

[77] BOTTOM-UP INTEGRATED APPROACH FOR SUSTAINABLE GROUNDWATER MANAGEMENT IN RURAL AREAS

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Introduction

Groundwater resources represent the largest volume of all unfrozen fresh water on Earth. However the knowledge and understanding of this precious resource is very little, if compared to surface water, especially when considering the general public and policy makers. Nonetheless groundwater abstraction for human needs significantly increased in the past sixty years (Foster and Chilton 2003), playing a major role in agricultural production and the support to rural livelihoods (especially in developing regions; Giordano and Villholth 2007).

For this reason it is of paramount importance to promote groundwater protection and to raise awareness on both its relevance and vulnerability to anthropic pressure. This, on the one hand, implies the implementation of science-based management practices, clearly resulting from sound hydrogeological and hydrogeochemical investigations, but also to start considering the social impacts of scarce and/or polluted water.

Indeed, groundwater resources if carefully managed can significantly contribute in meeting the increasing water demand, sustaining agricultural needs and adapting to global climate change (WWAP 2012).

Based on these assumptions, a bottom-up integrated approach for sustainable groundwater management in rural areas is proposed as a replicable example of a methodology for tackling groundwater issues.

The Bir Al-Nas approach

The need of including groundwater into Integrated Water Resource Management (IWRM) has been widely recognized (Foster and Ait-Kadi 2012), although the complete implementation of integrated approaches still remains challenging and characterized by dominant sectorial approaches.

However, the pressure of population growth, with the associated increase of food, water and energy demand, urge scientist to act in a holistic way when dealing with emerging water pollution and water scarcity issues.

As these problems calls for a prompt action, the Bir Al-Nas approach (Bottom-up Integrated Approach for sustainable groundwater management in rural areas) is proposed as a way to better address management strategies tailored on the real needs and issues of local populations. In Arabic *bir al-nas* means the “well of people” and emphasizes the effective inclusion of the social dimension into hydrogeological investigations.

The overall objective is meant to be achieved through an integrated hydrogeochemical and social analysis, finalized to obtain robust and reliable information for providing advices and supporting integrated management practices for rural development (Fig. 1).

The key aspect of the Bir Al Nas approach is the implementation of socio-economic assessment into hydrogeological investigations evaluating the impacts of human activities on groundwater quality and quantity. In practical terms this is done through:

- A Stakeholder analysis prior the hydrogeochemical and hydrogeological study. This analysis allows for the identification of the main actors involved in the studied water issue, their power relations and possible existing conflicts.
- The direct engagement and confrontation with final water users while performing the monitoring activities. This represents a moment for knowledge and information sharing that can facilitates a better understanding of local issues while also retrieving direct information on groundwater use.

The main rationale behind this approach it that is possible to get people with different interests willing to cooperate and solve water issues only if they fully understand why it is necessary and how they will benefit (GWP 2013).

The Bir Al-Nas approach is currently being tested in the Cap Bon Peninsula, which is one of the main agricultural regions of Tunisia (Ben Hamouda et al. 2011), also interested by groundwater salinization and aquifer overexploitation issues.

The final outcomes are expected to be on the one hand an increase of the awareness of groundwater issues from the rural community,

eventually resulting in a more proactive behavior in terms of groundwater protection. On the other hand, from the scientists' perspective, the engagement of farmers and well's owners will favor both the comprehension of local issues and needs, and help bridging the gap between science and society.

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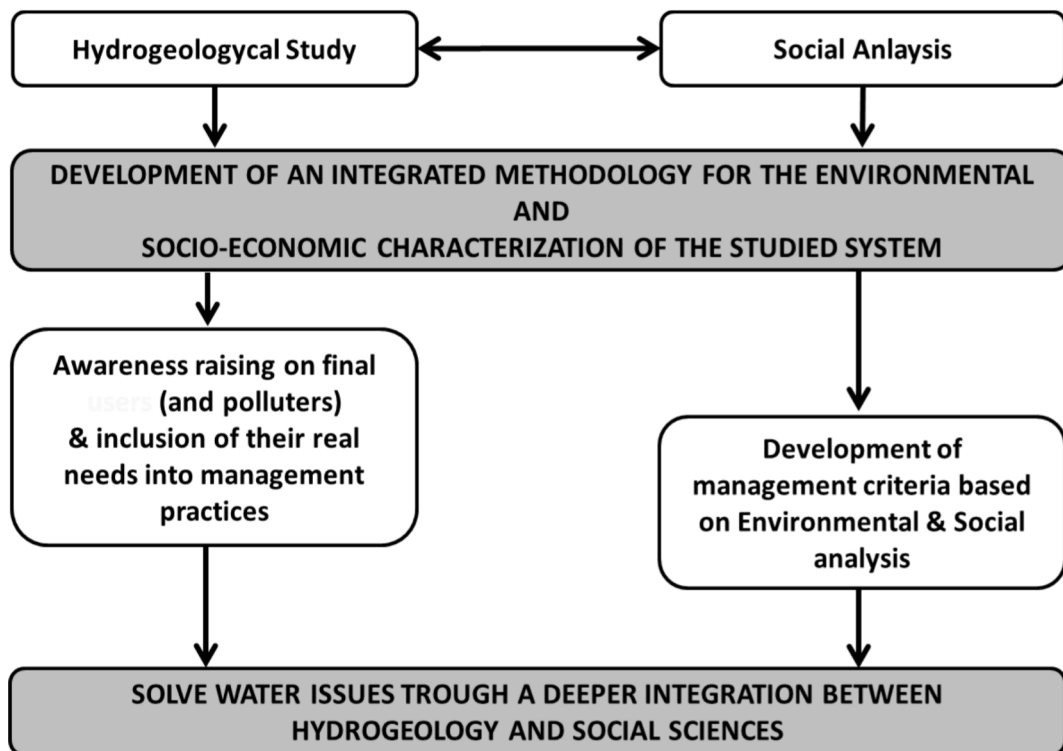


Fig. 1 - Conceptual scheme of the Bir Al-Nas approach..