

**Mountain people, forests, and trees: Strategies for balancing local  
management and outside interests. A synthesis of an electronic conference  
of the Mountain Forum**

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mountain forests, forest resources, agroforestry, watersheds, threats,  
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**Table of Contents**

Preface

Executive Summary

Introduction

Mountain People, Forests, and Trees

The World's Mountain Forests: Definitions, Meanings, and Trends

Sustainably Managing Mountain Forests

Mountain Forests and People: Past and Present

Historical Perspectives on Contemporary Issues

Andes

Appalachian Mountains

Central Seram Mountains

Colorado Rocky Mountains

Khumbu Himalaya

Uttarakhand Himalaya

Virungas

Western Carpathians

Mountain Forests Under Threat Today

Road construction

Forest conversion

Fire

Tourism

Air pollution and climate change

Mountain Forest Resources: Products and Values

Whose Values?

Products and Services from Mountain Forests

- Timber
- Non-timber forest products
- Multifunctionality and agroforestry
- Plantations
- Watershed protection
- Upstream-downstream relations
- Biodiversity
- Carbon storage

#### Mountain People and Their Forests

- Migration from and to the Mountains
- Poverty and Biodiversity
- Sacred and Other Cultural Aspects
- Traditional Knowledge
- Cultural Identity
- Women's Roles
  - Economics, gender and traditional medicine in Northern Vietnam
- Chipko

#### Management Structures and Institutions

- The Diversity of Approaches
- Local Participation
- Legal Structures
- Land Tenure: Rights and Responsibilities
- Technical Investment
- Community Forestry
  - Community forestry planning
  - Positive outcomes
- Institutions for Agroforestry
  - Gia Lai Agroforestry Extension Project, Vietnam
  - The Nepal Agroforestry Foundation

#### Policies for Mountain Forests

- Ownership and Governance Patterns
  - Forest policies and perceptions in the Tibet Autonomous Region
- Setting and Maintaining Priorities
- Forest Certification
- European Forest Policies
- International Initiatives

#### Implications and Recommendations for Policy and Action

#### References

#### Tables

Table 1. Promising mechanisms for the sustainable management of mountain forests

Table 2. Comparison of community forestry programs

Table 3. Implementing certification in the Pacific region

## Figures

Figure 1. Geographic distribution of case studies and examples

Figure 2. Basic services or functions of mountain forests

## Preface

Issues of sustainable development, interactions between mountain communities and lower lying regions, cultural aspects of traditional relationships between people and forests, and forest values are especially pertinent as we begin preparations for the UN International Year of Mountains in 2002.

Forests play crucial roles in the sustainable development of mountain regions, and in the conservation of watersheds which supply fresh water to over half of humanity. They harbor some of the Earth's richest concentrations of biodiversity, although this has drawn little attention up to now. And mountain forests are important sources of valuable timber and other wood and non-wood products in many countries.

But mountain forests are under threat as never before: the highest rate of deforestation in any biome is in tropical upland forests: 1.1 percent per year; and the cumulative impact of extractive industries such as mining and timber, the effects of global warming and acid rain, and even rapid expansion in such seemingly innocuous economic activities as ecotourism are exerting a toll on these critical ecosystems. Yet the physical and political remoteness of mountain forests has made it unusually difficult for stakeholders to understand and balance competing claims for protection, versus sustainable or extractive uses.

It was in this context that the Mountain Forum undertook this, its fourth global electronic conference, on the topic of "Mountain People, Forests and Trees: Strategies for Balancing Local Management and Outside Interests." Bearing in mind three key target audiences -- community organizations, professionals, and policy- and decision-makers -- the main objective of "Mountain People, Forests and Trees" was to understand the practices that can lead to more successful and sustainable community-based management of mountain forests and trees. Specific aims were to:

- Bring together experiences from mountains around the world;

- Contribute to our global knowledge of how mountain forests and trees are important not only for mountain people, but also for billions in lower-lying regions;

Identify practical, promising management strategies for communities and decision-makers; and

Provide concrete policy recommendations at local, regional, national, and global levels, including the UN Commission on Sustainable Development (CSD) for which forestry is an important part of the priority topic in 2000.

A wide diversity of knowledge, expertise and experience was contributed to the electronic conference. The 851 subscribers were represented by 101 active contributors comprising local community members, policy-makers, project planners, academicians and researchers from across the planet who provided case studies and information from both developing and industrialized countries, principally the former.

The agenda for the conference was developed by a planning team consisting of representatives from the Swiss Agency for Development and Cooperation (SDC), the Food and Agriculture Organization of the United Nations (FAO), the University of Oxford's Environmental Change Institute, and The Mountain Institute. Elizabeth Byers provided project coordination and was the lead moderator for the e-conference.

The five-week electronic conference was divided into weekly themes. The first theme, "Setting the Stage," moderated by Martin Price, was concerned with exploring current understanding about mountain forests and trees and their dependent communities, encompassing a knowledge of past and present forces of change within the context of highland-lowland interactions, and urban and rural needs and expectations.

The second theme "Who controls, who benefits, who interferes?" was moderated by Lhakpa Sherpa. It focused on discussion of the institutional frameworks related to the management and use of mountain forests, and aimed to identify institutional structures which are particularly appropriate in the context of different ownership and land use patterns. "Balancing economic and other values," moderated by Elizabeth Byers, considered the fact that economic forces are a reality that mountain people must face in the modern world, even those still depending on forest resources for subsistence and survival. The discussion addressed the many different values, on different scales, of mountain forests and the problems inherent in balancing, or integrating, local needs with the forces of globalization.

Theme four, "Sustainable use and protection," with Lhakpa Sherpa's moderation, looked at strategies for sustainability used by mountain communities and institutions, building on the issues and examples explored previously, and comparing different programs, models and outcomes.

Martin Price moderated the topic for week five, "Final discussion and next steps," which attempted some form of synthesis of ideas presented previously, along with a discussion of next steps, including the formation of on-going discussion and monitoring groups and the development of practical mechanisms and strategies for communities, recommendations to the CSD.

Financial support for the e-conference was provided by SDC. Far more than a traditional donor, SDC's leadership and support stems from long-term national experience and commitment to conservation and sustainable development of mountains. This institutional support has been given life and substance by the contributions of the many remarkable professionals involved from SDC, for whom work on the Mountain Agenda has been a personal priority. The costs of printing and disseminating the report were provided by FAO.

The Mountain People, Forests, and Trees e-conference discussion is archived in full at: <http://www.mtnforum.org/emaildiscuss/mpft/mpft.htm>

It is hoped that this conference and similar discussions will be of value to individuals and organizations involved in the conservation and sustainable development of mountain forests and the communities -- both upstream and downstream -- that depend on them.

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## **Executive Summary**

Forests play crucial roles in the sustainable development of mountain regions, which are home to about one tenth of the global population. Mountain forests help to capture and store essential atmospheric moisture, to regulate river flow, and to reduce erosion and sedimentation downstream. Over half of humanity relies on fresh water from the mountains. Mountain forests are also important sources of wood: valuable as timber and particularly as a fuel source for both mountain people and those in nearby foothills and plains. Yet many mountain forests are subject to high, often unsustainable, levels of logging and clearance for agriculture. The highest rate of deforestation in any biome is in tropical upland forests: 1.1 percent per year.

Most of the world's mountain communities are strongly influenced by surrounding lowland and urban areas with regard to timber extraction, watershed management and, often, recreation and biodiversity conservation. The interests of these outside forces do not necessarily include a sustainable

future for either mountain forests or mountain communities. Finding an equitable balance between the demands of lowland populations and the needs of mountain communities is an increasingly urgent priority. There is also a strong need to balance productive use of forests with their protection.

In response to the growing awareness of the importance of mountain forests both for mountain communities and at a global scale, the Mountain Forum conducted an electronic conference from April 12 to May 14, 1999, on the topic of "Mountain People, Forests, and Trees: Strategies for Balancing Local Management and Outside Interests." More than 850 stakeholders and interested individuals from around the world participated in the e-conference, and 101 of these participants contributed commentary or case studies. These have been organized in this summary report under the themes of mountain forests and people -- past and present; mountain forest resources -- products and values; mountain people and their forests; management structures and institutions; and policies for mountain forests.

The conference participants identified and described a wide range of actions that mountain communities, policy makers, and practitioners can implement to ensure the sustainable and equitable use of mountain forests. Many of these are linked to mountain features such as political and economic marginality, cultural and biological diversity, and ecosystem fragility. There are two major conclusions:

- Mountain people rely on the whole landscape for their livelihoods. Consequently, policies and institutions for mountain forests and agroforestry must recognize interactions between agricultural land uses, forests and trees.
- Every strategy for ensuring that mountain people derive sustainable livelihoods from their forests and trees must be tailor-made for the local physical, biological, cultural and political environment -- and ways of responding to change must always be included.

These conclusions are complemented by the following recommendations:

- Recognize the importance of mountain forests.
- Respect the need for long-term approaches.
- Consider the long-distance effects of policies and projects.
- Apply full-cost pricing of resources.
- Reinvest forest revenues in mountain communities and their environments.
- Support community-based property rights.
- Build on traditional institutions for community decision-making.
- Decentralize power and accountability.
- Build alliances with lowland partners.
- Recognize the cultural foundations of sustainable forest management.
- Protect intellectual property rights of mountain people.
- Foster complementarities between local and scientific understanding.
- Develop efficient energy resources for mountain people.
- Build transboundary cooperation.

- Ensure that experts communicate equitably.

These conclusions and recommendations, and the detailed information provided in the case studies that support them, are an important contribution to our knowledge and understanding of the interactions of mountain forests and those who rely on them, in the mountains, downstream, and further afield. As such, it is anticipated that this report will be of significant value both for those living in and making decisions regarding the future of mountain forests, and also for the 8th session of the UN Commission on Sustainable Development in 2000, during which forests will be an important topic for discussion.



Mountain forests provide critical water catchments (Bolivian Andes).  
Photo by Alton C. Byers.

## Introduction

### Mountain People, Forests, and Trees

Forests play crucial roles in the sustainable development of mountain regions, which are home to about one-tenth of the global population. More than half of humanity relies on the fresh water that accumulates in mountains, for drinking, domestic use, irrigation, hydropower, industry, and transportation. Mountain forests help to capture and store essential atmospheric moisture, to regulate river flow, and to reduce erosion and sedimentation downstream.

Mountain forests are important sources of valuable timber and other wood and non-wood products in many countries. The main fuel source for mountain people in developing countries and, to a lesser extent, industrialized countries, is wood. Fuelwood collected in the mountains is a major fuel source both for local people and those in nearby settlements in the foothills and plains; cooking fires can also help heat homes, dry and prevent insect damage to stored crops, and purify water. Many mountain forests are subject to high, and often unsustainable, levels of logging and clearance for agriculture. The highest rate of deforestation in any biome is in tropical upland forests: 1.1 percent per year.<sup>1</sup>

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1FAO. 1993. Forest Resources Assessment 1990 -- Tropical Countries. Forestry Paper No. 112. Food and Agriculture Organization of the United Nations: Rome.

Most of the world's mountain communities are strongly influenced by surrounding lowland and urban areas with regard to timber extraction and, particularly, watershed management. The interests of these outside forces, which are mainly economic, do not necessarily include a sustainable future for either mountain forests or mountain communities. There is a tremendous need for balance between the demands of lowland populations (e.g. timber, clean water) and the needs of mountain communities (e.g. sustainable livelihoods, opportunities for youth). There is also a strong need to balance productive use of forests with their protection. This need for balance applies equally to developing countries and many countries in transition, where many mountain people depend on forest products for subsistence and survival; and to the industrial world, where short-term profit-taking may conflict with conservation values.

Increasingly, it is accepted that mountain forests can be sustainably managed through approaches that recognize the linkages between ecosystem and societal processes. The rights and stewardship responsibilities of local communities, supported and arbitrated by national or regional institutions, are essential starting points. However, much work is needed to develop and implement such methods. The many interactions between forests and agricultural land use in mountain regions must be recognized. Issues of land tenure, training, natural regeneration techniques and, sometimes, the provision of suitable species are central to sustainable land use, which involves not only forests, but the trees outside, which are often valuable for producing fodder and fruit, and for slope stabilization.

Mountains, especially in tropical regions, but also in Mediterranean, arid, and temperate areas, are centers of biodiversity; and much of this is in the forests. They are important as habitat for animals and fish; hunting and fishing are important for both subsistence and recreation. Recreation and tourism in mountain forests are growing rapidly, leading to major challenges regarding how these activities should be managed to minimize environmental and societal impacts and maximize benefits to local communities.

