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Exploring watershed conservation and water governance along Pangani River Basin, Tanzania

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ABSTRACT

Water scarcity is among the contemporary problems of our time across the globe. The problem is worsened by policy failures to enforce water governance and watershed conservation. Consequently, it has curtailed the capacity of watersheds to release hydrological services, water in particular. We carried out this study to explore approaches for watershed conservation and investigate water governance challenges in Pangani River Basin, Tanzania. We collected data by using structured questionnaires and meetings with different actors in the study area. We found that retaining riparian vegetation is the appropriate strategy for watershed conservation and sustainable water flow. Water governance challenges include ineffective and uncoordinated water governing institutional structures; and untrustworthy financial management. We feel that building the capacity of water users association could bring about positive outcomes for both watershed conservation and water governance. We recommend that strategies and policies aimed at improving the flow of hydrological services should also focus on improving the welfare of the local communities, who are the primary beneficiaries of water from watersheds.

1. Introduction

Watershed ecosystems are key natural wealth for economic growth, ecological integrity and other hydrological services (Barbier and Thompson, 1998; Bennett et al., 2005; 2009; Boelee and Madsen, 2006; Boelee, 2011). Watersheds play a crucial role in the delivery of many ecosystem services (ES), including provisioning services, cultural, regulatory and supporting services (Miranda et al., 2003; MA, 2005; Brauman et al., 2007). In recent years, however, watersheds have been degraded beyond provision of water in a sustainable way (SafMA, 2004; De Groot et al., 2010; Lalika et al., 2015a). Water is a finite and exceptional ES as it can be a cultural provisioning, regulating and a supporting service. Thus for ensuring the availability and sustainable supply of this unique ES, it is essential to improve watershed conservation through water governance and strengthening water user associations through training, financial provision for modernizing irrigation infrastructures (Lein and Tagseth, 2009). On the other hand watershed conservation and watershed governance can be achieved through improving river committees as advocated by Komakech and van der Zaag (2011).

Reduced water flow, watersheds and catchment forest degradation are mainly due to failures in watershed governance (Yong et al., 2003; Franks et al., 2011; Brandes, 2005). Watershed governance focuses on improving decision-making in a more inclusive framework, achieving sustainable, healthy watersheds and the flow of benefits from them. Furthermore, watershed governance emphasizes on community benefits from the use of collaborative processes, the development of shared goals, greater trust among conflicting interests, better and more durable resource use decisions based on better information (Franks et al., 2011; Brandes, 2005).

A key factor for watershed governance success is improved collaboration and connections between local communities and decision-makers at the watershed scale. The central goal is to provide alternatives to existing systems of water governance and planning that are focused too narrowly on water, isolating the resource from its broader interactions across sectors and within ecosystems. For effective and efficient watershed governance, there are a number of management components to be fulfilled.

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They include: actual integration of economic and environmental objectives within the watershed context; integration of policies, programs and protocols which guide outcome-based planning, monitoring and enforcement; and, effective and efficient delivery of watershed services through the development of high-performance public and private organizational structures.

The smooth operations of these components are, however, precluded by fragmented management structures. These implies poor inter-sectoral coordination at field scale; diverging interests of watershed stakeholders and water beneficiaries; incompatibility between formal and informal institutions; lack of upstream and downstream integration; development interventions; inadequate political will to support watershed governance; and the constraining factors to water and forest management integration (Msuya, 2010) and uncoordinated integrated water management policies which contribute to poor and water governance gaps (Msuya, 2010).

Poor governance in the context of this study refers to the failure to manage effectively human uses and their impacts on water and watersheds. Others include poor water allocation, failure to resolve conflicts among diverse interests and failure to mitigate pressure on water from diverse sources (Tropp, 2007). Thus, understanding how watershed governance works is vital towards sustainable water flow.

In Tanzania, watershed governance problems are key obstacles towards sustainable water flow along many rivers including the Pangani River Basin (PRB). A number of reasons contribute to this situation. They include degradation of catchment areas, lack of effective conservation measures, weak and uncoordinated plans for water allocation and rationing, to name just a few. Furthermore, governance is confronted with little responsiveness and accountability, lack of effective institutional set-up, poor accounting and valuation of ES from watersheds (Brandes, 2005; Costanza et al., 1997; Lopa et al., 2011). Fragmented (sectoral) water management approaches speak a lot for the current failure of the watershed conservation intervention strategies (Msuya, 2010; Mombo, 2013). The future existence and sustainability of watershed management options depends largely on the presence of both formal and informal institutions (Mbeyale, 2009; Msuya, 2010). While formal institutions provide constitutional framework where organizations and individuals are brought together in a positive manner, the informal organizations offers norms and informal sanctioning mechanisms to govern the ways of doing things (Msuya, 2010; Blomquist and Schlager, 2005; Ngana et al., 2010).

