Agricultural Water Management 191 (2017) 207–217

Contents lists available at ScienceDirect

Agricultural Water Management

journal homepage: www.elsevier.com/locate/agwat

Research paper

Prosper, survive or exit: Contrasted fortunes of farmers in the groundwater economy in the Saiss plain (Morocco)

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ARTICLE INFO

Article history:
Received 5 January 2017
Received in revised form 16 May 2017
Accepted 19 June 2017
Available online 3 July 2017

Keywords:
Groundwater overexploitation
Socioeconomic differentiation
Inequalities
Capital
Farmers
Morocco

ABSTRACT

In North Africa, the development of groundwater-based irrigation enabled agricultural intensification and market-oriented production. Groundwater use was also often said to alleviate smallholder poverty. However, there is growing evidence linking the expansion of groundwater-based agriculture with increasing socioeconomic inequalities in a context of declining water tables and rapid agrarian change. This paper analyzes the contrasted fortunes of different categories of farmers participating in the groundwater economy, depending on access to other resources including land, capital and labor. The study was conducted in a 3910 ha area in the Saiss plain (Morocco), where rapid agrarian transformations took place with the arrival of investors attracted by state subsidies and the possibility to carry out intensive groundwater-based agriculture. The study began with interviews with key informants to determine the role of groundwater use in farm trajectories. Then, an inventory was undertaken of all farms and of all wells and tube-wells in the study area. Next, the groundwater use per farm type was determined on a sample of 24 farms. Finally, the socioeconomic differentiation of farms was determined, based on the inequalities in access to groundwater, land, labor and financial capital. The results revealed contrasted fortunes of farmers involved in the groundwater economy. The boom in the groundwater economy benefitted entrepreneurial and well-endowed farmers who made intensive use of groundwater, while the effects of their overexploitation of groundwater fed the marginalization of family farmers. The results show that capital has replaced landownership as the dominant production factor, thereby re-qualifying what is a 'small' farmer. Capital is not only required to obtain access to groundwater, but also to deal with the more risky agriculture frequently conducted in the groundwater economy. This leads to the exclusion of small family farmers who may quit the groundwater economy poorer than they entered it. The urgent need to control access to and use of groundwater in the face of declining water tables has little chance of producing results if socioeconomic inequalities remain unaddressed.

1. Introduction

Water is crucial to thelivelihoods of nearly one billion rural poor engaged in irrigated agriculture worldwide, as it is one of the most important keys to alleviating poverty and enhancing growth (Blanco-Gutiérrez et al., 2011; De Fraiture and Giordano, 2014; Gebregziabher et al., 2009; Giordano and de Fraiture, 2014; Hanjra et al., 2009a; Namara et al., 2010). In many semi-arid and arid areas, groundwater-based irrigation represents the most secure and reliable access to irrigation and has enabled the intensification of existing farming systems and the introduction of high-value crops (Shah et al., 2003; Zhang et al., 2014). The groundwater economy has attracted many different social categories of farmers seeking to improve their income, a social transition, or are simply struggling to sustain their livelihoods (Mukherji, 2006; Shah, 2010). In South Asia, poor and marginal farmers are well "*represented in terms of ownership of groundwater assets*", while many others gained access to groundwater through indirect informal mechanisms, such as water markets (Mukherji and Shah, 2005). On the contrary, in other countries like Spain, groundwater has served "*mostly to grow high-value export-oriented crops*" (Mukherji and Shah, 2005).

While groundwater was often viewed as a socioeconomic "good" and a source of "well-fare" in many parts of the world, intensive groundwater use can also be a socioeconomic "bad" leading to "ill-fare" through depletion of aquifers, especially when the richer farmers who grab the resource out-pump the poor farmers who

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http://dx.doi.org/10.1016/j.agwat.2017.06.014
0378-3774/

are unable to deepen their tube-wells (Hoogesteger and Wester, 2015). For instance, in a semi-arid region in Algeria, Amichi et al. (2012) explored how inequalities in access to depleting groundwater contributed to socioeconomic differentiation of farms. The study showed that the majority of farmers with no access to groundwater remained trapped in poverty, while more recently installed wealthier investors with more social power drove a land concentration process. Individual access and the absence of control of groundwater use has frequently depleted aquifers and resulted in blatant inequalities (Llamas and Martínez-Santos, 2005; Srinivasan and Kulkarni, 2014). In such situations, groundwater depletion may become a driver of chronic poverty, and farmers lose their potential exit route and the mechanism required to escape poverty, which "*would therefore have a significant adverse impact on income levels*" (Shah, 2010).

