

Indigenous land use practices and biodiversity conservation in southern Ecuador

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Abstract. It is well understood that any attempt to preserve primary forest in the tropics is destined to fail if the interests and use claims of the local population are not taken into account. Therefore, in addition to strict protection of the forests, an integrated concept of nature conservation and sustainable land use development is being sought. The DFG-research project presented here will figure out the extent to which traditional ecological knowledge and biodiversity management strategies can be made available for long-term land use development. Ethno-ecological and agro-geographical research methods were used to document indigenous knowledge of traditionally utilized wild and domestic plants, to analyze current forms of land use, and to evaluate ethno-specific life-support strategies and strategies of biodiversity management among Shuar and Saraguro communities in southern Ecuador.

Introduction

Loss of biodiversity and land degradation are not environmental problems as they are usually labeled, but problems created by the culture-specific relationship between people or societies and their natural environment - an inventive thought, which was first formulated by Paul Messerli (1994, p. 144), a geographer from Bern. In current research programmes with the objective of preserving ecosystems and habitats, it is essential not only to consider the natural ecosystem but also to include human dimensions. Centre of attention for such research must be human actions: the interplay of acting individuals (actors) and social groups (collectives of actors, e.g. communities) under specific social conditions. In the agricultural frontier zone of southern Ecuador, a region of heterogenic ethnic, socio-cultural and socio-economic structures, profound knowledge of ethnic-specific human ecological parameters is crucial for the sustainable utilization and conservation of tropical mountain forests. Today it is well understood that any attempt to preserve primary forest in the tropics is destined to fail if the interests and use claims of the local

population are not at the same time, and in the long term, taken into account. Therefore, in addition to strict protection of the forests, an integrated concept of nature conservation and sustainable land use development needs to be sought (e.g. Ellenberg 1993).

Goal of the DFG-research project presented here is to determine the extent to which traditional ecological knowledge and indigenous biodiversity management strategies can be made available for long-term land use development.

Research area and indigenous groups

The tropical mountain rainforests of the eastern Andean slopes in southern Ecuador have been identified as a one of the so-called "hot spots" of biodiversity worldwide (Barthlott et al. 1996, Myers et al. 2000). These mountain forest ecosystems, which have been described as particularly sensitive (cf. Die Erde 2001), have come under enormous pressure from the expansion of agricultural land (esp. pastures), the extraction of timber, the mining of minerals, the tapping of water resources and other forms of human intervention.

The area under study comprises the northern and eastern buffer zones of Podocarpus National Park, settled by indigenous Saraguro and Shuar communities as well as Mestizo-Colonos. Although the Mestizo-Colonos are by far the most prominent ethnic group in numbers, this article will focus on the indigenous Saraguro and Shuar communities settling around Podocarpus National Park (Fig. 1). The Shuar area of settlement extends from the lower levels of the tropical mountain rainforest (approx. 1400 m) down to the Amazonian lowland (Oriente) in the region bordering Peru. The Shuar belong to the Jívaro linguistic group (Amazonian Indians). They are typical forest dwellers who practice shifting cultivation in subsistence economy. Besides, they fish, hunt and gather forest products. During the last decades some Shuar have also begun to raise cattle and some are engaged in timber extraction as well. They are typical forest dwellers who practice shifting cultivation in subsistence economy. Besides, they fish, hunt and gather forest products. During the last decades some Shuar have also begun to raise cattle and some are engaged in timber extraction as well.

The Saraguros are traditionally Quichua-speaking highland Indians who live as agro-pastoralists for the most part in the temperate mid-altitudes (1800–2800 m) of the Andes (Sierra) in southern Ecuador. As early as the 19th century, the Saraguros kept cattle to supplement their traditional system of mixed cultivation, featuring maize, beans, potatoes and other tubers (Gräf 1990). By now, cattle ranching has developed as the main branch of their economy.