Responding to the international strategy on water and watershed governance, watershed management in Tanzania has undergone a major paradigm shift by transferring water management to the water user associations (Mbeyale, 2009; Msuya, 2010; Ngana et al., 2010).

Along the PRB the integrated water resource management has been in place for quite sometime through river basin management approaches and water user associations (Lein and Tagseth, 2009; Msuya, 2010; Lalika et al., 2015a). However, enforcement of policies, regulations, guidelines and local by-laws are handicapped with poor governance. For instance, research on how to bring together institutions working on water management (Sehring, 2009; Van der Zaag and Bolding, 2009) showed that local water management efforts were not often fully integrated into government water sector institutional reforms. Full integration entails harmonization of different policies into the same aim, objective, mission and vision; bringing together different management approaches into a single watershed conservation entity; harmonizing different watershed management levels into one management unit; and putting in place administration strategies aimed at solving water use conflicts between local communities and conservation organizations; upstream and downstream water users; hydroelectricity producers and other water users; local communities and foreign investors; smallholder farmers and livestock keepers; and local communities and river basin authorities (Mbonile, 2006; Msuya, 2010).

Lack of harmonization of different institutions aimed at watershed management normally results into unsustainable use of water resources and resource use conflicts. While Van der Zaag and Bolding (2009) argued that for any new water institution to be effective, it must be consistent with both the government and local-level institutions, Komakech and van der Zaag (2011) advocated that understanding the interface between locally developed water institutions and those created by the central government could add insight into the development of integrated catchment management institutions. Therefore, integration of water governance and watershed conservation by strengthening water user associations could enhance sustainable watershed conservation and water flow increase in the PRB.

Majority of small holder farmers along the PRB are engaging on irrigated agriculture. Inefficiency of rainfed agriculture caused by climate change and climate variability (Lalika et al., 2011; Lalika et al., 2015a) has forced smallholder irrigators to resort to irrigated agriculture as strategy to climate change and climate variability. These smallholder irrigators formed water user associations for monitoring water utilization along the PRB. However, the lack of effective water governance for water use fees collection is one of weaknesses of water user associations in the PRB (Lein and Tagseth, 2009). Irrigation officers at canal/village level lack commitment, patriotism, and working ethics in collecting water use fees.

Understanding water governance dynamics would enhance watershed conservation for sustainable water flow. The information could also be useful to policy makers for watershed conservation planning. The objectives of this study were to: (i) identify approaches for watershed conservation used in the study villages along the PRB; (ii) determine the role of water user associations along the PRB; and (iii) examine gaps and weaknesses in watershed conservation and water governance in the study areas along the PRB.

2. Materials and methods

2.1. Description of the study area

2.1.1. Location

This study was conducted in four villages, i.e. Kaloleni and Chekereni villages in Kilimanjaro Region and Karangai and Kikuletwa villages in Arusha Region along the PRB, Tanzania (Fig. 1).

The PRB drains the southern and eastern sides of Mt Kilimanjaro (5985 m) as well as Mt. Meru (4566 m), then passes through the arid Maasai Steppe in the west, draining some of the Eastern Arc Mountains (Pare and Usambara Mountains) which are the World biodiversity hotspots before discharging to the Indian Ocean at Pangani town. Along the PRB there are an estimated 3.8 million people, 80% who rely directly or indirectly on irrigated agriculture for their livelihoods (IUCN, 2007; IUCN and PBWO, 2008; Kamugisha, 2008).

2.1.2. Hydrology and drainage pattern

The hydrology and drainage pattern in the PRB catchment varies considerably both in space and time. The PRB comprises of several sub-catchments with widely different characteristics. The Pangani River which is referred (in other publications) as Pangani Mainstem rises as a series of several small streams and springs on the southern sides of Africa's highest peak, Mt. Kilimanjaro, and Mt. Meru (IUCN and PBWO, 2008; IUCN, 2007). These streams (Nduruma, Tengeru, Sanya, Malala, etc.) create the Kikuletwa and Ruvu Rivers (Himo, Muraini, etc.) which drain further downstream into the Nyumba ya