



Short communication

The role of forest provisioning ecosystem services in coping with household stresses and shocks in Miombo woodlands, Zambia



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ARTICLE INFO

Article history:

Received 9 March 2013

Received in revised form

8 June 2013

Accepted 17 July 2013

Available online 20 August 2013

Keywords:

Coping strategies

Ecosystem services

Livelihoods

Miombo woodlands

Shocks

ABSTRACT

This paper investigates the use of forest provisioning ecosystem services (FPES) in coping with stresses and shocks in rural households of Miombo woodland systems. It assesses the influence of socio-economic factors (wealth and gender) in households' coping decisions. The study employs a mixed methods approach by combining focus groups meetings, in-depth interviews, and interviews of 244 households stratified by household wealth classes and gender of household heads in Copperbelt province, Zambia. The results show that households face multiple shocks and that FPES are the most widely used coping strategy used by households facing idiosyncratic shocks, by households, followed by kinship. A higher proportion of poor and intermediate households rely on FPES to cope with various shocks than their wealthier counterparts. When stratified by gender, more male-headed households used FPES than female headed households. With respect to coping with household food stresses, charcoal production and sale is the most widely used strategy, followed by off-farm activities and remittances. In designing forest management strategies aimed at reconciling forest conservation and rural development, such as reduction of emissions from deforestation and forest degradation (REDD+) schemes, it is vitally important that alternate coping strategies are made available to rural households to reduce pressure on forests.

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1. Introduction

Ecosystems are increasingly recognised for their contribution of services to human well-being. This has led to an interest by many researchers in understanding human–environment interactions against the backdrop of climate change and dwindling ecosystems (MA, 2005). Across the world, understanding ecosystems is an important subject for scientific enquiry (Cowie et al., 2011; Rounsevell et al., 2010), largely due to the growing costs of biodiversity loss and ecosystem degradation (TEEB, 2008). This is particularly true for developing countries whose population heavily depend on ecosystems for survival (due to high poverty levels) and have the highest rates of ecosystem degradation (MA, 2005), and is especially the case for the dryland systems of Sub-Saharan Africa (Middleton et al., 2011; Stringer et al., 2012).

1.1. Forest provisioning ecosystem services and rural livelihoods

Ecosystems services are benefits that people obtain from ecosystems (MA, 2005). Provisioning ecosystem services are those products

that can be harvested and quantified such as food, fibre and fuel (Maass et al., 2005). Miombo woodland systems are the most extensive forest formation in Africa covering an estimated 2.7 million km² (Frost, 1996) and they provide FPES, which are important for the day-to-day living of their inhabitants. They are a source of foods such as mushrooms (Syampungani et al., 2009), edible insects (Mbata et al., 2002), indigenous fruits (Kalaba et al., 2010; Leakey and Akinnifesi, 2008), seeds, wild vegetables, honey and oils (Shackleton and Gumbo, 2010). The woodlands are also a source of traditional medicine for primary health care (Chirwa et al., 2008) and poles, fibres and other materials used for constructing houses and barns (Clarke et al., 1996). Woodfuel (firewood and charcoal) from the woodlands is an important energy source, providing over 75% of the total energy needs for both urban and rural dwellers in Zambia (Malimbwi et al., 2010). To the local people, “Miombo woodlands are a pharmacy, a supermarket, a building supply store and a grazing resource” (Deweese et al., 2010, pp. 61).

1.2. Vulnerability of rural households

Rural households are vulnerable to a wide range of stresses and shocks that affect their livelihood assets and options (Debela et al., 2012). Households experience different frequencies and types of idiosyncratic shocks (such as death, sicknesses, loss of property) and covariate shocks (e.g. droughts, flooding, outbreaks of human

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and livestock diseases) (McSweeney, 2004; Paumgarten and Shackleton, 2011). Rural households seldom have access to formal insurance institutions to help them cope with stresses and shocks (Debela et al., 2012). To cope with these stresses and shocks, households use various strategies such as selling productive assets, kinship, engaging in off-farm employment, or reducing the frequency and amount of consumption (Debela et al., 2012; Dercon, 2002). Others increase extraction of forest resources for consumption as well as a source cash income (Debela et al., 2012). The coping capacity of households is determined by a number of factors such as nature and intensity of shock (Pattanayak and Sills, 2001), local environmental endowments (Takasaki et al., 2004) and household socio-economic factors (Pattanayak and Sills, 2001; Turner et al., 2003). Although households use a variety of strategies to cope with idiosyncratic shocks (Heemskerk et al., 2004; Maxwell et al., 1999; Paumgarten and Shackleton, 2011), these strategies are often inadequate to cope with extreme covariate shocks (Dercon, 2002; Heemskerk et al., 2004).