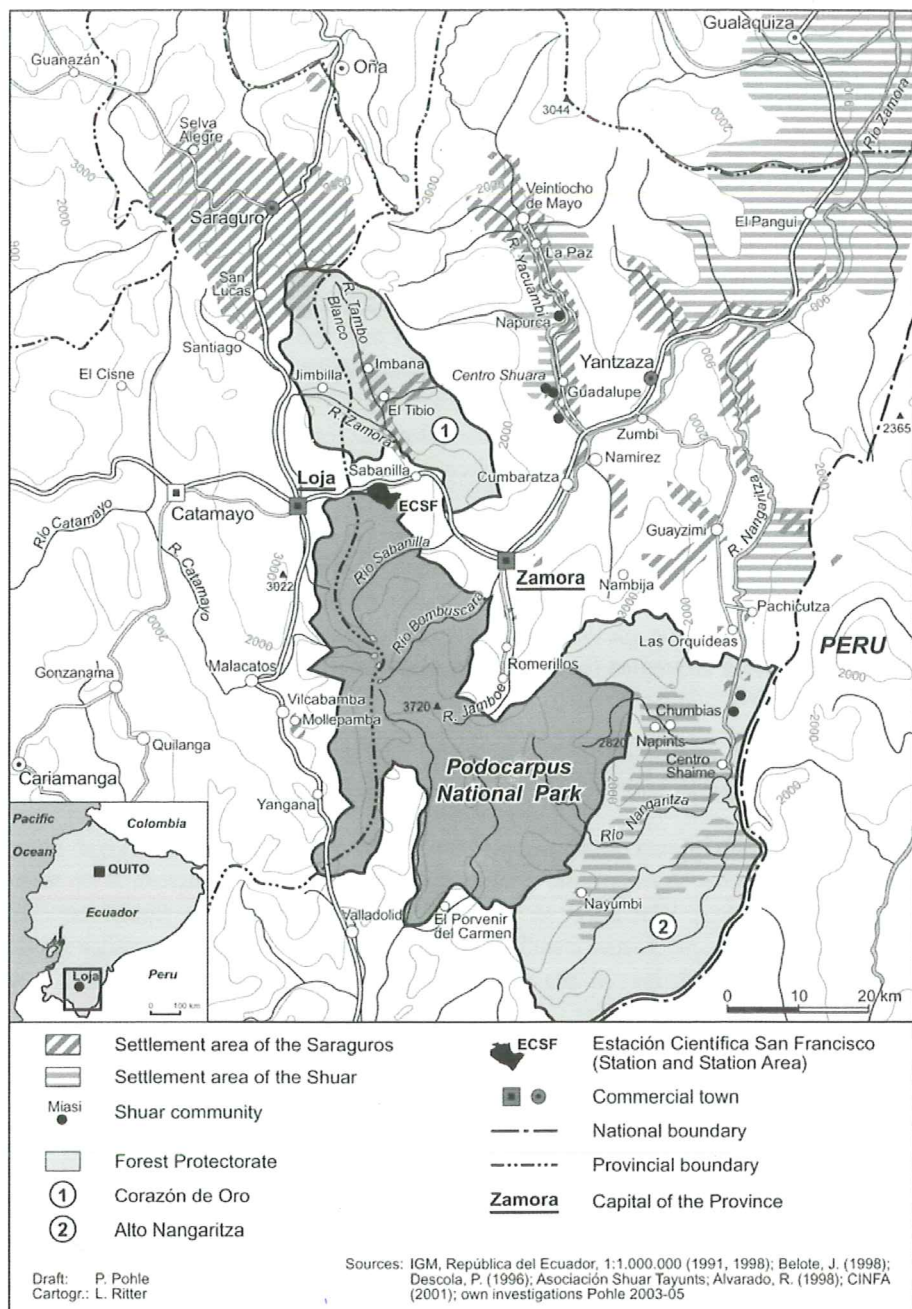


Figure 1. The Podocarpus National Park and settlement areas of indigenous groups.