Drawing together these various threads, it is evident that mountain forests are of crucial importance not only to mountain people, but also to a significant proportion of the global population. This was recognized in Chapter 13 of the 1992 Earth Summit's Agenda 21, entitled "Managing Fragile Ecosystems: Sustainable Mountain Development" which helped to draw worldwide attention to conservation and sustainable development needs for the world's mountain regions. Chapter 13 has two program areas: (a) generating and strengthening knowledge about the ecology and sustainable development of mountain ecosystems, and (b) promoting integrated watershed development and alternative livelihood opportunities. This report contributes towards these two



goals, bringing together a wide range of experiences from mountain regions across the world.

The 101 contributors to the "Mountain People, Forests and Trees" electronic conference -- local community members, policy-makers, project planners, academicians and researchers from around the world -- provided case studies and information from both developing and industrialized countries, principally the former. As this report is based on these contributions, the coverage given to different issues and mountain regions is uneven; nevertheless, the many case studies and contributions in this report represent a significant new body of knowledge regarding mountain forests and the people who depend upon them (see Figure 1). For a broader overview, the reader is directed to "Mountains of the World: A Global Priority,"<sup>2</sup> particularly the chapters by Hamilton and others on montane forests and forestry, and on mountain watersheds; and "Forests and Sustainable Mountain Development: A State-of-Knowledge Report for 2000."<sup>3</sup>

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<sup>2</sup>Messerli, Bruno and J.D. Ives (eds). 1997. "Mountains of the world -- global priority. A contribution to Chapter 13 of Agenda 21." Parthenon Publishing Group: New York and London. 495 pp.

<sup>3</sup>Price, Martin F., and Nathalie Butt (eds). 2000. "Forests and Sustainable Mountain Development: A State-of-Knowledge Report for 2000." CAB International: Wallingford and New York.

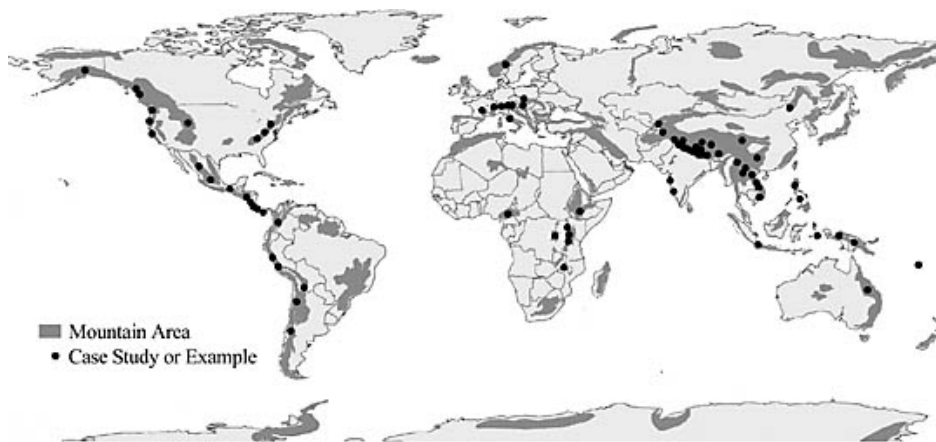


Figure 1: Geographic distribution of case studies and examples.

### The World's Mountain Forests: Definitions, Meanings, and Trends

There are many types of mountain forests. They range along a continuum from wholly natural forests, never influenced by human activities; to various forests whose composition has been altered by people through the removal and planting of selected species; to man-made plantations. Present knowledge regarding mountain forest resources -- their status, extent, location, condition and change over time -- is severely limited at the global level. Correcting this

situation is one goal of the Global Forest Resources Assessment 2000 (FRA 2000 -- part of the FAO's Forest Assessment Program). Using remote sensing and spatial information to map the world's forest ecosystems, the FRA is based on a core set of reporting standards and definitions endorsed by FAO member countries and the Intergovernmental Panel on Forests.

#### Defining Forest Ecosystems

One definition of forests is "tree-dominated ecosystems displaying the seral dynamics of ecosystem maturity, covering 20% of the area" (Ranil Senanayake 1999). FAO's FRA has derived a common definition of forest for all areas of the world: "Land with tree crown cover (or equivalent stocking level) of more than 10% and area of more than 0.5 hectares (ha). The trees should be able to reach a minimum height of 5m at maturity in situ." The FRA 2000 uses different subdivisions between the tropical/sub-tropical zones and temperate/boreal areas, to take into account for the difficulty of applying "plantation" as a definition in the latter areas.

Summarized from Robert Davis 1999.

Each mountain forest is characterized by different ecological processes. The many interacting elements of forest ecosystems -- animals, soils, trees, other plants, -- are important to both mountain and lowland people. However, while "forest" may be generally taken to mean a "tree-dominated ecosystem," for the purposes of considering the interaction of peoples and forests, it is important to remember that labels often derive from use.

#### Recognizing the Whole Forest Ecosystem

Forests are not just trees, which though providing a useful way to identify forests, are merely the largest (individual) components in dynamic ecosystems that include many other components. Tree species typically provide below 1% of biodiversity, and more than 75% of biomass (standing crop). Epiphytes, understory and ground flora, lichens and mosses are further floristic elements, while fungi, soil organisms, insects and other micro- and macrofauna are vital components of forest systems.

Summarized from Ranil Senanayake 1991; Rausto Sarmiento 1999c; Elizabeth Byers 1999d.

The word "forest" has many and varied meanings and nuances to different groups of people. It may be used, for instance, not only to describe an ecological system, but also to refer to an economic entity, or for political convenience. Also, trees of all kinds are important to those who use them -- whether they are in forests, around farmsteads, in fields, on terrace boundaries or elsewhere in the mountain landscape. These trees may be intentionally planted, as in parts of the Himalayas and elsewhere or just allowed to grow where they establish themselves.

Other ways to characterize the identity of a forest are in terms of its biodiversity status, and whether it is natural or anthropogenic. The second category is further divided; many anthropogenic forests have the capacity to revert to "natural" secondary forest if human intervention is removed. While this is ongoing, anthropogenic forests may be classed as plantations, agro-forestry systems or anthropogenic natural forests, according to the way in which the forest resource is used. In addition, it has been argued that the term "natural" is no longer relevant, as no part of our planet is absolutely free of human influence in the form of air pollution, climate change and other indirect effects.

While these technically descriptive terms may be reasonably comprehensive in terms of human-forest interaction, they do not necessarily tally with legal definitions or interpretations, with regard to administrative practice, forest law and policy. It is therefore necessary to examine closely the way operative rules apply to forest programs and the practical aspects of management. For example, the legal definition of forest in Indonesia is: "a spread out area filled with or planned to be filled with trees, other living (biological) and non-living elements which as a whole form an ecosystem unit" (Law on Forestry 1998, Tr. Nico Smith 1999). The law also includes more specific terms relating to use and ownership, and a separate definition of forest as appropriate to social forestry: "an area growing trees which as a whole forms a living natural community and a natural living environment, which is designated by the government as being a forest" (Nico Smith 1999).

However they are defined, mountain forests may be significantly changed, in the medium to long term, through the forces of climate change; a major concern given the long regeneration cycles and lifetimes of many mountain trees. According to the UN Food and Agriculture Organization (FAO), forests are shrinking globally at a rate of 11.3 million hectares each year, but still account for approximately 25% of the planet's land area. Mountain forests are dynamic ecosystems, and their political nature must be recognized and considered in the development of equitable policies and institutions in a rapidly changing world.

### **Sustainably Managing Mountain Forests**

Mountain forests have many different values, both economic and otherwise. While the most widely accepted value of many forests is timber, in mountain forests, timber is often much less important in economic terms than ecosystem services such as the production of water; biodiversity, including non-timber forest products such as mushrooms, animals and medicinal herbs; or tourism. The production capacities of mountain forests are limited by colder temperatures, variation in slope and aspect, shallower soils, and moisture regimes.

Sustainable production is a component of sustainable forest management; the traditional sustained yield concept implies a balance between removal and growth of timber. Much work is required in developing and implementing appropriate management approaches, which must also encompass the interactions between forests and agricultural land use in mountain areas, recognizing that mountain people are usually reliant on the whole landscape, and that their daily life involves an integration of resources, practices and values. Issues of land tenure and natural regeneration techniques are central to sustainable land use involving not just forests, but the trees outside which often produce fodder and fruit and provide slope stabilization.

Superimposed on these traditional uses of mountain landscapes, new considerations have become increasingly important in designing appropriate ways of managing mountain landscapes. These considerations include the fast-growing sectors of tourism and recreation -- including a great variety of sports from birdwatching to trekking, skiing, and extreme adventure sports -- and also ecosystem services, such as water supply, protection from natural hazards, and biodiversity. Mountain forests play vital roles in controlling runoff and reducing soil erosion, thereby contributing to better water quality in streams and rivers. They also help to protect settlements and transport infrastructure from natural hazards, such as avalanches, landslides, and floods. With their tremendous variety of habitats, mountain forests have high biodiversity, and some of this global richness is slowly being acknowledged through protected areas, debt-for-nature swaps and the recognition of intellectual property rights. Yet, while the benefits of protected areas are many -- education, research, biodiversity, recreation -- the level of protection for the natural environment should not exclude the needs of people who currently or traditionally rely on the ecosystem for subsistence. Where mountain forests have been largely removed or degraded, reduced fuelwood supplies and the accompanying shift to less nutritious foods clearly contribute to malnutrition. For example, in the densely populated mountains of war-torn Rwanda, two-thirds of families cook only once a day, and one-third cook even less frequently.

In developing countries, mountain people, especially women, often rely on an astonishing variety of forest species for food, fodder and medicine. Sacred or religious values are also important attributes of some forest products. People of many cultures recognize sacred forests, groves, and trees. Traditional natural resource management knowledge and close cultural links between people and their forests and trees -- combined as appropriate with technical or science-based approaches -- can be essential elements in ensuring the mountain forests and trees are sustainably managed.

The Mountain Forum e-conference provided a large number of case studies and examples of how mountain communities and forests interact with each other in

today's world. Some examples of promising mechanisms for the sustainable management of mountain forests are presented in Table 1.

Table 1. Promising mechanisms for the sustainable management of mountain forests

Type	Name	Where applied	Aims/how it works
Legislation/ Policies	Pan-European Operational Level Guidelines	Europe	Promotes sustainable management. Includes ecological, economic and social issues to be considered in national and local policies within a non-legally binding but highly consultative and balanced framework.
	National Biodiversity Policy	Slovakia	Aims to develop data bases for sustainable management; increase the proportion of naturally regenerated forest; monitor and assess changes and impacts on development of forest ecosystems.
	EU Rural Development Regulation	Europe	Negotiated between countries - provides financial subsidies for the ecological stability and sustainable management of mountain forests in a rural development context.
	NATURA 2000	Europe	System of protected sites across Europe that are valuable in terms of biodiversity.
	Forestry & Mountain Laws	Switzerland	Supports local control, communal decision-making and reinvestment in local communities
	National Park Declaration	Nepal	Protects forest from exploitation/ extraction - provides tourist attraction - boosts/secures local economy.
	Forest Master Plan/ Mining Act/ Afforestation Strategy etc.	Bhutan	Reforestation, conservation of biodiversity, buffer zone and enclave zone development - long-term effect.
Multi-functional land use strategies	Sloping Agricultural Land Technology (SALT)	Philippines	Replanting of native species/ enhancing productivity. Farming system integrates trees, food and commercial crops to raise farm income -- a mini-forest with timber, fruit tree species and shrubs cultivated alongside cash and food crops providing

			seed and income.
	Parma Mushrooms	Italy	Local enterprise - beneficial to local economy. Forests (of limited commercial value for timber) are protected.
	On-farm Native Tree Cultivation	Indonesia, Sri Lanka, Philippines	Protects natural regeneration for timber, fuel and soil conservation - provides income source from (mainly) fruit trees. Enhances biodiversity.
<b>Support/ extension</b>	Hills Leasehold Forestry and Forage Development Project (HLFFDP)	Nepal	Enables subsistence farmers to lease, long-term, blocks of degraded land - regeneration expands their available resource base and helps reverse ecological decline.
	Annapurna Conservation Area Project (ACAP)	Nepal	A broad range of alternative energy sources promoted to replace, or reduce the use of, fuelwood.
	Nepal Agroforestry Foundation (NAF)	Nepal	Supplements existing agroforestry technology so that farmers can become self-sufficient and confident with techniques. Education and instruction.
	WWF/ World Bank initiative	Papua New Guinea	Supports community-based foresters with financial backing for sustainable timber production and management. Aims to enhance economic viability of CF, with emphasis on sustainable production, while increasing protection of fragile forest biodiversity and the environment.
	Gia Lai Agroforestry extension project	Vietnam	Aims to improve the resource-management organization (at grass-roots level) of smallholders; build response capacity to rural development needs and opportunities; increase food security in project area.
	Food-for-Work forestry extension	Honduras	Planted trees are now managed in a similar way to naturally regenerated trees - aims to find a balance between tree and food crop production.
	FECOFUN	Nepal	Raises forest user group (FUG) awareness of rights and responsibilities; reinforces their role.
	Joint Forest	India	Government-led initiative to promote

