

The Nubian Sandstone Aquifer System Project: Mapping the World's Largest Known Fossil Aquifer



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The Nubian Sandstone Aquifer System project is a successfully completed joint project of the United Nations Development Programme and the Global Environment Fund (UNDP-GEF), the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the International Atomic Energy Agency (IAEA) to support the establishment of a regional strategy for the integrated management of the Nubian Sandstone Aquifer System (NSAS). The project's long-term goal was to establish rational, equitable management of the NSAS in support of **sustainable socioeconomic development**, and to protect biodiversity and land resources in the region.

The NSAS is the **world's largest known 'fossil' water aquifer system**, meaning that the water is ancient and non-renewable. Lying beneath the four northeast African countries of Chad, Egypt, Libya and Sudan, it covers some two million square kilometres. With growing populations and decreasing water availability from other sources, the aquifer is under mounting pressure. Increased abstraction of the shared groundwater resources without a clear understanding of the transboundary impacts threatens water quality, and has the potential to harm biodiversity and accelerate land degradation.

The joint project aimed to gain a clear understanding of NSAS transboundary issues, problems and potential solutions, and to establish a process for achieving a **strategic action programme (SAP)** jointly developed and agreed to by the four NSAS countries. The project followed two key strategies: to enhance the scientific data on the aquifer through the application of isotope hydrology techniques; and to improve cooperation between the countries sharing the aquifer. Isotope hydrology is used to characterize and quantify groundwater resources, and to determine water sources, pathways, rates of recharge and vulnerability to pollution.



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As part of the project, a new and innovative numerical model for the aquifer was constructed (building on earlier modeling efforts by the Centre for Environment & Development for the Arab Region and Europe (CEDARE)). The sophisticated new model treats the aquifer as a three-dimensional entity, and can be modified for future use as more data become available. The model will support decision making related to water management across the four Nubian countries.

Following the successful conclusion of the project, the NSAS countries have signed a strategic action programme to set up the policy and institutional reforms necessary to establish a framework for agreed collective management actions of the shared groundwater resources and to address key transboundary concerns at both the regional and national level for implementation of those actions.



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