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Current Opinion in Environmental Sustainability

The DIALAQ project on sustainable groundwater management: a transdisciplinary and transcultural approach to participatory foresight

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In the past decades, groundwater over-exploitation has increased the vulnerability of users, social inequalities and environmental degradation. In this context, the DIALAQ project aimed to experiment and disseminate a participatory approach intended to strengthen stakeholders' capacity to implement more sustainable agricultural and groundwater management. DIALAQ's network encompasses 8 regions in 4 countries (India, Morocco, France and the United States) including groups of farmers, administration's representatives, NGOs, elected representatives and researchers from several disciplines. A seed funding enabled cooperation between academics and non-academic partners that led to the consolidation of the network and enabled the design of the project. Firstly, a focused review of literature on participatory foresight exercises in the field of groundwater management is presented. Secondly, the challenges and pathways taken in designing the research is described. This process resulted in a common methodological and ethical framework presented in conclusion.

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Current Opinion in Environmental Sustainability 2016, **20**:56–60

This review comes from a themed issue on **Transformations and co-design**

Edited by **Susanne C Moser**

http://dx.doi.org/10.1016/j.cosust.2016.06.002

Introduction

In the past decades, groundwater over-exploitation has increased the vulnerability of users, social inequalities and environmental degradation. The DIALAQ[1] research project was designed to address these challenges. This project aims to experiment and disseminate participatory approaches intended to strengthen stakeholders' capacity to envision, plan and implement more sustainable and integrated agricultural and groundwater management strategies. DIALAQ is based on the hypothesis that scenarios are intermediary objects that can help, through participatory processes, to (1) bridge the gaps between the knowledge needed, produced and put in practice by scientists and stakeholders and (2) foster transformation to sustainability. The aim of DIALAQ was to implement foresight approaches in four countries (India, Morocco, France and the United States). Within this international project, we assumed that the diversity of cases and a transversal approach at an international level may help create knowledge on the use and abuse of groundwater, its impacts and the possible transformative changes in governance and practices. The project involved building communication between different cases where groundwater resources were overused (or at significant risk of overuse) to learn from this diversity. This kind of project usually faces two challenges: (1) to engage academic and non-academic partners and (2) to implement comparable approaches in different countries with contrasting situations in terms of legal frameworks, policies, types of agriculture and practices of future studies. Indeed, the main challenge related to transcultural approaches of envisioning possible futures. This paper focuses on the co-design phase of a joint research project. Firstly, we present a focused review of the literature on participatory foresight exercises in the field of groundwater management. Secondly, we describe the challenges (especially taking into account the diversity of actors within our network) and the choice made in project design. The co-design of the research involved consolidating the research network, selecting sites for project implementation and co-designing the objectives and activities. Cooperation between academic and non-academic partners led to the choice of a common methodological and ethical framework that we present in the concluding section.

[1] DIALogic exploration of futures and pathways for sustainable farming on overexploited AQuifers.

Participatory foresight for sustainable groundwater management

The challenge of groundwater governance

Groundwater is an invisible resource of critical concern. In the past 40 years, the 'pump revolution' has played a key role in the development of agriculture, providing economic development to rural communities [1–3]. Yet, groundwater resources are increasingly overexploited [1] and depleted [4]. This is accentuated by climate change because in many areas irrigation requirements are projected to increase while rainfall may decrease [5,6]. In many regions of the world, groundwater overuse has already led to a collapse of local economies, and caused or worsened social and ecological crises [4,7]. As groundwater tables decline, access to groundwater is increasingly skewed towards wealthy users, generating accentuated inequalities [8•]. Moving from this situation to a more sustainable one calls for transformative adaptations of technical, socio-economic and institutional types. Governance of groundwater is of increasing concern globally [9,10]. However, within the fields of research dedicated to groundwater issues, interdisciplinary projects are rare [11] and there has been limited social research in the broad arena of groundwater management [12] and limited communication between social research 'traditions' [13]. Notable works have been undertaken in economics, building on Ostrom [14]. These studies mainly assessed the individual, fragmented and diffuse use of groundwater and groundwater users' strategies that are often considered to focus on short-term profits [15]. Other studies discussed possible modes of regulation of groundwater [9,16] and the equity related issues [17]. Socio-economic and anthropological approaches also described the vulnerability of farmers [18], the connections between the intensive use of groundwater and poverty [19], farmers' knowledge and social status provided by groundwater access [20], groundwater related policy implementation [21] and farmer's resistance to these policies [22]. These studies unveiled the inequalities related to the access and use of this invisible resource [8•,20]. They showed the conflicts and contradictions between multiple interests, values and attachments. Actors of agricultural territories are ambivalent towards groundwater because it may become a resource for economic development and 'liberation' but it may also lead to possible 'trap' that towards more inequity and more poverty [23].

Dialogic democracy and future studies to improve groundwater management

There is recognition today that groundwater over-exploitation urgently needs to be curtailed but there is little consensus on how best this can be achieved [24]. In many cases, the most promising solutions may lie outside the groundwater sector and within a broader approach to resource systems [3,24]. The participation of local actors in the development of adaptive management to climate change is considered by some authors as a cornerstone to its success [13]. Designing and implementing participatory processes are proposed with reference to the dialogic democracy model [25] and to the framework of future studies [26]. Within dialogic democracy, collective decision-making emerges through a deliberative process which favours the collective exploration of identities and problems [25]. Only such collaborative research is found to enable the exploration of multidimensional uncertainties [25]. This can be referred to as post-normal science [27]. The different purposes and effects of participatory dialogic settings for water issues have long been debated [28]. Experiences that have taken place to date show that it is possible to implement participation with a variety of approaches ranging from modelling to methods based on arts and creative activities [29]. More specifically, transdisciplinarity has been implemented in the groundwater field [30]. Moreover, the crossover between future studies and environmental research has proven effective in understanding long-term environmental dynamics, and offers frameworks to make explicit the choices available to address wicked environmental problems [26]. Recent studies have illustrated how participatory foresight approaches can be used to explore possible innovative water management practices, including radical paradigm changes [31•,32,33•]. However these studies report difficulties in involving economic actors and stakeholders in discussions related to changes that may occur, with a certain degree of uncertainty, in the long (2030) or very long term (2050–2100) [31•,33•]. Planning is common in public policies at the national and state level and involves the definition of future 'visions' about agriculture. Yet in most countries these studies are carried out by policy makers at the highest level of government, and participatory foresight approaches are unusual (in India for example [34]).

Designing the research: challenges and pathways

Consolidating the network: connection of innovative people

DIALAQ enrolled academics and non-academics from four continents. It relied on farmers' organizations and ongoing partnerships between researchers and stakeholders to consolidate the project network. Connection between countries was initially made through the academic partners bringing together a wide range of skills in the social sciences (anthropology, economics, geography, sociology) and bio-physical sciences (agronomy, ecology, engineering, hydro-geology). The project was then introduced to stakeholders (NGOs, public administrations, municipalities and farmers organizations) already engaged in previous projects and with whom trust had already been established. Such choice was made, first, because enrolling non-academic partners is a challenge. They may consider that adaptation to groundwater overuse is not an urgent issue as compared to more serious problems such as labour availability or volatility of markets for farmers. The selected sites for DIALAQ were agricultural