

Utilization of forest products and environmental services in Bach Ma National Park, Vietnam

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Abstract

70 households living in two communes in the buffer zone of Bach Ma National Park were interviewed in order to qualify and quantify their utilization of forest products from the protected area. The interviewees were also asked to specify the environmental services they receive from the National Park. Utilization of forest products still plays an important role for supporting the livelihoods of marginal and poor households, but generally people appreciate the environmental benefits from the protected area, namely water storage, erosion control and, to a lower extent, also biodiversity conservation. That perception of the National Park opens opportunities to shift from a predominantly protective conservation policy towards encouraging sustainable systems for production of livelihoods benefits for the local population.

1. Introduction

The pattern of utilization of Vietnam's forest resources has been influenced by growing rural population, with limited income opportunities and the related widespread poverty and migration of landless people in the forest areas. This pattern has intensified agricultural cultivation and inappropriate exploitation of forest resources, resulting in depletion and degradation of the natural asset. The Vietnamese government has responded to these emerging conflicts through a series of initiatives that have addressed the Vietnamese society as a whole on environmental protection and conservation policy. However, local communities, living in or adjacent to protected areas, have continued to use the forest resources extensively in order to supplement their diets and household incomes, notably during certain periods in the year (Arnold & Perez, 2001). Forests are also the dominant source of household energy for cooking, construction materials, animal fodder and traditional medicines.

This paper examines the utilization of forest products in the buffer zone of Bach Ma National Park in Central Vietnam. In particular, it seeks to quantify the exploitation of forest products so that productive use values can be calculated. The establishment of the National Park in 1991 has undermined the legal exploitation of the natural resource base for the local

users, but it has also enhanced and ensured environmental services as a common good for the buffer zone communities. Hence, current study also intends to assess local people's awareness of the non-marketable functions and services Bach Ma National Park provides.

2. Study site

Bach Ma National Park is situated in Central Vietnam, 40km south-east of the old imperial city of Hue. The area of the park is located in Thua Thien Hue Province, within the latitude of 16°05' - 16°15' N and the longitude of 107°43' – 107°53' E. The park covers a total area of about 22,031ha which is managed with a minimum of human interference. Bach Ma National Park is identified in Vietnam's Biodiversity Action Plan as one of the last remaining Type A primary forests which should receive the highest priority for protection due to its biodiversity value. The National Park was created in 1991 with the aim to conserve the only green transect left in Vietnam, stretching from the South China Sea to the border with Laos. The dominant habitats are tropical evergreen monsoon forest in the lower areas and subtropical evergreen monsoon forest at altitudes higher than 900m. The flora of Bach Ma includes at least 1,400 species. This represents around 19 percent of the entire flora of Vietnam in only 0.07 percent of Vietnam's total land area. The park is located within the transition zone of northern (Sino-Himalayan, Indo-Burmese) and southern (Malesian) floras and is regarded to be an important 'Floristic Biodiversity Centre' for Indochina (Tran & Ziegler 2001).

The protected area is surrounded by a buffer zone of approximately 21,300 hectares. Around 65,000 people in 12,285 households are estimated living there. Population density in the buffer zone is high (158 inhabitants per km²) and is likely to increase within the near future. Local communities largely cultivate wet rice and the society is characterized by a high dependency upon agriculture. The socio-economic situation in the buffer zone of Bach Ma National Park is in many ways similar to other protected areas throughout Vietnam: the average income per head is low at around 250 USD per year, equivalent to 70 percent of the national income per head, and 40 percent of all households are classified as poor. Furthermore, the area provides difficult conditions to achieve high agricultural output and is blighted by natural disasters. The severe flood in 1999, for example, has reduced the growth rate in the agricultural sector considerably to -3.9 percent in that year (Phu Loc Statistical Office 2001). Consequently, without alternative economic incentives to agriculture, many households continue to use and commercialize illegal forest products, such as timber, firewood, and non-wood forest products.

3. Methodology

Field data were collected in the period from April to July 2001 in the buffer zone of Bach Ma National Park. Four villages belonging to two communes whose inhabitants are largely

dominated by the Kinh ethnic group were chosen as a representative test sample. All villages are located in close proximity to the boundary of the protected area, and were founded after the liberation of South Vietnam in 1975 when the Vietnamese government launched a large resettlement programme in the aftermath of the American War.

