December 2020 | No. 3

Preventing the Deterioration and Overexploitation of Groundwater

A Call for Urgent Action in the Agricultural Sector

Policy Brief

- The deterioration and overexploitation of groundwater at the global scale is leading to a dramatic rise of local problems.
- Private pumping for irrigation purposes has become established in poorly regulated contexts, with agriculture as the main sector responsible for this situation.
- Wherever agriculture depends primarily on groundwater, the entire agricultural economy is jeopardized. This requires urgent action.

Agricultural well in Abu Minqar, Farafra, Egypt, 2014. © Alvar Closas.

All Around the World, Pressure on Groundwater Is Rising

Both quantitatively (overextraction) and qualitatively (pollution, salinization), pressure on groundwater resources is rising in all parts of the world. The agricultural sector has increased its extraction threefold over the last 50 years. India is without a doubt one of the nations that has exerted the greatest pressure on its groundwater: 251 km^3 were extracted in 2010 for all combined uses. In the Maghreb, the development of the agricultural economy is linked to intensive groundwater usage, which, for example, has permitted Algeria to quadruple its irrigation surface area between 1985 and 2011.

In regions where surface water is abundant, those supplies — which already may be in great demand — also may experience analogous pressures due to unknown or ignored interconnections with groundwater. With climate change, there is a danger that these combined pressures will rise, especially in semi-arid and arid areas.

Authors Stéphanie Leyronas (AFD) and Olivier Petit (CLERSE, Université d'Artois), coordinators

AFD éditions
AGENCE FRANÇAISE DE DÉVELOPPEMENT

Individual farmers extract groundwater to overcome shortages of surface water, to intensify and expand irrigation, or to alleviate the constraints of collective management. Even when they are aware of the risk of resource depletion, they find themselves involved in a pumping race that excludes the poorest farmers and deepens economic and social inequalities. For this reason, consideration of political, economic, and social issues — more than ecological ones — is the key to finding sustainable groundwater management solutions.

Solutions That Are Difficult to Implement

Technical solutions for reducing water extraction (building of dams, hillside reservoirs, use of new irrigation techniques) often underestimate the indirect effects of their implementation. On Morocco's Saïss plain, for example, the introduction of drip irrigation, portrayed as a water-saving scheme, led to an increase in irrigated surface area of 50% between 2005 and 2014, and doubled groundwater extraction.

Limiting groundwater use is a necessity. The solutions proposed at the institutional level are generally a combination of:

- regulation by the authorities, involving regulatory intruments (permits, bans, quotas, zoning, well closures), economic instruments (taxation, subsidies), or indirect measures linking water to other issues (energy, food security);
- mechanisms based on the participation of all users, associating them in community-based management schemes.

However, these hybrid solutions face several stumbling blocks. The first relates to the invisibility of aquifers and to the insufficiency of hydrogeological surveys, which are not widely shared or available. They also encounter operational, financial, social, or cultural barriers. In Guanajuato, Mexico, for example, the public agency Conagua has the capacity to carry out between 280 and 320 inspections of wells and boreholes annually, while the area has about 20,000 such installations.

The barriers are also political, as for instance, when authorities prioritize short-term economic development and the preservation of social order over sustainable resource management.

This Policy Brief is based on the work of a number of contributors[1] and draws up four main recommendations.

[1] This text is the result of a collective effort undertaken with the backing of COSTEA and coordinated by Stéphanie Leyronas and Olivier Petit. It involved the following contributors: Charlotte Alcazar (SymCrau); Quentin Ballin (AFD); Marc Boisson (Artelia); Sami Bouarfa (INRAe); Aurélien Dumont (UNESCO); Emmanuel Durand (GRET); Nicolas Faysse (CIRAD); Rhoda Fofack-Garcia (France Energies Marines); Marcel Kuper (CIRAD); Selin Le Visage (Université Paris Nanterre); Frédéric Maurel (AFD); Imane Messaoudi (Université Paris Nanterre); François Molle (IRD); Marielle Montginoul (INRAe); Seyni Ndao (OFOR, Senegal); Audrey Richard Ferroudji (consultant); Jean-Daniel Rinaudo (BRGM); Dominique Rojat (AFD); Bruno Romagny (IRD); Isabel Ruck (Sciences Po Paris & CAREP Paris); Julie Trottier (CNRS).

1. Building Shared Knowledge and Representations

Authorities at all levels, water sector stakeholders, and water resource users must have shared, scientifically validated knowledge of the functioning of aquifers and of the interactions between surface water and groundwater. In parallel, and even without possessing exhaustive knowledge, actions to regulate uses must be set up. Perceptions of abundance and scarcity may vary among stakeholders. An institutional space for dialogue is essential in order to build shared knowledge and above all shared representations that are socially and politically accepted, as well as based on easily adaptable comprehension tools and indicators.

2. Implementing Negotiated Solutions

In order to propose solutions adapted to the context of each aquifer, it is necessary to acquire knowledge and understanding of the interests and constraints applying to the users of the resource, and of their trajectories and interactions. The relevant authorities must establish conditions to implement knowledge-sharing and negotiation processes whereby diverging interests can be expressed. Strengthening human resources (in terms of staffing and skills) is therefore essential.

3. Focusing on Collective Action Before Seeking Technical Solutions

In all projects impacting groundwater, defining what constitutes a common good among heterogeneous actors with potentially opposing interests is a preliminary step prior to negotiating the sharing and management of water. Instead of formulating solutions based on the increase of capacity — via the construction of infrastructure, for example — priority should be given to development approaches that see groundwater as a commons.

4. Developing Legitimate Local Regulatory Instruments

The sustainable management of groundwater is impossible when regulatory instruments and rules that relate to control and sanctions are neither recognized as legitimate nor deployed politically at the local level. This means that local public actors and users should be involved as much as possible in decisions concerning resource management. In this regard, analyzing the political and economic stakes of groundwater management at the territorial level is an effective way of bringing local elected representatives and users on board. This also represents an opportunity to extend discussions about groundwater — not just in hydro-geological terms — so as to grasp that resource's multifunctional nature (ecological, economic, social).

Area: multi-country
Keywords: water, agriculture, commons
Topics: water, agriculture

Agence française de développement (AFD) 5, rue Roland Barthes, 75012 Paris.
Publishing Director Rémy Rioux
Editor-in-Chief Thomas Mélonio
Graphic creation MeMo, Juliegilles, D. Cazeils
Design and production Coquelicot
Legal deposit 4th quarter 2020 | **ISSN** in process | **© AFD**
Printed by AFD's reprography service
To browse our publications: https://www.afd.fr/en/ressources-accueil