Aims and methods of the ethnoecological research project

The project was carried out within the DFG Research Unit FOR 402: "Functionality in a Tropical Mountain Rainforest" (www.bergregenwald.de). Within the ethnoecological project, ethnicity is viewed as a driving factor in the relationship between man and his environment. Fundamental differences between the indigenous Shuar and Saraguro communities as well as the local Mestizo-Colonos occur not only in attitudes towards the tropical rainforest and the management of forest resources, but also in wider economic and social activities, including all strategies for maintaining livelihood (Pohle & Gerique 2006).

During 2004, 2005 and 2006 ethnoecological, especially ethnobotanical and agrogeographical research was undertaken in sample communities of the Shuar (Shaime, Napints, Chumbias) and the Saraguros (El Tibio). The aims were: (1) to document the indigenous and local knowledge of traditionally utilized wild and cultivated plants (the ethnobotanical inventory was undertaken according to the "Code of Ethics"); (2) to analyze current forms of land use including the cultivation of forest and home gardens; and (3) to evaluate ethno-specific life-support strategies as well as strategies for natural resource management.

Significance of plant use for the Shuar and Saraguro communities

In biodiversity-rich places local people usually have a detailed ecological knowledge, e.g. of species, ecosystems, ecological relationships and historical or recent changes to them (e.g. Warren et al. 1995). This applies wholly to the Shuar communities. As traditional forest dwellers the Shuar of the Nangaritza valley have a comprehensive knowledge of plants and their utilization. All households make extensive use of forest products.

In Fig. 2 the number of plant species (wild and cultivated) used by the Shuar and Saraguro communities are listed. Plant uses were recorded according to categories of utilization like food, medicine, construction etc. According to the ethnobotanical survey¹, the actual inventory of traditionally used wild plants of the Shuar includes 211 species. Most of the plants are used to supplement the diet (74). Given the lack of state health care, medicinal plants also assume great significance (63). Furthermore, many plants are used as construction material (67), as tools and for handicrafts (37), as fuel, fodder or as ritual plants. The Shuar use forest products exclusively for their own needs and there is virtually no commercialization.

¹ The ethnobotanical survey was conducted by Andrés Gerique.

