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World Development Vol. xx, pp. xxx–xxx, 2014

0305-750X/$ - see front matter

http://dx.doi.org/10.1016/j.worlddev.2014.03.005

Safety Nets, Gap Filling and Forests: A Global-Comparative Perspective

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Summary. — In the forest–livelihoods literature, forests are widely perceived to provide both common safety nets to shocks and resources for seasonal gap-filling. We use a large global-comparative dataset to test these responses. We find households rank forest-extraction responses to shocks lower than most common alternatives. For seasonal gap-filling, forest extraction also has limited importance. The minority of households using forests for coping is asset-poor and lives in villages specialized on forests, in particular timber extraction. Overall, forest resources may be less important as a buffer between agricultural harvests and in times of unforeseen hardship than has been found in many case studies.

Key words — livelihoods, risk, shocks, coping strategies, income, diversification

1. INTRODUCTION

In developing countries, high rates of livelihood insecurity place major restrictions on welfare improvements (Wood, 2003). Rural livelihoods are particularly prone to uncertainties, be they related to the vagaries of weather and climate, or to injuries and illness, patterns of crime, or shifts in commodity prices or government policies (World Bank, 2001). Rural households usually adapt to these uncertainties both *ex ante* (before the shock) and *ex post* (in its aftermath). *Ex ante*, they may accumulate extra assets (livestock, monetary savings, etc.) with the explicit purpose to buffer future shocks. Similarly, they may hold buffer stocks of consumption items as an informal insurance. They may forgo potentially profitable but risky activities and may diversify production in order to reduce their exposure or any individual shock. Alternatively, they may organize themselves into networks based on social groups or institutions that allow them to pool risks. *Ex-post* coping strategies therefore also depend on the ex-ante plans employed. *Ex-post* responses may include income and consumption smoothing, asset sales, and reallocation of production factors, in particular labor (finding off-farm work or other more remunerative tasks, increase labor time, take children out of school and into work, etc.). The choice of coping strategy will depend on the type and size of the shock, individual household characteristics and factor endowments, and broader contextual factors such as the characteristics of local markets, availability of insurance, and the provision of public services (Beegle, Dehejia, & Gatti, 2006; Dercon, 2000; Hoogeveen, 2003; World Bank, 2001).

In the livelihoods literature, forests are often identified as a prominent safety-net source, accessed principally by reallocating more household labor to forest extraction. Natural forests and other wildlands with non-cultivated natural resources are supposed to provide households (especially asset-poor households) with additional flexible options in times of trouble. The effective conservation of forests and wildlands, often threatened by expansion of agricultural frontiers, is thus also legitimized as a natural insurance against calamities. In this paper, we study stated household responses to shocks, and their explanation. We also scrutinize *de facto* gap-filling patterns in responses to predictable seasonal fluctuations, as a distinct but related mechanism of making up for income shortfalls.

In both cases, our analyses draw on the Poverty and Environment Network (PEN) global dataset. The PEN

* We are grateful for comments on earlier drafts received by Arild Angelsen, Brian Belcher, Erin Sills, Kathleen Lawlor, and two anonymous reviewers, and for funding received from Economic and Social Research Council, Department for International Development, Danida, Denmark, IFS, Swedenand and United States Agency for International Development.

Please cite this article in press as: Wunder, S. *et al.* Safety Nets, Gap Filling and Forests: A Global-Comparative Perspective, *World Development* (2014), http://dx.doi.org/10.1016/j.worlddev.2014.03.005

database includes cross-sectional data, gathered by 33 PEN researchers during the period from January 2005 to May 2010, encompassing interviews with 8,301 households in 333 villages and 58 sites spread over 24 developing countries across three continents. Of these, 7,978 households answered the final survey containing a question about shocks suffered during the last 12 months (the remainder constituting attrition).[1] The PEN project emphasized a careful, quarterly recording of all environmental incomes (including both cash and subsistence components, from forests and other extractive, non-cultivated sources, as well as other major cash and subsistence income sources (agriculture, livestock, wages, remittances, etc.). Short (1–3 months) recall periods were used, with quarterly visits to households, distributed over one full year (Angelsen, Larsen, Lund, Smith-Hall, & Wunder, 2011). The PEN data cover all major developing country regions on three continents (Latin America, Asia, Sub-Saharan Africa). It can be seen as fairly representative of smallholder-dominated rural landscapes in which households have at least some access to forests.[2]

The remainder of the paper is structured as follows. In Section 2, we synthesize the literature on shocks, safety nets, seasonal gap-filling, and their relation particularly to forests and other environmental resources, in the process developing hypotheses for subsequent empirical testing. Section 3 presents evidence on the universe of shocks covered in the PEN data and describes the stated household responses. Section 4 provides a multivariate analysis explaining household decisions about whether or not to use forest and other extractive sources as their primary safety-net responses. In Section 5, we scrutinize briefly to what extent the intra-annual profile of households' forest extraction can be said to serve as a seasonal gap-filler. Our main conclusions and a discussion of the results close the paper (Section 6).

