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Relearning traditional knowledge to achieve sustainability: honey gathering in the miombo woodlands of northern Mozambique

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Abstract

Mozambique's Niassa Reserve contains Africa's best preserved miombo woodlands. Half of the households there gather wild honey from natural hives for consumption and income. However, most collectors used destructive techniques: setting fire to the grasses under the hive tree to create smoke and then felling the tree. Cutting trees to obtain honey was the principal source of tree mortality. Trees grow very slowly, about 0.25 cm diameter [dbh]/yr, meaning an average hive tree was nearly 200 years old. Furthermore, of the trees > 20 cm dbh of species important for nectar and hives, only about 15% had cavities. Although fire is intrinsic to miombo woodlands, the increased frequency resulting from anthropogenic sources impedes regeneration of some tree species as well as affecting bees, other wildlife and villages. A few people in the reserve had learned from earlier generations how to gather honey in a nondestructive way, using certain plant species to keep bees from stinging and climbing the trees using ropes to take the honeycombs out of the hives. Traditional practices included leaving the larval combs behind so the colony continued to grow. Previously, the older men who had this knowledge had not been willing to share it with younger men. The project arranged for one of the traditional honey hunters to participate in an international conference on honey collection with other indigenous collectors from around the world. This helped him recognize the value of his knowledge. The project team then arranged for him to demonstrate these traditional techniques to groups of honey hunters in nine communities within the Reserve. A year later, monitoring revealed that many collectors had adopted these nondestructive techniques. They found them less time consuming, and appreciated that they allowed collectors to return to the same trees repeatedly to obtain honey. Sharing traditional knowledge made honey hunting compatible with the conservation of miombo woodlands.

Keywords: miombo woodland, wild honey, bees, sustainability, conservation, traditional knowledge, fire, protected areas

Introduction, scope and main objectives

The miombo woodlands are the most widespread forest type in southern Africa, covering approximately 3.2 million km^2 across seven countries (Angola, DR Congo, Malawi, Mozambique, Tanzania, Zambia and Zimbabwe). Of the 50 million people who live there, 80% are rural, their livelihoods depending on miombo for agricultural and grazing land and products including fuel wood, construction materials, traditional medicines and foods such as wild tree fruits and mushrooms. Particularly for poorer households, miombo woodland resources account for a larger percentage of household income than subsistence agriculture (Campbell *et al.* 2002).

The Niassa National Reserve extends over 42,000 km^2 and includes one of the least disturbed areas of Africa's deciduous miombo woodlands. It was established to protect important populations of wildlife species and also includes populations of a number of the world's threatened tree species. Plant species include several trees on the world list of threatened trees (Oldfield, Lusty and MacKinven 1998 in Timberlake *et al.* 2004) as well as other plant species of conservation importance (Timberlake *et al.* 2004). The Niassa Reserve is home to more than 40,000 people, most from two ethnic groups, the Ajaua (Yao) and Macua, who inhabit 50 settlements, and live, on average, on less than one dollar/day (Cunliffe *et al.* 2009). They depend largely on subsistence rain-fed agriculture, but soils are poor and nutrients quickly depleted, so agricultural productivity is low and short-lived; new forest land must continuously be cleared for cultivation. Reserve inhabitants also hunt, fish and harvest forest products. These activities, depending how they are managed, have the potential to negatively impact both the sustainability of harvests and biodiversity. To help the reserve managers address their two principal objectives, biodiversity conservation and community development (GOM & SGDRN 2006), a multi-institutional team carried out research to evaluate inhabitants' uses of forest species and to determine if and how these activities affect key tree species. Further, the project sought to develop, in a participatory way, approaches to better meet the needs of local people while supporting the conservation objectives of the reserve through improved management and use of natural resources.

Methodology/approach and initial results

1. Use of trees by local people

Research focused on communities in the "Mecula corridor", settlements located along the entrance road to the Reserve from Lichinga. The first step was to apply a questionnaire about tree use to 30% of the households, randomly selected, from settlements along this transect (7 in Mecula-Sede, 3 in Mussoma and 2 in Ntimbo). Surveys were designed by the research team and applied by enumerators, graduates of the Wildlife Training College in Marrupa who speak the local languages (Yao, Macua and Swahili) as well as Portuguese and had been trained by the research team. Household interviews were carried out with the male or female adults found at home, 155 men and 136 women, for a total of 291 respondents.