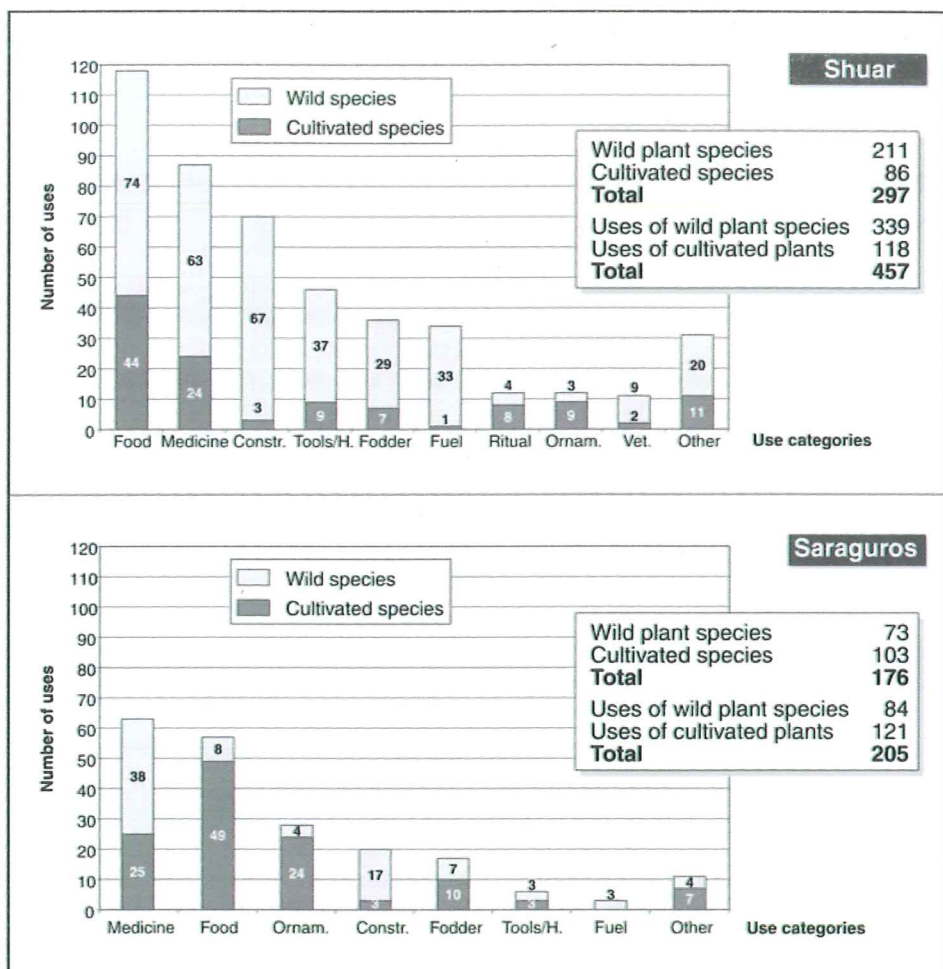


Figure 2. Wild and cultivated plant species used by the Shuar (Shaime, Chumbias, Napints) and the Saraguros (El Tibio) according to use categories. Note: one species can be found in more than one use category.

The Saraguros from El Tibio have a far less comprehensive knowledge on wild plant species and their utilization. The actual ethnobotanical inventory includes only 73 wild plant species. Most of them are ruderal plants used as medicine (38) or plants used for their wood (17). As agro-pastoralists they have converted most of the primary forest into pastures, home gardens and fields, leaving forest remains only along mountain ridges or in river ravines. Their actual plant knowledge reflects this traditional way of life. They have a comprehensive knowledge of cultivated plants (103), mainly pasture and crop plant species - even more than the Shuar (86) - but they are less familiar with forest plant species. The latter know-

ledge is mainly reduced to woody varieties which they extract and sell before clearing the forest.

Agrobiodiversity in Shuar and Saraguro tropical home gardens (huertas)

The results of the ethnobotanical and agrogeographical studies underline the thesis that the tropical home gardens of indigenous communities are places of high agrobiodiversity and refuges of genetic resources (Watson & Eyzaguirre 2002). Furthermore, they contribute significantly to securing and diversifying food supplies.

The forest gardens of the Shuar (Fig. 3) are characterized by an especially great diversity of species and breeds. In five huertas studied (size: approx. 600–1000 m²), a total of 185 wild and cultivated plant species and breeds were registered. For the most part they serve as nutritional items (58%) or medicines (22%). The main products cultivated are manioc (*Manihot esculenta*) and taro (*Colocasia esculenta*), along with various breeds of plantains (*Musa* sp.). Moreover, the planting of a large number of traditional local breeds was documented: e.g. 29 breeds of manioc and 21 breeds of *Musa* sp. – a further indication of the crucial significance that home gardens have for the in situ conservation of botanical genetic resources (Münzel 1989, p. 434).

The huertas of the Saraguros likewise display a great diversity of useful plants. In one sample home garden studied in El Tibio (Fig. 4), 51 species of cultivated plants were identified. Again, the majority are plants that supply nutritional value (41%), followed by medicinal and ornamental plants (each 20%). The most important cultivated products are plantains, tubers and various types of fruit. Given their relatively dense and tall stands of trees, the multi-tiered arrangement of plants and the great diversity of species, the gardens of the Saraguros can be seen as an optimal form of exploitation in the region of tropical mountain rainforests.