	Management (JFM)		self-determination and local mobilization. Most successful when integrated with autonomous community groups.
	Integrated mountain development program	China	Facilitates the development of diversified tree species = afforestation, within a context of integrated watershed management. Promotes local agroforestry.
<b>Community organizations</b>	Village Forestry Committees	India	Self-determined community planning and management of forest resources.
	Community timber management	Yunnan Province, China	Community manages its forestry resources, and has the rights to the timber market - economically productive management is ensured - revenues are reinvested in the community - schools, roads, water storage, electricity etc.
		FUG, Nepal	Transfer of benefits from central to local level as FUG have the right to harvest timber from their managed areas.
	Mahila mangal dal (MMD)	India	Protects the forest from destructive quarrying; undertakes nursery/ plantation work.
	Savings and Credit Cooperatives (SCC)	Nepal and others	Represents common interests of a larger proportion of forest groups than otherwise possible at general FUG assemblies. Self-determined economic power. Long-term investment opportunities.
<b>Economic instruments</b>	Joint Implementation (JI)	Latin America and others	Promotes the development of carbon markets. The Nature Conservancy currently runs several projects partly funded by the sale of carbon credits to mountain areas of forest that would otherwise be cut or burnt.
	Compensation/ subsidies to mountain people	Austria, Costa Rica, France, Switzerland	Transfers some of the economic benefits of upstream mountain forest conservation to those living upstream - promotes conservation.
	The Costa Rican Territorial & Financial Consolidation	Costa Rica	The Ministry of Environment and Energy will acquire threatened parklands for permanent protection - preventing deforestation and increasing carbon storage in secondary forest and pasture

	of Biological Reserves Project		land. Funds generated by sale of "carbon bonds" guaranteed by the government for 20 years.
	Forest Certification	Europe, Melanesia	Ensures products are produced in a sustainable way. Aims to raise management standards and promote sustainable management.
	Sustainable-practice tropical timber production - Futuro Forestal	Panama	Plantations, of native species as well as teak, will slow erosion, improve soil fertility, promote even stream flow and enhance forest biodiversity.
Religious practices	Ridam	Bhutan	Prohibition on entering designated mountain forests from mid-August to mid-October. Protects young wildlife and plants during late monsoon growing season, and focuses attention on important agricultural activities (socio-economic advantage).
Coordinated knowledge sharing	European Observatory of Mountain Forests (EOMF)	Europe	Aims to use the experience of everyone involved in mountain forests to share views, concerns and ideas about sustainable management and local development. Planning ahead/ long-term view is emphasized.

## Mountain Forests and People: Past and Present

The interactions of environmental forces and human actions have shaped and determined the composition and structure of the world's mountain forests. Many multifunctional local forest systems have disappeared from mountain environments, and today's problems often reflect the inevitable crisis that results from a lost symbiosis with the forests. Community values, which emphasize the human-nature interaction, have been lost in the transition to the nation-state where the generation of material wealth receives a higher priority.

This section of the report outlines the history of mountain forests on five continents, showing that there is no typical mountain forest. Each has a specific history tied to the people who have used it, and this must be recognized when planning for the future. At the same time, there are some common threads to these examples. A first is that, over past centuries, the area and composition of mountain forests has generally changed significantly. Regional or global economic and cultural forces have typically been the primary



initiating factors. A second thread is that laws and regulations often do not achieve their objectives; to be successful they need to take into account all of the diverse ecological and economic factors and cultural expectations relating to the forests -- and these change over time. Questions of access and ownership to forests are particularly important in this context. A third thread is that, given time (and where possible, assistance) to recover after logging or fire, many mountain forests are able to regenerate -- but that this can take decades or sometimes centuries. Finally, in recent years, a range of locally based initiatives based on an integrated understanding of forests and their importance have been implemented, giving considerable hope for the long-term conservation of key mountain forest ecosystems. All of these themes are taken up in more detail in subsequent sections of this report.

## Historical Perspectives on Contemporary Issues

### Andes

The longest mountain system on the planet harbors the greatest biodiversity on Earth. The huge variety of geographical attributes and vernacular cultures has over millennia given rise to the current landscape. Endemism, diversity and rarity of plant and animal species are common attributes of Andean forests that previously covered a greater area. Depending on latitude and elevation, there are many different forest types. Through much of the Andes, there are hydrologically and biologically important cloud forests, including the lomas vegetation in small pockets on the western flanks of the central and southern Andes which has survived the advance of the Atacama Desert, the driest place on Earth. Several tree species grow almost monotypically in different zones, including Podocarpus forests; the cedar forest and temperate forests -- including those of Nothofagus and native conifers -- of the southern Andes; and the high-altitude Polylepis woodlands of the central Andes.

Forest depletion has affected most of the Andes. Its initial causes were ancient management practices such as transhumance, fire, the advent of settled agriculture and the domestication of wild crop species. Many agricultural cultivars, fruit trees, medicinal and ornamental species came from tropandean forests. After the Spanish conquest of the Incas, a decree in 1539 allowed Indians the free collecting of firewood from native forests but prohibited the non-sustainable cutting of trees. Soon after the Spanish Crown was overthrown in 1821, the Creole became the state-sanctioned landlords of the local people, charging them for firewood extraction, sheep pasturing and ice. This breach of contract between the Indians and the State led to the Atsurpia Uprising, between the 1840s and 1880s, one of the bloodiest and longest peasant rebellions in the Andes. In the early twentieth century, vast amounts of fuelwood were cut and then delivered by the newly built railways to the lowlands in order to supply developing industries.

Campesinos and landless peasants continue to extract fuelwood from the forests. In the paramo and puna, the scarcity of firewood means that they must make extended trips to the highest forests. The devastation of old-growth forests, including those on coves and steep slopes, has pushed farming and livestock ranching to higher limits. Consequently, there are now two treelines under pressure: an upper one above the cloud forest belt, and a lower one in deforested inter-Andean valleys.

The planting of eucalyptus and pine monocultures has exacerbated biological impoverishment while providing benefits in terms of local fuel supply and building materials. Problems of poverty, marginality, rural migration, weakened cultural identity, erosion and degradation of the forest resources are thus faced by the ethnic Andean mountain groups. Forested highlands have almost disappeared from the tropical Andes, and those few remaining are being cut and burned (Jorge Recharte 1999; Fausto Sarmiento 1999a, b). The role of mountain forests, particularly neotropical montane cloud forests, is intrinsically linked with water production, not only for human use, but for the entire catchment's system. While timber extraction is a starting point for exploitation, fuelwood extraction is as important, due to charcoal production. Charcoal making is still the second most productive economic activity in the cloud forest belt, as the road network allows trucks to collect sacks from the roadside and deliver them to nearby towns. There is irreparable damage to seeds in the soils, impeding forest regeneration by constraining succession (Fausto Sarmiento 1999c).

Because of the pressures of external markets, the production of cash crops is still limited. Most of the subsidized dairy industry has kept extensive deforested areas for pasture. New efforts with coffee as a shade crop are underway to test the option of organic production, sometimes linked to ecotourism. However, in most isolated areas, coca remains the most profitable crop, which is grown on increasingly steep slopes. Drug production and trafficking have changed the economic, social, and political structure of many mountain areas.

### **Huascarán National Park, Peru**

In Huascarán National Park, remnant forests grow up to a few tens of meters below the snowline, hanging from rocky cliffs or amongst rock debris. The Polylepis forests, some of South America's most endangered, contain a diversity of flora and fauna within the park while providing habitat for many species of endangered endemic birds. The forests are also primary water catchment sources. Communities bordering the Park have customary rights to its pasture and forests, and all peasant families claim these rights -- an agreement between the Park authority and the communities allows the user groups access in exchange for their labor to cultivate and plant thousands of Polylepis seedlings each year. From both ecological and social perspectives, the peasant communities and the forests are interdependent.

Initiatives to incorporate the last mapped forest remnants and ethnoecological practices into novel conservation strategies are needed to help the Andean people to continue living with dignity and in balance with their environment. Summarized from Jorge Recharte 1999; Alton C. Byers 1999a.

### **Appalachian Mountains**

The Appalachian Mountains harbor the largest temperate deciduous forest in the world, typified by a rich diversity of hardwood tree species. European settlers cleared much of the lowland forests in this region, which form the headwaters of the Atlantic Coastal plain. By the late 1800s, many of the upland forests of oak, red spruce, and hemlock had been commercially harvested. However, the deciduous forests have shown remarkable resilience; despite periodic pest infestations such as chestnut blight and gypsy moth, forests have regenerated both naturally and as a result of re-seeding on cleared land and abandoned farms and are now approaching commercial maturity.

While private land ownership has largely dictated forest use, public forests include many state forests which reverted to the states due to tax delinquency during the depression of the 1930s. Though the Appalachian forests are in rural, mountainous areas, they are within a day's drive of 60 percent of the country's population and are increasingly valued for recreation and tourism -- especially in state and national forests and Great Smoky Mountains National Park, as well as along the scenic Blue Ridge Parkway. Forest use is at a crossroads; as the highly valuable timber resource approaches commercial maturity, management rights are sought by many -- primarily domestic -- companies. Urban and rurally based conservation groups are concerned that the forests' amenity, water quality, and biodiversity values will be compromised by a rapid escalation of timber harvesting.

Land trusts are particularly active in this region, buying and setting aside private forest land for conservation purposes. Increasingly, community groups are mobilizing to set aside private forests and maintain them for value-added timber, watershed, or recreational purposes. Balancing the diverse uses of Appalachian mountain forests will continue to be a complex and sometimes controversial task (summarized from Steve Selin 1999).

### **Central Seram Mountains**

In the late 17th century, the international clove trade brought the Nuaulu of central Seram into contact with the outside world. The last 40 years have seen a great expansion of tree-cropping, and for over two decades cash-cropping and rates of land sale and forest extraction have increased. Renewed forest clearance for spices and other tree crops initially took place through logging and spontaneous immigration. Forest clearance accelerated rapidly as new pioneer settlers practiced slash and burn cultivation -- transmigration and its

effects are the largest factor in forest transformation. Initially, the Nuaulu benefited from the state forestry laws of the 1960s, and also realized financial benefits; they could engage in land sales impossible elsewhere. Although they appeared to be sanctioning forest destruction for short-term gain, this practice did not contradict their own local ecological principles.

Since 1990, the situation for the Nuaulu has turned sour. Disillusioned with the effects of logging, Nuaulu have been increasingly involved in clashes with other villages over land-rights. The recent rapid erosion of their resource base has brought a strongly politicized response from the Nuaulu; they now speak in terms of preservation of tradition and environmentalism. The Nuaulu have gone through a transition from semi-independent tribesmen to dependent peasants; it is the scale of the current change that provokes the politicized nature of their responses. Their new conception of forests and resources as limited is connected to their perceived participation in an open global ecology (summarized from Roy Ellen 1995, in Tania Li 1999).

### **Colorado Rocky Mountains**

Until about 150 years ago, the Colorado Rockies were inhabited by groups of nomadic indigenous Americans. After the discovery of gold in the 1850s and 1860s, mining settlements grew rapidly, and vast quantities of wood were used for fuel, mining, railways and construction. The federal Free Timber Act allowed the removal of dead timber, but not live trees, from public lands. This was a particularly good example of a law that was passed without understanding of the ecology of many of the forests to which it applied, as people lightly burned forests and then could legally remove the dead trees for timber.

