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Investigating institutional arrangements in groundwater resources management in Iran

Rahimi Feyzabad^a, Fatemeh, Masoud Yazdanpanah^{b*} and Saeed Gholamrezai^c

a Department of Agriculture Extension and Education, Agricultural Sciences and Natural Resources University of Khuzestan, Mollasani, Iran.

b Department of Agriculture Extension and Education, Agricultural Sciences and Natural Resources University of Khuzestan, Mollasani, Iran, E-mail: masoudyazdan@gmail.com

c Department of Rural Development, Faculty of Agriculture, Lorestan University, Khorram Abad, Iran.

Abstract

Globally, there has been a dramatic increase in groundwater use in the past half-century, especially in arid and semi-arid countries. As one of the most arid countries in the world, Iran currently ranks among the top groundwater users globally – in fact, it is estimated that Iranians have already used most of their groundwater reserves. The continued unchecked use of groundwater resources may lead to serious problems, and if immediate action is not taken to address the issue, the situation could become disastrous in the near future. Sustainable groundwater resources management is therefore urgent and necessary in Iran. While there are several reasons for the underlying groundwater crisis in the country, a number of studies show that the groundwater crisis in Iran is an institutional crisis. In this regard, evidence revealed that countries around the world have different institutions at the forefront of groundwater resources management. These institutions supply guidelines for human conduct, while also providing distinctive opportunities for monitoring social behaviour and controlling resources through changes in the institutional environment, in order to shape the way individuals behave within social entities. Due to the importance of institutional arrangements in groundwater resources management, it is important to examine them in detail. The purpose of this research was therefore to identify the institutions involved in groundwater resources management and to examine the power and interest of each institution based on the Mendelow power and interest matrix. The study was conducted in the western part of Iran, specifically Lorestan Province. The data were collected through observation and interviews with the stakeholders involved (institutions) in groundwater management, and analyzed using a stakeholder analysis based on the interests and power held by the actors. The results indicate that there are many stakeholders (institutions) involved in decision-making processes related to groundwater resources management that all play a key role in groundwater management, and their decisions largely determine the success or failure of any groundwater-related policy. Among these institutions, water authorities are the most powerful institution in groundwater resources management, followed by agricultural and environmental authorities. The findings yield public policy for sustainable groundwater management in Iran.

Keywords: Groundwater Resources Management, Institutions, Iran, Mendelow Power and Interest Matrix, Stakeholder Analysis

^b Contact Address: Masoud Yazdanpanah, Agricultural Sciences and Natural Resources University of Khuzestan, Department of Agriculture Extension and Education, Mollasani county, 744581 Ahvaz, Iran, e-mail: masoudyazdan@gmail.com

Introduction

Groundwater is a crucial and an emergency water resource (Vrba & Salamat, 2007) that life and livelihood of millions people depend on them all over the world (De Loe et al., 2005; Boazar et al., 2019; Yazdanpanah et al., 2011) particularly in arid and semi-arid regions that groundwater is such a life-and-death issue in this regions (Shah, 2008). One of the most arid and semi-arid countries in the world is Iran (Azadi et al., 2019 a,b; Zobeidi et al., 2016). In Iran overexploitation of groundwater resources in recent years have caused a severe groundwater level decline in this country prohibiting further development of the aquifers (Aghazadeh & Mogaddam, 2011). Thus, it is estimated that the Iranians people have already used most of their groundwater reserves (Madani, 2014). Based on international reports (Mirnezami et al., 2018; Giordano, 2009), after India, the United States, Pakistan, and China Iran is the fifth-highest user of groundwater.

Agriculture and livestock are responsible for 92.2 % of the groundwater consumption in Iran compared to the 6.6% municipalities use and 1.2 % industrial use (FAO, 2016). So that over-abstractions of groundwater by farmers in Iran resulted severe disequilibrium of its water balance (Tizro et al., 2007). Because, use of groundwater resources by them, often was spontaneous (unplanned, uncontrolled, unregulated and unmanaged) and with no planning or control on the part of governmental authorities (Llamas & Martinez-Santos, 2005). The continued unchecked use of groundwater resources may lead to serious problems, and if immediate action is not taken to address the issue, the situation could become disastrous in the near future (Madani, 2014).