Indigenous concepts of biodiversity management - their contribution to a sustainable land use development

If the hypothesis is accepted that a multi-faceted economic and cultural interest in the forest on the part of indigenous and local communities offers effective protection against destruction, then a key role must be assigned to the analysis and evaluation of the ethno-specific knowledge about tropical mountain rainforests and their potential uses. Both indigenous groups have developed natural resource management strategies that could be used and expanded, in line with the concept "preservation through use", for future biodiversity management, but this should be done only in an ethno-specific way.

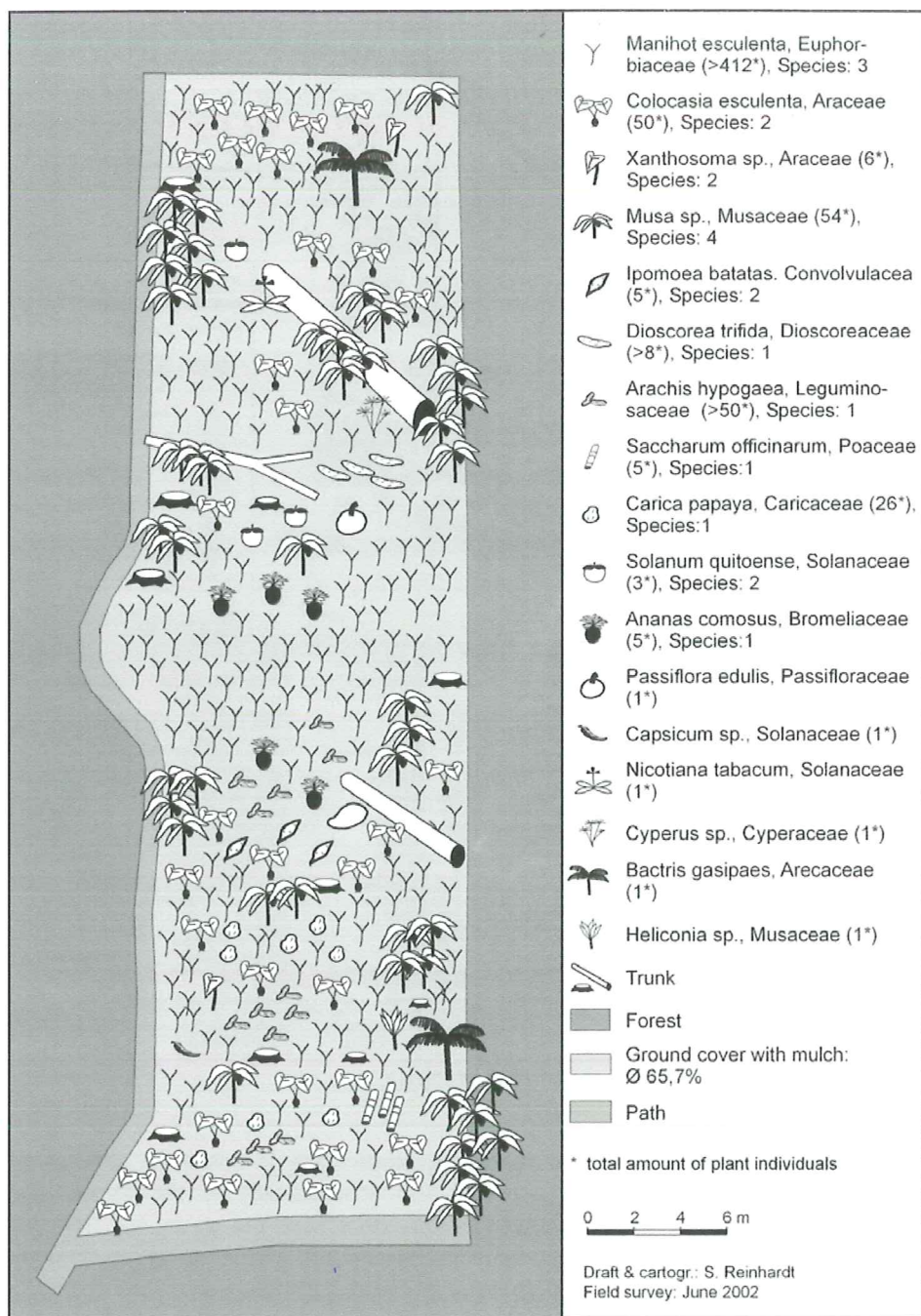


Figure 3. Shuar forest garden (huerta) in the Nanagarita valley.



