Niche commodities and rural poverty alleviation: Contextualizing the contribution of argan oil to rural livelihoods in Morocco.

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Abstract

Integration of many remote regions into the global economy has brought an increasing array of exotic products from rural areas in the developing world to the plates and cupboards of wealthy consumers. This article contributes to the growing literature that looks at the role of global consumers in social and environmental governance. We examine a set of global commodities that, due to their high value, retail at prices well beyond usual agricultural products, giving wealthy consumers great influence over livelihood and land use choices in producer regions. Growing expectations assert this kind of commercialization will alleviate rural poverty. We identify necessary conditions for this to happen in general, and consider the specific case of argan oil, produced in Morocco and sold abroad for prices above US$400 per liter. Using a livelihood approach drawing on geography and related fields, we test the claim that niche commodity trade alleviates poverty in this specific setting. We find that argan oil commercialization has played a relatively minor role in household budgets and assets accumulation while nonfarm work and remittances play a greater role. Our results show the importance of a livelihood approach in contextualizing commodity chains. We conclude that the poverty alleviation effects of niche commodity marketing are context-dependent and influenced by agro-ecological conditions, resource scarcity, resource ownership regime, and characteristics of the value chains.

Keywords: NICHE PRODUCTS; RURAL DEVELOPMENT; ARGAN; MOROCCO, LIVELIHOOD ANALYSIS

Introduction

Recent market trends linked to global economic integration are increasingly recognized as reworking social and environmental governance to give consumer choices greater influence over livelihoods and land use (Hartwick 2000; Hughes 2001; Lambin and Meyfroidt 2011; Raynolds 2004). The awareness of this increasing connectedness and of the opacity of links between consumption and production has led to calls for a reconnection of consumers and producers (Hartwick 2000; Lyon 2006). This reconnection is central to the emergence of "alternative" economies and products, which have become an object of inquiry in economic and political geography (Bryant and Goodman 2004; Hartwick 2000; McCarthy 2006; Watts, Ilbery and Maye 2005). Attempts to harness the power of consumers, (e.g., through environmental and social certification), have also been studied (Baird and Quastel 2011; Hughes 2001; Klooster 2006; Taylor 2005). In order to better understand how production and consumption are related in a globalized world, tools such as actor network theory, commodity chains, and commodity networks to represent trade have been applied. (Challies 2008; Coe, Dicken and Hess 2008; Whatmore and Thorne 2004). Key questions have been raised concerning the relevance of market-based tools of governance (Goodman 2004; Guthman 2007), the benefits of certification schemes (Klooster 2006; Lyon 2006), and the effects of of consumer influences on livelihoods and land use in places of production.

This study addresses the call for empirical studies of this reworking of governance (Goodman 2004) combined with "criticism of marketing claims regarding the environmental and social benefits of certain products" (Liverman 2004, p. 735). We look at the livelihood impacts of trade in particular commodities that we call *biological-resource-based niche commodities* (defined below). These commodities convey very high added value - some retail at prices

upwards of several thousands USD per kilogram, - increasing the influence of a few wealthy consumers on rural livelihoods and land use in (often poor) developing regions. Such commodities are expanding in urban markets due to producers diversifying away from traditional agriculture into more lucrative activities, the growing demand from wealthy consumers for "alternative" products, the quest for new and profitable commodities by private companies, and the search by development actors for ways to alleviate rural poverty. The objective of this study is to examine the potential of *biological-resource-based niche commodities* for poverty alleviation.

We use a livelihood approach to assess the impacts of argan oil trade on poverty in southwestern Morocco. Livelihood studies address the complex ways in which people engage with different activities and organize themselves to earn a living (Ellis 2000). The livelihood concept, originally created in an attempt to re-emphasize agency in development studies (Scoones 2009), has been used in a variety of fields, including studies of human-environment relationships (e.g. Zimmerer 1997) and of migration, diversification and the dis-intensification of land use (e.g. Bebbington 2001; Zimmerer 2007). In our case, the concept allows for integrating the study of a niche commodity into the complex web of activities in which its production takes place, effectively contextualizing the commodity chain, as advanced in Challies (2008).

Background and Theoretical Framework

The argan boom

Argan oil is extracted from the nuts of *Argania spinosa*, a tree endemic to southwestern Morocco, where it covers approximately 950,000 ha. Extraction is a labor-intensive activity traditionally carried out by women that involves cracking the hard shell of argan nuts, roasting the kernels, grinding to produce a thick paste, and kneading this paste to extract oil. This transformation takes two to three days' work per liter of oil, not counting harvest. Argan trees are managed under a complex tenure system in which the trees are usually state property but usufruct rights, including nuts harvesting, are granted to resident communities and regulated by customary rules that vary greatly among places, from *de facto* private ownership to open access.

Argan oil is used traditionally as seasoning, for skin care, and as a cure for various illnesses. It has been produced for at least nine centuries (Ruas et al. 2011), however until the late 20th century, its trade was restricted to Morocco and it had a relatively low market value. In the 1990s, cosmetic firms and the German development agency GTZ took interest in this resource for its potential as a skin care product, and as a "triple win" for conservation, rural development and economic growth (Turner 2009). Women-led cooperatives were created with the support of the European Union and the Moroccan *Agence de Développement Social*, among others. Private firms entered the market, buying raw material for processing. Demand for argan oil exploded in Europe and the United States and prices rose accordingly. Export prices now reach over US$400/liter.

From the beginning of the boom, argan oil marketing has been promoted as a solution for conservation and development. The recent *Green Morocco Plan* has put the development of argan oil production (with other niche products such as roses, saffron, cactus oil) at the center of the Souss region rural development strategy.[1] Recently, the conservation and development

claims have come under increasing scrutiny. Early research in the northern part of the argan region found that, given current property rights, people had little economic incentive for conservation and "most of the gains appear[ed] to have accrued to non-locals able to overcome capital and infrastructural constraints to entry into the mechanized, high-end market" (Lybbert et al. 2002, p. 142). Subsequently however, Lybbert et al. (2010) showed that households that had harvested more argan kernels in 1999 had also accumulated more goats by 2007, suggesting a positive influence of argan oil marketing on assets but a negative impact on the forest. Our case study uses original data from another region to test the claim that the argan oil trade has benefited inhabitants in production zones. First, however, we examine the potential impact of niche commodities on poverty alleviation and conservation.

Definition and typology

Argan oil is an example of what we call *biological-resource-based niche commodities* (hereafter BNC), in other words, niche commodities that are derived from natural or agricultural ecosystems. Niche products are specialized goods and services, sold to a limited number of consumers at prices generally higher than those of close substitutes. They have been the subject of a growing number of studies over the last decade, particularly with respect to food markets (e.g. Ilbery and Kneafsey 1999; Lee et al. 2010; Watts et al. 2005). In fact these products can be split into a number of distinct categories. They can be services (e.g., ecotourism) or goods. They derive their value from the manufacturing process involved (e.g., Japanese cast iron teapots) or from the raw material being used. The latter can be mineral (e.g., Himalaya salt) or biological.[2] We use the label BNC to refer to this last segment of niche products (Figure 1). The main criterion of a BNC is its market properties (i.e., a product sold in small quantities and at high prices). Its biological origin (agricultural

or not) is a sub-criterion. The concept overlaps with, but is not equivalent to, other categories such as organic (Raynolds 2000 and 2004), fair trade (Raynolds 2000; Taylor 2005), or Non-Timber Forest Product (NTFP) (Belcher et al. 2005), which are defined based on their production characteristics. For example, a NTFP for local markets and with low bulk value is not a BNC, but may become one after a commercial boom (e.g., açaí berries). Additionally, a BNC can be produced or extracted either in or outside forests (e.g., saffron or cashmere fiber). Similarly, fair trade or organic products may or may not be BNC (e.g. organic sunflower seed oil vs. organic cosmetic argan oil), and BNC need not be organic or fair trade. BNC are often associated with endemic species or unique *terroirs*, hence their limited global availability. They can be produced as for domestic crops, (e.g., specialty coffee), or harvested as products gathered from the wild (e.g., *kopi luwak*,civet coffee). In many cases, supply is partly controlled, either because it is a mixture of wild gathering and controlled production (e.g., vicuña fiber), or because only some aspects of production are controlled (e.g., semi-domesticated species such as shea and argan trees). Several BNC, including narcotics and wildlife body parts, are illegal commodities. Others are sold both legally and illegally (.e.g.,vicuña fiber). Since BNC are by definition scarce, they are often heavily regulated to prevent over-extraction. Our focus here is BNC produced in rural areas of developing countries for export to richer regions.

