



**1** The Sahel region stretches across the African continent between the Atlantic Ocean and the Red Sea. It is a band of land covering an area of 3 million km<sup>2</sup> that serves as a buffer zone between the Sahara desert to the north and the Sudanian Savanna to the south. The shaded area in the map gives an approximation of the scope and breadth of this region. Home to more than 50 million people, the Sahel is one of the poorest regions of the world. Among the challenges its people face are water scarcity and food shortages.



**2** Worldwide climatic disturbances have had a deep impact on available water supply in the Sahel region. Over recent years, the transitional semi-arid eco-region has faced major and persistent challenges, including adverse climate change effects, irregular rainfall patterns, and recurrent droughts that have resulted in reduced harvests. Groundwater is the main source of water for many people in the Sahel region. Groundwater abstraction from aquifers is increasing, but is not adequately regulated. As a result, water resources are overexploited, and are declining in quantity and quality.



**3** With limited potable surface water, Sahel countries tap into the groundwater of one of the five aquifers in the region: the Iullemeden Aquifer System, the Liptako-Gourma-Upper Volta System, the Senegalo-Mauritanian Basin, the Chad Basin and the Taoudeni Basin. These underground water resources cross national borders and are shared by thirteen IAEA African Member States: Algeria, Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Ghana, Mali, Mauritania, Niger, Nigeria, Senegal and Togo.

# THIRSTY SAHEL



**4** In Africa, when you talk water, you're talking about want or plenty. A single, productive borehole can make all the difference between a living and dying village. This remote village in Ghana is now all but empty because only salty water was coming out of this borehole. The lack of a readily available supply of potable water eventually forced most of the residents to abandon the village and relocate closer to a reliable water source.



**5** Limited understanding of how aquifers function and the absence of guidelines or standards for groundwater use in most Sahel countries can lead to the overuse, pollution and degradation of groundwater resources. Also, insufficient understanding can lead to boreholes being dug and then immediately abandoned because the supply of water is insufficient, as in this picture.



**6** In the Sahel, fetching water is traditionally a task for women and young children, and women may walk miles to the nearest supply of potable water. Population in the region is expected to double by 2020. As more and more people tap into underground aquifers for their main source of potable water, disturbing questions arise: how much groundwater is available in these aquifers? Can they be relied upon to supply the Sahel region in the future?



**7** In 2012, the IAEA launched a large scale, four-year, technical cooperation project to promote the integrated management and development of shared groundwater resources in the Sahel region. The project supports the use of isotope techniques in hydrological studies to map underground water, and to identify and understand the root causes of the main threats to the five transboundary aquifers. Isotope hydrology techniques can also provide useful information about the quality and availability of water hidden underground, and can be used to investigate the impact of climate change on water resources.

**8** By tracking the isotopes in water, scientists can obtain valuable information rapidly and cost-effectively, leading to a better understanding of water resource systems. This isotope data can be used to support the formulation of improved water management strategies and climate change adaptation policies to help countries meet their current and future water demands sustainably.



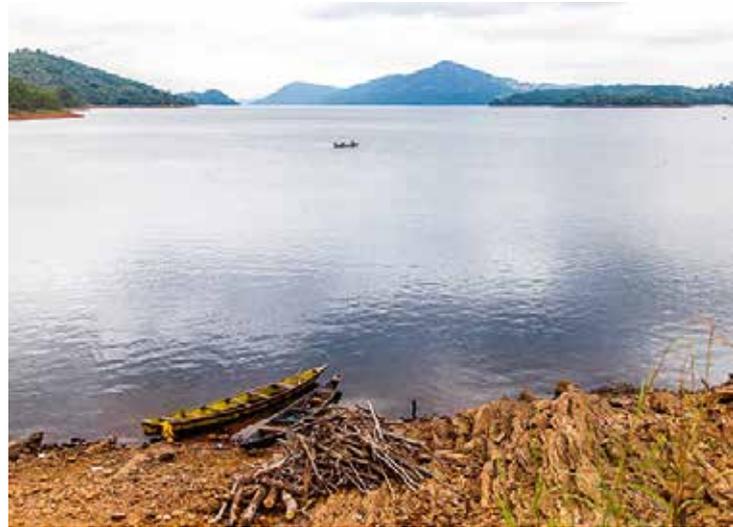
**9** As the demand for limited water resources grows, the transboundary management issues related to shared aquifers become more pressing. The Sahel countries recognize the importance of setting up the technical, legal and institutional frameworks necessary to manage their shared water resources in a cooperative and integrated manner.



**10** Through its technical cooperation programme, the IAEA is now helping 13 African countries in the Sahel to use isotopes to monitor and assess aquifer characteristics, in order to better understand how transboundary groundwater systems work; how much water can be extracted by each country without tapping the water reserves of another; and what impact human activities have on the aquifers. This information is essential for the development of effective regional water management programmes.



**11** Scientists at Ghana's Atomic Energy Agency have set up components of a tritium laboratory with the support of the IAEA's technical cooperation programme. Ghana is one of several countries in the region that have acquired modern analytical equipment through the Sahel project. Technicians are being trained, and it is expected that the laboratories will play a pivotal role in data analysis within the region.



**12** Mapping and understanding priceless water resources will help to ensure that countries in the Sahel region can develop long-term strategies for allocating and managing fresh water in an equitable, sustainable manner.

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