Food Policy 62 (2016) 122–132

Contents lists available at ScienceDirect

Food Policy

journal homepage: www.elsevier.com/locate/foodpol

Quantifying the economic contribution of wild food harvests to rural livelihoods: A global-comparative analysis

Gordon M. Hickey [a,*], Marième Pouliot [b], Carsten Smith-Hall [b], Sven Wunder [c], Martin R. Nielsen [b]

[a] Department of Natural Resource Sciences, McGill University, Canada
[b] Department of Food and Resource Economics, University of Copenhagen, Denmark
[c] Center for International Forestry Research, Brazil

ARTICLE INFO

Article history:
Received 2 March 2015
Received in revised form 6 May 2016
Accepted 11 June 2016
Available online 21 June 2016

Keywords:
Environmental income
Household income surveys
Food security
Forests
Integrative policy

ABSTRACT

This paper empirically quantifies and analyses (i) the economic contribution of wild foods to rural households, (ii) the household socio-economic, demographic, and geographical correlates of wild food income, and (iii) how wild foods can be better incorporated into integrative food security policies. We used household income data from 7975 households in 24 developing countries across three continents collected by the Poverty Environment Network (PEN). We found 77% of households to be engaged in wild food collection from forest and non-forest environments even though the share of wild food income in total household income was on average only 4%. Poorer households and households experiencing shocks derived higher income shares from wild foods. State land is the main source of forest-derived wild food income while private lands are most important for non-forest wild food income. Considerable regional variation in determinants and the direction of significant relationships indicate there is no one-size-fits-all approach to integrating wild foods into food and forest policies. However, our results reveal potential to increase household food security by integrating wild foods into national food policies in more customized ways.

1. Introduction

Lack of food security, i.e. access at all times to sufficient, safe, nutritious food to maintain a healthy and active life (FAO, 1996), affects approximately one in seven people worldwide, with future population growth, shifting consumption patterns, and environmental change likely to exacerbate the challenges that face local, national, regional, and global food systems (Godfray et al., 2010). For example, in order to meet future demand, global food production has been projected as needing to increase by at least 70% (from 2007 levels) by the year 2050 (Huang et al., 2011). At the same time, the ecological footprint of food production systems urgently needs to be reduced in order to ensure sustainability in the face of environmental change (Godfray et al., 2010; Phalan et al., 2011; Smith, 2013), a task made more challenging by the dietary shift associated with rising incomes (Cassman, 2012), leading to decreasing importance of starchy staples and increased consumption of meat, fish, fruits, and vegetables. It is increasingly argued that conventional agricultural response strategies could be reinforced if policy institutions included a clearer focus on biodiversity and natural resources, leading to improved household food security (Sutherland et al., 1999; Bharucha and Pretty, 2010; Johns et al., 2013; Sunderland et al., 2013; Shumsky et al., 2014).

Beyond official food insecurity statistics, more than a third of the world's population has been estimated to suffer from micronutrient malnutrition (Tontisirin et al., 2002), also known as 'hidden hunger', an issue that has often been overlooked in public policy (Kennedy et al., 2003; Johns and Eyzaguirre, 2006; Vinceti et al., 2013; Ickowitz et al., 2014). According to Kennedy et al. (2003), micronutrient deficiency generally goes unnoticed in the community, despite having significant effects on human growth, immune system function, and cognitive development. Micronutrient malnutrition is largely the result of food deficit and reductions in dietary diversity in favour of less complex high-energy diets, also shown to be a major contributor to non-communicable disease rates in many developing area contexts (including diabetes, obesity, and heart disease) (Toledo and Burlingame, 2006; Johns and Eyzaguirre, 2007). A number of studies have pointed to the potential role that biodiversity (incorporating ecosystem, species, and genetic diversity) can play in diversifying diets and providing essential sources of nutrition (Johns and Eyzaguirre, 2006; Toledo and Burlingame, 2006; Sunderland, 2011; Vinceti et al., 2013).

* Corresponding author.
E-mail address: gordon.hickey@mcgill.ca (G.M. Hickey).

http://dx.doi.org/10.1016/j.foodpol.2016.06.001
0306-9192/

Bharucha and Pretty (2010) noted that while biodiversity in the form of wild foods represents an important part of the global food basket, their precise role in supporting households, particularly in developing area contexts, remains poorly quantified and generally under-appreciated in food policy. Further, lack of inclusion in national statistics results in generally low levels of policy recognition of the role of biodiversity in poverty reduction (Roe and Elliott, 2004) making it difficult to move beyond the often single nutrient- or staple food-focused food security interventions that have had limited sustained success (Johns and Eyzaguirre, 2007). While some policy institutions have begun to promote the sustainable use of biodiversity in food security and human nutrition programming, e.g., the Sustainable Development Goals of ending hunger, achieving food security and improving nutrition, and promoting sustainable agriculture while also ensuring environmental sustainability and gender equality (United Nations, 2015), the potential for more locally-focused interventions based on traditional food systems needs further research and policy exploration (Johns and Eyzaguirre, 2006; Phalan et al., 2011; Burlingame and Dernini, 2012; Johns et al., 2013).

