



Community-Managed Forests, Household Fuelwood Use and Food Consumption[☆]

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ABSTRACT

This paper evaluates the role of use of community-managed forests as a means of improving economic well-being of rural Nepalese households. It utilizes a nationwide survey consisting of detailed questionnaires related to household welfare and employs instrumental variable (IV) approach to investigate the linkage between community-managed forests and food consumption in Nepal. Results show that households that use community-managed forests for firewood spend significantly more on food consumption than those dependent on government-managed forests. The study further finds that community-managed forest users appear to be more participatory and are more likely to find their food consumption adequate. Together, these results provide compelling evidence that community-managed forests can be an effective means of addressing food insecurity in a developing country setting.

1. Introduction

Amid serious concerns over high rates of deforestation, forest management issues have been at the forefront of development policy discussions around the world (Edmonds, 2002). This has led governments in more than fifty countries to carry out community forestry (CF) initiatives, aimed at providing local users with some control over natural resources (Agrawal, 2001). Figures from the World Bank suggest that communities and indigenous groups own 18% of the global forests as well as 25% of the forest cover in developing countries (Murty, 2009). Moreover, Agrawal et al. (2011) report that the area of community-managed forests roughly doubled to 250 million hectares (ha) between 1997 and 2008. Furthermore, Parajuli et al. (2015) indicate that community-managed forests have the potential to improve welfare of about 450 million people in Asia. Nepal currently includes over 18,000 community forest user groups (CFUGs), involving over 2.39 million households and 1.79 million ha of forests (Department of Forests, 2015).

Property rights and management of common property resources such as forests have become a central issue in development economics and policy (Baland et al., 2010). While proponents claim that community-managed forests lower ecological degradation and supply basic forest products for subsistence needs, empirical evidence on equity and

distributional benefits from CF management is rather mixed (Ostrom, 1990; Das, 2000; Kumar, 2002; Gautam et al., 2004; Ribot et al., 2006). Moreover, forest use in South Asia is directly linked with food and energy needs of rural inhabitants (Shyamsundar and Ghate, 2014). This has further underscored the need to evaluate the role of forest management policy in improving both environmental and economic outcomes in the developing world.

The need for an empirical study on socioeconomic repercussions of community-managed forests is especially relevant in the context of Nepal's substantial shift in forest management policy over the years. In 1957, the Nepalese government nationalized all forests holdings of greater than three acres in hilly and mountainous areas of the country (Bromley and Chapagain, 1984). This led to massive government revenues from timber exports and ultimately an increase in food production (Griffin et al., 1988). According to Bluffstone et al. (2015b), Nepal launched CF initiatives in the late 1980s in response to severe deforestation and forest degradation. Subsequently, it promulgated the Forest Act in 1993 that enabled the government to hand over accessible national forestland to respective local communities through several forest user groups (Edmonds, 2002). Specifically, the CF program intervention “recognized the role of local communities in forest management and redefined the role of state to facilitate local initiatives” (Bluffstone et al., 2015b). While recent estimates show that over 80% of

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households in Nepal rely on firewood for cooking (Nepal et al., 2011), research on evolution of CF initiatives in Nepal has focused mostly on improvement in environmental quality.¹

This study takes advantage of a rich nationwide household survey to assess the impact of community-managed forests on monthly food consumption per capita in Nepal. As both placement and usage of community forests are potentially endogenous, the study utilizes a novel instrument for CF firewood sourcing: number of years since government first approved operational plan for a community-managed forest in a given village. Specifically, it exploits plausibly exogenous nature of the exact date when the government issued a certificate of operational plan to implement a community-managed forest for the first time in a village and construct a relevant and valid instrumental variable (IV) for use of a community-managed forest (more on the endogeneity problem and instrument is discussed in Section 3). Using the IV strategy, this study explores the role of community-managed forests in improving economic well-being of rural households in Nepal.

Empirical results indicate that household's reliance on community-managed forests for fuelwood significantly increases monthly food consumption per capita in rural Nepal. Standard ordinary least squares (OLS) estimates show that community-managed forest users expend 4.3% more on monthly food consumption per capita than their counterparts relying on government-managed forests, and the result is robust to a broad set of specifications and assumption checks. IV results, which are larger in magnitude, further confirm that community-managed forests lead to an increase in household food consumption. This study provides direct evidence that successfully implemented community-managed forestry initiatives can effectively address food insecurity among rural households in the developing world.