At the close of the mining era, most of Colorado's remaining forests were designated national forests, under the administration of the federal Forest Service. The intention was to protect watersheds and ensure reliable timber supplies according to the principles of sustained-yield forestry, one implication of which is that forests must be protected from fires, which endanger the long-term supply of timber. In the early years of this century, the emergence of recreation led to one of the first of many management conflicts; the roads had been built mainly for fire protection, but the access they allowed led to greater numbers of fires from cigarettes and campfires.

Colorado's forests now have two primary functions: providing reliable water supplies and an environment for recreation. Regional populations have risen and many reservoirs have been built in the mountains, to supply the cities on the plains. Recreation has been the dominant use for 40 years and nearly all forest management activities now take recreational and aesthetic criteria into account. To increase the diversity of forest stands and decrease the likelihood of catastrophic fires, the Forest Service has begun to use 'prescribed burning':

intentionally starting fires under conditions chosen so that trees will be killed only in predetermined areas. Many ski resorts and private dwellings are, however, adjacent to wilderness areas, where natural fires are left to burn. Who holds responsibility for minimizing the potential and actual damage of fires is a major issue; a long-term problem that derives from past history, former ignorance of the fire ecology of these mountain forests, and past and present government policies (summarized from Martin Price 1999a).

## **Khumbu Himalaya**

Sagarmatha National Park, or Khumbu, is located in the Mt. Everest region of Nepal. The 1114 km<sup>2</sup> park has 3,500 residents of Tibeto-Burman origin and Buddhist faith. Their primary livelihood activities include potato cultivation, livestock herding, trade, and tourism; the park's forests are used for grazing livestock, collecting firewood and leaf-litter, and harvesting timber. Although the region may have been used seasonally by other ethnic groups for several thousand years (Alton C. Byers 1999b), the ancestors of the present-day Khumbu people came from eastern Tibet about 450 years ago. They settled in the lower subalpine valleys where human and livestock population grew and agricultural fields expanded (Lhakpa Sherpa 1999b). Crop damage by free-roaming livestock may have become a major problem and the community accordingly instituted a mandatory transhumance migration system.

An indigenous forest protection system appears much more recent. Forests may have been burnt and cleared, gradually eliminating forest and making settlements vulnerable to avalanches and rock falls. The community began to create village forest reserves, located closed to settlements. Community appointed volunteers were nominated to protect reserved forests and wildlife. Techniques such as regeneration planting, silvicultural tending, grazing and fire exclusion do not appear to have been part of the traditional forest protection system.

The influx of Tibetan refugees into Khumbu following the Chinese annexation of Tibet in 1959 considerably stressed the local systems. In 1965, the Government of Nepal established its first administrative office in Khumbu; central government regulations severely undermined indigenous control. Nepal was opened to foreign visitors in 1950; numbers arriving in Khumbu rapidly increased after the construction of a small airstrip. There was no control or supervision of forest resource use, and to prevent the area's destruction by tourism, it was declared a national park in 1976.

The park took over all the responsibilities of forest protection, and tourism has relieved some of the pressures on forests just outside the park area by providing off-farm employment for local people (Lhakpa Sherpa 1999b). Silver fir is now regenerating widely as the emphasis has been on growing forests. The loss of grazing area -- as silver fir is tolerant to grazing -- does not adversely

affect farmers who can afford to buy feed for their animals, but the poorer stock owners must compete for a reduced grazing resource. This situation has arisen as a result of misconceptions over the vulnerability of trees, and illustrates the need for an informed balance of knowledge and needs in management planning (Barbara Brower 1999b).

Hydroelectricity has replaced much of the firewood demand, but using hydroelectric power on a large scale is economically unwise for hotel owners -- not because electricity is too expensive, but because wood is too cheap. One way to resolve this issue is to include ecological costs in the price of firewood, making electricity -- where available -- financially as well as environmentally attractive (Christa Fischbacher 1999). Local people's support for conservation measures of the park is growing. The park raises substantial revenue from entrance fees, which traditionally went to the government treasury. The Government has recently authorized the park to use up to 50% of its revenue for local development under the Buffer Zone Act. If implemented effectively, the buffer zone initiative should greatly benefit the people who live in and around the park (Lhakpa Sherpa 1999e).

### **Uttarakhand Himalaya**

The Uttarakhand Himalaya is well known for active social and environment movements; the historical antecedents to the ongoing struggle go back two centuries. When the British pushed into the area in 1814, most of the land was ceded to Britain, with the remainder left to the surviving heir of the Garhwali throne. The British began timber extraction to feed both the Empire's industrial needs and the Indian railroad system. Tree replanting also altered the ecological balance of the hills: slow-growing oaks and deodar (Himalayan cedar) were replaced with chir pine, for both timber and resin use. The forest department became the main enforcer of both appropriated "reserve" forest boundaries and the new plantations.

The exploitation further marginalized subsistence agriculture, which was the backbone of the regional economy. The forest policy, along with the colonial and feudal administrations, came to represent the main oppressive force in the lives of villagers. The area was eventually merged into Uttar Pradesh shortly after independence and the Indian State followed in the footsteps of the British; with industrialization now turned inward, demands on resources proliferated. Coupled with the 1962 border war with China that saw the frontier closed to ancient trade routes with Tibet, the economic conditions in the hills declined precipitously. New scourges such as liquor emerged to affect the inhabitants. Women were particularly affected, as the mass migration of men to the plains for work increased, leaving them to tend to the ever more onerous task of working the family farm.

Heavy deforestation came to be seen as the source of many of these problems, and by 1973 the stage was set for an uprising against the regional forest policy that had changed little since the British left. The Chipko movement achieved a remarkable mobilization of the peasantry and in 1980, Prime Minister Indira Gandhi finally accepted a 10-year ban on tree felling above 1000 meters.

While much has changed, illegal felling continues unabated. The future ecological and social well-being of Uttarakhand lies with the new generation of activists; the task now lies with bringing these social and environmental concerns into the political arena, where hitherto only vested interests have exercised power (summarized from Rajiv Rawat 1999a).

## Virungas

Between 1926 and 1930, almost 700 km<sup>2</sup> of afro-montane forest was brought under the protection of the Albert National Park, the first such reserve in Africa, and a Ugandan Gorilla Sanctuary. At the end of the colonial period, administrative responsibility for the major part of this reserve was split between Zaire (Virunga National Park) and Rwanda (Volcanoes National Park -- VNP). Until 1973, the VNP was managed by the Direction of Water and Forests within the Ministry of Agriculture. Responsibility was then transferred to the new Office of Tourism and National Parks. Management was supported by the Belgian Technical Assistance program and an international consortium of conservation groups.

Over the last three decades, the Rwandan sector of the Virunga ecosystem has been dramatically reduced in size. Just before independence, in 1958, the Belgian authorities allowed 7,000 ha of protected forest to be cleared for human settlement, and between 1969 and 1973, a further 10,500 ha of parkland were converted to agricultural use. This was done through a cooperative development project -- managed by the Rwandan government and the European Economic Community -- to grow pyrethrum, a natural insecticide, for international export. Soon after the forest was cleared, however, means of chemical synthesis were established, resulting in a drop in the market price and partial abandonment of the project. Around 40% of the pyrethrum fields were converted to subsistence agriculture. In 1979, 1,300 ha more were cut to make room for more settlers in the western region. As an exception to this trend of loss, in 1986 several hundred hectares along the border were reincorporated into the park.

Overall, the total area of the Volcanoes National Park has decreased by 54%, from 328 km<sup>2</sup> to a 150 km<sup>2</sup> remnant. This conversion has occurred principally within lower elevation zones and thus the associated loss of biological diversity has been significant. The park retains considerable biological value, and recent changes in land use policy have been positive (summarized from Will Weber 1987, in Alton C. Byers 1999b).

## Western Carpathians

The mountain forests of the Western Carpathians have experienced two millennia of exploitation. The Romans valued the high-quality timber for shipbuilding, and later the Slavonic tribes retreated before the invading Huns, using the forests to provide timber for wooden fortifications. By medieval times, population pressure had led to fragmentation and a great decrease in the forests' area. Over the following centuries, the proportion of forested area continued to decrease, though silvicultural practices and the recognition of the protective functions of the forests began in the 19th century. After the Second World War, Slovakia's forests were nationalized, and since 1950, the area of forest land has increased by 10-12%, mainly through the afforestation of less productive and infertile land.

Slovakia is one of the most forested countries in Europe with over 70 fragments (20,000 ha) of natural and virgin forest, with 40-45% of semi-natural forest cover, mostly in the mountains. Uniquely for Central and Western Europe, the species composition of the semi-natural forests is very close to that of the original forests. The diverse biotopes in alpine and sub-alpine ecosystems include alpine meadows, rocky walls and cracks, snow beds and dwarf pine stands. In the past, inaccessibility and harsh climatic conditions offered some protection. Currently, the management categories of forests are: commercial forests (67% of the forest area), mainly producing timber; protection forests (15%); and special purpose forests serving non-productive and public functions including soil conservation, watershed protection, biodiversity conservation and recreation (18%).

National policy on the principles of forestry development places great significance on the ecological importance of forests, especially in terms of conservation and the amelioration of the negative effects of pollution. Air pollution has damaged up to 85% of trees (particularly evergreens) over 600,000 hectares; foresters accordingly attribute special importance to preservation of the gene pool and regeneration of genetic sources in the forest.

More general ecological objectives are being approached more slowly, partly because they rely heavily on funding. Financial support for this type of non-productive (in terms of economic production) forestry is greater elsewhere in Europe, although legislation and legal standards related to environmental protection in Slovakia are rather advanced (summarized from Libor Jansky 1999b, 1999c, 1999e).

## Mountain Forests Under Threat Today

The different examples in the previous section show clearly that the various facets of the history of any mountain forest should be clearly recognized and understood when considering its possible future. Many of the threats of the past continue today -- but there are also new pressures. Some of these are



outlined in the following section, which provides examples of a number of pressures which can be described as globally important, either because they are linked to global phenomena, such as climate change and air pollution, or because they occur in many places around the world, so that cumulatively they have global importance. There are many examples of such pressures. Some can be linked directly to economic, development, and political priorities, such as the demands of the timber and paper industries, uncontrolled shifting cultivation, the development of new types of land use, and policies relating to land tenure, military security, or the control of illegal crops. Others relate to events -- such as fires, avalanches, and landslides -- that are perceived as natural, but whose effects on mountain forests and the people who depend on them are often significantly affected by human actions.

### **Multiple Threats in the Uttarakhand Himalaya**

People in India's Uttarakhand Himalaya are threatened by earthquakes in a very active seismic zone; more than 200 tremors occurred in a period of only a few months in 1999, and resulting landslides are also a threat. Men tend to migrate to the plains in search of work and greater economic security, increasing the work and difficulties of their female partners who remain. Availability of water is a problem. The forest is relied upon heavily for its watershed protection; it is feared that accelerating deforestation due to fire will mean no water for drinking, irrigation, domestic use, hydropower, industry or transport. Summarized from Anil Jaggi 1999.

In every case, there is a complex interaction between ecological and societal processes which must be taken into consideration when developing policies to address "threats" -- some of which may become opportunities.

### **Tropical Montane Forests (TMF): Threatened or Resilient?**

Alternative ways of looking at problems are useful for ensuring that mountain people derive long-term benefits from their forests. Threats characterizing TMF may be said to include the fragility of the forests, population growth, human greed, politics and economics, fear of change. However, viewed from a different perspective, the same issues take on a different appearance: the resiliency of TMF -- mature forests have the capacity to deal with disturbance; appropriate concentration of people in proper locations and the adoption of sustainable production; globalization and technological power can be used to mitigate human impact on the ecosystem; global concern can lead to sustainable forest management policies and research becoming central to government policy.

Summarized from Gonzalo De Las Salas 1999.

## Road construction

Road construction has been a major force of change for mountain people and their forests for centuries. Mountain roads may be built for many purposes: for example, to provide access to valuable resources, for strategic reasons, as part of development projects. Even when the roads are not built primarily to provide access to forests, they often lead rapidly to major new pressures. One example is the Valley of Flowers, one of India's natural wonders -- an alpine valley containing an immense diversity of flora and fauna. A new road along a current trek route threatens the valley's existence. The Punjab state government supports the project, and the speed with which the Environment Minister cleared the proposal has led to suspicions of political motivation. Parking facilities and accommodation are also planned as backers intend to capitalize on the busy pilgrim trade.

Himalayan road building projects are notorious for destabilizing the terrain. The use of dynamite continues, in spite of the area's geological sensitivity; many roads were buried during the recent earthquake, beneath rubble initially loosened when the roads were blasted through the mountains. Additionally, quarrying has greatly disfigured the mountain landscape, and traffic pollution from the new road will affect the wildlife severely.