High frequency and intensity of shocks coupled with inadequate household's coping strategies is a common poverty trap for many rural households (Carter and Barrett, 2006; Zimmerman and Carter, 2003). The rising levels of human vulnerability to multiple stressors are increasing rural people's dependence on ecosystem services (Shackleton and Shackleton, 2012).

Although use of forests to cope with stresses and shocks has been reported in some empirical studies mostly in Latin America's tropical forests (Godoy et al., 1998; McSweeney, 2004), only a few studies have been conducted in the dry forests of southern Africa (e.g. Paumgarten and Shackleton, 2011).



Fig. 1. Location of study area.

There is a vital need for more empirical case study research to provide quantitative and qualitative data on how FPES are used as a natural insurance against stresses and shocks. Furthermore, although several studies have recently explored the influence of socio-economic factors on use and sale of forest products (Babulo et al., 2008; Heubach et al., 2011; Shackleton and Shackleton, 2006), studies on how social and economic differentiation of households' influences use of forest resources to cope with stresses and shocks are lacking.

Understanding local people's use of FPES in responding to shocks and stresses is essential if the long-term goals of economic development and biodiversity conservation are to converge in regions with high poverty levels and biologically diverse ecosystems (Paumgarten and Shackleton, 2011), which have an intertwined challenge of poverty and addressing forest degradation (Soltani et al., 2012).

The aim of this study is to improve understanding on the role of forests as a natural insurance against stresses and shocks among rural households in Miombo woodland and to assess the influence of wealth and gender of household heads on coping decisions.

2. Study area and methodology

The Copperbelt Province of Zambia (Fig. 1) covers a total surface area of 31,014 km². It lies on the central African plateau at an average altitude of 1200 m above sea level and exists under granite and granite gneiss, basement schist and lower Katanga rock systems (Syampungani et al., 2010). It is a high rainfall area, receiving average annual rainfall of 1200 mm and experiences three weather seasons that are distinguished based on rainfall and temperature, namely; hot dry (September–November), rainy season (December–March) and cold dry (April–August) (Chidumayo, 1997). The average temperature ranges from 17 °C in the cold dry season to 37 °C in the hot dry season. In terms of vegetation, Miombo woodland systems represent 90% of the Copperbelt province's total natural vegetation (GRZ, 1998). These woodlands are dominated by trees belonging to *Julbernardia*, *Isoberlinia* and *Brachystegia* genera, which are widely used for charcoal production. The Miombo is further rich in various indigenous fruit trees such as *Uapaca kirkiana*, *Anisophyllea boehmii*, and *Strychnos cocculoides* (Kalaba et al., 2013).

2.1. Site selection

Two study sites were purposefully selected on the basis of the ecological setting, evidence of use of Miombo agro-ecosystems, similarities in socio-economic activities and livelihood activities, and differences in legal status of the forests, location and local institutional contexts (Table 1). These are Mwekera Forest Reserve and Katanino Joint Forest Reserve.

In the two sites, four villages were selected namely; Bwengo and Kashitu villages (Katanino site), and Misaka and Twesheko

Table 1
Site characteristics.

Site characteristics	Katanino site	Mwekera site
District	Masaiti rural	Kitwe city
Location of site	13°36' S and 28°42' E; elevation 1300 m above sea level	12°49' S and 28°22' E; elevation 1295 m above sea level
Legal status of forest	Joint forest management	National forest reserve
Local institutional administration	Customary	State
Cultural context	Rural traditional	Rural peri-industrial
Distance to the nearest urban markets	75 km	20 km
Forest type	Miombo woodlands	Miombo woodlands
Ethnic groups	Lamba is the dominant ethnic group	Mixed ethnic groups ; Bemba, Luvale, Ngoni, Tumbuka, Lamba, etc.
Livelihood activities	Farming, charcoal production, livestock	Farming, charcoal production

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