2. SHOCK RESPONSES: LITERATURE AND HYPOTHESES

A large literature has evolved on the risk management and adaptation strategies of rural households (e.g., Alderman & Paxson, 1992; Coate & Ravallion, 1993; Deaton, 1997; Dercon, 2005; Foster, 1988; Morduch, 1995; Udry, 1990). Households often cope by smoothing income through the diversification of agricultural or other activities. Reardon, Delgado, and Matlon (1992), for example, find evidence that households in Burkina Faso smooth income through participating in livestock husbandry, and Debela, Shively, Angelsen, and Wik (2012) report evidence of households in Uganda changing labor allocation in response to shocks. Smoothing consumption, on the other hand, can require access to insurance, borrowing or saving, or depletion of productive assets. Evidence generally supports the view that consumption smoothing is important, but generally incomplete (e.g., Binswanger & McIntire, 1987; Rosenzweig & Wolpin, 1993; Wolpin, 1982).

Research in many rural settings in developing countries has shown that the use of forests, both for cash and subsistence, can provide a natural form of insurance to many rural households, especially the poor (Angelsen & Wunder, 2003). Wealthier households tend to have more options, both to prepare for shocks (e.g., by building stocks of assets that are easily liquidated) and to choose between suites of response options (Dercon, 1998). For coping with shocks, therefore, forest resources often are more important in poverty-stricken areas than savings or credit access (Godoy, Jacobson, & Wilkie, 1998). One form of natural insurance provided by forests is as reserve areas for agricultural conversion. For example, in the case of floods, fires or pests reducing cropped areas, households may fall back on converting forestlands and its stored soil nutrients (Sunderlin, Angelsen, & Wunder, 2003). However, more commonly the literature focuses on the household's option to increase extraction of forest products. Many non-timber forest products (NTFPs) are found to be important, for food, medicines, game, etc. Since these resources are typically located in quasi open-access areas, they can be harvested when needed, including by landless people (e.g., Almeida, 1996; Falconer, 1990; Godoy *et al.*, 2000; Ogle, 1996; Shively, 1997). However, timber resources may also be an important source of emergency cash income, e.g., selling boards from a valuable tree to raise cash for medicine, or using timber directly to reconstruct damaged houses (Chambers & Leach, 1989). Hence, opinion is divided as to how important NTFPs are for responding to shocks.

Foraging and other forms of forest dependence by rural households often increase in the wake of unanticipated misfortune (Falconer & Arnold, 1989; Ogle, 1996; Scoones, Melnyk, & Pretty, 1992; Towson, 1994), as confirmed by case studies in Africa (Campbell-Platt, 1980; Debela *et al.*, 2012; Falconer, 1990, 1992; Fisher & Shively, 2007; Khundi, Jagger, Shively, & Sserunkuuma, 2011), Asia (Gunatilake, Senaratine, & Abeygunawardena, 1993; Liswanti, Sheil, Basuki, Padmanaba, & Mulcahy, 2011; Völker & Waibel, 2010), and Latin America (Godoy *et al.*, 1998; Hecht, Anderson, & May, 1988; McSweeney, 2004; Pattanayak & Sills, 2001; Takasaki, Barham, & Coomes, 2004). For example, Pattanayak and Sills (2001) show for the Brazilian Amazon how the number of forest collection trips is positively correlated with both agricultural shocks and expected agricultural risks. Debela *et al.* (2012) highlight for rural Uganda how large losses from shocks lead households to rely more on forests to cover both their subsistence and cash needs. McSweeney (2004) found in rural Honduras that young households with few liquid assets sold forest products when crops failed. In Peru, both forest extraction and conversion to new cropland was found to be important for coping with floods (Takasaki *et al.*, 2004), a situation that was quite similar during floods in East Kalimantan (Liswanti *et al.*, 2011). However, research has also shown substantial diversity among rural populations' use of natural resources in times of crisis (Barham, Coomes, & Takasaki, 1999; Byron & Arnold, 1999), including the degree to which households pursue income-smoothing mechanisms, rather than reducing consumption or temporarily depleting assets (Morduch, 1995; Rosenzweig & Binswanger, 1993). We can summarize these observations in a basic hypothesis:

Hypothesis 1. In times of crises and economic shocks, rural households in developing countries turn to forests and other environmental resources as important safety nets, increasing the extraction of forest products, or converting more forests to cropland than in normal times.

Secondly, the shock type could also shape forest responses. Covariate shocks (e.g., climatic events, price fluctuations) are defined as those that affect most or all households in a community. Idiosyncratic shocks (e.g., illness, death) affect single (or small groups of) households only. Those idiosyncratic shocks that reduce adult labor availability (e.g., illness, death) will naturally reduce the likelihood of labor-intensive responses, including forest extraction. When covariate shocks arise, moreover, safety-net mechanisms that depend on the community (e.g., selling labor, borrowing money) may become less

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