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The economic contribution of forest resource use to rural livelihoods in Tigray, Northern Ethiopia

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ABSTRACT

By explicitly incorporating forest environmental products (FEPs) in household income accounting, this paper examines the role and significance of FEPs in household income and in rural poverty and inequality. As most conventional household surveys do not incorporate income from environmental sources, substantial gaps exist in our understanding of the actual functioning of rural economies and the extent of rural poverty and inequality. Using data from 360 randomly sampled rural households from 12 villages in Tigray (northern Ethiopia), we measure forest environmental resource use with a monetary yardstick and compares the value of FEPs with other household economic activities. We found that products from environmental sources represent an important component in rural livelihoods. Our analyses indicate that in the study area income from forest environmental sources occupies the second largest share in average total household income next to crop income. Poverty and inequality analyses show that incorporating forest environmental incomes in household accounts significantly reduces measured rural poverty and income inequality. Therefore, we suggest that sustainable forest management schemes should be adopted to maintain and enhance the flow of economic benefits to the surrounding communities without damaging the natural resource system.

1. Introduction

Incomes from environmental sources play an important role in rural livelihoods in developing countries. In particular, products from forest environmental sources contribute significantly to rural households' economic wellbeing (Reardon and Vosti, 1995; Reddy and Chakravarty, 1999; Cavendish, 1999, 2000; Vedeld et al., 2004; Fisher, 2004; Getachew Mamo et al., 2007). Most rural household surveys, however, only capture conventional rural activities, such as crop production and livestock rearing, and rarely incorporate incomes from environmental resources. The goods and services provided by environmental resources, such as forest environmental products[1], are often omitted. This is because forests or grasslands tend to be either communally owned or, if privately owned, not expressly cultivated. As a result, there is a substantial gap in our understanding of the actual economic contribution of environmental resources, the functioning of rural economies and the extent of rural poverty and inequality.

Recently there is a growing awareness of the importance and value of the use of natural resources in the lives of rural communities (Campbell and Luckert, 2002; Cavendish, 2000; Vedeld et al., 2004; Reardon and Vosti, 1995; Fisher, 2004). For instance, Cavendish (1999) estimated that 35% of the total income of rural households in communal areas of Zimbabwe originates from environmental products. Fisher (2004) showed that 30% of household income in rural Malawi is accounted for by forest income. In the Dendi district of south western Ethiopia, Getachew Mamo et al. (2007) have found that forest income contributes 39% to average household income. Godoy et al. (2002) have estimated that, on average, 17–45% of household earnings across four Amerindian villages in the Bolivian lowlands and eastern Honduras is generated from forest activities.

In the agrarian economy of Ethiopia, the economic contribution of trees and forests is significant but not well documented. Due to a lack of data and methodological problems in environmental valuation, the existing figures on forest value estimates understate the total contribution of the forestry sector to the country's economy. These figures even do not fully reflect the 'formal' economic contribution of forests, let alone the 'informal' ones.[2] In the period 1982–1992, for instance,

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[1] In this study 'forest environmental income' refers to imputed or cash income that is (a) derived from using or selling products harvested from forests or grasslands, and (b) not included in national income accounts.

[2] 'Formal' refers to marketed forest products; 'informal' to forest products with no formal markets or not included in income accounts.

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the agricultural sector accounted for 45% of the total GDP of Ethiopia, while over the same period, forestry accounted for about 5.5% of the agricultural sector and 2.5% of total GDP. These estimates, however, do not reflect the non-marketed forest products and environmental and social services of trees and forests in the country.

In Tigray (the northern-most region of Ethiopia), though forest resources are degraded, their contribution to the regional economy is still significant. The Tigray Forestry Action Program (TFAP, 1996) indicated that gum and incense products alone account for 1% of the value of the Region's agricultural output. Tilahun et al. (2007) found significant net benefits from *Boswellia papyrifera* forestlands at household level. If all forest products (both marketed and non-marketed) had been accounted for, the true contribution of forests to the local economy would have been significantly higher. The aims of this paper are to systematically integrate the value of forest products within the more conventional set of household economic activities and to empirically analyze the role and significance of forest environmental products in rural household income. This paper further examines whether the incorporation of forest environmental income affects poverty and inequality estimates in the rural economy of the Tigray region of northern Ethiopia.