Emergence of BNC

One pathway of emergence of BNC is the *creation* of a niche product *via* bio-prospecting. In other words, a product that was originally restricted to local use is made suitable for international markets, targeting specific user groups such as the cosmetic industry or consumers of exotic fruits and juices. Another pathway is the *differentiation* of a mainstream

resource within an existing international market, as in the case of specialty coffee or fair trade cacao. This differentiation may be based on quality (production method, raw material selection), environmental (organic), social (fair trade), or geographical (origin) characteristics. A third pathway is the *expansion* of established high-value product chains due to increase in global demand driving prices up (e.g., caterpillar fungus and saffron).

Reasons for engaging in BNC commercialization

While *private firms* are driven into BNC trade to generate profit, the motivations of producers, consumers and development agencies deserve some discussion.

Producers engage in BNC trade for two main reasons. One is the prospective of *increased margins*. If high retail prices for BNC are transferred to producers, there is incentive to produce them, especially if traditional agricultural commodities offer low returns. Seizing market opportunities early on may create a competitive advantage for pioneers at later stages. Secondly, producer households engage in BNC trade as part of a *diversification* strategy. Diversification reduces their vulnerability to price and climatic cycles if activities are complementary. BNC trade may help generate the cash needed to set up or sustain other activities (e.g., buying a motorbike), complement irregular income (e.g., unskilled wage labor), or simply add income.

Consumers may buy BNC for five reasons, which are embodied in the narratives accompanying BNC marketing. *Care for nature* or environmental awareness influences the demand for organic products and for products claiming to benefit nature (Bryant and Goodman 2004). Numerous BNC are marketed with a narrative of conservation-friendly

extraction practices, such as vicuña fiber (Lichtenstein 2010) or argan oil (Lybbert, Barrett and Narjisse, 2002). Certification includes organic labels, as well as other sustainability claims. *Care for others* or solidarity also motivates consumers. Increased awareness of the socially unfair conditions under which commodities may be produced, has led a growing number of well-off consumers to purchase fair trade products (Bryant 2004). A gender or empowerment of women narrative is also associated with several BNC. *Care for oneself* or beauty and health is another motivation. Premiums for some non-western "natural" medical or beauty products can be extremely high. For example the caterpillar fungus (*Cordyceps sinensis*), with alleged aphrodisiac value, is sold for US$1750 to 7500 per kg on the Chinese market (Winkler 2008). Marula oil is sold for US$350 to 600 per liter for its moisturizing and antioxidant properties (Schreckenberg 2003). *Quality and taste* also justify high premiums. Gourmet products can reach skyrocketing prices, for example civet coffee is sold for US$700—1300 per kg (Marcone 2004), and edible bird's nests for up to US$10,000 per kg (Marcone 2005). Finally, *tradition* is part of narratives associated with most BNC. "Traditional" products associated with ancestral indigenous practices of a community represented as living in harmony with nature can attract high prices. Some places, such as the Amazon rainforest (e.g., açaí berries), or the Himalayas (e.g., goji berries), have strong evocative power. geographical indications or designations of origin provide consumers a guarantee that their products originated in a specific *terroir* – a place whose character determines the particular qualities of the products (Gade 2004). Seemingly consumer price rises when more of these five narrative components of BNC marketing are fulfilled (Table 1).

Development agencies[3] have facilitated the emergence of BNC through value chain interventions (Humphrey and Navas-Alemán 2010; Nill and Böhnert 2006), through support for the marketing of non-timber forest products and the creation of labels and geographical

indications (Belcher, Ruiz-Pérez and Achdiawan 2005; Belcher and Schreckenberg 2007; van de Kop et al. 2006). Recent policies have targeted BNC more explicitly (FAO 2010; GTZ 2003). Given that a large fraction of the world's poor are rural dwellers for whom conventional agriculture offers little economic expectation, differentiation and niche marketing seem to create unique opportunities to "make the market work for the poor". In some cases, including for argan oil, nature conservation is another motivation. Arguably, win-win market solutions are easy to promote among donors and aid organizations.

BNC and poverty alleviation

The commercialization of BNC holds the potential to generate significant income for the poor, provided that several conditions are met (Figure 2). First, the quantity that can be marketed by the poor must be sufficiently large to significantly increase their income. Overall per capita production must be significant, and the poor must own a fair share of the production. Second, the price paid to poor producers must be sufficient to cover costs (mainly the opportunity cost of labor and transport costs) and generate profit. This entails high retail prices, sufficient price transfer to producers, and access to BNC distribution channels and markets by the poor (meaning that barriers of entry are inexistent or easily overcome). High retail prices may be achieved when the resource is scarce relative to global demand and when some of the conditions for consumer premiums mentioned above are met. This condition of global scarcity does not conflict with the condition of sufficient per capita production; indeed global scarcity need not mean low per capita production if production is spread among few producers. Price transfer to producers and market access depend on the commodity value chain and on household attributes. Development agencies often argue that these conditions cannot be met without external intervention. Where the conditions do ensure a significant

income for the poor, to sustain that income over time both sustainable resource extraction and sustained consumer demand are required.

BNC and conservation

The effects of BNC trade on conservation depend on the effect on increased extraction or conservation measures. The high value of BNC may lead in some cases to *over-extraction* and resource depletion. For example, crops may expand into marginal lands, seeds may be harvested to a point that affects regeneration, or animals may be overhunted. Alternatively, BNC trade may encourage the *regulation* of exploitation and the adoption of conservation measures. The outcome largely depends on resource property regimes and resource institutions. It may also depend on the transfer of norms and values from consumers or national institutions (e.g. through production standards and certification schemes).

Case Study of Livelihoods and Argan Production in Morocco

The case study tests the claim that BNC commercialization improves smallholders' livelihoods in a situation apparently favorable to all parties, and has been promoted as such by development agencies. Argan oil meets several of the conditions for success. Retail prices are very high, in part due to the global scarcity of the raw material - argan trees are endemic to Southwest Morocco. The five conditions for consumer premiums are also met: 1) part of the production is certified organic, and the rising market value of oil is thought to encourage ecosystem conservation by producers; 2) it is associated with a gender empowerment and

rural development narrative; 3) it has desirable health properties both as cosmetic and edible oil; 4) it is used as a gourmet seasoning in high-end western restaurants; and 5) it is associated with an "Edenic" narrative (Bryant and Goodman 2004) emphasizing Berber identity and tradition. Several women's cooperatives have been created to stabilize prices and provide technology and market access. Recently, fair trade criteria have been set by the Fairtrade Labelling Organization and argan oil has been protected by a Geographical Indication. In spite of large differences between local and retail prices, local market prices for homemade argan oil and for unprocessed kernels have risen to very high levels. One can thus expect that the argan boom has had some benefit to the poor.

The study area is located in *Taroudant* province in South-western Morocco, around the market center of *Awluz*.[4] (Figure 3). Traditional livelihoods in the area are based on barley and wheat cultivation under argan trees, animal husbandry, argan oil production, and wood and charcoal extraction. Recently, they have increasingly given way to nonfarm work and migration. Argan oil trade is probably the only activity based on natural resources that has been increasing. However, forest degradation is threatening future production: A time series analysis of aerial photographs from 1970 and high resolution satellite images from 2007 showed that forest density declined by 44.5 percent in the study area, mostly due to increasing aridity and fuelwood extraction (le Polain de Waroux and Lambin, 2012).

We studied five villages; one was selected in 1995 as "test village" for the *Argan region Conservation and Development Plan,* a joint project of the Moroccan Government and the German Technical Cooperation. The village hosts an early argan oil production cooperative, created in 1998. It delivered 7150 liters of oil annually in 2004-2007, providing an income of about 2100 MDH (Moroccan Dirhams) or US$265 (1 US$ = 8.5 MDH) per woman*year.

Production halted in 2009 due to management issues, but it had resumed, albeit at a lower pace, in 2011 and 2012.

