

Stories from the field

Balancing competing water needs in Morocco's Saiss basin

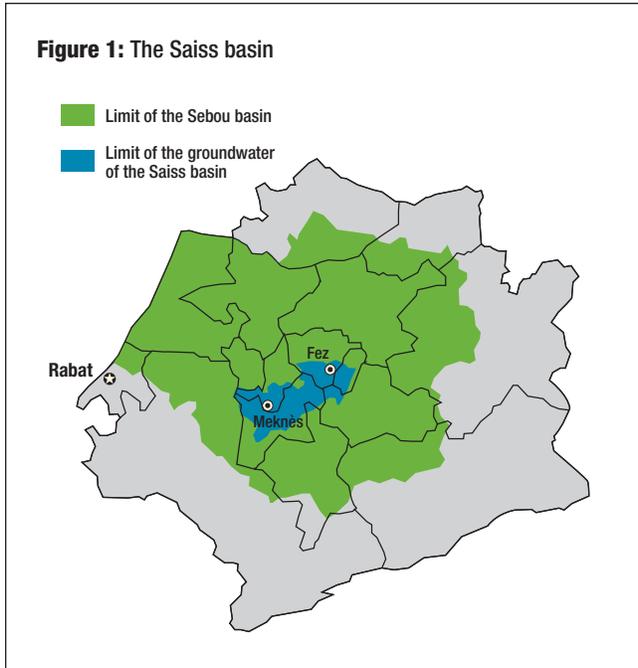


Each year, Moroccans use nearly 70% of their annual recoverable water supply which is about 20 cubic kilometres. While this may sound sustainable, at the local level it is not viable because community use of groundwater is increasing, while overall supplies are limited.

The Saiss basin, located in the upper eastern reaches of greater Sebou basin (shown in the map inside) represents 11% of Morocco's annual water endowment, providing water for 1.8 million people. It constitutes about a quarter of Morocco's arable land and sustains some 8 000 commercial and subsistence farms.

The Saiss basin serves many competing water users – local industry, a diverse agricultural sector, and towns and cities in the region, which include the major centres Fez and Meknes. Declining levels of precipitation in the region over the last 40 years have been accompanied by a 1°C increase in the average temperature. Given that there is little prospect of water supplies increasing to meet the needs, a research team led by Al Akhawayn University is working with local communities and authorities to examine whether managing the demand for water can protect the basin's future in the context of growth and climate change. The focus of CCAA's project here is agriculture as it accounts for over 82% of water consumption in the Saiss basin.

**Small hold farmers in the Saiss basin
cope with summer water shortages.**
Photo courtesy of Al Akhawayn University



The Moroccan state does not require farmers to cultivate specific crops. And many farmers in the basin choose to grow water-intensive crops because they offer high market prices. Some 4 500 hectares are in production as apple orchards and hundreds of hectares are cultivated as vineyards. Irrigation therefore accounts for significant levels of water use. About 37 000 hectares of farmland are irrigated, of which 46% is by pumped water, 32% is from surface water and about 22% is drip irrigated.

The Saiss basin makes up one-quarter of Morocco's arable land and provides water for 1.8 million people.

The Saiss aquifer has experienced increasingly unsustainable levels of exploitation since 1980. Its waters are only partially replenished each season, making it susceptible to rapid depletion. With decreasing precipitation and increasing groundwater use, some small rivers and springs have disappeared and flows in what remains has been significantly reduced.

Since 1970 spring waters fed by the aquifer declined by 45% – from 24 cubic metres per second to 15 cubic metres per second. The surface water table has fallen by 70 metres over the past 27 years at the Hajj Kaddour measuring station in the Saiss basin. Economic and population growth have contributed to rising pollution levels in ground and surface waters and put further pressure on the basin, as many water sources are now unusable.

Average temperatures have risen by 1°C in the last 40 years.

The issue of water access is fraught with tensions, in some cases pitting upstream communities against their downstream neighbours. Farmers recognize that the aquifer is threatened, but do not cooperate with the authorities who attempt to regulate water access by prohibiting new well construction. Researchers hope to increase levels of understanding and cooperation among the stakeholders and involve water users in finding solutions by improving information sharing and dialogue among commercial and subsistence farmers, water managers and researchers. The research team will also bring evidence on how climate change and increasing demand are likely to affect water availability to discussions on how the basin can be sustainably managed.



Researcher Fatima Ejekki interviews a farmer in Aïn Chegag as part of community surveys conducted to better understand local water use needs and vulnerabilities. Photo courtesy of Al Akhawayn University

Strategic partners include the Sebou Basin Agency (ABHS), which is responsible for managing the aquifer, the provincial agriculture directorates (DPAs), local administrative and elected authorities, and the National Meteorological Directorate.

