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Production efficiency of community forest management in Nepal

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ABSTRACT

Nepal's forests have been transferred to community management with the twin objectives of supplying forest products and addressing local environmental problems. Community forests provide a range of benefits, from direct forest products such as timber and non-provisioning ecosystem services such as soil protection. There is a need to understand the extent to which environmental and community benefits are joint products or substitutes. Stochastic frontier production analysis (SFPA) was used to study the production relationship between environmental and community benefits and production efficiency analysis to study the extent to which communities were able to achieve maximum benefits. SFPA indicated that the magnitude of direct forest product benefits was influenced by various socioeconomic and forest related factors such as distance to the government office, community forest size, and group heterogeneity negatively affect community forest products benefits. On the other hand, links to the market, forest products dependency, and the number of households in the community augment benefits from community forests. In addition, forest product benefits and environmental benefits were complementary to each other. Production efficiency analysis showed that communities were not producing forest products efficiently. Factors such as social capital contributed positively to production efficiency, whereas caste heterogeneity in the executive committees of community forest user groups was negatively associated with efficiency. These findings can contribute to better implementation of community forestry programmes in Nepal, improving the welfare of communities by increasing direct forest product benefits without environmental harm.

1. Introduction

Management of many Nepalese forests has been divested to local communities who have been entrusted to supply local forest products and to address local environmental problems. Communities produce a range of forest products such as timber, fuelwood, fodder and grasses from their community forests (CFs) as well as non-provisioning ecosystem services, such as soil protection and wildlife conservation (Thoms, 2008). The policy and management problems of CFs have recently shifted from establishment and protection to efficient management and distribution in many developing countries (Adhikari, 2006; Chhatre and Agrawal, 2009; Tole, 2010). Efficient management of forest resources requires an understanding of the extent of resources and services produced, their determinants, their importance for community welfare, and changes in outputs under alternative management strategies.

There is limited information on environmental and community welfare effects of entrusting communities to manage forests. There is some evidence at the household level that CFs increase income disparities within communities (Adhikari, 2005; Malla, 2000; Thoms, 2008). Chakraborty (2001) and Iversen et al. (2006) analysed institutional and economic stability effects of CFs at the community level and found that the quality of institutional control mechanisms determines the performance of CFs. Other CF performance criteria include social, biological, and economic attributes (Misra and Kant, 2004).

Several studies have indicated improvement in forest condition with community forestry. For example, Gautam et al. (2004a) found a significant improvement in CF forest cover over 25 years from 1976. Likewise, Gilmour et al. (2004) identified improvements in soil erosion control and water conservation in areas where communities have been able to regenerate forest cover in previously degraded land. However, these studies have taken into account only the biophysical aspects of the forest; they have ignored forest products. Other studies, such as those undertaken by Thoms (2008) and Adhikari (2005), have dealt only with consumption of forest products at the household level and have provided limited information on changes in environmental benefits. The relationship between community welfare from consumption of forest products and the condition of the natural environment in CFs has not been addressed.

This article analyses the production performance of CFs in terms of benefits deriving from forest products at the community level and investigates the relationship between forest production and various social, economic and environmental factors. CF production efficiency is

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estimated by examining the relationship between ecosystem and community outcomes, and factors that influence production efficiency are investigated.

2. Community forest management in Nepal

Nepal forest resources have always had an important place in sustaining rural livelihoods. More than 80% of the population relies on forest products, such as fuel wood for cooking and heating and fodder and litter for livestock production (Thoms, 2008). Recognising the increasing depletion of forest resources and the Department of Forests' limited capacity to handle the problem alone, in 1978 the government introduced policy to seek local communities' cooperation in sustainable management and use of forest resources (Gautam et al., 2004b). The Forest Act 1993 and the Forest Regulation 1995 have guaranteed local communities rights to use forest resources. The Nepalese government intends to hand over all accessible forest to local communities for sustainable management and utilisation (Thoms, 2008). The CF management approach is often cited as one of the success stories for managing common property resources (Adhikari, 2005; Chakraborty, 2001; Chaudhary, 2000).

Under CF management, parts of national forests are given to the local community, which is vested rights of access, use, exclusion and management of forest resources (Thoms, 2008). Each forest user group (FUG) prepares its own constitution for day-to-day group functioning, and a forest operational plan. The forest operational plan and the constitution are legal documents mutually agreed between the local community and the government. FUGs undertake development and forest management activities based on the provisions in these two documents. Up until 2012 more than 17,000 forest patches, about 22% of Nepal's total forest area, had been entrusted to communities. Approximately 2.19 million households, about 35% of the total population, have been involved in CF (Department of Forests, 2013).