Data and Methods

Household interviews

Retrospective household interviews covering livelihoods, income, and assets, were conducted in the five villages (eighty-six interviews, table 2) between November 2009 and January 2010 by the lead author. Interviews were held in the local language (*Tashelhit*), with the help of an interpreter. Households were contacted with the help of a local collaborator, with explicit attention to maximizing diversity in livelihood and economic status in the sample. We conducted village-level household censuses covering basic assets and livelihood indicators to crosscheck the representativeness of our sample. Interviews were conducted with the household head (always male in this region) if available (fifty-five interviews), or his wife (twelve interviews) or oldest son (nineteen interviews) otherwise. Interviews included questions on production of cereals, argan nuts, almonds and olives, focusing on the harvests of 2009 and 1996 (1996, a particularly good agricultural year, was a convenient reference point). Interviews also asked about the number of herd animals. Work and migration history were approached using timelines representing employment periods and locations for all household members. For assets, the number of items owned and purchase date were asked (or the date of building or renovation for houses). Income sources were estimated by asking respondents to sketch their household budget, and by checking with them its coherence with previous answers on livelihoods. Information on livelihoods, prices, wages, and village history was obtained through key informant interviews, informal conversations, and direct

observation during four visits to the area between June 2009 and January 2012 (totaling about six months). We complied with the ethical principle of *respect for persons* as advocated by human research protection programs by informing participants orally of the research aims and design (prior informed consent), and by respecting their wish to remain anonymous in our data collection and publication.

Income

To compare the income from argan oil we estimated the monetary value of five income categories: agriculture (cereals, olives, and almonds), animal husbandry (sheep, goats, and manure), forest products (argan oil and wood), local non-farm activities, and remittances. The monthly income from animals and manure sales, argan oil sales, local non-farm activities, and remittances were asked directly in the household interviews. The value of argan wood gathered for domestic uses was estimated as the number of donkey loads of wood times its price. The value of self-consumed argan oil was considered equivalent to the same amount of olive oil, which is widely purchased locally. The value of cereal production was computed as the quantity of flour produced times its local markets price, minus production costs.[5] The value of almonds and olives was estimated as the price of buying the same quantity of almonds or olives on the local market.

Regression on asset index

We used regression analysis to estimate the relative effects of argan oil production, non-farm work and remittances on wealth in 2009 and on wealth difference between 1999 and 2009, as

estimated by means of an index representing assets (e.g. housing and domestic equipment). Relevant independent variables were tested individually along with a set of control variables in intermediate models. Variables with significant parameters at a 90 percent level in these models were then cast together in multivariate regression models to control for interactions.

In the absence of complete and accurate consumption expenditure data, wealth can be measured through a polychoric principal components analysis (pPCA) on assets variables (Kolenikov and Angeles, 2004). This method is a type of principal component analysis based on polychoric correlations that deals with both continuous and categorical variables, and takes into account the ranking of categories within variables, the frequency of occurrence across the population of the categories, and the frequency and ranking of the other categories. The first eigenvector of the pPCA captures the greatest variation in the sample and can be used as an asset index. We selected ten asset variables that best reflected wealth differences according to our observations and discussions with residents during initial fieldwork (see table 3), and used their 1999 and 2009 values as inputs for the pPCA. The first axis was used as the asset index after standardization. For any household, A_{2009} is the asset index in 2009 and A_{diff} is the difference between the 1999 and 2009 index.

Control variables were variables potentially influencing the assets index, but outside the focus of the study. Land holdings, traditionally a determinant of household wealth, were represented by a proxy variable based on average cereal production for the years 1996 and 2009 (direct information was not available as plot size was usually unknown to respondents and plots were fragmented, making area estimations difficult). Cereal production, when categorized, can be considered as a reasonable proxy for land holdings because most of the productive agricultural land is still cultivated, and production factors differ little among

households (no chemical fertilizers or pesticides are used). For herd size, another important productive asset, we used the 1999-2009 average (or since the first year data were available). While herd size may influence wealth, the reverse is not always true as animal husbandry is one of several possible livelihood strategies: some households may invest in animals, but others steer away from livestock breeding. We therefore do not consider this variable as endogenous to wealth. Workforce, measured as the number of workers, may influence production and the potential to diversify. Education of the head of household may influence wealth through skills and better access to employment. Travel time to the market was also included as a proxy for accessibility.

The existence of an association between *argan oil production* and wealth was tested using the harvest of argan nuts and sales of argan oil[6], for both 2009 and the 1996-2009 average value to account for the variability of production between these two years. A dummy variable was included for households that had sold argan oil through the argan cooperative.[7]

We also included variables related to *non-farm work and migration*, such as the time spent working in a specific activity or abroad. Timelines from the interviews were used to generate aggregate indicators of activities of the household. For any activity (e.g., "work in the transportation sector"), we computed a "*percent working time*" variable representing the relative amount of male labor put into that activity or location at the household level between 1999 and 2009. For example, the variable *work in transportation* corresponds to the number of years spent working in the transportation sector by male household members during the last 10 years, divided by the number of years worked in total. Women were not included in these variables because, in our study area, they invariably work in the village, engaging in

household and farm activities such as firewood collection, argan oil production, cooking, weeding, and more. Table 4 provides a summary of variables used in the regression analysis.

Results

Income

Income was dominated by remittances, which average 35 percent of total (Table 5). Activities associated with natural resources accounted for less than half of households' income, taking into account the subsistence value of self-consumed products. Income from argan oil averaged 83 MDH (US$10) per month or 4.1 percent of total income (sd = 9.3) for the whole sample. Most of the argan oil income however was earned in village A, with an average of 208 MDH (US$25) per household*month, or 11.8 percent of household income in this village (sd = 14.1 percent), as compared to 29.9 MDH (US$3.6; 1.2 percent of total income; sd = 3.8 percent) for the remaining villages. Eleven Households got more than 10 percent of their income from argan oil, among which nine were in village A. Important variations between villages were also found in the share of farm-related income, from 30.9 percent in village D to 56.7 percent in village E. At 2009 prices, producing argan oil in the study area provided lower returns on labor than working as a wage worker on a commercial farm: about three days of work were needed to produce one liter of oil sold ~150 MDH on the market, which amounts to ~50 MDH per day, whereas the local daily wage for agricultural workers was ~100 MDH.

Argan oil income varied interannually due to price and climatic variations. To project the potential income for a higher level of production (i.e., for years with better climatic conditions than 2009), we computed the budget share of argan oil on the basis of the declared 1996 production level (an exceptionally good year), assuming that all production would be sold at the average market price in Awluz in 2010 (100 MDH per liter, US$12), a very good

year. We obtained a "best case" average share of 8.0 percent (sd = 10.7) of household budget derived from argan oil, or 13.9 percent (sd = 14.6) for village A and 5.5 percent (sd = 7.5) for the other villages. The households with the highest proportion of income derived from argan oil sales were mid-range households, with asset levels around the sample mean (0.43) (Figure 4).

Regression on asset index

The proportion of the variance in the sample explained by the first axis of the polychoric PCA, i.e. the asset index, was 53.7 percent. There were wide differences in assets (significant at a 95 percent level) between villages C and E, and the other villages in 2009 (Figure 5). All variables included were positively associated with the index (Table 6).

In the *intermediate models* (Table 7), argan oil sales in 2009 were negatively associated with A_{2009} (the asset index for 2009) and harvest of argan nuts was also negatively associated with A_{diff} (the ten-year difference in asset index), but these effects disappeared in the multivariate models. Participation in the argan oil cooperative had no significant impact on assets. Time spent in Moroccan cities and abroad was positively associated with A_{2009} but not with A_{diff}, for which only one non-farm sector (construction) was significant. Over 80 percent of the male labor was allocated to non-farm activities between 1999 and 2009. The service sector was most important in terms of work time (35.1 percent of total work time) followed by the construction sector (26.3 percent).

In the *final multivariate model for A_{2009}* (R^2_{adj} = 0.566), argan oil sales were unrelated to A_{2009}. The time spent abroad was highly significant both statistically and quantitatively, as

the difference between households with the lowest and highest value of time spent abroad amounted to 0.28 units. The time spent working outside the village was likewise significantly and positively related to A_{2009}. Land holdings and accessibility were also significant – positive and negative, respectively – determinants of wealth in 2009 (Table 8).

In the *final multivariate model for* A_{diff} (R^2_{adj} of 0.397), harvest of argan nuts was unrelated to A_{diff}. The only significant variable apart from the controls was the time spent in the construction sector, which was positively related to A_{diff} and had an effect comparable in magnitude, but opposite in sign, to that of accessibility. Land holdings and the number of male workers were both positively related to difference in assets (Table 9).