In total, 70 households were interviewed by using a semi-structured questionnaire. Questions focused on the use of timber, non-timber and non-wood forest products but non-consumptive forest services were also investigated. Information was gathered on the utilization of forest products, seasons and frequencies of entries into the protected area for collection purposes, and a rough estimate was given on the quantity of forest products harvested and collected. The interviewees were also asked to what extent they consider the forest as important to support their livelihoods and whether they could imagine living without the protected forest.

The obtained list of products was categorized into timber, firewood, and non-wood forest products (NWFP). The definition of NWFP followed the classification given by FAO (1999) where NWFP are all biological materials other than wood which are extracted from natural forests for human use as well as services derived from forests and allied land uses.

In practice, collecting sound data on forest use from interviews turned out to be difficult: interviewees were often reserved and hesitated to answer detailed questions, as they were generally aware of the regulations of the government of Vietnam on collection of biological materials in National Parks (Mai & Tran, 1996). Those who invade and clear the forest or collect forest products risk several punishments. These punishments depend on the kind of extraction and vary from confiscation of tools and material collected for smaller violations to heavy fines or imprisonment for extraction of timber, high value plants and animals susceptible to endangerment. Hence, additional information on the utilization of forest products was also obtained by direct observation in the villages and in a major market located in the buffer zone.

4. Results

The surveyed households use a variety of forest products and the survey also indicates that the use of forest products is particularly crucial for marginal households as it provides a prompt income with no significant material investment. Furthermore, the dependency upon forest resources is accentuated in situations by lack of money or actual food shortage.

4.1 Utilization of forest products

4.1.1 Timber

Local people use four hardwood timber species (*Dipterocarpus* sp., *Parashorea chinensis*, *Parashorea stellata*, and *Heritiera cochinchinensis*) to meet their demands for timber wood

(Grever, 2001). The highest demand was observed in those villages where wooden houses are dominant and hardwood is mainly used for house construction and repairing. Wooden houses are usually refurbished once every five to ten years for which a volume of 0.5 m³ to 1.5 m³ is required. A lesser amount of timber wood is also used for construction of furniture. Despite the fact that timber wood exploitation from the National Park is strictly prohibited, there are still many cases of forestry law violation. The number of forest violation cases in the two districts of Nam Dong and Phu Loc belonging to the buffer zone, and Bach Ma National Park appears very high, recorded at 4,545 cases between the years of 1995 and 2000. The quantity of wood to be seized recorded at 4,587m³ (SPAM 2002).

4.1.2 Firewood

One of the most important non-timber product for daily life in the buffer zone is firewood. Each interviewed household requires wood for preparing food because other means of energy use (e.g. gas, charcoal) are not yet widely introduced. The estimated daily firewood demand lies between 6.1 and 21.3 kg and reflects the fact whether local households are involved in traditional pig production. In this system, the typical diet fed to fattening pigs is mainly based on cooked rice and cooked cassava leaves and roots, which increase the daily demands for firewood considerably. Firewood is usually collected in the forest or the home garden around the house and a share of the firewood is often sold in the local market. Better-off households tend to purchase their supply whereas poorer households are engaged in the collection of firewood.

According to Eve (1997), 20 kg of firewood has a volume of approximately 0.08 m³ which leads to an estimated annual firewood demand of 8.9 m³ to 31.03 m³ per household. Extrapolating these figures to the 12,285 households living in the buffer zone of Bach Ma National Park reveals the annual consumption of 109,410 m³ to 381,204 m³ firewood for the whole buffer zone area. This large quantity is not exclusively extracted from the protected forest resource but also from forest plantations, home gardens, and bush fallow in the buffer zone. However, a number of the villages around the National Park do not have access to any compensation areas in order to meet their daily demands for firewood and are prompted to access the protected area regularly.

4.1.3 Non-Wood Forest Products

Due to their economic value, good accessibility and high availability, rattan and several products deriving from palm trees are the most commonly exploited non-wood forest products in the National Park. Three different species of rattan are commonly harvested: *Calamus scipionum*, *Calamus rudentum*, and *Calamus tonkinensis*; the two latter species are listed as threatened in Vietnam (Phan, 1996). Local people reported the collection of

rattan on 15 to 30 occasions a year, mainly in the dry season from June to August when activities in the agricultural sector are reduced (Grever, 2001). Each harvest lasts up to two days and yields a quantity of approximately 50 trunks. The mode of exploitation is destructive because the whole plant is cut on soil level and only the roots are left. Rattan trunks are usually sold to local traders, but occasionally the leaves are also used for self-consumption (e.g. roof cover) as a salvage product (Johnson 1998). The price for one trunk depends upon both the diameter and the quality of the product, but it is generally in the vicinity of 1,000 VND per trunk.