3. Factors influencing production in community based forest management

In neo-classical production analysis the contribution of the organisation which is responsible for production has been generally ignored. As a result, only transformation factors have been analysed, ignoring transaction factors. However, institutional economists such as North (1990) have demonstrated the role of the agency in the production process. North (1990) claimed that transformation factors, such as land, labour and capital, and transaction factors, which are related to social, economic and cultural aspects of the agency, are equally important. Similarly, Misra and Kant (2004) have demonstrated the significant role of social and economic factors related to agency in joint forest management production processes in India.

Studies have documented the influence of group size, access to market and forest dependency on collective action in community-based management (Agrawal, 2001a; Agrawal and Chhatre, 2006; Gebremedhin et al., 2003). Agrawal (2000), in a study of community forestry in northern India, reported that forest condition was better in communities with large numbers of households than in communities with small numbers of households. Similarly, Heltberg (2001) observed better collective action in large groups than in small groups. However, these outcomes are not consistent with collective action theory, which claims that the likelihood of collective action is higher in small user groups (Poteete and Ostrom, 2004).

Wade (1987) claimed that scarcity of resources encourages people to form groups to achieve needs, which would not be achievable by individual action. In contrast to earlier findings, Bardhan (1993) argued that medium levels of scarcity favour collective action because at high levels of scarcity people struggle for survival and the breaking of resource use rules is likely. At low levels of scarcity people get adequate access to resources, so they are reluctant to participate in collective resource management activities.

Many studies have demonstrated the influence of market access on CF management, but its role is widely contested. Some researchers (such as Agrawal, 2001b; Gebremedhin et al., 2003) have argued that better market access increases the value of resources, and thus produces an incentive for CF groups to heavily exploit the forest. Other researchers (such as Baland and Platteau, 1996; Pender and Scherr, 1999) have found that access to markets may lessen the contribution of group members to resource management since community members are less reliant on forest. Thus, the effect of market access on common resource management is ambiguous and site specific.

In recent years, the notion of social capital has emerged as one of the main determinants in the success of community management (Van Ha et al., 2004). Social capital is a multi-dimensional concept comprised of four components: associational activity, social relations, trust and reciprocity (Pretty and Ward, 2001; Van Ha et al., 2006). It is claimed that the existence of social capital facilitates interactions amongst community members and builds trust and hence lowers transaction costs (Pretty and Ward, 2001), which enhances efficiency of outcomes (Van Ha et al., 2006). Nepal et al. (2007) argue that social capital fills information gaps between community members, and as a result information flows smoothly at lower cost. Evidence from several studies has indicated that social capital acts as an input factor and contributes positively to the production process. For example, Van Ha et al. (2006) found a positive role for social capital in production efficiency in paper recycling mills in Vietnam. Interestingly, they found that social capital contributes more to the production process than physical capital. Sakurai (2006) analysed the effect of social capital on collective action in community forestry management, and found that structural social capital, which is measured in terms of frequency of governing rule change in CFs, contributes to collective action.

The role of group heterogeneity on the performance of community based resource management is well documented in the literature. Economic and non-economic differences within a community generate heterogeneity (Dayton-Johnson and Bardhan, 2002). Community management discourse has identified three main types of heterogeneities; social heterogeneity, economic heterogeneity and spatial heterogeneity (Poteete and Ostrom, 2004; Varughese and Ostrom, 2001). Theoretically, heterogeneity, whether it is economic or social or spatial, generates diversity in knowledge, capacity and interest (Adhikari and Lovett, 2006). Diversity may impede consensus building and rule enforcement regarding management of common property resources. White and Runge (1994) and Cernea (1989) argued that heterogeneity amongst group members makes it costly to achieve consensus about a common goal.

Dayton-Johnson and Bardhan (2002) developed a theoretical model consistent with a 'U' shaped relationship between economic heterogeneity and resource conservation. In an empirical study of communally owned irrigation systems in Mexico, Dayton-Johnson (2000) demonstrated that group performance of irrigation systems, was significantly negatively associated with economic inequality and social heterogeneity. Increased heterogeneity up to certain limits does not support resource conservation. However, further increases in heterogeneity may produce more conservation of resources because dominant users may bear the cost of externality and at the same time support small users to free ride on the former's contribution in order to conserve resources.

However, the effect of heterogeneity on resource management is highly variable (Adhikari and Lovett, 2006; Gautam, 2007; Poteete and Ostrom, 2004; Varughese and Ostrom, 2001). For instance, Bardhan (2001) noticed consistently less maintenance of community managed irrigation canals in villages with higher social heterogeneity. Somanathan et al. (2007), reported evidence of a positive relationship between land equality, measured as the ratio of minimum to maximum landholding in village, and collective action in pine forests in the