Interviews yielded multiple common names for species that were important for different uses, from construction to fuel, carving and food. Determining the scientific names of those species required multiple subsequent botanical collections and interviews. However, initial analyses revealed that 47% of households gathered honey, mostly from wild hives. This led to a decision to focus on honey as a potential livelihood option that could be compatible with the conservation objectives of the reserve.

2. Honey collection and production, a threat and an opportunity

To learn more about honey gathering and production, focus group discussions were organized in three randomly selected settlements, where separate groups of 20–25 men or women answered 28 questions about these activities. Mr Alberto Siabu, from the local Macua community, was interviewed as an

expert informant, as he was very knowledgeable about plants, honey harvesting and hive management.

The focus group discussions and expert informant confirmed that honey was an important source of income, particularly during the dry season (June–Oct). The principal tree species reported by respondents as important to bees are listed in Table 1. *Julbernardia globiflora* and *Brachystegia boehmii* were most frequently mentioned.

Table 1. Tree species important for hives and/or nectar. Trees with asterisks were sampled within the impact study (section 3).

Local name	Scientific name	Hive tree	Nectar source
Njombo	*Brachystegia boehmii**	x	X
Nchenga	*Julbernardia globiflora**	x	X
Nzolo	*Pseudolachnostylis maprouneifolia**	x	X
Ncueso/Mkwesu	*Tamarindus indica**	x	X
Nchiso/Ntxisu	*Terminalia sericea**	x	X
Nzacala	*Diospyros kirkii*		
Npindimbi	*Vitex payos*	x	
Ncalati	*Burkea africana**		x
Ntumbati	*Pterocarpus angolensis**		X
Mnonji (Baobab)	*Adansonia digitata*	x	
Mbanga	*Pericopsis angolensis*		
Mpapa	*Brachystegia spiciformis**		x

Honey collection in the reserve is practised only by men. About 11% of respondents used traditional bark hives, mostly made from *B. boehmii* (35% of respondents) or *J. globiflora* (33% of respondents), but honey was typically gathered from wild trees. Baobab trees have sacred status and are never cut, but only a select group can gather honey from those trees (5% of respondent households). The techniques collectors reported threaten future harvests and the ecosystem: setting fire to the grass below the honey tree to pacify the bees with smoke (75% of collectors); and then felling the tree (82% of collectors) to reach and cut out the hive, thus destroying the colony and the future potential for bees to use that cavity. Collectors commonly set several fires and fell several trees a day. Collecting groups can start multiple fires and fell dozens of trees during a multiday collecting trip.

Since excess fire frequency was a concern of the reserve managers and the tree populations of the Niassa Reserve were of conservation interest, a decision was taken to further study honey harvesting, its effects on the woodland, and the potential to improve its management and benefits from its harvest.

3. Impact of honey harvesting on honey trees and tree species composition

To evaluate the impact of honey harvesting on the forest, the eight tree species important for hives and nectar (Table 1) and the threatened species, *Dalbergia melanoxylon*, three areas that had experienced different intensities of honey harvest (a long period, i.e. high; a medium period, i.e. medium; or starting recently, i.e. low) were selected for systematic, stratified sampling. Within each of the three areas, two blocks were sampled. Within each block, seven to 13 rectangular transects of 200 m x 40 m were established. Within each transect, all trees > 20 cm dbh of the species of interest

were identified, their diameters measured at 1.3 m above the ground (dbh) and evidence recorded of damage and presence of stem or branch cavities. Stumps and felled trees were also identified and measured and likely cause of mortality was determined (i.e. windfall, felling and removal, felling for honey harvest, elephant damage). In addition, evidence of recent fire was recorded. To assess the impact of felling and burning associated with honey harvesting on species composition and tree population dynamics, tree regeneration of all species was sampled in five 16 m² subplots within a subsample of nine transects per area.