1.1. Wild foods and household food security

Burlingame (2000) conjectured that at least one billion people may use wild foods as a means to supplement diets, and that such foods can also improve the palatability of staple foods and generate cash income (Arnold and Perez, 2001; Sunderland, 2011; Shumsky et al., 2014). Wild food resources are also known to act as important nutritional and livelihood safety nets during periods of shortage, shock or livelihood disruption (both foreseeable and unforeseen) (Arnold et al., 2011; Vinceti et al., 2013; Shumsky et al., 2015; Wunder et al., 2014a), especially amongst the poorer sections of society (Shackleton and Shackleton, 2004). In their review of 36 studies in 22 countries in Asia and Africa, Bharucha and Pretty (2010) found the mean number of wild food species used per location to range between 90 and 100. However, commercial overharvesting, inappropriate regulatory frameworks, and land use changes are diminishing opportunities for wild food collection in many contexts, undermining the capacity of traditional food systems to meet household food and nutrition needs (Johns and Eyzaguirre, 2006).

As the main source of terrestrial biodiversity, tropical forests (the majority of which are state-owned) have often been identified as playing an important role in household food security, nutrition, and livelihoods, particularly amongst the most vulnerable (Murray, 1991; Arnold et al., 2011; Sunderland, 2011; Vinceti et al., 2008, 2013; Sunderland et al., 2013). Few studies, however, have attempted to systematically quantify the extent of this contribution across contexts in order to inform more integrated food security policy and practice. This knowledge gap is also apparent in the diverse and complex policy frameworks that govern non-forest environments, constituting rich sources of wild foods and biodiversity (Bharucha and Pretty, 2010; Sunderland, 2011; Powell et al., 2011). As a result, numerous authors have called for greater empirical support to better inform decision-makers on the potential benefits associated with more integrated approaches to dietary diversity, health, and biodiversity (Johns and Eyzaguirre, 2006; Arnold et al., 2011; Sunderland et al., 2013).

This paper seeks to contribute to this policy dialogue drawing from a large international household income survey in the tropics, which notably included wild food collection. Our research proceeds from the premise that more rigorous and comparative empirical evidence on the role of wild foods in supporting livelihoods has the potential to inform integrative food security policy frameworks and strategies, supporting formal institutions to improve human health and well-being through improved natural resource management. Specifically, our research was guided by the questions: (1) To what extent do wild foods play a role in supporting household incomes (cash and self-consumed subsistence)? (2) What are the socio-economic, demographic, and geographical correlates of wild food subsistence and household income; and (3) How can wild foods be better incorporated into integrative food security policy and strategy?

2. Methods

The Poverty Environment Network (PEN) is a global-comparative quantitative research initiative aimed at improving understanding of the relationships between environmental resources and rural livelihoods. Using common definitions adopted across the network, standardized formats for collecting qualitative contextual information, and standardized prototype structured household-level questionnaires, PEN generated data that allows systematic comparisons across study sites. A detailed description of PEN purposes, methodological approaches and experiences are provided by Angelsen et al. (2011). Study site village surveys were implemented at the beginning and end of field work, designed to cover a 12 month period, and including quarterly household income surveys, using one or three-month recall periods depending on the product. Household surveys also included an initial survey focused on basic household information (including demographics, assets, and forest access) and a terminal survey including information on shocks and other incidents over the preceding 12 months. Questionnaires were translated into seven main languages (available at http://www.cifor.org/pen/), but were also translated further into local languages and dialects, whenever necessary, and made compatible with locally prevalent products, terminologies, and measurement units. Trained enumerators were used to conduct the surveys and a strong focus was put on establishing trust with respondents through the use of local enumerators where possible, repeated household visits, and confidentiality during all survey rounds.

A total of 33 PEN partners (Angelsen et al., 2011), primarily PhD students, were recruited internationally using the study site selection criteria: (i) location in tropical or sub-tropical regions of Africa, Asia, or Latin America; (ii) close proximity to forests; and (iii) contributing country or site-level variation to the global data set. The final data set included 24 countries, 58 sites, 333 villages, and 7975 households. Partners selected villages to capture variation in characteristics such as distance to market, land tenure, vegetation type, population density, ethnic composition, and levels of poverty. Households were randomly sampled based on household rosters or pre-existing censuses.

While the PEN sites are widely spread over most continental sub-regions and on a national income scale, PEN does not have the convenient features of a randomized sample. *Ex post* analysis of PEN representativeness in Angelsen et al. (2014: Appendix) demonstrated that, comparing across sites the distribution of forest cover and population density, respectively, the PEN sample mimics well the rural developing world in general, except for the most population-dense and forest-scarce regions. Hence, the PEN sample is probably representative of smallholder-dominated tropical and sub-tropical landscapes with moderate-to-good access to forest resources (Wunder et al., 2014b).

Annual total household income is the sum of all outcomes of household economic activities, measured in income per adult equivalent units; adult equivalence adjustments were used to enable comparison of empirical results across households differing in size and composition (Cavendish, 2002). Values across countries are compared using Purchasing Power Parity (PPP) rates. We use the value added income measure (Sjaastad et al., 2005), i.e. all