Discussion

Findings

> "Those who left and worked outside the village for a long time, they earn money. The others stay poor." A local villager (19 October 2009).

Both the budget and asset analyses show that argan oil plays a minor role in income, except for one village and under good price and climatic conditions. In normal years, it provides a significant income to few households. It cannot explain asset differences either among households, or over time. Involvement in the cooperative is equally insignificant in asset accumulation. Quite strikingly, the share of argan oil in household budgets for the year 2009 is lower on average than that of argan wood or livestock. We can thus not conclude that argan oil trade has significantly improved livelihoods in the study villages. This does not imply however that argan oil or its production has no other, non-monetary value. Indeed argan oil is prized by locals and migrants, as an object of pride or a connection to home. Its production is an important social activity for women, although it is not always considered enjoyable, as this remark made to us by the cooperative's young president shows: "Look at my hands, how bruised they are [from cracking the nuts with stones]! I keep cracking nuts all day! Fortunately I will soon be married in Marrakesh, then I don't have to make argan oil any more!" (26 February 2011).

By contrast, non-farm work and remittances are highly significant for income and asset accumulation. Households with a history of international migration and those with a greater level of external involvement were likely to be much wealthier than others in 2009, ceteris

paribus.. Over the last decade, the sector most favorable to asset accumulation was construction, from small family-businesses to large enterprises.

It is sometimes argued that migration is endogenous to wealth because leaving the village is costly. While this may be true for international migration, field evidence suggests otherwise since most people leave as young adults , without much skills or money, start in low-paying jobs, and move to better positions (or not) as they gain experience and build professional networks. As for international migration, for nine out of fourteen households in our sample with at least one international migrant migration seems exogenous to wealth because either migrants started as miners in France (miners were not selected based on wealth but on abilities and strength), or they were sent abroad through professional networks, or they were poorer than average. Removing the five remaining households from the sample did not change regression parameters significantly.

Land holdings and accessibility explain a large part of the variance in wealth and its change between 1999 and 2009, while animal husbandry is insignificant. The importance of landholding can hardly be attributed to cereal production, which barely suffices for home consumption. Instead, we suggest that it reflects structures of social power and path dependence. Large landowners were traditionally from powerful families, who likely enjoyed better food, health, education and social networks, giving them an advantage over others. This was confirmed in discussions with elders. While animal husbandry contributed to past assets, today herds are increasingly decoupled from wealth,. As for accessibility to the market, its significance may reflect the difficulty of engaging in income-generating activities in areas too remote for commuting; the increased cost of housing investments in remote areas

due to the transport of material and rugged terrain; and the lack of access to technology, education and health care, which influences the finding non-farm jobs.

The argan oil trade has nominal impact on wealth for several reasons. *Firstly*, raw material is only available in a limited amount and its quantities are geographically and temporally variable. Apart from village A, low production of argan nuts is due to sparse occurrence and the dry climate of inland Southern Morocco. Decreasing forest density over the last decades (le Polain de Waroux and Lambin 2012) has undermined production, and strong year-to-year climate variability makes it unpredictable (it was close to zero in some of the surveyed villages for 2008). *Secondly*, market prices fluctuate: they have been highest in years of scarcity; and when nuts are scarce in the argan region as a whole, this is particularly so in its drier parts. Prices also fluctuate seasonally depending on the availability of kernels, which are thus subjected to speculation. As is commonly stated, "When we have nuts, the price is low; when the price is high, we have no nuts" (a villager, 19 October 2009). The price-stabilization role of the cooperative partially failed due to long delays in payments to women and to governance problems. Moreover, prices paid to cooperative members were below-market at times of peak demand. The costs of price fluctuations are thus borne primarily by producers, who complain "the cooperative only helps its president" (who is a salaried worker). *Thirdly*, the poor cannot alone overcome the entry barriers into the high-quality export market. In the absence of efficient institutional support, private firms appropriate most of the margins from argan oil trade (Lybbert et al. 2002). Men are usually conscious of this, and we were frequently approached with requests for help in setting up "argan export business". Some also rely on migrant networks to this end. Women are less informed about these differences, as they do not market the oil themselves. When asking a woman for the current oil market price, a common response is: "I don't know, my husband sells it".

Referring back to the theoretical framework (Figure 2), one could conclude that the conditions for a significant per capita production, market access, and value transfer to producers are not fully met.

Significance of our findings for the argan region

This study draws on a limited number of villages. Lybbert et al. (2010) analyzed household impacts of the argan boom using panel data from 96 households in the northernmost region, where the forest is densest and trade most developed. Using small livestock herd size as an asset indicator, they found that households that had collected more kernels in 1999 had increased their herds more than others by 2007. The presence of an argan cooperative in the surveyed villages did not influence change in herd size. While this result may reflect an increase in investment, in our sample herd size was unrelated to other assets and wealth. Other ongoing research on household livelihoods in the region suggests that income related to argan oil marketing has been significant for some households but is indeed limited relative to nonfarm work and remittances.[8] The argument that people have no economic incentive to plant and protect trees (Lybbert et al. 2002) probably holds, especially given tenure insecurity (argan trees are legally state property).

The argan trade has also had various social impacts. The creation of cooperatives has altered gender relationships, bolstering the social recognition and self-confidence of women, particularly those socially disadvantaged. However, sometimes it may raise suspicion on the part of other villagers and spur conflicts within households (Damamme 2011; Turner, *unpublished manuscript*). Finally, the cooperatives' agenda of promoting education may have increased school enrollment among girls (Lybbert et al. 2011). The boom has also

prompted new tenure claims and contestations, and intensified competition over resource access (Turner, *unpublished manuscript*). It has arguably made argan oil an object of regional pride for residents.

Summing up, argan oil production is part of a diversified portfolio of livelihood activities that includes farm as well as non-farm activities. While the increase in local market prices witnessed over the last decade has probably provided a complementary source of cash to many households, the magnitude of these benefits in most cases does not compare to that of benefits brought by the increased work opportunities in rural non-farm activities and in cities. Better institutions (functioning cooperatives, fair trade certification or other) might help ensure a higher and more stable transfer of value to the producers. However, they will not prevent cyclic resource shortages due to climatic stress and degradation, and the fact that only a limited amount of oil can be produced by households with current production methods.[9] Commercializing argan oil may thus not on its own provide great hope for poverty alleviation. Other interventions targeting migrants and non-farm work opportunities, and improvements in the social security system, might be more efficient. These could include raising minimum wages, securing migrant remittances through an insurance-like mechanism, and improving access to professional education (Rigg 2006).

Conclusion

This study contributes to a growing body of literature on consumer influence on social and environmental governance as a consequence of global economic integration. We analyzed the rise of *biological-resource-based niche commodities*, or BNC, a set of commodities with very high added value and hence potentially high influence on land use and livelihoods. We

proposed reasons for their emergence, and a typology. We identified basic conditions for BNC to benefit the poor and ways in which their trade might affect conservation. We then used a livelihood approach to analyze the poverty alleviation impacts of the argan oil trade, which has been promoted by development agencies as a solution for conservation and development in Southwest Morocco. Contextualizing argan oil production, we showed that while it has provided a complementary source of cash, its impact on overall income and assets has been marginal in the study area in comparison to other income sources. This suggests that the market claims referred to at the outset are overdone. It also shows the importance of using a livelihoods approach to complement commodity network analyses, which might overlook the context of production (Challies 2008). Other cases of BNC commercialization may nevertheless yield different results. There is evidence that benefits derived by producers of, for instance, caterpillar fungus (Winkler 2008) and açai berries (Brondizio 2008) can provide a significant share of household income. The poverty reduction effects of commercializing BNC thus depend on a number of context-related factors.