Palm leaves, probably belonging to the genus *Livistonia* or *Licuala*, are the raw material for manufacturing the traditional Vietnamese conical hats. The collection of these leaves is strongly associated with access into the forest for the exploitation of rattan. The harvest rate is estimated at 1,000 to 1,500 leaves per harvest which generates an income in the range of 40,000 to 60,000 VND.

Leaf harvesting of the palm *Caryota* sp. is exclusively used for two different purposes of self-consumption: (i) the leaflets with a length of about one meter are traditionally used for covering the roof of houses and sheds; (ii) stalks are commonly used as a salvage product for building fences and walls along the home garden and agricultural fields. Wild crafting of orchids as well as hunting and collecting of mammals, birds, and frogs were mainly recorded through additional irregular observations and therefore, these data lack of accuracy.

The flora of Bach Ma National Park includes at least 1,400 species of which 432 are potentially used by the local population for a variety of medicinal purposes (Tran & Ziegler 2001). However, this traditional knowledge is mainly found among the ethnic minorities of Ka Tu and Van Kieu, living in remote areas of the buffer zone which was outside the geographical focus of this study. The surveyed two communes were established within the last 25 years and the majority of the interviewees lack the knowledge of how to use the medicinal plant resource systematically. The current survey indicates that no medicinal plant is collected inside the National Park; origins of the crafted plant resources derive from home gardens, rice paddies and other locations in close proximity to the surveyed village.

As shown in Table 1, several reported species are multiple-use plants, belonging to commonly growing wild herbs, cultivated fruit trees (e.g. *Psidium guajava*, *Chrysophyllum coinito*), vegetables (e.g. *Eclipta prostrata*, *Houttuynia cordata*, *Centella asiatica*), or ornamental plants (e.g. *Polyscias fruticosa*, *Cordyline fruticosa*).

Table 1

List of certain multiple-use plants used for medicinal purposes in the buffer zone of Bach Ma National Park (Grever, 2001).

Species	Local name	Family	Treatment
<i>Pseuderatherum platiferum</i>	Hoan ngoc	Acanthaceae	diarrhoea, sore throat
<i>Cordyline fruticosa</i>	Huy et du	Agavaceae	kidneyache
<i>Polyscias fruticosa</i>	Dinh lang	Araliaceae	kidneyache
<i>Ageratum conyzoides</i>	Co hoi	Compositae	cold
<i>Artemisia vulgaris</i>	Ngai cuu, Thuoc c uu, Co cuu	Compositae	fever, headache
<i>Eclipta prostrata</i>	Co muc	Compositae	blood-staunching
<i>Phyllanthus urinaria</i>	Cho de	Euphorbiaceae	cancer
<i>Plectranthus amboinicus</i>	Rau ton	Lamiaceae	fever
<i>Psidium guajava</i>	Oi	Myrtaceae	stomachache
<i>Ludwigia ascendens</i>	Rau dua	Onagraceae	fever
<i>Chrysophyllum coinito</i>	Vu sua	Sapotaceae	stomachache
<i>Centella asiatica</i>	Rau ma	Umbelliferae	cold
<i>Houttuynia cordata</i>	Diệp c a	Saururaceae	fever

4.2 Forest services

The interviewees were asked to specify marketable and non-marketable services they gather and obtain from the forestry resource in the National Park. Several answers per interviewee were possible. For practical reasons, the specifications were grouped into categories as outlined in Figure 1. The Figure shows that approximately 66 percent of the responses refer to values and services deriving from the forest asset. Interestingly, only 7 percent of the interviewees considered the marketable value of forest products as worth mentioning, whereas the majority emphasized non-marketable ecosystem services, namely water storage, erosion control and, to a lower extent, also biodiversity conservation.

However, more than one third of the interviewees regarded the forestry resource as having no use value and did not associate any environmental service with it. For this group the depletion and the eventual loss of the protected forest has reportedly no immediate impact upon their livelihoods.