Local groups and one regional political party have begun to protest. There is growing realization that such roads not only destroy the environment but provide little financial return for locals in exchange for the heavy ecological price. Management of the new project is not controlled locally, and it is likely that labor will also come from external sources. The revenue generated by the continuing development of this tourist infrastructure does not reach the local people -- schools and hospitals in the region are few and far between (Rajiv Rawat 1999b).

### A Himalayan Farmer's View

"People believe that if there are roads in the village, development has taken place. But what is the direct benefit of having a road in our village? The people here are not connected with the roads, but with their forests. The grass will go, the trees will go, the stone will go from our village."  
Himalayan farmer, quoted in Olivia Bennett 1999a.

## Forest conversion

The conversion of forests to provide agricultural land is a phenomenon that is as old as civilization. However, with the current rapid growth of human populations, especially in developing countries, this process is clearly of global significance. One key region is Central America, where Pacific-facing steeplands in Nicaragua, Honduras and El Salvador have been converted to

agro-ecosystems; only a tiny proportion of the original dry forest cover remains. These slopes are cultivated principally by subsistence farmers with small holdings using basic technology. Although lacking forest cover, these areas contain large amounts of tree germplasm in the form of hedgerow trees, stumps in fields that resprout during fallow periods, and the soil seed bank. This germplasm resource remains as a result of the resistant nature of the trees, lack of farmer resources for the removal of stumps and unwanted trees, and the protection of on-farm trees as a response to the dearth of off-farm trees.

The lowlands are also largely deforested but, in contrast to the highlands, commercial agriculture prevails and most on-farm trees have been eliminated by mechanized plowing. Commercialization of lowland agriculture has marginalized small farmers and pushed them onto the unproductive steepplands -- a situation unchanged in spite of a string of agrarian reforms. In addition, montane cloud forests are being cleared or utilized unsustainably, leading to the erosion or loss of their important values for biodiversity, water collection, and watershed protection.

### **The Impacts of Hurricane Mitch**

The devastation caused by Hurricane Mitch in Central America in 1998 has highlighted upstream/downstream relations -- steeppland environmental restoration has long been the focus of development agencies and local governments. Reforestation using mostly potted planting stock is relatively unsuccessful. Tree species diversity, however, is not as threatened as appearances suggest, and working with these agricultural systems is the way to conserve this diversity. The socio-economic factors underlying the situation, such as insufficient resources for legal control and lack of community-level organization, need also to be addressed.

Summarized from Adrian Barrance 1999a.

Forests are often subject to political machinations -- in Kenya, as in other countries, voters have been solicited with cleared forest land, regardless of local forest policy. This clearing is often done by fire, which can spread and cause even more damage, such as those on Mount Kenya several years ago. Hundreds of hectares of pristine forest on Mount Kilimanjaro are currently being destroyed (Ulf Carlsson 1999). Rural populations are then faced with a decrease in soil fertility as soil cover is lost, destruction of water catchments and the consequences of a shrinking fuelwood supply -- less food is cooked properly, which can lead to malnutrition. A lack of sufficient fodder for livestock can also be disastrous. Large-scale felling can leave local peoples impoverished or in debt to those responsible for the clear cutting. There are implications for biodiversity -- native trees and the wildlife for which they provide a habitat could become extinct (Esther Njiro 1999).

Farming systems themselves are often the cause of reduction of forest biodiversity, as in Negros Occidental in the Philippines. In the 1960s and 1970s, the lucrative world sugar market was the trigger for the clear-cutting of secondary growth forests to make way for vast tracts of sugarcane plantations. Between 1904 and 1979, 20,000 hectares of primary forest (under American-owned logging concession) was replaced by rice and corn monocultures. These intensive farming methods have led to massive landslips and floods, hastened soil nutrient depletion, especially in upland areas, and reduced biodiversity yet further (Benedicto Q. Sánchez 1999c). In Colombia, the narcotics industry has cleared huge areas of jungle and mountain cloud forest to provide land for coca and opium poppy cultivation (Elizabeth Byers 1999c).

Government- and industry-directed "integrated resource management" often purports to compensate for the devastation wrought by commercial deforestation with afforestation programs; generally these are in fact nursery plantations of broadleaf trees -- often of non-native species -- which do not replace, in any sustainable sense, the previous natural forest. Traditional management methods of local communities also tend to be overlooked in these cases; it is thus appropriate to make a distinction between different types of forestry ownership and management (Peter Parkes 1999).

## Fire

Fire is part of the natural ecosystem of many forests, traditionally used as a management tool -- but also to extend agriculture into forest areas, and to provide better grazing for domestic animals. In recent years, forest fires have devastated regions across the world (Indonesia and Brazil in 1997, for example), and threatened many others. Uttarakhand recently lost 60-70,000 hectares of forest and, therefore, forest wealth, biodiversity, wildlife, high value medicinal plants, freshwater sources and topsoil (Anil Jaggi 1999). Government authorities, NGOs and villagers were all unprepared. Although large amounts of funding are provided for fire protection, there is no cohesive management plan. Though local people are concerned, lack of logistic support has made it difficult for them to act effectively (Anand Bhattarai 1999d). However, in one case the community investment motivated an entire village to work together to extinguish fire in the forest they managed and regenerated -- it was their own livelihoods they were protecting (Ashish Kothari 1999c). Generally, only those who feel they have a stake in the forests are willing to work to protect them -- another illustration of the value of involving local user groups in day-to-day forest management.

## Fires in Nepal's Langtang National Park

Since forest burning was banned in the 1970s, the Trisuli valley of Langtang National Park, Nepal has suffered several ravaging fires. It is felt locally that lack of controlled burning is responsible, as it allows a build-up of dead

material which then provides excellent fuel and allows the fires to penetrate deeper into the forest. Banmara (*Eupatorium adenophorum*), artemisia and raspberry contribute by spreading rapidly in the absence of managed succession or periodic clearing. Traditionally, fire was used to improve grazing on pastures and in secondary scrub areas -- the resultant new growth produced grasses and ideal conditions for many wild flowers, including valuable medicinal species and bamboo seedlings; many species can only regenerate after fire as their seeds require scarification of this type to germinate.

Summarized from Lhakpa Sherpa 1999d; Ben Campbell 1999a,b.

Setting fire to forests is illegal in India and Nepal (and many other countries), but this does not resolve the problem. Education is required to raise awareness about the implications of fire; apathy on the part of the government is just as dangerous. Currently the situation remains unsettled though controlled and monitored burning is one possible solution. Local knowledge is undervalued, which has the effect of removing the communities further from conservation goals.

## **Tourism**

Tourism is the world's largest industry, and is a contentious issue in many areas; it is difficult to evaluate the negative and positive impacts objectively. As an added complication, tourism is not only seasonal and highly variable, but also susceptible to the vagaries of national and international socio-political situations. It undoubtedly contributes to forest degradation in some regions, yet the financial benefits it brings may be considered to offset this. Again, the question is one of value, and specifically that of the long term as opposed to the short term, or; are the benefits sufficient to meet the needs of ecosystem health over time?

In developing countries, one topic of concern relates to fuelwood. In some places, burning dung is an alternative, but its use as soil fertilizer is then reduced -- chemical fertilizers are expensive and lack many of manure's properties (Tim Volwiler 1999c). In Nepal's national parks, the amount of wood used for cooking and heating has increased rapidly over the last three decades as tourist numbers have grown, leading to the problems associated with deforestation in some areas. Alternatives such as kerosene and hydroelectric power have drawbacks, particularly the necessary start-up investments; a successful solution must be one where the local community are able to meet their own needs from the resources available, while being also able to profit from the tourist industry. Thus, each locality needs to develop its own appropriate strategy that balances the needs of both these groups. In some parts of the USA, hikers and campers may only use camping stoves for cooking; this has proved effective and successful (Tim Volwiler 1999a).

## Annapurna Conservation Area

The lack of proper planning in the promotion of tourism in the Annapurna area of Nepal meant that forest resources were used unsustainably. Each tourist used three times more fuelwood than a local person did. In addition to this extra pressure on resources already in use, new tourist-driven settlements in higher zones created fresh impacts on the forest in those areas.

In 1986, the Annapurna Conservation Area Project (ACAP) was initiated. A broad range of alternative energy sources was promoted in order to replace, or reduce the use of, fuelwood. Technologies such as backboilers, improved cooking stoves, smoke water heaters, solar water heaters, and micro-hydroelectricity provided a variety of affordable choices. Kerosene, a short-term solution where forest degradation is severe, is seen as a solution for lodge-owners, as the cost can be borne by the tourists. Community-owned micro-hydropower installations are held to be the optimal long-term energy source. The socio-economic dimensions of providing incentives must also be considered; a crucial issue has been to raise local awareness of how the local natural environment, tourism, and economic development are linked. It is also vital to educate tourists about the local environment and conservation programs, and that they can afford to support this -- low-budget tourism can result in environmentally unfriendly activities.

Those who now make their living from tourism do not have time for comparatively unrewarding agriculture; previously intensively cultivated land is now fallow, and people have begun to plant trees. This has been encouraged by both local and international organizations, and raises the question of whether or not forestry should take precedence over agriculture, especially in economies based on subsistence farming. Overall, there are signs of positive effects of these efforts on forest conservation. Yet, in areas where the conservation efforts are not so concentrated, such as along the Marsyangdi valley (Sanjay Nepal 1999) there is a gradual deterioration of forest cover -- villagers say that gathering firewood takes longer now.

Summarized from Gehendra Gurung 1999.

In Europe, North America, East Asia and New Zealand, but also in an increasing number of developing countries, downhill skiing has had major impacts not only on mountain economies, but also on mountain forests. While much of the skiing takes place in the alpine zone above the treeline, swathes are cleared through the forests for lifts and ski runs. These can often have secondary effects, such as blowdown, erosion, and increased risks of avalanches.

Across the world's mountains, tourism is an increasing part of regional and local economies and has given economic value to undisturbed forest ecosystems. However, communities near but not actually on the tourist trail may be at a disadvantage in terms of lost commercial opportunity, while suffering from

some of the negative impacts of tourism. The key lesson is to ensure that tourism is properly integrated into local economies, and that they do not become dependent on this notoriously fickle industry.<sup>4</sup>

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4Godde, Pam (ed). 1999. "Community-Based Mountain Tourism: Practices for Linking Conservation with Enterprise. Synthesis of an Electronic Conference, April 13-May 18, 1998." Mountain Forum and The Mountain Institute: Franklin, West Virginia, USA. Available on the Mountain Forum web site at: [http://www.mtnforum.org/resources/library/cbmt\\_01.htm](http://www.mtnforum.org/resources/library/cbmt_01.htm)

### **Air pollution and climate change**

In Central Europe, air pollution from local and international sources is a major threat to forest health, affecting both trees and the soils in which they grow. The high density of pollution sources in the Slovak Republic has resulted in forest damage across the region; airborne toxic emissions from Poland, the Czech Republic and the former East Germany have also contributed greatly. The damage appears to have been exacerbated by climate change, as evinced by lack of rainfall. Factors such as wind, snow, insects and fungal infestations have contributed to the decline of commercially and ecologically important forest tree species. Initially, dieback occurs along the upper treeline and in dwarf pine stands, followed by the lower mountain ridges. Social and political changes in Central and Eastern Europe in the last ten years, and the transformation of the whole economy have also, through their influence on mountain forest management, affected the state of mountain forests (Libor Jansky 1999a).

Climate change may be the greatest long-term threat to mountain forests, significantly influencing their ability to provide the many functions that are important to mountain people and hundreds of millions living downstream. The increased concentration of carbon dioxide in the atmosphere may be beneficial for the growth of trees; however, it may also change the ratio of leaves to wood, or the number of minor branches, which may in turn change the value of the trees to people. Also, the productivity of mountain trees may be affected by changes in cloudiness and the frequency and timing of frosts, the competitive ability of tree and other plant species, and populations of pests and disease-causing organisms which thrive as temperatures increase. New climates may not be suitable for insects or birds needed for pollination, so that trees become unable to reproduce.

Likely increases in numbers of extreme events -- heavy snowfalls, major rainstorms, ice storms, and droughts -- may lead to major damage to mountain forests. Jointly, climate change, air pollution, and changes in land use deriving from economic and political forces will lead to major changes to the world's mountain forests over the next century and beyond. To respond to these major forces of change will require research to develop better understanding for predicting the behavior of mountain forest ecosystems, species, pests, and

diseases; inventory methodologies which consider regeneration as well as future harvests; and appropriate management strategies, including genetic conservation and breeding.