The most intensively harvested area had the highest density of stumps, 36/ha (Fig 1). Felling for honey gathering was the principal source of tree mortality (Fig 2). The proportion of transects with evidence of recent fire was also highest in intensively harvested areas (Fig 3). Research in the reserve had revealed that trees grew, on average, only 0.25 cm/year, so the average honey tree was about 200 years old. Furthermore, only 15% of the standing trees were observed to have cavities, meaning that only a few trees of sufficient size could be expected to provide potential hive locations. The density of juvenile trees was lower in sites subjected to a high intensity of honey harvesting and recent fires which was also found to affect the composition of tree regeneration, selecting for more fire-tolerant species.

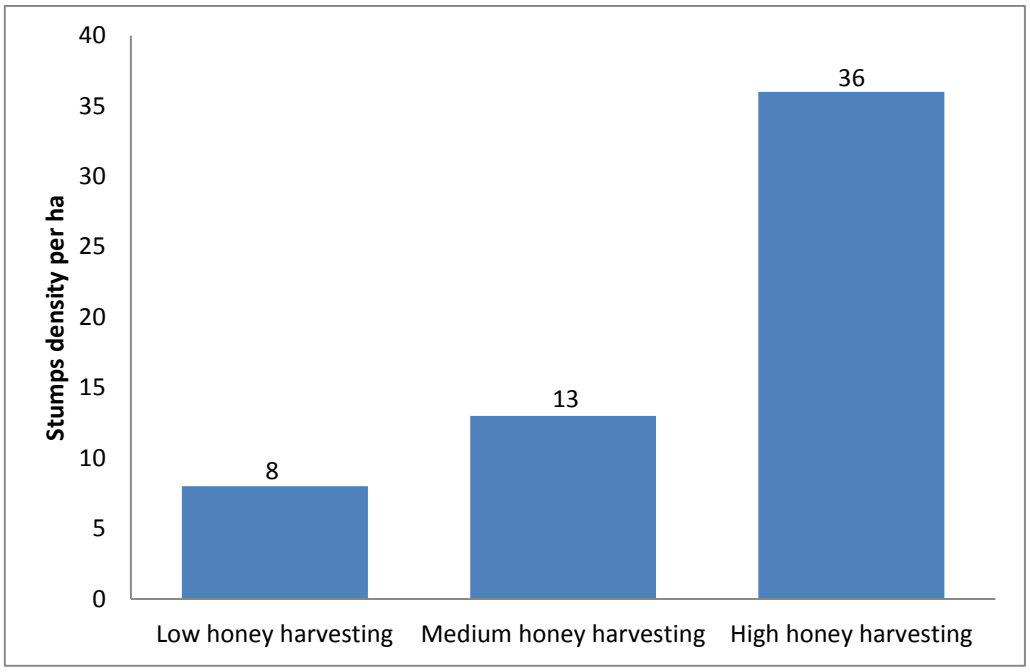

Figure 1. Density of stumps per ha in three honey collection areas with different intensities of use.

