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The Role of Isotope Hydrology in Supporting Water Management in Small Island Developing States

Yuliya Vystavna, Oliver Kracht, Astrid Harjung
International Atomic Energy Agency, Vienna, Austria

Abstract

Small Island Developing States (SIDS) face exceptional challenges in terms of limited resources, infrastructure, and vulnerability of their water systems to climate change and natural disasters. In the last decades the impact of climate change on SIDS exacerbates the water availability problems: ocean acidification, intensification of the hydrological cycle, extended drought periods, intense rain events, sea level rise, groundwater salination, and groundwater shrinking. Another challenge is the lack of water laboratories that are necessary for the continuous generation of national data to support decision making in water management. Through the Technical Cooperation Programme, Coordinated Research Projects, trainings and the Global Network of Water Laboratories (GloWAL), the International Atomic Energy Agency promotes the use of isotope hydrology in SIDS (Mauritius, Marshall Islands, Palau, Vanuatu, Samoa, Fiji, Barbados, Saint Lucia, Saint Vincent and the Grenadines, Trinidad and Tobago) and beyond (Malta and Cyprus), allowing national experts to better identify and assess water resources. Isotope hydrology provides valuable insights into the accessibility and sustainability of groundwater resources, as well as for sea water intrusion quantification. It also aids in identifying sources of contamination and tracking of pollutants. This way SIDS can make informed water management decisions, ensuring the availability of safe and reliable water sources for their populations. Technical cooperation projects are also supporting the development of national laboratory capacities for water-related data generation and databases development. Such laboratories are limited to isotopic methods but also undertake hydrological and hydrochemical analysis. The sustainability of laboratory operations and development of isotope hydrology as an innovative tool to improve understanding of water resources availability under changing climate should be grounded on the collaborations between local authorities, non-governmental organizations, and international agencies. This helps providing the necessary resources and expertise to support water management and the overall well-being and sustainable development of island communities.

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