### **Mountain Forest Resources: Products and Values**

Historically, people living outside the mountains capitalized on what they regarded as unlimited resources of timber, water, minerals, and natural beauty. Mountains were not perceived as habitats for people. In many mountain regions, the commercial exploitation of mountain communities and their environment continues unabated. Agricultural land and forest cover have been replaced by roads, hotels and airstrips. In the process, contractors, tourist operators and forest departments have all profited.

The traditional economy of mountain people consisted fundamentally of subsistence agriculture, and cottage and small industry. For centuries, many have sought work on the plains to increase their income potential and supplement the needs of their families.

Many mountain communities are attempting to develop economic frameworks that sustainably accommodate their expanding needs. These rely on regenerative use of trees, forest and environment, involving climate and other natural attributes such as herbs, mushrooms and bees. Lowlanders, however, have imposed their own development models, involving unsustainable resource exploitation.

### **Whose Values?**

In economic terms, the value of a resource is determined by its marginal use value in the production of goods and services. Ecologically, resources have value in stabilizing the life-support system that enables human existence (Madhusudan Bhattarai 1999c).

While most mountain forests provide a wide range of extractive and non-extractive benefits and have an economic value, only a small proportion is realized financially. In many cases, alternative uses such as logging or conversion to agriculture would give greater revenue. However, benefits such as soil conservation, watershed protection, medicinal plants, fodder and fuelwood are also part of the economic equation of the forest, and benefits from the forest as a whole are shared by a disparate range of stakeholders. It is important to formulate evaluation schemes that give fair weighting to local preferences while also considering that significant benefits such as a cleaner water supply are not satisfactorily expressed in market terms (Chetan Agarwal 1999).

Assigning measurable values to natural resources such as biodiversity, scenic beauty or sacred traditions is at best a subjective and arbitrary process, which runs the risk of trivializing their cultural importance. Further, it has been argued that it is invalid to place any economic value on nature (Sanjay Nepal



1999c). Thus non-measurable values must be weighed carefully in the development of management policy (Edwin Bernbaum 1999), and preferences of local user groups should not be subsumed by more (monetarily) powerful interests. Management at a local level is compulsory to protect local uses and value. In the Andean Apu, or mountain gods belief systems, different groups are intimately linked to deities in all aspects of the ecosystems (mountains, forests, birds, clouds); these cultural traditions have no monetary value, or even any relationship with economics at all (Fausto Sarmiento 1999d).

Though it is not wrong to identify economically valuable resources, as this can help with the clarification and preservation of resources over time, there must be acceptance of, and space for, alternative (i.e. non-economic) value structures in functional management programs. The recent development of ecological economics as a separate discipline, combining the efficiency notion of economics and system perspective of ecology, can be viewed as a positive step in this direction (summarized from Madhusudan Bhattarai 1999a).

### **Products and Services from Mountain Forests**

Mountain forests provide society with a great diversity of products and services. These may be divided into three general functions (see Figure 2):

- Productive function:
  - wood (for fuel, construction, woodworking, etc.)
  - non-timber forest products (herbs, mushrooms, animals, etc.)
  - grazing and fodder for domesticated and wild animals
  - provision of high quality water supplies
- Protective function
  - decreased risk of natural hazards (landslides, avalanches, floods, etc.)
  - watershed protection / reduction of soil erosion
  - habitat for forest fauna
  - conservation of biological diversity
  - carbon sequestration
- Welfare (amenity) function:
  - landscapes for recreation and tourism
  - landscapes and special areas with aesthetic, spiritual, and cultural values

This ordering moves from marketable goods to which economic value can be readily attached, to public goods whose values are not easily expressed in economic terms. The demands of society mean that mountain forestry must increasingly take into account the less commercial products and services. In developing countries and regions, however, requirements for products at the top of this list are large, and often expanding.

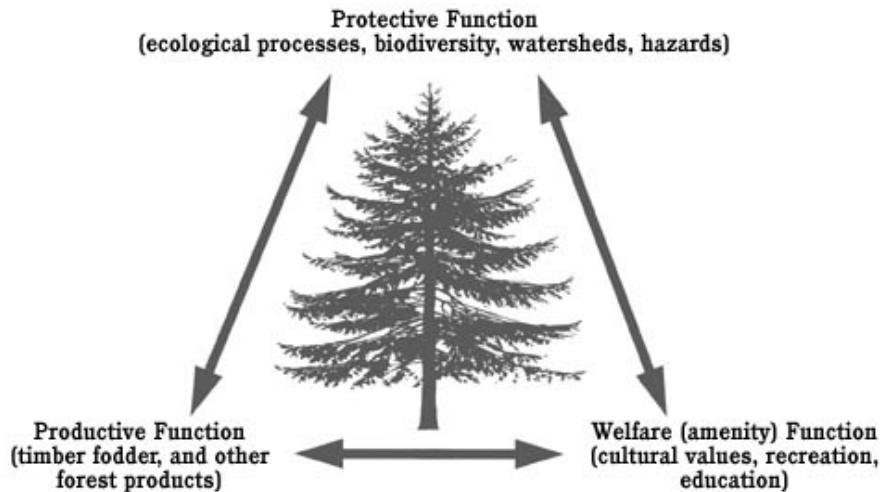


Figure 2: Basic functions of mountain forests.

## Timber

The most immediately obvious forest resource is perhaps timber, for construction, mining timber and many other purposes. "Scientific" forestry, developed in western Europe from the late 18th century regarded the production of timber as the focal point of forestry; the means by which all other goods and services would be produced. This philosophy spread around the world by the end of the 19th century, and is still the foundation for many policies for the management of mountain forests.

The production of timber and wood products represents a very important, and often controversial, sector of forest utilization. The scale of operation varies from individual households and small rural industries -- which often provide the only source of industrial employment in rural areas -- to large national and multinational companies. Both too high and too low levels of timber extraction can pose threats to the ability of mountain forests to fulfill their functions. While scientific forestry has historically been based on defining the maximum sustainable yield of timber, in regions -- such as the Alps -- where demand for timber has declined significantly, there is a strong argument for defining a minimum sustainable yield that ensures that the protective and welfare functions are assured.

In the USA, a federal Forest Service was created to provide a framework for the economic development of timber products and to protect watersheds; the timber industry is linked inextricably with institutions which are involved in conservation and natural resource protection (Christopher Hannibal-Paci 1999c). Timber is used both domestically, for construction purposes, and exported. Often, the financial rewards are not reinvested, either at source, or into any form of sustainable practice. This is a serious lapse as timber resources are indefinitely renewable if managed properly. As shown by the following example, there can often be severe conflicts of interest involving

timber companies, local communities, and environmental groups, both local and from further afield.

### **Tongass National Forest, Alaska, USA**

Management of Tongass National Forest, a coastal Western Hemlock-Sitka Spruce forest, has been controversial for many years. After the Second World War, to encourage settlement in the area, long-term timber harvest contracts were agreed. The result was an unsustainable increase in pulp production, large profit margins for the lumber companies, and little value-added economic benefit to the local workforce. Awareness of the resulting environmental degradation led to negotiations for termination of the contracts, resisted by the powerful corporations involved.

In an ironic twist, the funds provided in aid for affected communities in the region and subject to local discretion are being used by the Ketchikan mill to lobby Congress to reverse the process of mill closures. There is fierce opposition from the logging interests to the Clinton administration's plan to further reduce timber harvests. This has brought the situation even further into the political arena.

Summarized from Tom Volwiler 1999e.

The complex interaction between ownership and management and responsibility of forest timber resources is illustrated by the following case study from China, which allows comparison of different management policies.

### **Timber Operations in Yunnan, China**

Pingzhang community and Yizi community are both characterized by low population density, high dependence on rich forest resources (fuelwood for cooking and tobacco drying, timber for house building, wild fungi for marketing, humus for animal mulch and fertilizer). The natural Yunnan pine forests, some mature, cover over 80% of the communities' area.

Local county and prefecture governments allocate an annual commercial timber figure to each village, in addition to timber cutting for community use. Both communities base their timber management on the capacity of the forest resource, taking the maturity of the trees and transportation limitations into consideration. Professional community forest rangers are appointed to manage and protect forests used for household and community purposes. They tightly control and supervise the quantity of commercial timber cut, and local farmers undertake activities such as cutting, collecting, and building forestry roads; the economic benefit thus belongs to the community. After cutting, regeneration is promoted by planting.

In Pingzhang community, village leaders and farmers participate eagerly in commercial timber cutting, and lobby for permanent cutting levels to be assigned. The community has the rights to the timber market, and can decide to which commercial timber companies they sell. In this way, economically productive management is ensured -- with greater financial benefits for the community. Since 1989, it has built a primary school, roads, more than 900 mini-water storage units, and established drinking water facilities and electricity in some villages.

In Yizi community, farmers receive income only from felling or road building. The right of decision on timber sales is controlled not at the community level, but at the township level; one stage removed. As economic benefits do not enter the community directly, villagers do not want to fell trees. They lose out in two ways, as lack of full participation also means that the potential benefits, in terms of improvement of quality of life, are not realized.

The different dynamics within these two communities clearly show the importance of self-determination at the grassroots level for forest management.

Summarized from Lai Qingkui 1999b.

### **Non-timber forest products**

Forests yield many products apart from wood, including fodder, fruits, herbs, mushrooms, and animals. While such non-timber forest products (NTFP) provide means to ensure sustainable livelihoods, marketing problems, price stability and the impacts of harvesting are issues of concern. Effective and appropriate production of all resources and products is difficult; managing for one product can impinge on others. Complex decisions have to be made with inadequate knowledge and using limited mechanisms -- not all forest products have market value, for others the commercial worth is difficult to establish, and many different groups often have an interest in forest production (Lhakpa Sherpa 1999e). All groups extracting and benefiting from NTFP must participate in policy-making for forest management.

### **Celebrating Parma Mushrooms**

The communities of Val di Taro, Parma, Italy have traditionally harvested mushrooms (mainly *Boletus* sp.) and other edible fruits from their mountain forests which have limited commercial wood value. Previously, families collected for themselves, or for a market that reached as far as Genoa, within a valley-wide communal free-right legal framework. Development of preservation (dry-storage) methods enhanced the value of the fungi, which are such a central part of the local economy that they are now celebrated and officially recognized. A national label was legally obtained for the dried mushrooms, which are, commercially, ten times as lucrative as the fresh

product. Local enterprises organized collection, preparation and trade which is now international (New York, Edinburgh, Paris), with companies and restaurants providing good local employment opportunities. The average family revenue is estimated as US\$2000 per year. Members of the Associations of the inhabitants of Val di Taro worldwide meet regularly to celebrate their forests, their memories and their global success.

Summarized from Pier Carlo Zingari 1999e.

Another factor is the need to discriminate between NTFP that entail the conservation of a single species and those that promote whole ecosystem conservation; for instance, in Central America, some farmers use Aceituno (*Simarouba glauca*) seed to make soap, and protect Aceituno trees accordingly. As only these trees are preserved, they often remain alone in the middle of fields. Butterfly farming in the Arfak Mountains Strict Nature Reserve in Irian Jaya, and apiculture in Malawi's Nyika National Park are other examples of NTFP (Adrian Barrance 1999f).

### **Multifunctionality and agroforestry**

Multifunctionality, or balancing all values, is a traditional practice for the sustainable management of mountain forests around the world, holistically regarding forests and their human communities as a single system.

### **Multifunctionality in India**

"Our entire life depends on forests. We get firewood from forests, wood for our house construction, and also fodder for our cattle. . . . We also get grass, leaves of trees, precious herbs and minerals for our animals. In addition, forests also give us tea leaves, humus, fertilizer, and so on. In the summer all the cattle, goats and sheep are taken there for grazing. Forests add to the beauty of nature. In the forest there is no soil erosion. It rains there and the atmosphere also remains clean and fresh. This will keep the birds and wild animals healthy for a long time, and save them from extinction."

Lakhupati, an elderly tribal woman from Kinnaur, quoted in Olivia Bennett 1999b.

Multifunctionality is a key concept in Europe. Forest products, both material and non-material, are a part of the identity of local people.