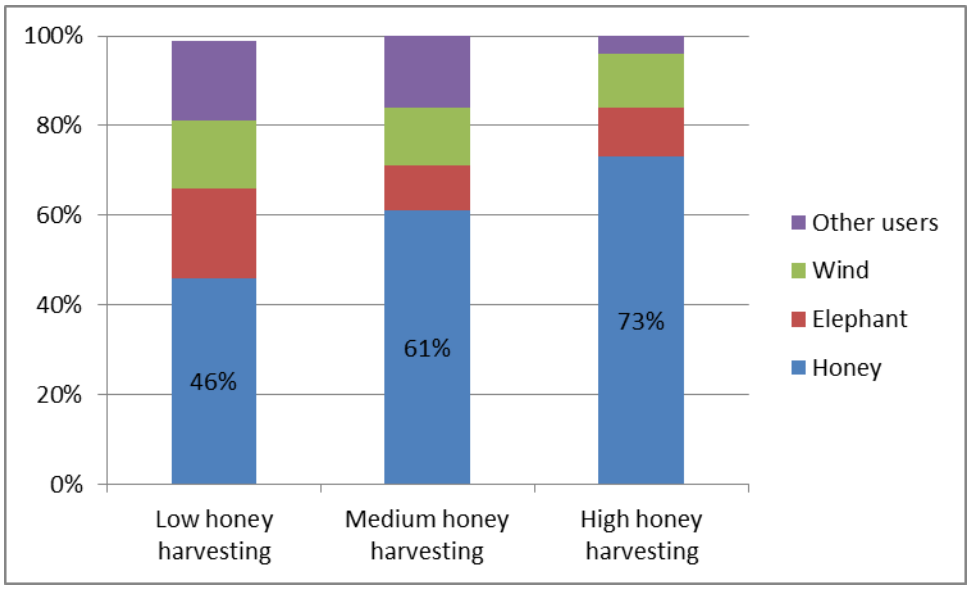

Figure 2. Sources of mortality of trees in areas with different intensities of honey collection.

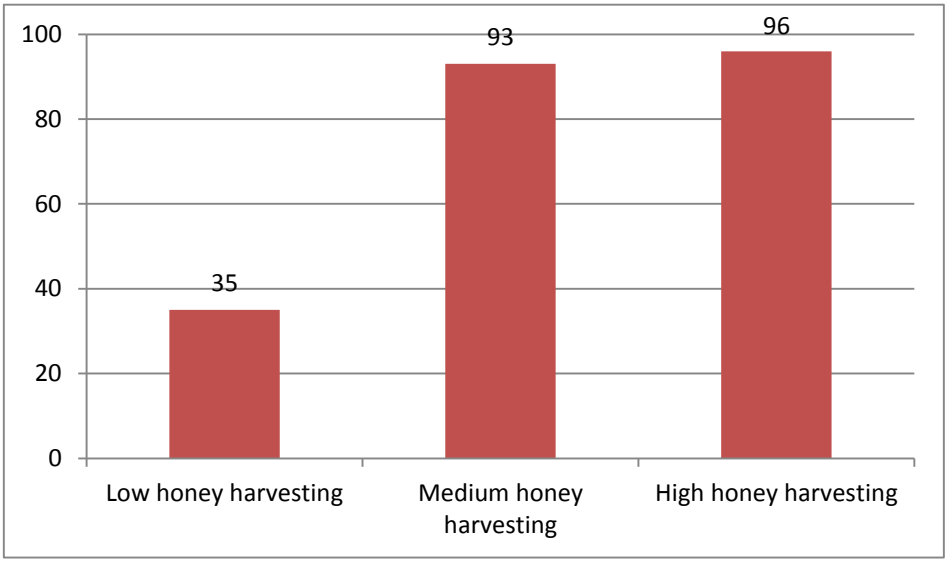

Figure 3. Percentage of transects with evidence of recent burning in areas with different intensities of honey collection.

4. Sharing information about theof impacts of honey harvesting and alternative approaches

The research team shared these results with honey-hunters and sought to explore with them less destructive alternatives. The 13th Congress of the International Society of Ethnobiology took place in France in May, 2012, shortly after this stage of the research. One of the Congress events focused on honey gathering by indigenous peoples around the world. This represented an opportunity to learn about traditional methods used to sustain honey production. After determining that Mr Siabu had sufficient respect and status with the local communities, the research team arranged that he be invited to attend the meeting. He was accompanied by the reserve's conservation coordinator, who translated

for him when he and other honey gatherers shared their experiences. When Mr Siabu returned, he had a newfound recognition of the value and importance of his own knowledge.

Mr Siabu described nondestructive ways of gathering honey that he had been taught by an uncle in 1975,"a year of hunger when honey was all there was to eat or sell". These techniques involved using certain plants, spread on the skin and around the cavity, to prevent the bees from stinging ("Namalungo grande", *Ampelocissus obtusata*; "Namalungo pequeno", *Rhoicissus digitata*, "Chiwambola", *Olax dissitiflora*, and "Nacaute", *Steganotaenia araliacea*). In addition, a smoke torch of green leaves of "Ntomonhi" (*Diplorhynchus condylocarpum)*, wrapped around burning kindling, is placed in a cleared area below the tree to provide smoke, and the collector climbs the tree, using a rope, to remove the honeycombs. Mr Siabu also owned traditional hives and described how he made them, installed them in the canopy of trees and harvested honey from them. He agreed to join the research team at meetings to disseminate and discuss the results of the impact study, and to describe and demonstrate these nondestructive methods.

