Land Use Policy 79 (2018) 684–694

Contents lists available at ScienceDirect

Land Use Policy

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

Rethinking sustainable land management planning: Understanding the social and economic drivers of farmer decision-making in Africa

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ARTICLE INFO

Keywords:
Land degradation
Sustainable land management
Farmer decision-making
Tanzania
Malawi
Africa

ABSTRACT

Land degradation is a critical challenge to sustainable development. This paper examines factors that shape farmer decision-making around sustainable land management (SLM) practices in Tanzania and Malawi. It seeks to understand the contradictions that often exist between what research recommends, projects promote and donors invest in and what SLM options farmers actually choose to implement. It focuses on the costs, benefits and economic drivers that shape farmer's willingness and ability to invest in SLM (or that force them into situations that result in land degradation). The SLM techniques most commonly practiced, and which farmers express the greatest preference for, are often not those that yield the highest production gains, generate the greatest income, or involve the lowest costs. Meanwhile, other apparently profitable SLM techniques show relatively low rates of adoption. Farmers highlighted a wide range of non-monetary attributes and characteristics that determine whether they consider an SLM option to be economically attractive, viable and sustainable. These findings underscore the need to think beyond simple benefit/cost-based measures when prioritizing SLM interventions. Farmers' needs, aspirations and preferences extend far beyond efforts to maximize short-term income and production gains or to minimize direct outlays and cash expenditures. We also found that significant gaps often exist between the SLM decisions farmers would like to make and those that they are actually able to undertake, given their economic circumstances and the resources available to them. If these broader economic factors and drivers of farmers' land management decisions are not considered in SLM policy, research, planning and implementation, there is a risk that proposed interventions will do little either to address the root causes of land degradation or to meet farmers' needs and aspirations.

1. Introduction

Sustainable land management (SLM) policies, programs and projects have been implemented across Africa from the colonial era to the present. These efforts have often had little impact on land use. Land degradation has been, and still is, considered a major constraint to economic development. Alarmist statistics about impending or current disaster feature in much of the literature and Africa is considered particularly vulnerable: "[O]ver 75% of arable land in Africa is considered degraded' (Orchard et al., 2017, p. 46), "land degradation hotspots cover 51 and 41% of the terrestrial areas in Tanzania and Malawi, respectively" (Kirui, 2016, p. 609). Scholars have documented how many initiatives have been supported by poor or conflicting biophysical evidence of degradation and been shaped by pre-conceived notions of African farmers' and pastoralists' supposed lack of knowledge of 'improved' or 'sustainable' farming technologies and practices (Leach and Mearns, 1996; Jones, 1996; Peet and Watts, 1996; McCann, 1999; Crummey and Bassett, 2003). Underlying much of the literature on land degradation is the assumption that farmers persist in carrying out 'unsustainable' land management practices, for a variety of reasons – lack of technical knowhow, slow uptake of new technologies, failure to understand how their actions affect the landscape or short-term planning horizons, to name but a few. Not unlike the colonial era, "poor farming techniques continue to be cited today as the main causes of the erosion problem" (Mbaga-Semgalawe and Folmer, 2000, p. 321).

Thankfully, the paradigms and rhetoric driving SLM discourse have undergone something of a shift over recent decades. There is now a growing recognition that land degradation should not be seen solely as a result of technological or informational failures, but rather as being fundamentally social and economic in its causes and effects. So, solutions to the problem must also be social, economic and political and improved practices to manage land need to overcome the wide range of

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https://doi.org/10.1016/j.landusepol.2018.08.041
Received 15 February 2018; Received in revised form 28 August 2018; Accepted 28 August 2018

market, institutional and governance conditions that constrain farmer adoption (Alamirew, 2011; Barbier, 2000; Barungi and Maonga, 2011; Chirwa, 2008; Emerton, 2014a; Gebremedhin, 2004; Giordano, 2003; Knowler, 2001; Mascarenhas, 2000; Maro et al., 2013; Morey, 1986; Pender et al., 2006; Sauer and Tchale, 2006; Southgate, 1988; Stocking and Murnaghan, 2001; Tenge et al., 2011; von Braun et al., 2013; WOCAT, 2016; Yirga and Hassan, 2010).

Regrettably, many of the research frameworks used to design, inform and analyse land management interventions have been slower to take this broader perspective on board. There remains a marked lack of multidisciplinary, multidimensional analysis, and conventional biophysical and socioeconomic survey techniques often are ill-equipped to uncover the complexities of farmers decision-making. There is still an over-reliance on (and over-confidence in) the generation of 'hard' numbers and data, which describe and classify the effects of land degradation and the characteristics of the farmers that suffer it, but do little to explain the reasons why it occurs in the first place (Bojö, 1996; Emerton et al., 2016; Nakhumwa and Hassan, 2012; Tenge et al., 2011). Land degradation research (and the solutions it points to) still tends to be oriented towards promoting the most physically 'efficient' and 'productive' farming techniques and technologies. Meanwhile, received economic wisdom tells us that as long as these options are more profitable or less costly than (unsustainable) land-use alternatives, they will be taken up by farmers (Barungi and Maonga, 2011; Lovo, 2016; Mangisoni, 2009; Mazvimavi, 2011).

