



Research article

Financial incentives: Possible options for sustainable rangeland management?



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ABSTRACT

Large-scale mismanagement of natural resources emanating from lack of appropriate policies and regulatory framework is arguably one of the reasons that led to resource degradation and poor livelihoods in many countries in the Middle East and North Africa (MENA) region. Sustainable rangeland management practices (SRMPs) are considered to be a solution to feed shortages and rangeland degradation. However, the scope for SRMP adoption, has been a subject of debate. Using a case study from Syria and the application of the Minimum Data Analysis method (TOA-MD), this paper provides empirical evidence for ensuring wider adoption of SRMP. The paper argues that the introduction of financial incentives in the form of payments for agricultural-environmental services can increase the economic viability and enhance the adoption of SRMPs and is a better alternative to the unsustainable state subsidies for fodder purchases and barley cultivation on rangelands. Model results indicate that further investment in re-search toward generating low cost technologies and tailored governance strategies including a financial incentive system would lead to better management of rangelands and improve livelihoods in the Syrian *Badia*. These findings are valuable for policy makers, donors as well as development and extension practitioners in the MENA region as they can better inform future courses of actions.

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1. Introduction

Rangelands cover more than 40% of the earth's surface and two-thirds of the global dryland area (UNCCD et al., 2009). Rangelands are both the primary sources of food and feed for livestock production and of fuel-wood and medicinal herbs for millions of resource-poor pastoral and agro-pastoral communities (Louhaichi et al., 2009). Rangelands also provide an important habitat for diverse plant and animal species (Trumper et al., 2008).

An over-riding feature of rangeland is their low, but highly variable, precipitation. In the face of growing animal and human population pressure, poor management practices, and climate change, the ecological health of rangelands is in a precarious condition (Han et al., 2008). The increased competition between cereal production and grazing in low rainfall areas is a further threat to the

traditional nomadic system of drought management and contributes to the degradation of rangelands (Hazell et al., 2001). Thomas (2008) defines rangeland degradation as long-term loss of ecosystem function and productive capacity of rangelands, which manifests in the reduction of and damage to biophysical, social, cultural, or economic features (Thomas, 2008).

To encourage domestic production of livestock, many governments in the dry areas provide highly subsidized forage to livestock owners. However, these subsidies encourage overstocking and over grazing and thus are indirectly financing desertification by reducing herders' incentives to adapt herd sizes to forage availability and by encouraging other unsustainable land use practices such as barley cultivation (Baas et al., 2000; Hazell et al., 2001). Other institutional and management approaches aimed at addressing rangeland degradation have been tested in the dry areas of MENA but their adoption has been limited – adding to the frustrations of governments and development agencies alike (Dutilly-Diane et al., 2007).

Over the years, payments for environmental services (PES) and

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voluntary agri-environmental schemes have gained momentum as effective instruments to provide incentives for sustainable management of ecosystems. Due to their exorbitant costs often related to high transaction costs (Dunn, 2010), PES agri-environment schemes frequently emerge as options for high-income countries only (Donald et al., 2006; Primdahl et al., 2010). However, the adoption of PES has begun to increase in many developing countries in recent years (e.g. Dunn, 2010; Fripp, 2014; Codato, 2015). When compared to the costly state subsidies for fodder in the MENA region, PES are becoming a more realistic management alternative. There is now a strong case in favor of replacing state subsidies with agri-environmental schemes that serve the dual purposes of providing more fodder and enhancing the sustainable management of rangelands (Woertz, 2013).

Using a case study from Syria and the Minimum Data Analysis method (TOA-MD) support this emerging trend and provides empirical evidence regarding incentive payments and the optimal amount needed to ensure different adoption levels of SRMP. This paper thus supports policy and donor decisions that aim at enhancing the sustainable management of rangelands. The results of this study will also be useful for development and extension practitioners in guiding and increasing the efficacy of future interventions for sustainable rangeland management in the dry areas of the world in general and the MENA region in particular.

2. Description of rangeland management practices in the study area

2.1. Description of the study area

The case study was conducted in the lowlands of the Syrian *Badia* (an Arabic term for steppe), (34°28'45"N and 38°35'00"E). The Syrian Ministry of Agriculture and Agrarian Reform (MAAR) defines the *Badia* (zone 5) as the driest agricultural zone in Syria – with a Mediterranean arid climate, exhibiting highly variable and extreme low precipitation and temperature patterns. Average long-term annual precipitation is approximately 180 mm, with average, minimum and maximum annual temperatures of 17.6 °C, 2.4 °C and 39 °C respectively. The *Badia* comprises of 10.2 million ha (55% of the country's total area of 18.5 million ha) and is the most degraded ecosystem in Syria.