The Niassa Reserve has a community monitoring agent in each village who collects data for the reserve's monitoring unit. The agents document observations ranging from incidents of human/wildlife conflict to community fishing. They helped organize meetings with nine groups of honey hunters, and accompanied the team to share the main findings. The above figures, drawn on flip charts, were shown to the honey hunters, followed by a discussion of the consequences for future production of destroying hives, colonies and cavity trees, and of alternatives.

The honey hunters acknowledged that their practices were destructive, and that heavily collected areas no longer produced honey. Mr Siabu described the methods he used and spoke about the potential of traditional hives. When others indicated interest in learning them, demonstrations were arranged so he could show them his techniques.

The demonstrations included making a rope from bark, preparation and use of the protective plants, making and using the smoke torch, climbing the tree, tranquilizing the bees, removing the honey combs and extinguishing the torch. Mr Siabu also emphasized the importance of leaving the larval combs in the hive so the colony could reproduce. These demonstrations revealed that climbing a tree to obtain the honey was faster and less work than felling one. The idea of revisiting the same trees to harvest honey repeatedly was also appealing, and led to extensive discussions about rights to particular trees. People claimed to recognize trees from which others had obtained honey, and respected collectors' exclusive rights to collect from these trees. During the discussions, honey hunters also revealed that community leaders had agreed which honey harvesting zones could be used by each community.

5. Adoption of improved harvesting methods and hives

To build on the recognition of rights on the part of communities and individuals to continue to obtain honey from certain areas and certain hive trees, which represented an incentive for repeated and therefore nondestructive honey gathering, the research team proposed that the communities monitor their honey harvests, documenting who obtained honey when and where. This would provide a foundation for developing honey marketing plans. Forms were developed and distributed in notebooks to the agents, thereby also providing the research team with a means for evaluating the extent of adoption of improved practices.

It was important to better understand the opportunities for promoting traditional hives to complement wild honey gathering. Although made from bark which is removed from a living tree, thereby girdling and killing it, a hive could reportedly last up to 10 years and could produce up to 35 litres of honey/year in two harvests. Since a wild hive was likely to yield a maximum of five litres of honey,

this meant that each traditional hive could produce as much each year as eight to ten trees, potentially saving 100 trees from being felled over the course of its productive life.

To learn about levels of interest in adopting beehives, a questionnaire about hive management was applied to a random selection of 65 (35%) honey hunters in nine communities. Since keeping bees near homes was recognized as a potentially hazard for children, we convened separate focus groups of honey hunters and their wives in eight villages (96 men and 66 women), to learn their perspectives regarding honey collection by burning and felling, by climbing, and by managing hives, as well as views on the processing, marketing and sale of honey.

Groups of honey collectors in seven communities were revisited a year after the initial discussions and demonstrations. All the monitoring agents indicated that collectors had obtained honey through climbing, not felling. In response to researchers' questions,, the honey hunters' responses corroborated the records. They said they preferred climbing because it was less time consuming than felling. A few of them said they had previously heard of nondestructive ways to obtain honey, but that no one had been willing to teach them. Now that the 'secrets' were 'out', they agreed to teach others. A few individuals had tried constructing and installing traditional hives. When one described difficulties getting the bees to move in, Mr Siabu suggested a technique to attract a colony.

Figure 4 is a diagram of the process of change documented over the course of this project.