This study is related to recent literature that evaluates the impact of forest user group participation on household welfare. For example, Mazunda and Shively (2015) employ panel data collected in two districts of Malawi and apply a propensity score matching estimation technique to evaluate the environmental and economic impact of Forest Co-management Program. While they report evidence of a reduction in forest pressure on forest clearing, they don't find any significant impact on household cash income. Gelo and Koch (2014) conclude that decentralized forestry management in southwestern Ethiopia, with improved non-timber forest products market linkages, leads to higher revenue gains. In a different study, Ameha et al. (2014) explore the participatory forest management in two Ethiopian pioneer sites and report higher livestock assets and forest income among members of forest user groups.

The study is also relevant to the broader literature seeking an empirical examination of fuelwood consumption and production in developing countries (Amacher et al., 1993, 1999). Previous research has shown that market prices, labor opportunities and access to basic resources determine firewood consumption in Nepal (Amacher et al., 1996). Cooke (1998) points out the need to assess the impact of community-level resource management practices on household consumption. This study supplements prior research to show that there exists a clear relationship between forest management policy, fuelwood consumption and economic well-being of subsistence households in a developing country context.

The study improves upon the existing literature on effectiveness of community-managed forests in a number of ways. First, it draws

¹ For instance, satellite imagery shows that community-based forest management in Nepal has resulted in more efficient use of forest resources, with a significant decline in incidence of forest fires and use of slash-and-burn agricultural practices (Niraula et al., 2013). A number of other studies show more generally that transfer of forest areas to respective communities in Nepal has led to better forest protection (Tachibana et al., 2002; Malla et al., 2003; Nagendra, 2007; Poudel et al., 2015). In addition, CFUGs have contributed to a 14% decrease in household fuelwood extraction from forests (Edmonds, 2002). See Bluffstone et al. (2015a), Uddin et al. (2015) and Edmonds (2002) for more details.

generalizable conclusions about the linkage between community-managed forests and household welfare. While several qualitative studies² have found positive effects of community-managed forests in the middle hills of the country, Thoms (2008) argues that community forestry in Nepal has been more successful in forest conservation than improving livelihoods. Conversely, Maskey et al. (2006) claim that community-managed forests have been effective in providing rural society's basic subsistence needs in Nepal, though Neupane (2003) reports that forest products available from community-managed forests may not be equitably distributed among forest user groups. Second, it employs the IV approach to account for endogeneity of forest use among rural households in Nepal. It also performs different sets of falsification tests to support the validity of the instrument used and strengthen the methodological rigor. Finally, it delves into the heterogeneous impact of CF initiatives across different observable characteristics and further investigates potential mechanisms for the documented effect. To the author's knowledge, this is the first empirical study that directly examines the relationship between the use of community-managed forests and food consumption in Nepal.

The remainder of the paper is structured as follows. Section 2 presents a detailed background on Nepal and a comprehensive overview of the forest management policy. Section 3 develops an empirical model followed by data description and the main results of the study in Section 4. Section 5 discusses implications of empirical findings. Section 6 concludes and proposes potential areas for future research.

2. Background

Nepal is a land-locked country with a total area of 147,181 square km surrounded by India on three sides and China to the north. According to 2011 Population Census, the population of Nepal stands at 26.6 million (NDHS, 2012). Topographically, Nepal is divided into three distinct ecological zones: mountain, hill, and *terai* (or plains). For administrative purposes, Nepal is divided into five development regions: Eastern, Central, Western, Mid-western, and Far-western. Similarly, the country is divided into 14 zones and 75 administrative districts. Districts are further divided into smaller units, called village development committees (VDCs) and municipalities (NDHS, 2012). In September 2015, Constituent Assembly divided Nepal into seven federal states, which are further sub-divided into urban and rural areas (NDHS, 2016).

2.1. Community Forestry in Nepal

Community-managed forests in Nepal are areas of nationally owned forestland handed over to user groups for meeting bare subsistence community needs and conserving forests. Currently, forests cover almost 40% of the country, one-fourth of which comprised community-managed forests (Paudel et al., 2013).

Through community forestry, the government gives forest user groups (FUGs) rights of access, use, exclusion, and management but retains ownership. Neither the land nor CF rights are permitted to be sold or transferred (Thoms, 2008). As explained by Leone (2013), FUGs are legally recognized autonomous bodies that have full authority to use, manage and conserve forests and consist of households with equal rights over the resources. Households that don't belong to the FUG are excluded from access to a community-managed forest. Leone (2013) also reports that FUGs have no political-administrative boundaries, which means that one FUG may cover more than one community and vice versa.

According to Thoms (2008), each FUG member is allowed to harvest an equal amount of a given forest product regardless of household size or income. One of the ways FUGs can empower themselves involves

² See Timsina (2002), Malla et al. (2003) and Neupane (2003) for review.

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