### **The Métayage System**

Near Siena, in Italy's Montagnola Senese region, forests have been sources of food, small trade and spiritual values in the shade of an agricultural métayage system (where farmers pay rent in kind), for centuries; they have always been the main source of identity and livelihood. While the apparently agricultural system provided products and inputs to large landowners and external economic factors, it was in fact a forest-based socio-economic fabric in which

biodiversity, community, sacred and symbolic forces and cultural values were interacting.

Ten years ago, a small laboratory-museum was established with an oral testimony facility. Schools, families and researchers are increasingly contributing to the success of the venture, which brings a significant number of visitors and helps support sustainable local activities.

Summarized from Pier Carlo Zingari 1999e.

As this Italian example shows, it is often not possible -- or desirable -- to separate the forest and agricultural parts of mountain ecosystems, land uses, and cultural systems. They are closely interconnected. Agroforestry systems provide particularly good examples. In developing countries, one approach to upland land management is Sloping Agricultural Land Technology (SALT), a farming system integrating trees, food and commercial crops to raise farm income. This comprises a mini-forest with timber, fruit tree species and shrubs cultivated alongside cash and food crops providing seed and income (Benedicto Q. Sánchez 1999b).

### **Agroforestry in the Philippines**

Farmers organized local reforestation activities in various communities in La Castellana (Negros Occidental). Families collected 1,887 seedlings of native species -- takinis, tabuyog, bangkal, lunok (strangler fig), yabnog, bolo, bagacay, talisay, and bamaboos -- which were later planted as streambank stabilizers. In the Northern Forest Reserve, organic farmers collected 5,725 seedlings of hardwood and indigenous dipterocarp species such as lauan, ahosahos, salongsalong and tugas to be later integrated as perennials in their agroforestry farms.

Various additions are used to improve soil fertility: the leaves of nitrogen-fixing plants, chicken or carabao manure, rice straw (hagony) for mulching and green manure, and seaweed. Biological pest control systems are in place: plants to repel pests and attract beneficial insects to stabilize predator/prey ratios and the agroecosystem food web. A total of 39 rice varieties were grown in this agroforestry structure in 1998, and despite the scourge of El Niño, the average yield was higher than the provincial average.

Summarized from Benedicto Q. Sánchez 1999b.

### **Plantations**

While plantations are man-made tree formations, they retain some of the value of natural forests and can maintain some biodiversity by providing limited wildlife habitat. The management practice employed is the decisive factor; lack of field or ground layers (understory vegetation) can exacerbate soil erosion and runoff. Plantations are more effective carbon sinks than late-seral

forest, and some plantations mature into secondary forest if allowed to do so, or act as nurse crops for natural revegetation. Plantations may also provide some protection for watersheds, or capture water from clouds where appropriate cloud forest conditions exist. Planting conifers in place of broad-leaved woodland, however, causes almost irreversible damage: the soil becomes acidified, which causes a whole range of ecological effects, not least to the local drainage area.

## **Trees in China**

Government forestry agencies in mountain areas are now involved in both forestry and the development of fruit, nut and other crop trees. The policy framework considers integrated watershed management and promotes the development of diversified tree species, and includes fruit production as well as the classical mandate on forests.

Expansion of fruit and nut orchards accounts for 20% of total forest area growth, and tree crops often make up 50% of afforestation activities. Government forestry agency activity is heavily constrained by the lack of long-term funding for timber production and forest resource control. These agencies often have the option to instead invest directly in orchards under shareholding agreements. There is growing concern over imminent merchandising problems - 1,000 rural mountain and 600 hilly counties in China are all competing with the same tree crop products in largely undifferentiated markets.

A number of the cultivated species are multipurpose trees appropriate for mountain farming systems. Chestnuts, for example, are planted mainly on slopes with degraded vegetation cover. Several species are mainly integrated into farm and home garden systems; researchers and local governments are promoting agroforestry.

Government forestry agencies now face the issue of whether or not they can make the adjustment from being directly involved in production, to providing a support service for all stakeholders, and primarily mountain farmers. While this is feasible for forests, it is more problematic for fruit trees and other high-return crops. Ways of adjusting government roles, especially in transition economies, must be developed.

Summarized from Claude Saint-Pierre 1999b.

## **Watershed protection**

With at least half of the world's population depending on reliable and safe water supplies from rivers originating in the mountains, the role of forests in watershed protection is vital at a global scale. Surface and shallow mass erosion are minimized by forest cover on mountain slopes, thus reducing the

deposition of sediment in watercourses and contributing to high water quality. The importance of watershed protection is a critical reason for watershed-scale approaches to land uses, rather than piecemeal approaches driven largely by local concerns. However, in many cases this will require investments in mountain people and their land management activities from those who derive downstream benefits.

Another related issue is the choice of species for upper watersheds. Reservoir catchment areas in the UK and elsewhere have traditionally been planted with exotic conifers for watershed protection; this is increasingly being questioned as a sound management technique. Conifer plantations have a higher transpiration rate than natural vegetation, which reduces overall runoff. Similarly, in Fiji, water flow into a reservoir was significantly reduced as a result of the establishment of *Pinus radiata* plantations intended to protect the watershed. Where drainage channels are necessary -- as in Sitka spruce plantations on the wet uplands of the UK -- water leaves the catchment more rapidly than it would with natural upland vegetation (such as the highly absorbent *Sphagnum* moss), and results in greater peaks and lows in runoff patterns (Adrian Barrance 1999b).

Many factors warrant consideration by watershed managers, including past and future land use, ground cover, soil types, climate, and natural climax cover (Robert Mowbray 1999b). Trees with insufficient understory vegetation and soil litter can greatly increase the risk of soil and water losses (Carlos Llerena 1999).

### **Upstream-downstream relations**

Watershed issues are part of the larger picture of upland-downstream relations, a highly contentious topic in many parts of the world. Often, lowland agencies determine the socio-economic and policy issues that influence highland communities and their forest management. Many of the issues relate to water, particularly reliable supplies of fresh water of the desired quality, in the right quantity, and at the right time. Those who live downstream may variously value the mountains as sources of hydropower, mining, or timber resources, as locations for recreation and scenic value, or as repositories of biodiversity. Yet the same resources are crucial to the livelihoods and cultural integrity of mountain people.

In Indonesia and elsewhere, mountain communities are generally not empowered (Sabu George 1999a). It is inequitable for farmers to bear all the costs of minimizing negative impacts on downstream communities. Mechanisms to transfer some of the economic benefits to mountain people need to be implemented, as has been done in countries such as Austria, Costa Rica, Ecuador, France, Italy and Switzerland. Negotiation between lowland and upland people may be problematic, with too many stakeholders and the diffusion of costs and benefits, so that responsibility for the fair distribution of



costs and benefits must rest with the relevant government(s). A fair assessment of benefits and costs can provide a framework of benefit transfer to mountain people, in such a way as to promote conservation.

Two major factors that link upstream and downstream communities are flood risk avoidance and the potential for hydroelectric power. In this context, downstream communities have a clear stake in upland forest management. In successful projects, fair exchange processes are established, with income and natural resources protected by assurance of suitable compensation and social integration, including the protection of cultural resources of indigenous groups. Such relationships are vital in local catchment areas. For example, where the irrigation water of one user group originates in a forest of another group, a framework to promote a sustainable trade of forest products between the communities would be mutually beneficial.

### **Does Deforestation in the Himalayas Cause Flooding in Bangladesh?**

Severe flooding in the Indian plains of the Ganges and Brahmaputra and in Bangladesh has been widely reported as the direct result of deforestation in the Himalayas. The implications are that Himalayan forest cover is being rapidly depleted, and that there is a direct link between this and the flooding in the lowlands (Ganga and Brahmaputra basins); and the responsibility rests with the management practices of mountain people. Upstream-downstream relationships are politically sensitive, and in this case, the reported "facts" are misconceived. While in certain areas there is loss of forest cover, forest cover overall is not dramatically decreasing. This underlines the importance of resource assessment and monitoring of changes. Further, the crucial factor of ground cover must not be ignored -- forest areas without litter cover (or indeed canopy layers) can be characterized by much worse erosion than well-maintained sloping agricultural terraces or pasture.

Although the deforestation theory (mountain population increase --> growing fuelwood, fodder and timber demand --> uncontrolled forest removal in marginal areas --> intensification of erosion and peak river flow --> extreme flooding and siltation on the densely populated and cultivated Ganga and Brahmaputra plains) appears logical, it is unsubstantiated. Recent studies have thrown into doubt any important link between the Himalayas and flood processes in Bangladesh. While the highland catchments of the two river systems do contribute to base flow, it is only one component in the complex flood dynamic, not a directly contributing factor.

Forest clearance in a highland watershed can have negative impacts (soil erosion, increased surface runoff) on the local watershed, but these effects tend to be leveled off further downstream. Mountain forests are crucial for the ecology of the entire Himalayas and the people who depend on them, and

afforestation programs should be regarded in this context, not as a means of preventing flooding in the lowlands.  
Summarized from Thomas Hofer 1999.

## **Biodiversity**

Much of the social value of biodiversity resources is attributable to their global significance, while individuals' private values derive mainly from the local situation. The conservation of biodiversity is a difficult issue, starting from the question of "for whom is the biodiversity being conserved?": local people who derive subsistence or food security from a range of species; tourists who enjoy diverse ecosystems and unusual species; or unknown sufferers from diseases which might be cured from plants or animals -- which may yet be undiscovered or whose potential uses are not known; or many other current and future beneficiaries?

Therefore, better understanding of the benefits and costs of conservation programs is needed for the development of appropriate policy to reconcile the differences between the values. The focus of biodiversity protection has recently shifted to analysis of existing institutions, and to the creation of incentive structures at both individual and societal levels. Institutional reform allows for sweeping change to address issues such as common access disputes, over-exploitation of resources and negative public attitudes towards conservation.

Proper analysis and quantification of existing economic incentives and institutions are important for policy recommendations regarding natural resource management, and to influence national and international political decision-making processes. These analyses are also important for effective cooperation and involvement of the private sector and local communities. Institutional reform processes are especially important in developing countries for the conservation and sustainable use of environmental resources, and to ultimately establish markets for environmental goods and services.

Efforts to conserve biodiversity in low-income countries must complement economic development (Kai Lee 1999d). For example, "nutrient mining" by subsistence farmers in marginal areas is a key factor leading to deforestation and depletion of forest biodiversity, so that investment to improve agricultural productivity is one promising solution to the problem of managing biodiversity. There is a direct correlation between economic growth and conservation expenditure; though this is often counteracted by another correlation: between economic growth and the increased consumption of resources (Adrian Barrance 1999d, e; Madhusudan Bhattarai 1999c).

The success of biodiversity conservation programs in protected areas, the major focus of biodiversity management programs worldwide, largely depends on the economic and other incentives available to local stakeholders.

Conservation projects need to be sensitive to prevailing socio-economic conditions, and focus on local participation and management. In natural resource management (NRM) programs sponsored by governments and development agencies, social and private benefits often diverge; while conservation costs are borne by the local communities, benefits are distributed externally.

Cooperative frameworks between communities, societies or nations can be put in place in order to manage critical programs effectively so that benefits are fairly administered. The first step must be to improve farmers' food supply and living conditions; only when local subsistence is resolved can people participate in biodiversity conservation. The perceived value of conservation resources is income-elastic, in other words, the demand that society places on conservation goods and services rises with disposable income. In order to protect the natural resources of an ecosystem, this demand must be therefore effectively managed.

### **Incentives for Biodiversity Conservation**

The problems of biodiversity conservation reach across boundaries and borders. Consequently, national and international understanding, cooperation, support, and adequate compensation to the individual or nation bearing most of the opportunity costs of such programs are therefore required. A "Mountain Ecosystem Conservation Fund" could be an appropriate way of resolving these problems.

Summarized from Madhusudan Bhattarai 1999e.

Investment in methods to improve agricultural productivity may not necessarily assist in conserving biodiversity when economic development is the primary goal. Recent findings in Madagascar of the US Agency for International Development (USAID) illustrate this dichotomy: enhancement of subsistence agricultural productivity provides benefits to people while increasing the loss of biodiversity by the clearance of greater areas of forest. If the new options made available by increased farm production include further destruction of biodiversity, the raising of income cannot be justified on the grounds of biological conservation (Kai Lee 1999a).

In areas of high importance for biodiversity, experience in Khumbu, Nepal, suggests a number of lessons for widespread application. They include the following (Lhakpa Sherpa 1999e):

- Compartmentalization (a mix of different uses on specific areas) can help to ensure sustained production of incompatible forest values;
- Indigenous management strategies can develop and be sustained only with substantial local autonomy in resource control; outside interference is the greatest threat to the sustainability of indigenous forest management systems;

- Protected areas can enhance socio-economic and environmental sustainability; even foreign ideas and top-down approaches can produce desired end results if adapted to local conditions; and
- Protected areas with human populations may be the best hope for the future, considering the shrinking untouched forested areas and growing human population and influence.