Part of the Iranian water crisis is due to the institutional crisis. Evidence revealed that all of the world have diverse institutions arrangement at the forefront of groundwater resources management (De Loe & Lukovich, 2004; Ivey et al., 2004). These institutions provide guidelines for human conduct, while also providing distinctive opportunities for monitoring social behavior and controlling resources through changes in the institutional environment, in order to shape the way individuals behave within social entities (Schneegg & Linke, 2015). In other hand, various institutional arrangements influence prospects for cooperation in collaborative decision-making processes (Behnken et al., 2016). Also, institutional arrangements can facilitate public support for source water protection when they provide for public awareness, but more importantly, when they provide opportunities for meaningful involvement in decision-making and implementation (Ivey et al., 2006). It can be used in a creative way to identifying, resolve and dealing with resource conflicts (Dietz et al., 2003; Varughese & Ostrom, 2001), because of, conflict management, rather than being based on well-defined institutions. So it can be stated, institutions distribute power among social groups (Andersson & Agrawal, 2011). Thus, due to the importance of institutional arrangements, isolating this component may a deeper and more contextualized understanding (Ivey et al., 2006). Due to the importance of institutional arrangements in groundwater resources management, it is important to examine them in detail.

Material and Methods

The purpose of this research was identify and categorization of the institutions involved in groundwater resources management (GRM) in the western part of Iran, specifically Lorestan Province. To this end, various stakeholders mapping techniques exist and the most used one is the power/interest matrix proposed by Mendelow (1981). Thus, this study examine the power and interest of each institution based on the Mendelow power and interest matrix. This analysis is intended to provide an optimal picture of the expected role of each stakeholder in GRM.

The data were collected through direct observation and semi-structure interviews with 34 stakeholders as 'key informants' involved (institutions) in GRM.

The identification and categorization of the stakeholders involved was done by means of two questions. In the first question, respondents were asked to indicate the institutions involved in GRM. These stakeholders were selected based on snowball sampling, beginning with obvious stakeholders and information was obtained from semi-structured interviews. In the second

question each stakeholder was identified by two key attributes: power and interest (figure 1). The 'key informants' were interviewed with a questionnaire consisting of two closed-ended questions. This two questions for measurement of power and interest were scored on a 1–5 point scale (very low, low, moderate, high, and very high). Thus, the final list of stakeholders was established based on the individual assessment of the two attributes.

Results and Discussion

Descriptive analysis of the data revealed that the age of the participants ranged from 29 to 58 years, with a mean of 41.09 years (S.D.= 7.13). The sample consisted of 28 male (82.4%) and 6 female (17.6%). Results of two basic questions show that the key stakeholders involved in the GRM in Iran spanned the state and non-state sectors (private) that including:

1. Local institutes in rural area: The locally key stakeholders involved in GRM including the Rural Councils, Rural Municipality and Water Users' Associations (WUAs). This institutions have central role in the implementation and monitoring of the GRM plans.

2. Government sector: The most of this stakeholders including Ministry of Energy, Regional Water Company, Organization of Agriculture, Water and Wastewater Company, Rural Water and Wastewater Company, Department of Environment, Rural Cooperative Organizations, Geological Survey & Mineral Exploration, Parliament, Judicial system, Governors, Police, Electricity Distribution Company and Higher Education Institutes. This stakeholders based on their mission have three function including law and policy making, executive and supervisory (Yazdanpanah & Feyzabad, 2017).

3. Private sector: Other stakeholders activate in GRM were the Private Corporations and Non-Government Organizations (NGOs). This institutions including Well Drilling Companies, Irrigation Networks Companies and Pumping Stations and Sellers and Suppliers of Pumping and Irrigation Equipment. Unfortunately, in some cases, Well Drilling Companies have been digging unauthorized wells. Also, despite the important role of NGOs in GRM, due to the political problems, there is no active specialized NGOs in this era. Among these institutions, the Regional Water Company is the most powerful institution in GRM, followed by Agriculture Organization.

Conclusions and Outlook

The results indicate that there are many institutions involved in planning and implementation processes related to GRM that some of them have play a key role in groundwater management, and their properly roles largely determine the success or failure of any groundwater-related policy. Unfortunately despite of many kind of institutions in era, the cross sectional incoordination and lack of collaboration between them lead to inefficiency in GRM. Thus, it is essential to consider how participation and collaboration between institutions in groundwater management. Also, appropriate laws and policies need to be formulated to make effective institutional arrangement.

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