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Environmental Development

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

Drivers and barriers towards sustainable water and land management in the Olifants-Doorn Water Management Area, South Africa

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ARTICLE INFO

Keywords:

Ecosystem services
Water governance and management
South Africa
Olifants-Doorn Water Management Area

ABSTRACT

Over the last 17 years South Africa's water and land resources management has changed dramatically. This rapid evolution has been accompanied by a growing number of laws and policies to co-balance water allocation for human basic needs and ecosystem integrity. Most often, new ideas and innovative concepts constitute new challenges towards their implementation. This paper examines drivers and barriers towards more sustainable and integrated governance and management practices from the perspective of ecosystem services in the Olifants-Doorn Water Management Area (WMA). Results obtained from a literature search and qualitative interviews indicate that the environmental awareness of stakeholders about their natural resources and related ecosystem services increased over the last years. Furthermore, we observed that the establishment of new polices became a key driver towards increased sustainability within the Olifants-Doorn WMA. Nonetheless, ensuring coherence between sectors and actors when considering natural resource governance remains a major challenge. For future sustainable developments, decentralized and localized management structures as well as the establishment of strong leadership should be emphasized in the Olifants-Doorn WMA. Further, sufficient water and land monitoring systems are necessary for decision makers, farmers and local water suppliers in order to maintain ecosystem services and their values for human well-being.

1. Introduction

Freshwater and land resource systems provide important ecosystem services to humanity and can be defined as *the conditions and processes through which natural ecosystems, and the species that make them up, sustain and fulfil human life* (Daily, 1997: p3). Often ecosystem services are claimed and modified by various actors (e.g., farmers, conservationists and municipalities), which in turn produce social and ecological trade-offs because the use of some services comes at the expense of others (Bennett et al., 2009). According to Poff et al. (2003) balancing complex and often conflicting demands over water and land resources among different actors and sectors is one of the key challenges of the 21st century. To achieve a balance between conflicting demands, resource managers and environmental decision makers must integrate and negotiate competing interests from a variety of

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stakeholders,¹ the environment included. In other words, integrated water and land management must be established to promote the coordinated development of water and land resources and related ecosystem services in such a way that socio-economic developments are assured without compromising the integrity of ecosystems (Lenton and Muller, 2009). In this paper, land management is linked to agriculture production systems such as the irrigation of crops or clearing of natural vegetation or alien invasive plants for agriculture cultivation. This means that land management for agricultural purposes should be done in such a way not to compromise future production of commodities, risks to land degradation should not increase and the quality of soil and water must be maintained for land systems to be economically feasible and socially acceptable (Bouma, 2002).

Given the mostly technocratic development trajectory of water resources (Meissner, 2015) and land management (Koning and Smaling, 2005), most management and governance systems do not provide the structural conditions necessary to implement integrated approaches without changing certain system characteristics. It is assumed that a transformation towards more sustainable practices requires (i) a shift towards participatory management and collaborative decision making, (ii) cross-sectoral cooperation and (iii) implementation of decentralized management approaches (cf. Pahl-Wostl, 2009). Although these characteristics are well known for their importance in the context of sustainable natural resources management, we strongly emphasize the relevance of further empirical investigations in order to indicate future directions of governance and management. In other words, case study research is necessary to deliver evidence-based findings including best practices as well as failed management approaches and interventions. This in turn provides the possibility for knowledge transfer to other regions of the world. In this article, water and land use management in the Olifants-Doorn Water Management Area (WMA) in South Africa is analysed. This is a typical case of a semi-arid river basin where the integrity of ecosystems is threatened by over-allocation of water resources and enduring land clearing for agriculture purposes. Prior to this research, it has been unclear if and how water and land management in the Olifants-Doorn WMA could be developed towards more sustainable and integrated practices. This knowledge gap is addressed by investigating the following research question: what are the key drivers and barriers affecting sustainable water and land management? Driving forces as well as barriers are often multiple and interacting factors such as political, biophysical, economical and societal determinants. Their causal linkages are often mediated by other factors (e.g., climate variability), thereby complicating statements of causality or attempts to establish the proportionality of various contributors (MA, 2005). A case in point is integrated water resources management in Botswana, where the country's Integrated Water Resources and Water Efficiency Plan states that poverty eradication and climate change are cross cutting issues. The Plan goes on to say that poverty eradication drives pro poor tourism and that climate change will have an impact on the country's tourism sector and opportunities in the sector (Department of Water Affairs, 2013). The link between poverty eradication, tourism and climate change is likely to be felt in the Okavango Delta, a major tourist destination in Botswana and an environment reliant on proper water and land management. Said differently, because of the plethora of variables together with their causal linkages, causality is not a simple and straightforward concept researchers can apply to any situation. Complexity creeps in when there are multiple variables and multiple linkages between the variables.

An intensive literature search, a policy analysis of strategic documents and qualitative expert interviews delivered enough information to better understand the regional circumstances and the main management challenges of the Olifants-Doorn WMA.

2. Theoretical and conceptual background

In order to identify and understand drivers and barriers towards sustainable water and land resources management it is crucial to understand first, the complexity of the resources being managed and second, the underlying governance and management characteristics.

2.1. Social-ecological systems and ecosystem services

Managing natural resources in a sustainable, equal and efficient manner requires integrated perspectives on social and ecological systems: a coupled, inseparable system of humans and nature (MA, 2005), in which ecosystem services are conceived as a bridging component (Bennett et al., 2009). This article builds upon the definition of social-ecological systems provided by Glaser et al. (2008), under which a social-ecological system consists of a bio-geophysical unit and its associated social actors and institutions (e.g., rules and norms). A social-ecological system describes the structures and patterns of the relations between the system's elements, in which networks, feedbacks and causal chains are concepts that can be expressions of these relations and dynamics (Jahn, 2009). In this article, a river basin, the Olifants-Doorn WMA, is a social-ecological system which is described as being complex and adaptively delimited by spatial or functional boundaries surrounding particular ecosystems and their problem context (e.g., water pollution, water scarcity, ecosystem damages).

Worldwide, the concept of ecosystem services has received attention in the sustainable management of natural resources as a way to communicate human dependence on ecological life support systems (Daily, 1997). The concept has become both a heuristic analytical tool for academics and a powerful discursive tool for conservationists and politicians interested in the preservation of nature's legacy (Fischer et al., 2009). In other words, ecosystem services as a human construction can be a theory and ideology. As a theory to manage natural resources, the concept emphasizes the critical role of integrating competing interests in environmental decision making and allows negotiating between conflicting demands over water and land resources (cf. Jewitt, 2002). A further advantage of this concept is to facilitate the creation of novel partnerships, particularly between civil society, the local population and

¹ Stakeholders are defined as any individual or group sharing common interests, and who may be affected by water and land-use decisions.

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