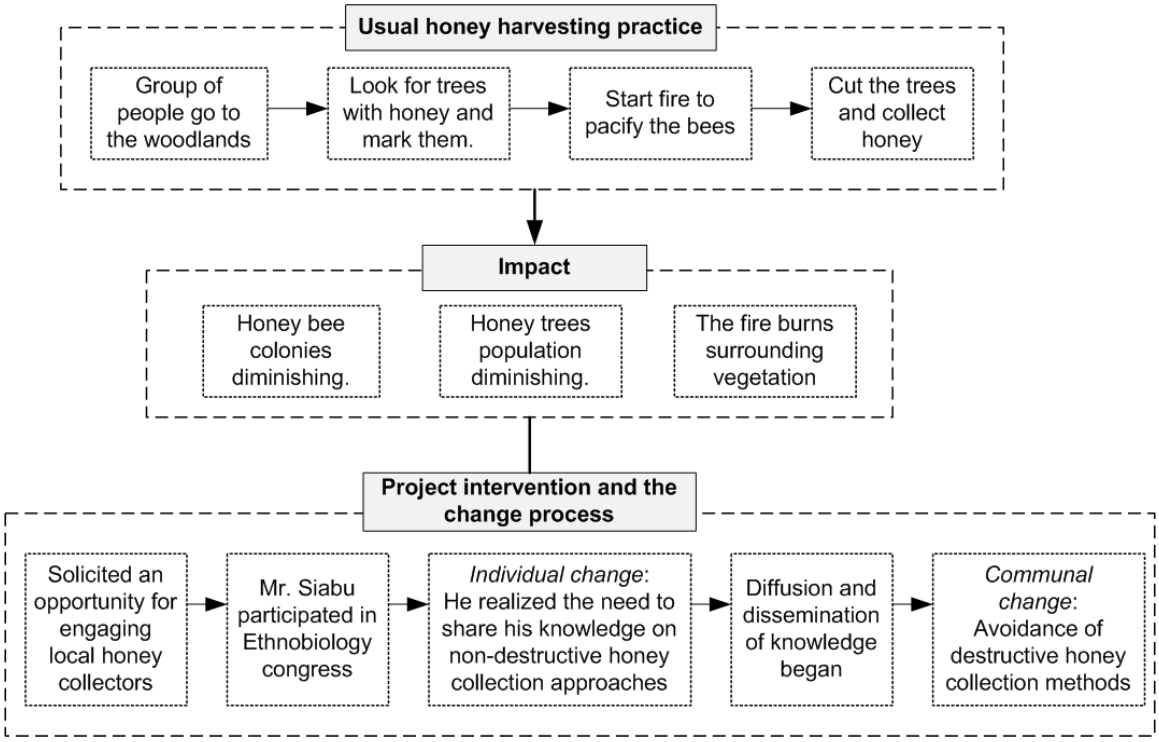

Figure 4. **The process of promoting nondestructive honey harvesting**

Discussion

Many people have recently arrived in or returned to the Niassa Reserve after a period of conflict. This may be one reason that traditional knowledge about nondestructive honey harvesting methods has been lost. It seems, too, that traditional knowledge about honey collection may have been held within families, as is the case with the ceremonial aspect of collecting honey from baobab trees, which can only be carried out by selected individuals and in specific ways. Giving Mr Siabu the opportunity to participate in an international conference about honey collection and production, and to share his

knowledge with indigenous people from countries from France to India who described how they did it, helped him recognize the value of his knowledge. Having observed the felling of trees and the progressive degradation of areas where he had formerly collected honey, he also recognized the importance of promoting nondestructive methods that would allow for continuous and sustainable harvests. Sharing his knowledge within the communities of the Niassa Reserve contributed to Mr Siabu's stature, which in turn stimulated others with expertise to come forward and share their knowledge. Empowering local people and supporting them to diffuse crucial information may be a more effective way of igniting change in a community than awareness creation campaigns or programmes by outsiders. Local honey hunters' interest in adopting these practices may reflect their trust in and respect for the individual conveying the message, as well as the fact that he spoke the same language (both verbally and contextually).

Conclusions/outlook

Widely recognized as a vital habitat for elephants and other large mammals, the Niassa Reserve also retains extensive populations of miombo woodland trees. Over the course of this project and since, the human population density within the reserve has continued to increase, and with it, the extent of agricultural clearing. The Wildlife Conservation Society is now involved as a collaborator with the government of Mozambique in the management of the reserve. In addition to a major focus on controlling poaching, they propose to institute a programme of work with the communities in the reserve to encourage livelihood options that are compatible with biodiversity conservation. Honey production, based both on nondestructive gathering from the wild and from hives, represents one of these options. Its promotion will require continuing support to honey gatherers and hive managers, including capacity development and marketingAn Environmental Education Centre, with accommodation where participants can stay for several days, has been established at Camp Mariri, Mbamba, in the reserve, to teach local students and teachers about their environment and its conservation. It would be desirable to provide opportunities there for collectors from throughout the Niassa Reserve to learn about sustainable honey harvesting.

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