With this in mind, we can now tentatively extend the theoretical framework proposed at the outset of this study (figure 2) by suggesting additional factors that may determine the poverty-reduction impacts of BNC trade (figure 6). Variability in agro-ecological conditions over time and space in cases where production is uncontrolled or partly controlled compromises *significant per capita production*, as shown by the differences in production between villages and years in our study. Resource depletion, whether through unsustainable use or external factors such as climate change, has the same effect of decreasing production. Ensuring *value transfer to producers* in cases where resource availability fluctuates and producers are price takers necessitates price-protection mechanisms, otherwise most of the margins are likely to be appropriated by middlemen or retailers who control marketing and

produce the narratives associated with these commodities (Goodman 2004). In our study, the ratio of retail prices for the end-consumers to local market prices reached ten to one. If the value chain can be shortened, e.g. through cooperatives or migrant networks, then producers are more likely to capture a significant portion of the added value. Likewise, institutional support, whether in the form of cooperatives, access to credit, or extension services, is necessary to help producers overcome *barriers of entry* into trade infrastructure. Regimes of resource ownership are important in determining the *share of production* that is accessible to the poor. The commercialization of BNC produced on private land that is mostly owned by the rich cannot be considered pro-poor. Many BNC are common-pool resources, in which cases the definition of access rights is crucial. These regimes vary greatly from one region to another. Even within the argan region, multiple management systems of the commons co-exist. In cases where access is open and unregulated, technology and labor availability may limit access of the resource to the poor. Finally, the *high retail prices* of BNC are caused by the scarcity of the resource relative to the global demand. Maintaining some degree of *global* scarcity while keeping sufficient per capita production at the *local* level implies limiting the number of producers, which may in some cases mean excluding newcomers to BNC trade. There is a tradeoff between the magnitude of (per capita) benefits from BNC commercialization and the number of its beneficiaries. The number of producers can be limited through the definition of geographical indications, which creates narrow market segments and thus artificial scarcity.

BNC provide an entry point to assess social and environmental impacts of consumption and development-conservation relationships, and as such they deserve more attention. Our findings provide a useful framework for research on the impact of BNC trade on poverty reduction. However, other dimensions of BNC not included in this framework should also be

considered. These are for example the possibility of poverty traps, anti-poor development or increased vulnerability resulting from specialization; and indirect beneficial effects of BNC trade (e.g. job creation, strengthening of social networks, and stronger connection to markets).

In the introduction we questioned the relevance of market-based tools of governance. We argue that development agencies should consider supporting BNC commercialization only as one aspect of diversified livelihood portfolios, and should only do so after careful evaluation of the returns from BNC intervention as compared to other development actions. Attention should be given to the extent to which producers really *can* have sufficient control of the commodity chain to retain value. An important part of the BNC value lies in the narrative attached to it, which is often *produced* by intermediaries (Goodman 2004). The continued willingness of some development agencies to support market-based rural development (e.g. World Bank 2007), whether through bioprospecting, non-timber forest products, BNC, or improved crops, shows the power of *win-win narratives* (Oya 2009). These narratives imply that all actors - the poor, private companies and the environment - benefit from certain reforms, such as agricultural trade liberalization. The literature and our case study show that these benefits are usually not shared equally, and that win-win narratives are often overstated. Acknowledging this fact allows setting priorities for action. In the case of BNC commercialization, a set of conditions, including sufficient production, adequate price transfer and market access for the poor, must be met for it to alleviate poverty. The success of BNC marketing as a pro-poor strategy may necessitate interventions to support market access through education, credit and adequate technology, secure price transfers to producers, and monitor resource use to prevent depletion. Where these conditions are met, BNC

commercialization may benefit the poor. Where they are not, other policy options, including non-market ones, may prove more efficient at poverty alleviation.

Notes

1. See http://www.ada.gov.ma/en/Plans_agricoles/plan_agricole_region_souss_massa_draa/les_ambitions.php (last accessed 17/04/2012). While this move may seem innovative, a closer look at the plan suggests that it is quite in range with the philosophy of past agricultural policies in Morocco. Indeed, its focus on privatization and on the aggregation of smallholders in partnership with private firms perpetuates a well-established tradition of trying to deal with rural poverty without engaging in redistributive land reform (Davis 2006; Swearingen 1987).

2. Biological and mineral resources have different production and extraction rhythms: whereas mineral resources are non-renewable stocks, biological resources are renewable, thus providing better prospects for sustainable income generation.

3. By development agencies we mean any organization with a development agenda (including, for example, the British DFID, the FAO or the World Bank).

4. Known as Aoulouz in French.

5. Thus, the value of self-consumed cereals is:

$$V_{sc\text{-}cer} = p_{sc}*[Q_{cer}*(c*P_{flour} - P_{mill}) - (T_{plowing} + T_{threshing})*P_{tractor}] \quad (1)$$

with p_{sc} the proportion of cereal production kept for self-consumption, Q_{cer} the cereal production, c the amount of flour given by one unit of cereals, P_{flour} the price of flour, P_{mill} the cost of grinding cereals, $T_{plowing}$ and $T_{threshing}$ the amount of time that a tractor was used for plowing and threshing, and $P_{tractor}$ the cost of hiring the tractor. For households using donkeys

instead of a tractor, plowing and threshing costs were considered negligible. When sold, the cereals are not ground to flour but are sold as whole grain. The value of cereals sold is thus:

$$V_{s\text{-}cer} = (1\text{-}p_{sc})*[Q_{cer}*P_{grain} - (T_{plowing} + T_{threshing})*P_{tractor}] \quad (2)$$

where P_{grain} is the price of grain.

6. Because harvest data were more reliable than oil production data, we estimated argan oil sales (S) as:

$$S = H*c*PS \quad (3)$$

where H is total harvest, c the number of liters of oil for one unit of nuts, and PS the proportion of argan oil produced that was sold by the household (as declared in the interviews). Lybbert et al. (2011) report an increase in unprocessed kernel sales during the last decade in their study area. In our sample, however, all but two households reported having sold no kernels in 2009 and 1996.

7. Ownership rules of argan nuts were not taken into account in the analysis because: 1) they are defined at the village-level and thus indistinguishable from other village-level effects, and 2) their complexity makes it difficult to identify any direct causal relationship. Differences in ownership at the household level are reflected in the harvested quantities.

8. Xavier Le Roy, Institut de Recherche pour le Développement, Montpellier, France (5 September 2011, personal communication by email); Jihane Bejbouji, Centre de Développement Forestier, Marrakech, Morocco (12 September, personal communication, by email); Romain Simenel, Institut de Recherche pour le Développement, Montpellier, France (21 September 2011, personal communication, by email) and Bertram Turner, Max Plank

Institute for Social Anthropology, Halle/Saale, Germany (19 August 2011, personal communication, by email).

9. While the production of oil from the kernels is now mechanized, cracking the nuts to extract the kernels is still done by hand. It is expected that machine extraction will be feasible in the near future, but this is unlikely to be in the producers' interest.

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Figure captions

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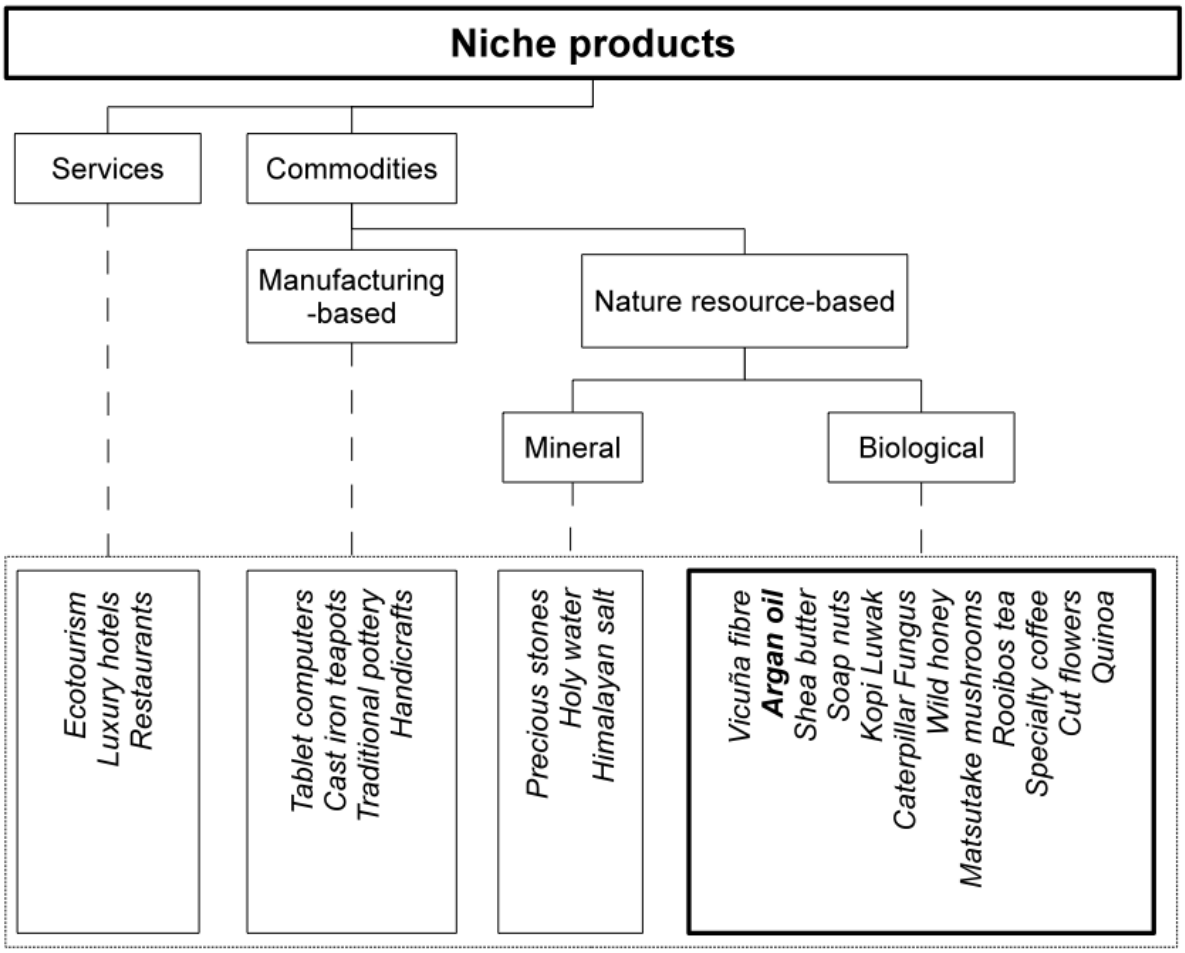