In the recent past, there has been renewed interest in the question of how to address poverty reduction through irrigation development (Namara et al., 2010; Shah and Singh, 2004). The creation of wealth often does not alleviate poverty in irrigation areas, and additional policy interventions are required to minimize the differential distribution of social and economic benefits across farmers (Bhattarai et al., 2001; Jayaraman and Lanjouw, 1999). Indeed, it would be naïve to think that rural poverty could be tackled only by improving access to groundwater by the poor, when poverty is one outcome of complex interactions between access to water and other resources like land, capital, and credit; social and cultural relations; and depends on institutions and policies (Hussain and Hanjra, 2004). Although irrigation helps reduce poverty, smallholders often remain poor because their land holdings small, they have large families, are highly dependent on agriculture, have poor access to infrastructure and markets, and limited opportunities to improve their living standards (Hanjra et al., 2009b). State investment to enhance agricultural economic growth can help alleviate poverty. However, when inequality, which undermines social cohesion, is prevalent, poverty is transmitted across generations (Green, 2012). These continued inequalities may constrain the scope for further poverty reduction from economic growth, and jeopardize the impact of policy interventions (Jayaraman and Lanjouw, 1999). Moreover, the focus on global economic growth to achieve sustainable poverty alleviation often leads to neglecting current socioeconomic inequalities, which in turn, are the fundamental causes of the reproduction of poverty (Cling et al., 2004). The sustainability issue crops up anew when escaping poverty is at the cost of unrestricted access to groundwater (Suresh and Raju, 2014). Dealing with situations of declining water tables in the face of atomistic groundwater use by different categories of farmers is not easy. Shah et al. (2008), for instance, showed how in Gujarat, some marginal farmers lost their access on water markets due to the reduction in the supply of energy, as the government was looking for ways to manage groundwater demand and improve agricultural water management. Falling water tables may, therefore, frustrate poverty alleviation (Kemper, 2004).

In regions that depend on groundwater based irrigation, some farmers have managed to escape from what is called "old poverty", which was related to limited access to productive resources and subsistence farming (Rigg, 2006). However, success has been shared disproportionately, as farmers with more financial ability to access groundwater increased their farm income, whereas smallholders with limited financial capacity were more often left behind (Adams and He, 1995; Harriss-White and Janakrajan, 1997; Wang et al., 2015). Farming systems with the highest potential to generate incomes are also those with the highest barriers to entry, which remain generally concentrated in the hands of well-endowed farmers who have the capital to engage with high-value and market-oriented agriculture (Rigg, 2006). The economic euphoria made possible by groundwater use was thus often reserved for medium and large-scale farmers, confirming the role of the financial capital in the process of producing inequality (Piketty, 2013). In many cases, intensive groundwater use accelerated socioeconomic differentiation among farmers (Amichi et al., 2012; Prakash, 2005). This was sometimes compounded when large-scale farmers' powerful lobbies succeeded in capturing most financial support provided by the state (Namara et al., 2010). It is not surprising that increasing socioeconomic differentiation is often linked to inequality in the distribution of productive resources (Bhattarai et al., 2001; Prakash, 2005). As pointed out by Kuper et al. (2012), private groundwater use has limited redistributive capacity. Moreover, if no financial capital is available to make use of the water, having access to groundwater does not automatically produce wealth. When access to groundwater is physically possible, but does not fulfill its potential due to lower water productivity or the inability of farmers to make the required infrastructural investments and bear the costs of intensive agriculture, this is referred to as economic water scarcity (Namara et al., 2010). These farmers are often obliged to sell or lease their lands to wealthier actors in order to gain access to groundwater, in reverse-tenancy configurations, thereby losing their power of decision over their own land as well as their income from it (Colin, 2013).

This article analyzes the process of socioeconomic differentiation of different categories of farmers who engaged in the groundwater economy. The objective is to understand how access to groundwater changed the pathways of different types of farms depending on access to other resources like land, capital and labor. The article shows how certain social categories of farmers gained considerably through their access to groundwater, while others barely survived or even had to quit with 'immiserizing' effects, i.e., they were worse off than they were before entering the groundwater economy (see Shah, 2010) in a context of declining water tables and volatile agricultural markets. To investigate the dual nature of the groundwater economy, inclusive for some and excluding for others, a case study was undertaken in the Saiss plain in Morocco, where groundwater use started in the 1980s and where the real boom began in the 2000s. Different categories of farmers co-exist, often competing but also cooperating in their access to different production factors. The rapid development of irrigated high value crops was catalyzed by an intensive entrepreneurial model, largely implemented by newcomers (investors and lessees) in agriculture, who were often attracted by state subsidies. The existing small family farms, mostly former members of agrarian reform cooperatives who benefited from land reforms 25 years ago, developed strategies to obtain access to groundwater and capital to adapt to droughts, declining water tables and the volatility of market prices. This article highlights the process of land concentration by investors, the current mining of land and water by lessees, who amass resources to obtain wealth, and the way former cooperative members who escaped 'old' poverty when they obtained access to land and farm machinery through agrarian reforms, got trapped in 'new' poverty, which appears to be a by-product of collapsing agricultural prices and groundwater depletion.

2. Methodology

2.1. The study area

The case study was carried out in a 3910 ha area of the Saiss plain in Morocco, 20 km to the southeast of the imperial city of Meknes (Fig. 1).

Average rainfall in the Saiss plain is 500 mm/year, enabling rainfed cultivation of cereals and forage crops over extensive areas. Cattle raised for milk and meat exert little pressure on ground-