Conceptions of 'profitability', in particular, continue to be problematic and to embody a one-dimensional view of what is 'best' for farmers and the land they cultivate. However great the benefits of SLM actions or costs of land degradation now or in the future are demonstrated to be in theory, this has little meaning unless it translates into real changes in the economic conditions and opportunities that farmers face as they go about their day-to-day business. Experiences from numerous projects suggest that the main problem to overcome in SLM projects is not that the overall gains from SLM are unrecognised, but rather the absence of incentives for farmers to adopt (Jones, 1999; Jones, 2009; Kaggwa et al., 2009; Pandey, 2006).

Researchers' and planners' perceptions of SLM costs and benefits at the farm-level remain narrowly defined, limited in focus and overly oriented towards market values. Perhaps most seriously, SLM projects and interventions have often failed to address the economic factors underlying land degradation as they affect farmers (Bojö, 1996) and have not resulted in solutions that are economically viable, equitable and sustainable for land managers (Giordano, 2003; Pretty and Shah, 1997). Incorporating the wider economic context in land degradation research is crucial for understanding farmers' decision-making and their willingness and ability to invest in SLM. Also critically lacking are more nuanced understandings of how farmers themselves view, define and value land management costs, benefits and economic impacts. Recent work has attempted to include a wider set of factors in analysing decision-making and adoption (Jones, 2002; de Graaff et al., 2008; Assefa and Hans-Rudolf, 2016; Nigussie et al., 2017; Tenge et al., 2011; Tran et al., 2018). There has however often been a tendency to focus solely on one aspect or influence of farmer decision-making (for example poverty, gender, age, access to credit, tenurial status, perceptions of risk, and so on). This approach misses the point that farmers operate in complex environments, and must weigh up multiple factors and considerations when they make land management decisions. The wide variation between different farmers' conditions, needs and aspirations in relation to SLM is often underemphasised. In turn, SLM interventions need to be designed (and their success evaluated) in response to these multifaceted and differentiated conditions. Tenge et al (2011) suggest as much for a site in Lushoto, Tanzania and highlight farmers' desires to achieve multiple benefits for any intervention adopted. In this paper, we attempt to shine some light on what shapes farmer decision-making and to describe a more holistic perspective for identifying, assessing and informing SLM design options.

2. Materials and methods

2.1. Study sites

This research investigated the obstacles to and opportunities for increasing the adoption of SLM practices[1]. It examined the multiplicity of economic factors that interact to shape farmers' willingness and ability to invest in SLM (or, conversely, encourage or even force them into situations which result in land degradation), and which, ultimately, determine how the success of SLM should be judged in economic terms. Research took place in eight villages in Tanzania and Malawi, chosen because they are perceived nationally to be areas of high land degradation: Malindi, Mwangoi, Sunga and Tema in Lushoto District, Tanzania and Gwauya, Kapulula, Malaswa and Mpulula in Ntcheu District, Malawi (Fig. 1). Farmers in both study sites employ a mix of SLM approaches that include those introduced by external projects and those that they have been using for generations. Lushoto in particular has had a long history of initiatives, starting in the colonial era, to address land degradation (Feierman, 1990; Tenge et al., 2004; Wickama et al., 2014a) and continuing up to today (Mowo et al., 2006; Wickama et al., 2004).)

Lushoto has a steep and rugged topography (Peterson et al., 2014) and highland areas above 1,000 m cover about 75% of the district (Lushoto District Council, 2016). Slopes of 45–55% are frequent (Lyamchai et al., 2011) and in many cases the land gradient goes up to 60% or more (Tenge et al., 2007). Annual rainfall varies between 900 and 1,300 mm, depending on the agro-ecological zone (Sijmons et al., 2013) and is divided into two distinct seasons. In 2012, the average population density of Lushoto was 120 persons per km^2 (NBS, 2013). Here, the prevalent SLM options include terracing, grass strips, tree planting, contour planting, mulching, crop residue incorporation and applying manure.

Ntcheu is located in the south-west of Malawi. It has a single rainy season that runs from December to April and annual rainfall ranges between 600-1,200 mm (Economic Planning Division, 2009). In 2008, population density and growth rates in Ntcheu were 138 persons/km2 and 2.5 percent respectively (NSO, 2009). More than 80 percent of the population engage in agriculture as their main occupation (Mkandawire, 2010; NSO, 2012). SLM options practiced and promoted include crop residue incorporation, leaving trees on farm, burying weeds, contour ridges, box ridges, applying green manure, crop rotation, applying livestock manure, and planting on the contour.

In Lushoto, high agricultural potential and a dense and rapidly increasing human population, coupled with limitations on the availability of cultivable land, have resulted in severe land pressure. Land scarcity is escalating, plot sizes are decreasing and smallholder farming has for some time been undergoing a re-orientation towards high value horticultural crop production. Farms have also been expanding into progressively more fragile areas. Beginning with the introduction of commercial crops in the last century (Wickama et al., 2014a), there has been significant encroachment into forests and protected areas and cultivation has spread along fragile riverbanks (Onyango et al., 2012). Erosion is evident, with average rates of topsoil loss on arable land currently recorded to be between 0.6–1 cm a year (Kaswamila, 2013). Soil fertility is also a major concern (Mowo et al., 2006): 90 percent of soils have been found to be deficient in phosphorous and 73 percent inadequate in nitrogen (Ndakidemi and Semoka, 2006).

Low land productivity remains a major issue in Ntcheu District and indeed throughout Malawi, a problem that is intensifying in the face of

[1] This paper uses the definition of SLM given by FAO/TerrAfrica, as: "the adoption of land use systems that, through appropriate management practices, enables land users to maximize the economic and social benefits from the land while maintaining or enhancing the ecological support functions of the land resources" (FAO, 2007).