Figure 1.

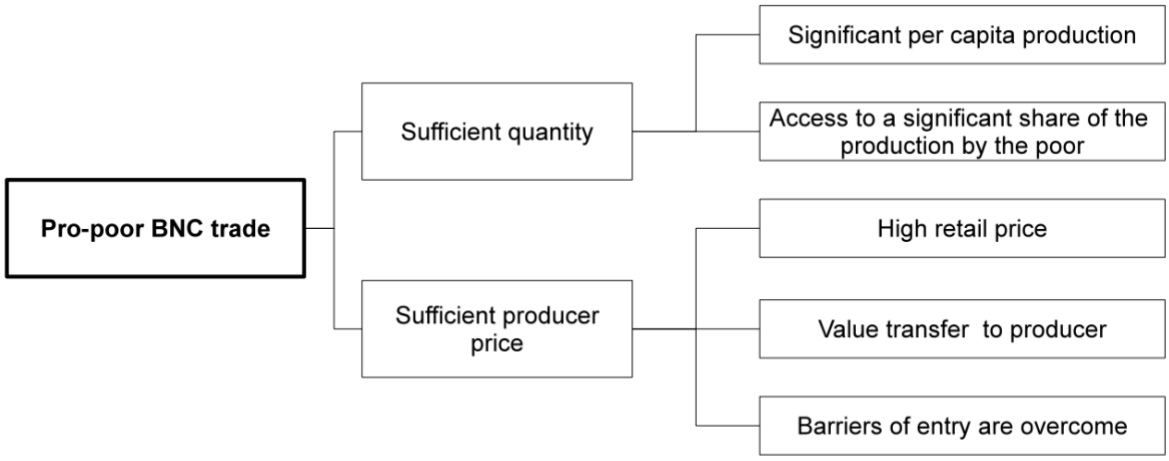
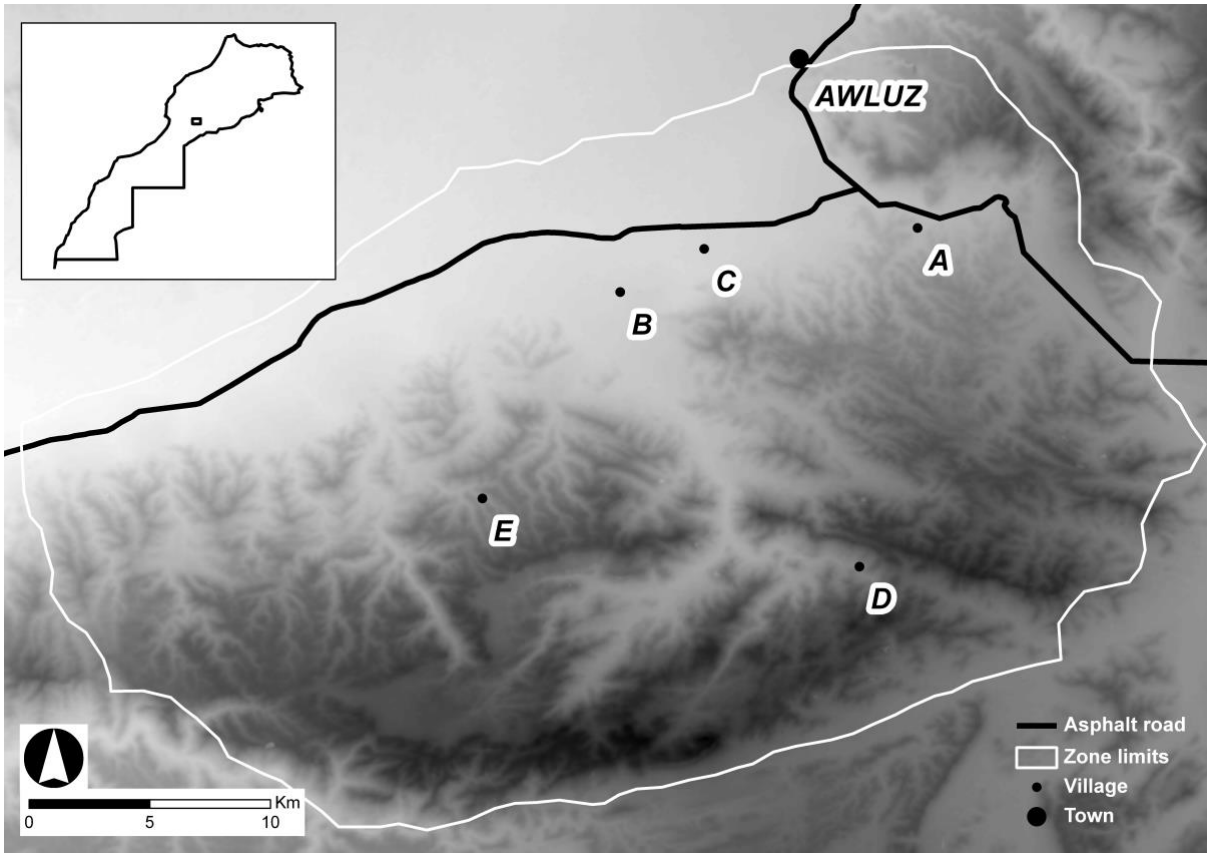


Figure 2.



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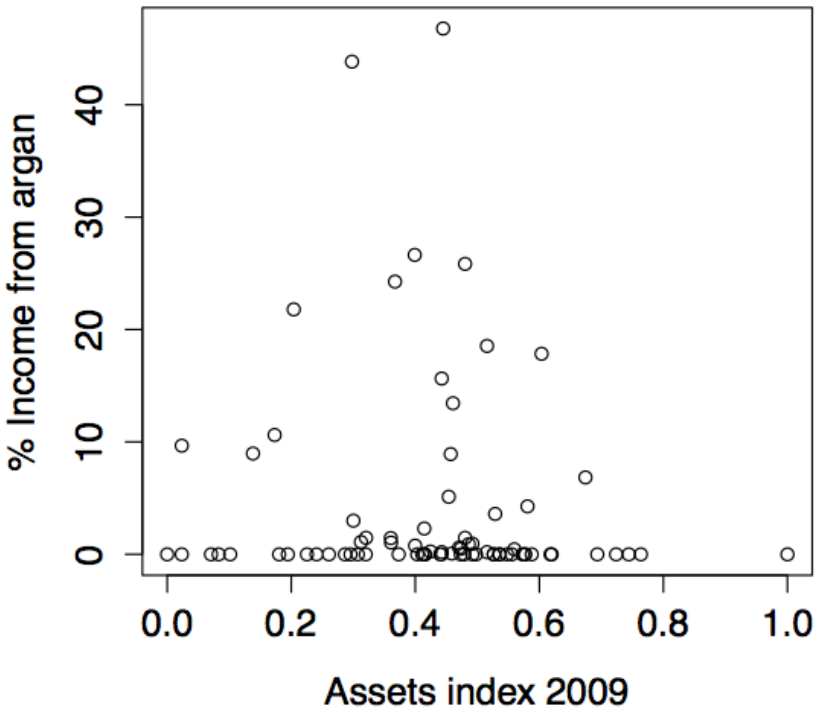