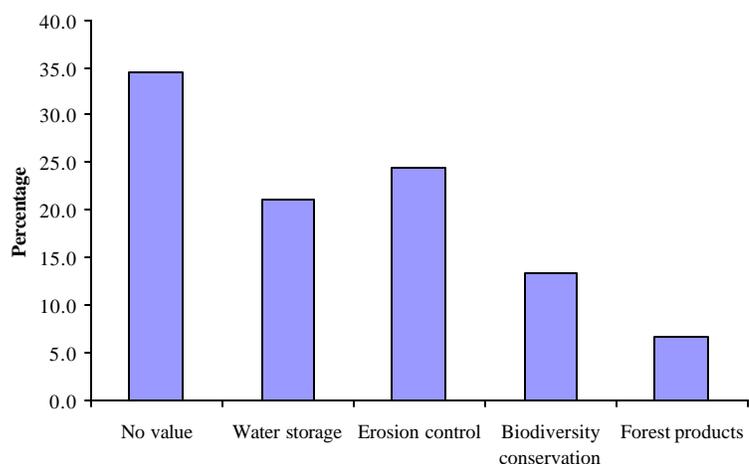


Fig. 1. Reported forest value among the surveyed households.
Multiple answers were possible per interviewee; n = 90.

5. Discussion

Establishment of protected areas generally follows restrictions on traditional resource uses by local communities (McNeely, 1988; Gomez-Pompa & Kaus, 1992). Economic losses due to reduction in land and livestock holdings are reported frequently in the vicinity of protected areas. Farmers often cannot compensate these changes due to a lack of technical and financial support from the area's management board or governmental departments (Maikhuri et al., 2001). Income and supplies from forest related activities continue to play a vital role for emergencies during periods of agricultural shortfalls or unemployment (Falconer, 1994; Ogle, 1996) and the subsistence use of firewood and NWFP remains large and essential.

Vietnam also has one of the highest human population densities in Asia (PRB, 1996), which is the source of the primary threats to the country's natural resources and long-term persistence of its biological diversity. The forests of Bach Ma were also subject to a rapid decline in forest cover caused by anthropogenic activities and intensive pressure upon the natural resource base following the resettlement programme in the aftermath of the American War and the introduction of the market economy in 1986. Wilkie & Godoy (1996) argue that, with increased exposure to trade and markets, use of the forest is increasingly concentrated on some higher value Non-Timber Forest Products. This development was observed in Bach Ma in the late 1980s when, for example, excessive and destructive harvesting of the valuable resin plant *Aquilaria crassna* (Thymelyaceae) has diminished the resource and the species is now believed to be locally extinct (Larsen, 1997). The destructive harvest of rattan has to be carefully monitored, as there is a large rattan processing capacity available within the vicinity of the park in Hue and Da Nang City. The depletion or removal of certain species can rapidly influence such forest characteristics as composition and structure of vegetation (Redford, 1992;

Fitzgibbon et al., 1995). These impacts have nowadays created empty forests in Vietnam lacking the intact floral and faunal communities necessary to maintain viable ecological processes (UNDP, 1997).

Generally, people in the buffer zone of Bach Ma National Park appear to be positive towards conservation. A possible explanation for the focus on non-consumptive values may be concluded from the fact that local people in the buffer zone are mainly engaged in subsistence farming where water and soil are both crucial and precious resources whose abundance and quality determine the survival of the farming economy. Furthermore, the severe floods in November 1999 caused several land slides in the area that killed a total of 34 people and destroyed hundreds of hectares of agricultural land in the buffer zone (Phu Loc Statistical Office 2000). It is very likely that this natural disaster raised the level of awareness for the necessity of conserving the forest.

Direct environmental benefits have favored an environment in which only a minor part of the local population still perceives mostly negative aspects of the existing conservation policy. This study has demonstrated that local people attribute with the National Park a resource they value and seek to conserve. Traditionally, local requirements are perceived as a threat to conservation efforts, with the consequence that little thought is given to how local inhabitants could also benefit from the establishment of the protected area (Ghimire, 1994). More emphases on the demands and aspirations of local people could favor a shift from a predominantly protective orientation in forest management and conservation policy towards encouraging sustainable systems for production of livelihoods benefits (Freese, 1997).

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