Figure 5. Napints (1000 m): scattered settlement of the Shuar in the tropical rainforest at the eastern periphery of Podocarpus National Park. Photograph A. Gerique.

soil and the vegetation. The system of cultivation and fallow on small rotating plots (Fig. 6) has much in common with ecological succession in that it uses the successional process to restore the soil and the vegetation after use for farming (Kricher 1997, p. 179). In the Shuar forest gardens the fallow periods last for about 24–30 years while the cultivation periods cover 4 years.

- (2) Their tending of forest gardens according to principles of agroforestry and mixed cropping with a high agrobiodiversity and a particular high breed variety of cultivated plants. As it is commonly known, polycultures are more resistant to insect attacks and plant diseases.
- (3) The natural fertilization of soils by mulching and the use of digging sticks and dibbles as a suitable form of cultivating the soil.
- (4) Their sustainable use of a broad spectrum of wild plants in small quantities, satisfying only subsistence needs and avoiding over-harvesting.

If the Shuar's traditionally practiced and clearly sustainable plant diversity management is to be preserved, this is possible only by legalization of their territorial claims and comprehensive protection of their territories, for example by demarcating reservations. This appears to be underway with the establishment of a so-called Reserva Shuar (Neill 2005). Additionally, it is necessary to respect and support the Shuar's cultural identity, not only to avoid the loss of traditional environmental knowledge, in particular traditional plant lore. To improve

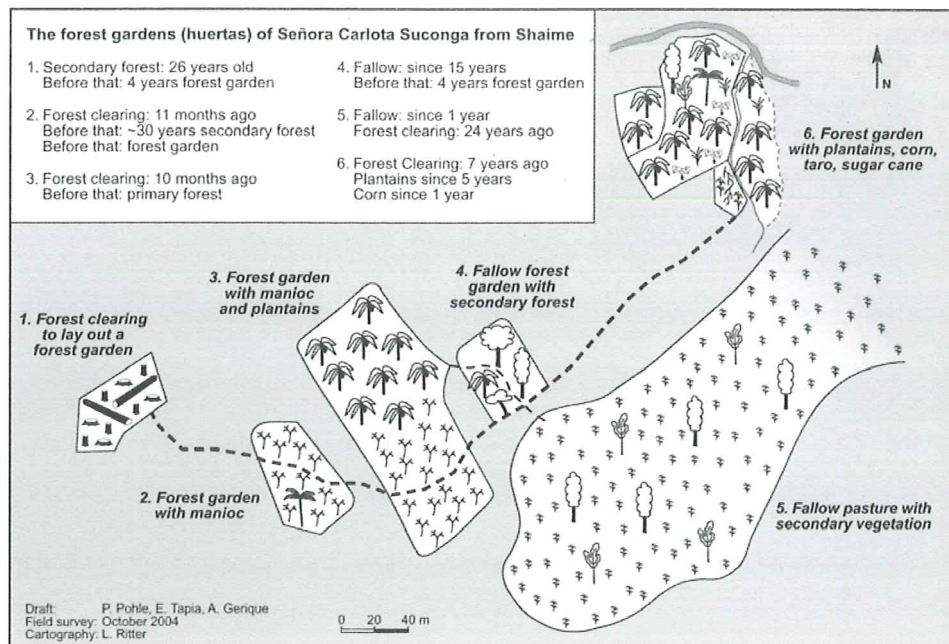


Figure 6. The forest gardens (huertas) of Señora Carlota Sucongá from Shaime (920 m).

livelihood in an economic sense, additional sources of financial income are essential. In this line the promotion of ecotourism, support of traditional handicrafts and the cultivation of useful plants for a regional market could be discussed.

