

Water Resources

Objective

To enable Member States to use isotope hydrology for the assessment and management of their water resources, including the characterization of climate change impacts on water availability.

Conserving and Protecting Fossil Groundwater Supplies

The IAEA Isotope Hydrology Laboratory developed new capacities to assess groundwater overexploitation and to determine non-renewable fossil groundwater. Through projects under the technical cooperation programme, noble gas isotopes dissolved in groundwater were used to assess water age and aquifer replenishment rates that feed into effective protection and conservation strategies for fossil groundwater resources (Fig. 1).

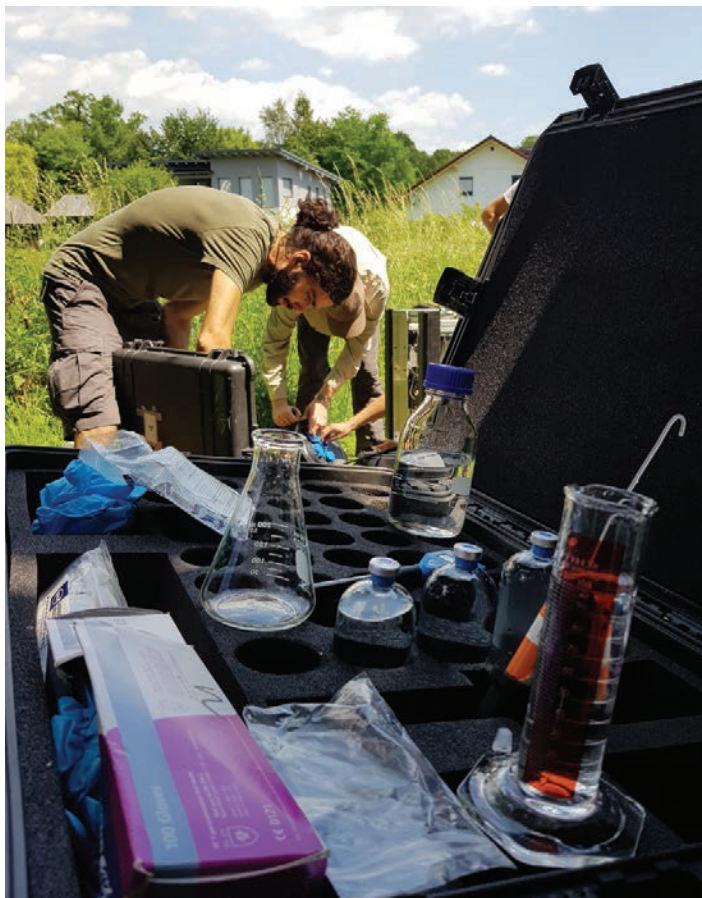


FIG. 1. Groundwater sampling for age dating purposes.

The Laboratory also completed the installation of a high sensitivity mass spectrometer with an integrated sample extraction and processing system to analyse noble gases in environmental groundwater samples from Member States, including routine capacities for extracting krypton-81 to age fossil groundwater to over one million years in age. This groundwater age information is critical for water management in Member States, as it helps to determine the rate of groundwater replenishment for sustainable extraction.

Evaluating Nitrogen Contamination of Surface Water and Groundwater

A new, low cost method to routinely test for dissolved nitrogen and to determine the source of this contaminant through fingerprinting was developed. The new method uses an inexpensive titanium (III) reagent to directly convert nitrate to nitrous oxide gas for isotope analyses and replaces time consuming and labour intensive conventional methods that are only available in a few developed Member State laboratories. The titanium method was adopted in 17 developing Member States through a CRP and as a service by the IAEA Isotope Hydrology Laboratory to assist projects under the technical cooperation programme aimed at helping water managers to better address serious water pollution from nutrients and to help inform effective remediation strategies (Fig. 2).



FIG. 2. Preparation of water samples for tritium analyses to be used for groundwater age dating purposes.