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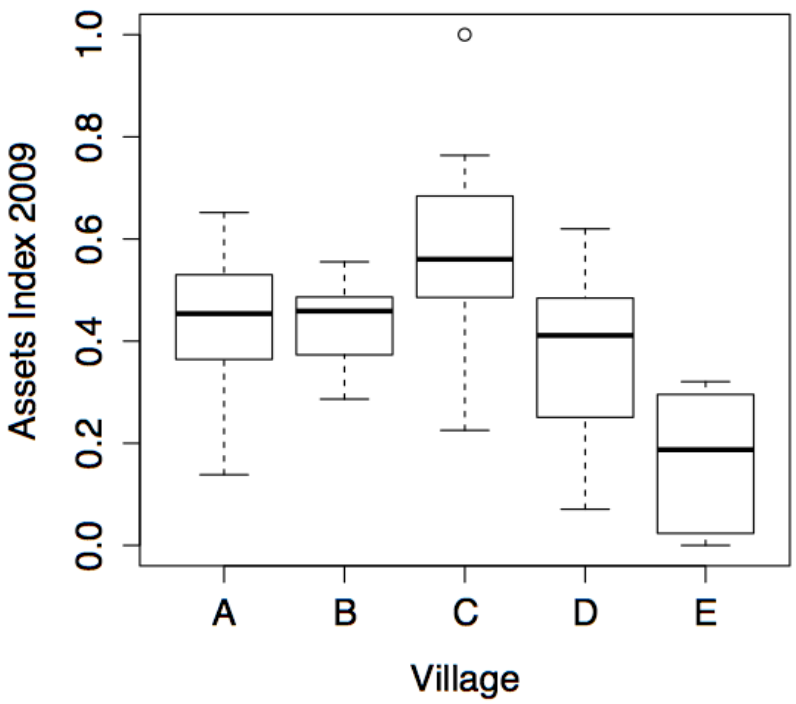

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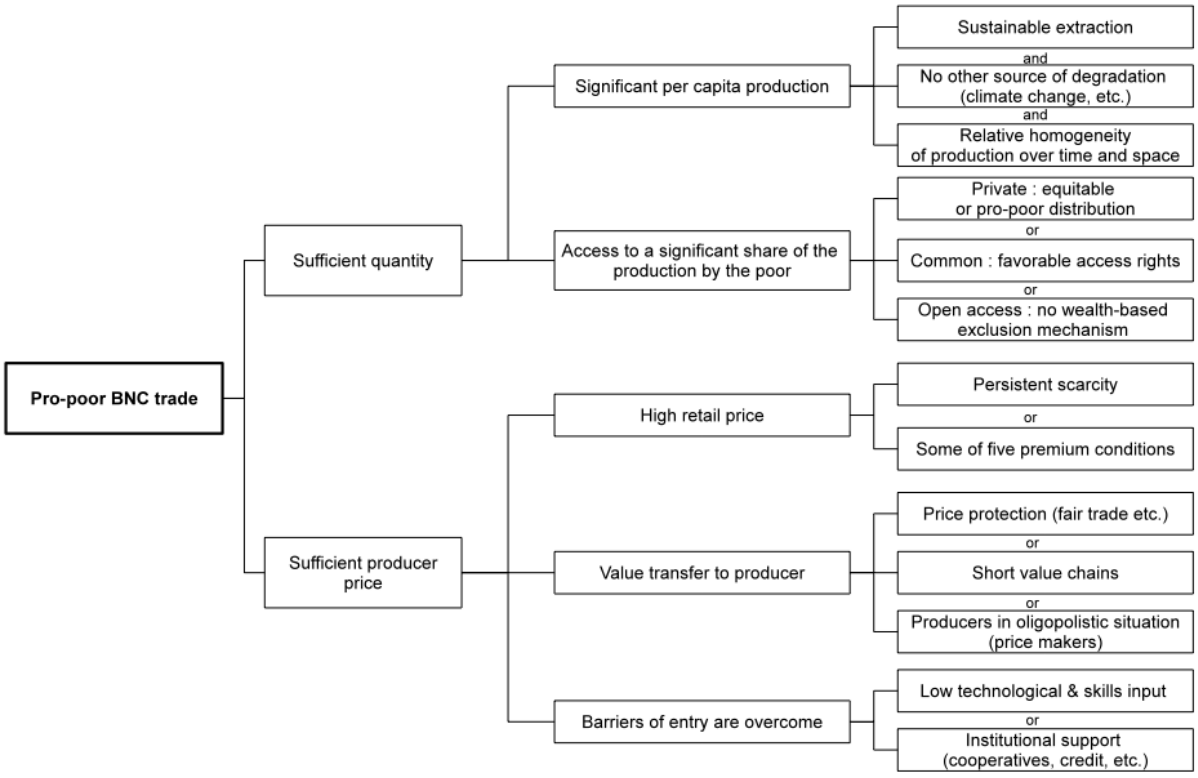

Figure 6.

Table 1. Biological resource–based niche commodities (BNCs) examples, narratives, volumes, and prices

Product	Main origin	Conservation narrative	Organic certification	Development narrative	Fair trade certification	Tradition narrative	Designation of origin/GI/ trademark	Gourmet/ quality product	Health narrative	Volume international trade (T/year)	Export price (range, US$/kg or l)	References
Argan oil	Morocco	+	+[a]	+	+[b]	+	+	+	+	1,000–2,000	100–400[c]	Cunningham (2011); online retailers (2011)
Kopi Luwak (civet coffee)	Indonesia	–	+[a]	–	–	+	–	+	–	<0.25[d]	700–1,300	Marcone (2004); online retailers (2011)
Jamaican Blue Mountain coffee	Jamaica	–	+	–	–	+	+	+	–	~1,700	80–120	Walker (2009); online retailers (2011)
Caterpillar fungus (Cordyceps Sinensis)	Tibetan plateau, Himalayas	–	+[a]	–	–	+	–	–	+	80–180[e]	1,750–7,500[f]	Winkler (2008)
Matsutake mushrooms (Tricholoma matsutake)	Southwest China, Korea	–	–	–	–	+	–	+	+	2,000–3,000	150–400	Yang et al. (2009)
Shea butter	Sudan-Sahel	+	+[a]	+	+[b]	+	–	–	–	~2,800[g]	20–250[h]	USAID (2002); Elias (2004); Greig (2006); Cunningham (2011); online retailers (2011)
Soap nuts	India, Nepal	–	+[a]	+	–[b]	+	–	–	+	No data	20–50	Online retailers (2011)
Vicuña fiber	Andes	+	+	+	–	+	–	+	–	~5	250–1,000	Lichtenstein (2010)
Fair trade rooibos tea	South Africa	–	+	+	+	+	–	–	+	>6,000	20–65	Raynolds and Ngcwangu (2010), Gerz (2006; in van de Kop, Sautier, and Gerz 2006)
Edible bird's nest	Southeast Asia	–	–	–	–	+	–	+	+	~2	2,000–10,000	Marcone (2005)
Quinoa	Bolivia, Peru	–	+	+	+	+	–	–	+	~10,500	7–30	Caceres et al. in Raynolds, Murray, and Wilkinson (2007); Jacobsen (2011); online retailers (2011)
Saffron	Central Asia, Mediterranean	–	+[a]	+	–	+	+	+	–	~200	3,000–12,000	Ghorbani (2008); online retailers (2011)
Marula oil	Southern Africa	+	+[a]	+	+[b]	+	–	–	+	29	350–600	Cunningham (2011); Schreckenberg (2003); online retailers (2011)

[a]Also frequent claims of organic production without certification.
[b]Also frequent claims of working according to fair trade standards, or of other beneficial arrangements, without certification.
[c]Depending on whether edible or cosmetic oil.
[d]For Indonesia before 2004; it is likely to have increased because civet coffee is now on offer from other countries such as Vietnam and the Philippines.
[e]For the Tibet Autonomous Region, China, in 2004.
[f]Prices in Tibet Autonomous Region, China, in 2005; retail prices can be expected to be higher.
[g]For West Africa in 2001.
[h]Depending on whether for cosmetic (high prices) or other uses.