While the Shuar's forest management can be evaluated as preserving plant diversity, the sustainability of the Saraguros' use of the environment has yet to be rated. Market-oriented stockbreeding has particularly led in recent decades to the rapid increase of pastures at the expense of forest. In spite of ecological conditions unfavourable to agricultural pursuits (steep V-shaped valleys, acidic soils, extremely high precipitation), these Andean mountain farmers have at least, by means of their intensive form of pasture management, succeeded in generating a sufficiently stable agrarian and cultural landscape (Fig. 7). In contrast to many completely deforested and ecologically devastated areas settled by Mestizo-Colonos (Fig. 8), the richly chequered agrarian landscape of the Saraguros presents, not only esthetically but also ecologically, a fundamentally more positive picture.

Among the Saraguros, initial attempts have also been elaborated to manage biodiversity in line with the concept "preservation through use". The first thing to be mentioned in this context is the keeping of home gardens with a wide spectrum of wild and cultivated plants, particularly woody species. With regard to the diversity of species, the remnants of forest still largely preserved in ecologically unfavourable locations are significant. In order to stem the further loss of



Figure 7. Richly chequered cultural landscape of the Saraguros on a steep slope of the Río Tibio valley with the scattered settlement of El Tibio (1770 m).

biodiversity, however, it will be necessary to convince the Saraguros that in particular scrub- and wasteland (matorral) should be replanted with native tree species. The pressure on the tropical mountain forests caused by the pasturing economy will only be reduced, though, when the Saraguros can be shown a profitable alternative to it. As examples of promising endeavours in this context may be regarded:

- (1) The selective timber production and replanting with native tree species as proposed by foresters (Günter et al. 2004).
- (2) The introduction of silvipastoral or agroforestry systems.
- (3) The market-oriented gardening.
- (4) The cultivation and marketing of useful plants, e.g. medicinal herbs.
- (5) The promotion of “off-farm” employment opportunities.
- (6) The payment for environmental services to protect the watershed area of Loja.

Protecting biological diversity - from National Park to Biosphere Reserve

Podocarpus National Park, covering a total of 146,280 ha, was established in 1982 as southern Ecuador's first conservation area, whose goal is to protect one of the

conomic sense as well as serve the interests of conservation and preservation of biodiversity. Thus, the establishment of an extractive reserve could be suggested as an alternative to deforestation.

In line with the concept "protection by use", ecotourism can be structured such that it is compatible with conservation interests and serves the local economy as well. This is also the experience around Podocarpus National Park. The attraction of the park is clearly the tropical rainforest with its specific wildlife, particularly tropical birds; fewer visitors have botanical or eco-geographical interests. However, compared to other national parks of South America (e.g. Manu National Park of Peru), southern Ecuador and Podocarpus National Park are a major tourist destinations.

The most promising approach, in which conservational protection and sustainable development are the guiding principles, is the integrated concept of conservation and development exemplified by UNESCO's Biosphere Reserve (UNESCO 1984). The idea behind it is to mark out representative sections of the landscape composed of, on the one hand, natural ecosystems (core area) and, on the other, areas that bear the impress of human activity (buffer- and development zone; Erdmann 1996). In Ecuador, three biosphere reserves have already been drawn up (Ministerio del Ambiente 2003). The establishment of such a reserve would also be desirable for southern Ecuador and was recently accepted by UNESCO, in September 2007.

Biosphere reserves are strongly rooted in cultural contexts and traditional ways of life, land use practices and local knowledge and know-how. In the buffer- and development zone of the Podocarpus National Park measures to be taken could rely on the rich ethno-specific traditions in forest- and land use practices by indigenous and local communities. Under the umbrella of an UNESCO Biosphere Reserve in southern Ecuador, not only would the protection of tropical mountain ecosystems be guaranteed, but also the development of ecologically and economically sustainable and socially acceptable forms of land use would be assured.

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