2. An overview of the economic functions of forests and the importance of the valuation of forest resource use

2.1. Multiple functions of forests to rural livelihoods

In most developing countries the livelihoods of rural households are directly or indirectly linked with the natural resource base. This is mainly due to the fact that a significant proportion of the population is engaged in agricultural and other primary sector activities for their very survival. Comparing with secondary and tertiary economic activities, it is the agricultural activity that involves an extensive use of natural resources for its production.

Besides as inputs in agricultural production, natural resources directly offer a wide variety of products and services to rural households: consumption goods, consumer durables, production inputs, inputs into productive capital, assets, and a range of indirect values (Cavendish, 1998). Subsistence and cash incomes from non-cultivated forest-related resources complement other income sources with a continuum ranging from households that depend almost entirely on these incomes to those that basically do not depend on them at all (Vedeld et al., 2004).

In the literature, three different major functions or roles of forest income in rural livelihoods are identified (Cavendish, 2002; Vedeld et al., 2004; Angelsen and Wunder, 2003):

- *By supporting current consumption or meeting a household's subsistence needs*: Forest products are important to maintain the current level of consumption and prevent a household from falling into deeper poverty. This function has no or limited scope of lifting people out of poverty. This may be in the form of seasonal gap-filling and complements other incomes; regular subsistence uses; and/or low-return cash activities.
- *By providing valuable safety nets in times of emergency*: Forest products are used to overcome unexpected income shortfalls or cash needs. This function refers to the role forests can play during periods of hardships (during the period of unpredictable irregular events that cause a temporary need for extra income).
- *By providing a possible pathway out of poverty*: Forest products provide a way to increase household income in a sustainable manner either via the accumulation of capital to move into other activities (a “stepping out” strategy) or intensification and specialization of existing activities (a “stepping up strategy”).

Despite the wide range of forest functions, economic decisions do not often take into account these functions and their respective values. One of the main reasons for overlooking forest functions in economic decisions is that the value of many forest products and services is either underestimated or not calculated at all because of the absence of well-functioning markets and information asymmetry.

The total economic value of nature (forest) is an aggregate of the use and non-use values of forests. This includes direct use values, indirect use values, option values, existence values and bequest values (Kengen, 1997; Campbell and Luckert, 2002; Bishop, 1999; Lette and Boo, 2002). In this paper, we only consider the direct use values associated with local consumptive uses, such as fuel wood, construction wood, fodder, timber, fruits, medicinal plants and so on.

2.2. The importance of valuing forest resource use

Valuing forest resource use by rural households enables us to assess its quantitative contribution to rural livelihoods and the extent of dependency of rural people on forest products. Moreover, estimating the economic value of environmental resource use in rural livelihood systems is important to provide a realistic measurement of rural poverty. According to Cavendish (2000), the traditional concept of poverty focuses on monetary income and wealth. As a result, until the 1960s development policies were focusing essentially on the expansion of monetary income. However, a number of recent empirical studies on rural economies in developing countries show that non-monetary income and consumption may even be more important for market-remote rural households than cash income (Cavendish, 2000; Fisher, 2004). Based on rigorous fieldwork in Zimbabwe, Cavendish (2000) makes a compelling case that environmental income can play a crucial role in the livelihoods of rural households, especially the poorest. In his study, the lowest income quintile derived about 40% of total income from the use of environmental resources. Even when the percentage contribution from natural resources is relatively small, income from these sources may be of vital importance to people living at subsistence level. In particular, environmental income may fill the gap in times of income shortages from other standard sources and act as a safety net or insurance during unpredictable economic shocks. If such a significant source of income is neglected, our understanding of rural poverty will be partial and distorted.

Cavendish (2002) identified two additional reasons for valuing environmental resource use. First, many forms of rural environmental degradation or enhancement are driven by a household's extraction and management choices related to environmental resources. Households may choose to degrade the environment or invest in environmental protection. Exploring the role of environmental resources in rural livelihoods enables us to understand the economic constraints and incentives that may lead to conservation or destruction of the rural environment. Second, understanding environmental values will have key policy implications on issues such as land use policy, agricultural intensification, privatizing the commons, and designing resource management schemes. A clear understanding of how poor people are dependent on their environmental resources is fundamental in shaping policies that safeguard and develop environmental assets for the poor in a targeted manner (Sjaastad et al., 2005; Cavendish, 2000).

3. Sources of forest products

For the purpose of this study, we elicited data on forest environmental products from three main sources.

3.1. Exclosures

These are forested areas owned by the community with restricted access. The harvesting of forest products from exclosures is regulated by the community. However, there are many instances where community regulatory rules are violated by individuals. This is mainly due to the need of local people to supplement their subsistence income. As