Table 2 : Sampling

Village	# interviews	# households (total)	Sampling rate (%)
A	26	87	30
B	20	44	45.5
C	20	60	33.5
D	10	20	50
E	10	16	62.5

Table 3: Variables used in the asset index

Variable	Type	Description
House type	Ordinal	Index reflecting construction materials used : 0 = only stone and/or earth ; 1 = stone and/or earth partly covered with cement ; 2 = mainly stone and/or earth with parts in cement bricks ; 3 = mainly cement bricks with parts in stone and/or earth ; 4 = only cement bricks
# Rooms	Ordinal	Number of rooms in the house
Guest room	Ordinal	Presence of a room designated for events and guests (taddwarit) (0 = no such room, 1 = room without and 2 = with foam seats)
Ceilings	Binary	Presence of ornamented plaster ceilings
Toilet	Binary	Presence of a toilet
Kitchen	Binary	Presence of a kitchen with gas cooker and sink
Fridge	Binary	Ownership of a fridge
Mobile phone	Ordinal	Ownership of mobile phones (0 = none, 1= one, 2= more than one)
Video equipment	Ordinal	Ownership of a television, DVD-player and satellite antenna (0 = none to 3 = all three)
Vehicle	Ordinal	Presence of a vehicle (0 = none, 1 = motorbike, 2 = car)

Table 4 : Regression variables

Variable name	Variable type	Meaning
Control variables		
Land holdings	ordinal	Index of land holdings based on average cereal production for the years 1996 and 2009 (for households without data in 1996, the 2009 value was used) : 0 = no production ; 1 = up to 100 abra ; 2 = 100 to 200 abra ; 3 = 200 to 300 abra ; 4 = 300 to 400 abra ; 5 = over 400 abra (1 abra amounts to about 13 kg of grain ; 200 to 300 abra are needed annually to feed the average household).
Animals	numeric	Average number of goats and sheep between 1999 and 2009 (where information did not extend back to 1999 we used the average for the available period)
# Male workers	ordinal	Average number of male workers in the household between 1999 and 2009
Education	binary	Formal education of the head of household : 0 = no education ; 1 = primary or koranic school (no case of education higher than primary school for heads of household)
Travel time to market	binary	Travel time to the next market town, in minutes, using the transportation available to villagers (single value per village)
Tested variables		
Argan nuts harvest	numeric	Argan nuts harvest in 2009
Argan nuts harvest (average)	numeric	Average argan nuts harvest in 1996 and 2009
Argan oil sales	numeric	Argan oil sales in 2009
Argan oil sales (average)	numeric	Average argan oil sales in 1996 and 2009
Cooperative	binary	Involvement in the argan cooperative : whether the household has sold some argan oil through the argan cooperative
% Time outside village	numeric	Percent total working time spent working outside the village (but in Morocco) over the last 10 years by household members (pondered mean)
% Time abroad	numeric	Percent total working time spent working abroad over the last 10 years by household members (pondered mean)
% Time non-farm	numeric	Percent total working time spent working in the non-farm sector over the last 10 years by household members (pondered mean)
% Time in various activities	numeric	Several variables representing total working time spent working in the following activities over the last 10 years by household members (pondered mean) : Trade, construction, services, transportation

Table 5 : Percent of income from various sources

Sector	Mean %	Standard deviation
Agriculture	13.1	10.4
Animal husbandry	16.8	22.4
Forest products	13.6	12.0
of which argan oil	4.1	9.3
Local non-farm	21,5	28.8
Remittances	35.0	30.0

Table 6 : Variables weight in asset index

Variable	Level	Weight	Variable	Level	Weight
House type	0	-0.45	Kitchen	0	-0.31
	1	-0.11		1	0.23
	2	0.17	Fridge	0	-0.17
	3	0.39		1	0.33
	4	0.61	Mobile phone	1	-0.33
# Rooms	---	0.24		2	-0.02
Guest room	0	-0.38		3	0.30
	1	0.08	Video equipment	0	-0.30
	2	0.55		1	0.02
Ceilings	0	-0.07		2	0.06
	1	0.35		3	0.34
Toilet	0	-0.49	Vehicle	0	-0.21
	1	0.14		1	0.18
Variance explained : 0.537				2	0.47

Table 7: Regression on asset indexes with control variables and single test variables

	A_{2009}			A_{diff}		
Variable	Estimate	p-value		Estimate	p-value	
Control variables (values when no other variable is cast into the model)						
Intercept	3.42E-01	3.69E-08	***	1.12E-01	8.89E-04	***
Land holdings	4.96E-02	9.26E-04	***	2.32E-02	1.36E-02	*
Animals	7.74E-05	8.34E-01		-1.60E-04	4.92E-01	
# Workers	3.53E-02	3.01E-02	*	2.11E-02	3.87E-02	*
Education	1.32E-02	6.70E-01		-1.57E-02	4.49E-01	
Travel time to market	-1.86E-03	2.21E-07	***	-7.75E-04	2.23E-04	***
Added variables (one by one)						
Argan nuts harvest 2009	7.32E-05	5.91E-01		---	---	
Argan nuts harvest (average)	6.55E-05	6.23E-01		-1.47E-04	7.27E-02	.
Argan oil sales 2009	-3.18E-01	5.47E-02	.	---	---	
Argan oil sales (average)	-6.39E-05	9.21E-01		-5.34E-03	1.51E-01	
Cooperative	-9.52E-03	8.33E-01		-2.92E-02	3.10E-01	
% Time outside village	8.37E-04	8.54E-02	.	-9.45E-05	7.63E-01	
% Time abroad	3.41E-03	2.74E-03	**	6.64E-04	3.45E-01	
% Time non-farm	7.99E-04	1.73E-01		2.57E-04	5.01E-01	
% Time trade	1.02E-03	1.04E-01		-1.82E-04	6.94E-01	
% Time transport	1.71E-03	1.22E-01		-1.07E-03	1.29E-01	
% Time construction	-2.76E-05	9.54E-01		7.87E-04	6.16E-03	**
% Time services	-4.98E-04	3.35E-01		-4.89E-04	1.30E-01	

Table 8: Final multivariate regression model on A_{2009}

Variable	Estimate	p-value		VIF	min-max difference in A_{2009}
Intercept	3.08E-01	2.39E-06	***	---	---
Land holdings	5.08E-02	4.05E-04	***	1.43	0.20
Animals	1.84E-04	5.88E-01		1.21	---
# Workers	1.65E-02	2.87E-01		1.28	---
Education	1.97E-02	5.33E-01		1.37	---
Travel time to market	-1.71E-03	7.24E-07	***	1.53	-0.27
Argan oil sales 2009	-2.23E-03	1.57E-01		1.24	---
% Time outside village	9.84E-04	3.59E-02	*	1.2	0.10
% Time abroad	3.71E-03	9.73E-04	***	1.1	0.28
R^2_{adj} = 0.566 ; 73 degrees of freedom ; F-statistic = 14.2 p-value = 2.99e-12 ; RESET = 0.1076. p-value = 0.88					

Table 9: Final multivariate regression model on A_{diff}

Variable	Estimate	p-value		VIF	min-max difference in A_{diff}
Intercept	6.78E-02	1.30E-02		---	---
Land holdings	2.55E-02	9.91E-03	**	1.33	0.10
Animals	-1.58E-04	5.41E-01		1.3	---
# Workers	3.08E-02	7.16E-03	**	1.19	0.12
Education	8.16E-04	9.71E-01		1.28	---
Travel time to market	-6.40E-04	3.67E-03	**	1.51	-0.10
Argan nuts harvest (average)	-1.09E-04	1.71E-01		1.06	---
% Time in construction sector	7.88E-04	1.51E-02	*	1.22	0.08
R^2_{adj} = 0.397 ; 60 degrees of freedom ; F-statistic = 7.289 p-value = 2.582e-06 ; RESET = 1.378. p-value = 0.26					