustained without clean air to breathe, safe water to drink, healthy soils for crops and livestock production and a clean and stable environment to support work and life.

The IAEA's technical cooperation programme helps Member States to achieve their development priorities while monitoring and protecting the air, earth and oceans.

Managing Groundwater

Groundwater is the primary source of drinking water for half of the world's population. It is important that developing countries can pro-

tect and optimize what limited groundwater resources they have. Groundwater that has been contaminated due to land use activities affects public health and the environment. Industry is the greatest source of water pollution for developing countries. Rain runoff, especially flood water, is another major polluting agent because of the many different substances that it carries into freshwater systems.

IAEA technical cooperation projects promote the use of isotopic techniques to understand the source, extent and behaviour of water resources, as well as their vulnerability to pollution. Isotope hydrology also helps to identify the origin and extent of pollution or saline water intrusion, and provides valuable inputs for sustainable water resource management.

IAEA projects support the development of comprehensive national and transboundary water resource plans for domestic, livestock, fishery, irrigation and other water uses, and help Member States to develop regulations, procedures, standards, minimum requirements and guidelines for sustainable water management. Regional monitoring networks and databases on isotopes and the chemical constituents of surface water and groundwater can also help to improve water resource management.

Additionally, radiation processing technology, in combination with other techniques offers improved environmental safety through effective treatment of wastewater, and supports the reuse of treated wastewater for urban irrigation and industrial purposes.

Conserving Agricultural Water

Nearly three-quarters of the freshwater used annually is consumed in sustaining agriculture. In forty years, that consumption will need to increase by 50% to meet rising food demand. At the same time, indiscriminate use and ever-more frequent extreme weather events, such as droughts, shrink our access to freshwater. Effective conservation is thus an urgent priority for both rain-fed and irrigated farming systems. IAEA technical cooperation projects apply nuclear technology to develop efficient and cost-effective irrigation methods that improve yields and the effectiveness of soil and water conservation strategies in retaining water and applied nutrients for food production under both rain fed and irrigated agricultural systems.

Harmful algal blooms in oceans can severely affect local and international trade. The IAEA helps in finding quicker and more accurate means of detecting the presence of toxins in marine life.
(Photo: D. Sacchetti/IAEA)

Improving Crop Growth

To be certain that every drop of rainwater or irrigation water reaches crops, isotopic techniques are used to optimize soil-water-cropping practices and fertilizer technologies. This research improves the soil's fertility and quality to grow more nutrient-rich and higher-yielding crops. Carefully dosing and placing fertilizers reduces waste, protects the environment and cuts costs while increasing plant production.

Monitoring and Protecting the Oceans

Marine pollution is a serious threat to marine creatures and habitats. Pesticides, toxic chemicals and heavy metals that enter the marine food web can lead to mutation, disease and behavioural change, and eventually end up in the food we eat. Trade in fish and seafood depends on a country's ability to determine the quality of foodstuffs.

IAEA technical cooperation projects help Member States to establish or strengthen analytical laboratories that can measure environmental radioactivity and pollutants in the oceans or in marketable foodstuffs. Other projects build national capacities to carry out marine environmental studies using nuclear analytical and radiotracer techniques that can track the movement of heavy metals and pollutants in the marine environment. By using such techniques, Member States can enhance their understanding

Isotopic techniques also identify soil-water-cropping practices and fertilizer technologies that improve soil fertility status and soil quality for more nutrient-rich and high-yielding crops. (Photo: L. Potterton/IAEA)

of the earth's oceans, and their ability to manage and protect marine resources.

Identifying Harmful Algal Blooms

In the ocean, harmful algal blooms (HABs), often referred to as red tides, can severely affect local and international trade. The IAEA helps Member States by finding quicker and more accurate means of detecting the presence of toxins in marine life. Early warning programmes provide important information about HABs to fishermen and consumers.

What the IAEA Technical Cooperation Programme Does

Training courses and workshops cover topics such as marine contamination analysis, the distribution of contaminants, soil fertility and crop nutrition, soil and water conservation, soil-water salinity management, the establishment of permanent regional monitoring station networks and equipment use and methods customized to regional needs.