The Syrian *Badia* is residence for more than one million nomadic and transhumant *Bedouins*. Population density stands at about 0.1 persons per ha. Eighty-eight per cent of the active workforce in the *Badia* engages in herding. However, about one third of the households have small herds leaving the pastoralists largely underemployed. The *Badia* inhabitants have very limited off-farm employment opportunities, which leads to impoverished livelihoods. Nonetheless, the pastoral communities in Syria are important because they are virtually self-sufficient in terms of daily food and they supply the urban areas with a great part of their animal products (Masri, 2006). The rangelands carry approximately 12 million animals (about 10 million sheep, 1.7 million goats and 27 thousand camels) that provide about 15 percent of the nutritional requirements for sheep in Syria in a "normal" rainfall year (Vercueil, 2003). Livestock rearing is the main economic activity in the Syrian *Badia*, making it the largest farming system (by size) in the country (Wattenbach, 2006). Barley grain supplement is used for a period of about 90 days during winter. During the summer, the animals from the *Badia* migrate to graze on agricultural residues after harvest in the higher rainfall zones in the west of the country where wheat, barley and cotton are grown.

From the legal point of view, the *Badia* is state-owned land. It is characterized by hilly, infertile lowlands that harvest scarce rain-water and accumulate soil and nutrient deposits throughout the

soil profile. Water is the main limiting factor for both crop and livestock production. Ground water tables are typically very deep (over 150 m) thus making the use of ground water for agriculture and land management technically and economically infeasible. Earth dams and water ponds are the only means of trapping and holding water from seasonal rainfall and streams in the area, and a number of dams and water harvesting structures have been constructed since 1997 (IFAD, 2012).

2.2. Management of the Syrian *Badia*

Bedouins cultivate barley in the *Badia* lowlands because of their fertile soils and high soil moisture levels. Unlike the practice in more favorable areas, however, barley is cultivated in the *Badia* lowlands every year without crop rotation (Sadiddin and Atiya, 2009). Barley is grown as a multipurpose crop that can be harvested as a grain or straw, and grazed as stubble post-harvest (Thomson, 1985). During drought years, or when crops do not achieve complete maturity, barley is also grazed during the green or mature stage. During wet seasons, barley is grazed before harvesting and also used for human consumption and malting (Mustafa et al., 2006). Land preparation for barley cultivation is done using poly-disk plows which remove perennial and annual vegetation and so stimulates wind and water erosions, depletes the remaining soil seed stock, and uplifts the "dead soil" containing sterile carbonates. The result is a crusted soil that prevents water infiltration and promotes further land degradation (Gintzburger et al., 2006).

A further negative side effect of barley cultivation is that herders become tied to one location during cultivation and harvesting, with livestock feeding effectively tethered to cereal stubble during summer grazing (Louhaichi and Tastad, 2010). Such reduction and containment of traditional nomadic herding practices of the *Bedouin* leads to concentrated rangeland degradation and, in sum, indicates that the extensive and increasing cultivation of barley in the steppe (Sanlaville, 2000) is an important aspect of the mismanagement of the Syrian *Badia*.

As a measure of combating rangeland degradation, the Syrian Government has banned barley cultivation in the *Badia* since 1995 – a measure that is unique throughout the MENA region. The government had to deal with the tradeoffs between the two competing objectives of supporting extensive livestock production in order to meet the ever-increasing demand for red meat and controlling livestock production because of rangeland degradation. Banning barley cultivation in the *Badia* was a measure that recognized the damaging effects of cereal cultivation on the highly fragile soils and natural vegetation in these environments (Edward-Jones, 2003). However, a more holistic concept of rangeland management and rangeland governance was missing and, due to the absence of viable alternatives for livestock feeding, *Bedouins* still illegally cultivate barley, especially in the lowlands.

Recognizing the need to rehabilitate the severely degraded rangelands and re-establish fodder production, the government initiated the *Badia* Rangelands Development Project (BRDP). This project restored about three million ha of the *Badia* rangelands (IFAD, 2010). The project provided all the needed inputs (e.g., seedlings, tractors, and irrigation) while the communities participated physically in implementing the project activities while being remunerated for their daily labor. This set-up gave the *Bedouins* a sense of ownership as they played a key role in a successful project.

2.2.1. Options for sustainable management of rangelands

Prior to project implementation, the common rangeland management practice was continuous grazing leading to low vegetative cover, dominance of invasive species and soil crusting. In this study,

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