In Hajj Kaddour, surface water levels have dropped by 70 metres in the last 27 years.

Some farmers find existing rules governing water use to be unworkable and, as the basin authority has limited staff to enforce the rules, they routinely flout them. In some cases, water allocation systems are actively sabotaged. Conflict over the Bitit water canal illustrates these tensions. The Bitit spring emits about 1 300 litres of water per second, which serve two tribal communities via concrete canals.



Researchers, farmers and community representatives meet with the director of the El Hajeb DPA and drip irrigation service providers at a workshop held in Bouderbala agricultural technical center, El Hajeb. Photo courtesy of Al Akhawayn University



Faces behind the research

*Ahmed Legrouri,
Dean, School of Science
and Engineering,
Al Akhawayn University*

Originally trained as a chemist at universities in Rabat, Toulouse and Glasgow, project leader Ahmed Legrouri later undertook research at the University of Marrakech on the use of synthetic clays for water purification. Now Dean of Science and Engineering at Al Akhawayn University, his work serves communities in the surrounding area, focusing on applied research with social, economic or technological impacts.

In their current research on water demand in the Saiss basin, the Al Akhawayn team faces the challenge of attempting to reconcile many competing views and needs among stakeholders.

“Our current research targets, in addition to farmers, other stakeholders concerned with water issues and climate in the region,” says Legrouri. “It aims to contribute to behavioural and institutional changes among the farmers and the various administration levels.”

He sees participatory approaches as key to bridging between these stakeholders.

“Some of the most useful aspects of our work are applying participatory action research in the field, and introducing related monitoring and evaluation approaches such as visions, action, partnerships and outcome mapping to generate consensus with our stakeholders. We are directly involving employees of the provincial agriculture directorates and the basin agency in using these participatory approaches when dealing with large and small scale farmers.”

Legrouri is hopeful that the project will serve as a platform for creating the synergies needed between authorities and competing water users to save the Saiss aquifer.

“In our last meeting with the basin agency in Fez, we were happy to hear that a call for proposals will be launched soon for work to be carried out for the preparation of an aquifer contract... It’s a good sign.”



The water is shared between the state and the two rural communities – one upstream and the other downstream. Some upstream farmers have repeatedly destroyed spring-fed canals designed to provide water to downstream communities.

Finding solutions to such bitter conflicts demands a clear understanding of water users' needs, beliefs and constraints, and respect for the solutions they may propose. Through surveys and stakeholder meetings, the project team is actively listening to and documenting farmers' views, so that a composite picture can inform a future water use agreement.

Field work carried out to date in the towns of Sefrou and El Hajeb indicates farmers blame their shrinking well waters on the decrease in rainfall. Their preferred solutions include building a reservoir for rainwater and snowmelt, deploying drip irrigation (though they cannot currently afford to purchase the equipment), and having effective water use agreements to minimize conflict.

Researchers are contributing a shared base of evidence to inform water use planning among basin authorities and competing water users.

Research is shedding light on the water needs of rural households and on local perceptions of official efforts to protect water resources. Awareness campaigns by the DPAs and ABHS do not reach farmers effectively. Farmers say they need more information on farming techniques and weather forecasts and many feel the existing rotation system for irrigation is impractical.

Much remains to be done, but the project is making progress in bringing stakeholders together to discuss how to better manage the demands on their available water supply. Workshops held in



Research leader Dr Legrouri and staff from the El Hajeb DPA visit the Zoubia cooperative. The cooperative was formed in 2009 as a common basin, fed by the Bitit spring, from which farmers draw water in turns on an agreed rotation system. Photo courtesy of Al Akhawayn University

January and February 2010 responded to local farmers' interests. The first workshop offered presentations on drip irrigation and other techniques of minimizing water use in agriculture; the second (at the request of local communities) gave an opportunity for local people to voice their concerns directly to the basin authority, and to hear, in turn, about the authority's mandate and the limits it faces in responding to community needs.

Research continues into 2011, with ongoing efforts to improve the base of shared knowledge, and to develop more precise downscaled projections for climate change at the regional level. While it may be too much to hope for a new water use agreement within the life of the project, researchers hope to see farmers' associations better organized and informed, and better able to make use of knowledge and techniques to minimize water use. The basin authority will soon be developing an aquifer contract, which will seek commitment and involvement from all stakeholders, with input from the Al Akhawayn research team.

*The project "Using Demand Side Management to Adapt to Water Scarcity and Climate Change in the Saiss Basin" illustrates progress towards CCAA's outcome area 2: **At risk groups, policymakers and researchers share learning and expertise on climate vulnerability and poverty.***