Expert assistance makes available on-the-spot training in a developing country by a recognized expert. When complex equipment is supplied to a country, the project usually includes the visit of an expert to train the staff in the operational and technical aspects of the instrument.

Training and fellowships prepare local personnel to take over the responsibilities of soil-water-crop management, air quality and water resource assessment, and freshwater/marine water environmental impact evaluation in Member States.

Conferences, symposia and seminars are designed for the exchange of ideas between scientists from various countries.

Equipment and materials provided by the IAEA are used to establish or enhance sustainable environment, water resource assessment and land and agricultural water management.

Partnerships

Technical cooperation projects involve collaboration between governments, IAEA partners and Member States, keeping in mind priority national developmental needs where the IAEA has a unique role to play, where nuclear technology has a comparative advantage or where the IAEA can add value to services from other development partners. The IAEA strives to establish partnerships and working relationships through consultations and interactions with United Nations system organizations and other potential partners. Collaborative work ensures the coordination and optimization of complementary activities and informs relevant UN organizations of the developmental impacts of the TC programme.

Many activities are carried out in partnership with international organizations, such as the United Nations Environment Programme, the United Nations Development Programme, the International Maritime Organization, the Global Environment Fund, the Food and Agriculture Organization, the Consultative Group on International Agricultural Research, Inter-American Institute for Cooperation on Agriculture, Alliance for a Green Revolution in Africa, the Intergovernmental Oceanographic Commission and the United Nations Educational, Scientific and Cultural Organization, National Oceanic and Atmospheric Administration and the United Nations Industrial Development Organization.

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For more information, visit: tc.iaea.org

Optimal Results by Juanita Perez-Vargas

IAEA Supports Water Research in Latin America

Jane Gerardo-Abaya, Programme Management Officer for Latin America in the IAEA's Technical Cooperation Division discusses in this interview the Agency's support in handling water challenges in Latin America and the Caribbean:

Gerardo-Abaya: The IAEA extensively studies this problem because the region is severely affected by inadequate safe water supplies. The region has large water resources, however, most population centres are located in coastal areas where water availability is limited or vulnerable to contamination due to seawater intrusion into aquifers when there is excessive water extraction.

The population is heavily dependent on the use of groundwater which is generally limited. And while a small portion of the urban population has no access to water, a large portion of rural areas have no access to drinking water.

This also has to do with water which, although at times available, is contaminated. Access to sanitation is a problem for the region, especially where wastewater remains untreated, and can reach the groundwater, contaminating this scarce resource. In addition, agriculture can be a problem because pesticides and fertilizers eventually flow into the groundwater or surface water. It is important to note that agriculture uses water largely for irrigation, livestock and aquaculture production, comprising 70% of global water consumption.

How does the IAEA help Member States address water supply problems?

Gerardo-Abaya: The IAEA enhances Member States' ability to acquire a scientific understanding of the occurrence, flow and water dynamics and to understand the mechanisms of contamination. This is achieved by using isotope hydrology that adds value in obtaining conclusive results, which are not normally achievable with traditional hydrological techniques alone.

There is a growing need for scientific information among decision makers to support effective policy formulation and resource management. In this area, the IAEA's support for Member States' scientific research is very valuable.

Juanita Perez-Vargas

Specifically, the IAEA provides both laboratory and field training. The IAEA teaches best practice in sample collection, analysis, and data interpretation to be certain we can understand the processes at work. The IAEA also provides expert assistance and supports upgrades for Member State laboratories to help them achieve optimum performance in research.

What kind of results have these projects achieved in Latin America ?

Gerardo-Abaya: Seven coastal aquifers and their characteristics are now under study by the authorities, nuclear institutions and universities in Argentina, Costa Rica, Cuba, Ecuador, and Uruguay. Our specific achievements have been to increase the number of qualified specialists in groundwater management, as well as increasing research capacity in laboratories and in the field thanks to equipment provided by the IAEA.

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