In many Indian national parks and sanctuaries, local groups have become hostile to wildlife and conservationists, due to the approach of the latter, who seek to protect wildlife from the people, rather than with them. Further, when government conservation schemes are implemented, a system of fear and reprisals tends to be substituted for the sense of responsibility previously held towards forest conservation. The key factor in successful sustainable management is thus local participation, and a balance of incentives and disincentives is crucial in minimizing environmental degradation (Sanjay Nepal 1999d). Adaptation must be a system of learning, assessment and adjustment during the process of implementing change. The primarily political nature of issues relating to mountain forest communities requires that they be addressed at all political levels. Integration of local and outside interests provides an infrastructure conducive to conflict resolution. Partnerships between local institutions and resource specialists are appropriate means of increasing the resources available to user groups.

### **Tree Biodiversity in the Philippines**

The Philippines is one of ten global hotspots for biodiversity conservation. Forests now tend to be remnants, found in the more inaccessible areas, usually steep mountains. State services rarely reach most households in mountain areas, and taking produce to markets is similarly difficult. Farms tend to comprise a number of widely dispersed plots, and while farming is the primary activity, other income-earning opportunities may be taken to support the family. These communities and their farming systems are fragile as they are still evolving in response to deforestation for which they are also blamed -- instead of being seen as part of a complex chain of cause and effect related to power structures and access to prime resources.

Forestry and biodiversity policy have evolved rapidly over the past two decades. Farmers' perceptions and actions in relation to tree cultivation in the uplands are influenced by two key aspects: the 1989 logging ban, a response to decades of deforestation; and land tenure. Security of tenure and willingness to plant trees are influenced by the fact that most of the uplands are state-owned and the remaining areas often controlled by large landowners.

Tree cultivation strategies vary between households, largely determined by available resources, and tenure security has implications for on-farm biodiversity. While native hardwood species are perceived to have greater

worth than fast-growing exotics, the latter are more commercially viable and so are planted in greater numbers. It is widely, but falsely, believed that native trees are unmarketable. Forestry extension promotes only two species, both fast-growing exotics, as foresters believe that farmers are interested only in commercial value -- there is a lack of awareness of the large range of species farmers are already cultivating, and of their reasons (including subsistence needs). Farmers could be encouraged to cultivate more species and meet their needs through supportive policy and institutions; increased tenure security would bring ecological as well as socio-economic benefits. Summarized from Anna Lawrence 1999.

The Green Revolution of the 1960s all but destroyed a large part of indigenous knowledge and farming methods in the change to monoculture, genetic uniformity and export-oriented agribusiness systems. However, it is possible, and desirable, to achieve improved standards of living and conservation of biodiversity by sustainable, organic farming within the context of forest conservation and regeneration.

Local people are well aware of the importance of biodiversity: "What we had heard from people before us was that there was no shortage of fodder in their times. Nature had given them enough, but now the jungle is under pressure from the population and it has lessened. Fodder trees have been replaced by pine. The jungle has become commercial and the availability of fodder has vanished. What the elders tell us is that earlier there were dense forests and there were many species in them. But now in the monoculture pine forests there is no diversity. Now people are trying to plant trees for fodder, the people of my village are developing the forest" (Jagat Singh Chaudhary, from the Alaknanda Valley, India, quoted in Olivia Bennett 1999b).

### **Bhutan -- A Nation of High Biodiversity**

Forests and trees play very significant roles in Bhutanese society and culture. Policies regarding biodiversity conservation, the importance of wildlife, the creation and management of parks and protected areas are especially critical. The high priority that Bhutan gives to biodiversity conservation reflects the fact that it is one of ten global biodiversity hotspots, with the highest proportion of forest cover and protected areas in Asia.

The many policies relevant to conservation include the Forest Master Plan, the Afforestation Strategy and the Mining Act. The ecosystems of the several parks and protected areas range from the sub-tropical to the alpine; their landscapes from plains to Himalayan peaks. They have varied habitats and wildlife as well as plants of medicinal, traditional, religious and commercial significance, and include many sites of cultural heritage. Through buffer zone and enclave zone development, the state has pledged to maintain at least 60% of land under forest cover (currently 72.5%). The Nature Conservation Section of the Ministry

of Agriculture manages the protected areas and the long-term conservation of biodiversity, while the Bhutan Trust Fund for environmental conservation provides financial support for management activities. Overall, a quarter of Bhutan is protected.

To determine environmental change and forest health, the indicator species approach has been used widely -- it relies on a few species that can be easily detected and identified, and monitored over time. Species used for this purpose in the eastern cool temperate broad-leaved forests are: rufous-necked hornbill (*Acerosus nepalensis*); capped langur (*Presbytis pileatus*); leopard (*Panthera pardus*); and wild dog (*Cuon alpinus*).

Summarized from Don Messerschmidt 1999a.

### **Carbon storage**

Trees are mainly composed of carbon, and carbon storage is a significant attribute of mountain forests in an era of climate change driven by carbon dioxide emissions. Implicit in the idea of a carbon market, proposed by many, is that carbon could become an important forest product. The theory is as follows: carbon-source industries would purchase credits (Certifiable Tradable Assets, or "carbon bonds"), from carbon-sink industries. In this way, there would be market-driven motivation for the maintenance of mature forests which represent the largest carbon pool. Conversely, there would also be justification for conversion of older forests to younger plantations, as the rate of carbon storage is greatest there.

Some developed countries are sponsoring Joint Implementation (JI) programs which encourage the development of carbon markets. Currently in Latin America, The Nature Conservancy is running several projects funded in part by the sale of carbon credits to maintain areas of forest which would otherwise be cut or burnt for other uses (Robert Mowbray 1999c).

### **The Costa Rican Territorial & Financial Consolidation of Biological Reserves Project**

The Costa Rican Ministry of Environment and Energy will acquire threatened parklands for permanent protection, preventing tropical deforestation and increasing carbon storage in secondary forests and pasture lands. Funds will be generated by the sale of carbon bonds, guaranteed by the Costa Rican government for 20 years. Ongoing monitoring will be conducted by an outside commodity trading company which will be partly supported by World Bank funding. Certifiable Tradable Assets will be produced both from carbon stored in primary forests protected from deforestation, and that stored on land currently in secondary forest or pasture and allowed to regenerate into higher carbon forest. The project will take place in 27 protected areas, including 422,800 ha of primary forest and 107,698 ha of secondary forest and pasture.

Summarized from Robert Mowbray 1999c.

## **Mountain People and Their Forests**

As the previous sections have shown, mountain people depend on forests for many aspects of their lives. In traditional mountain economies, ways of life are characterized by the complementary use of forests, fields, and grazing land at different altitudes. Forestry and agriculture are the pillars of almost all mountain communities, and the great variety of land-use systems reflects the diversity of physical and cultural conditions and their evolution over centuries. Though rooted deeply in their ecosystems and cultures, mountain people throughout the world are increasingly subject to significant forces of economic, social, and political change which endanger these systems. This section explores many of the key issues which relate to these dynamic forces and their cultural contexts.

## **Migration from and to the Mountains**

In general, the ecosystems and social systems of mountain regions have limited carrying capacities, and are often far removed from governments and vulnerable to negative effects of economic progress, or modernization processes. These areas are especially sensitive to population pressures, and cannot support large numbers of people even when they are living traditionally, in ways that are intrinsically valuable and often promote conservation and sustainability (Kai Lee 1999a). For the survival of many mountain communities in developing countries, and also in countries in transition, temporary migration, particularly of men, is frequently seen as the only solution to such problems.

In most industrialized countries, there is general abandonment of less productive areas, such as mountains, and net movement to the cities. The concentration of farms on the most productive soils means that, in principle, for each hectare of highly productive soil under agriculture, approximately 10 ha of less productive farmland can be left to regenerate as secondary forest. This fact, combined with the intensive mechanization of farming and improvement of food transportation systems, means that marginal rural lifestyles are less viable. Globally, this trend has been the norm for the 20th century (Chadwick Oliver 1999).

## **New Mountain Inhabitants in Scandinavia**

While many rural districts in Norway and Sweden, are experiencing population decline, the demand by city dwellers for holiday homes or second homes, and other tourist facilities in mountain forests is increasing. This has led to conflict in areas where small rural populations remain, as a result of the (economic) imbalance between the rural/primary sector and urban/tertiary sector. Summarized from Tom Warren 1999.

Policy decisions on encouraging or facilitating movement between rural and urban lifestyles must be well-informed, and ideally consider alternatives such as making rural ways of life more attractive, economically viable and environmentally sustainable (Chadwick Oliver 1999).

## **Poverty and Biodiversity**

The mountains of the developing world include many centers of global biodiversity. However, many of the most diversity-rich areas are also home to some of the poorest communities on Earth. Southwestern China is an area of particularly high biodiversity; and across the country as a whole, it is estimated that about 59% of the population lives in mountain regions, which occupy 66% of the national territory (Liu Can 1999). To alleviate poverty in these areas, the Chinese government has initiated an integrated mountain development project, in which forest resources will play a key role. Alleviation of poverty is a priority for developing countries. The link between higher income and greater deforestation and degradation of natural resources is widespread, presenting a challenge to such programs that aim to enact the tenets of sustainable development. Previous failures of institutional approaches to conservation and poverty alleviation have been due to the "top-down" style of implementation; appropriate solutions must be inherently "bottom-up."

Historically, much poverty has been created by colonization, which has caused irreparable damage to many agrarian societies. Though there is not a simple, linear relationship between poverty and biodiversity, the idea that a society places value on biodiversity through rules, controls, and sanctions may explain the relatively small-scale degradation of natural resources in regions inhabited by economically disadvantaged groups. Implicit is the importance of a feeling of belonging and identification with place. In situations where damaging agricultural practices are encroaching on forests, it is typically small farmers who, displaced from their (lowland) homes for economic reasons, are culpable. In many cases, the situation is further exploited by larger interests -- perhaps also responsible for the initial dispossession -- who regard the deforested land as an economic asset rather than a home (Adrian Barrance 1999e).

The aims of any integrated conservation program are twofold: to feed and provide economic opportunities for local groups while conserving biodiversity in their ecosystems. If these goals are mutually exclusive, there are moral, political and practical limitations on the opportunities for policy-makers to base their decisions on what is best for biodiversity conservation. It would be inappropriate to implement policies to restrict wealth in order to protect biodiversity; perpetuating local poverty for an immeasurable greater good is ethically indefensible.

While poverty alleviation is a high priority for developing countries, forest resources and biodiversity are threatened by the global economy, based as it is



on opportunism. Globalization can be generally taken to mean economic homogenization, implying far greater emphasis on trade and investment than on the value of the global commons. Finding ways to increase wealth through non-destructive measures, such as developing low-impact agriculture (some forms of agroforestry, for example) or enhancing the productivity of land already under crops, may be suitable ways of meeting the twin aims of poverty alleviation and biodiversity conservation.

### **Sacred and Other Cultural Aspects**

The unique ways of life of mountain people that often enable them to live in harmony with their environments are related, in many cases, to sacred and other aspects of their cultures. Examples from two continents are presented here, but there are many other ways in which forests and their products are closely entwined with many of the cultural aspects of the lives of mountain people around the world.

Forests in Bhutan are a rich source of belief, custom, myth, legend and song, and a key aspect of its religious identity as a Buddhist country. Traditionally, many practices and beliefs reflect the high value placed on both respect for the natural environment and the sustainable use of its many resources. In common with many Asian societies, particular bodies of water, trees, forests, flowers, mountains, wildlife, the earth and the underworld are believed to be sacred, in some cases with associated spirits and deities. The national government has decreed official protection for sites of special significance. The sacred aspects of trees are especially significant in a society where forests dominate daily life (Don Messerschmidt 1999a).

#### **Ridam**

A long-standing practice in eastern Bhutan, Ridam is the annual prohibition on entering or using a designated mountain forest from mid-August to mid-October. Its positive effects are both ecological (by protecting young wildlife and plants during the late monsoon growing season) and socio-economic (by focusing attention on important agricultural activities). There are two powerful motivations behind the observance of Ridam; peer pressure within the community and the Buddhist belief that the acts of this life will be rewarded or punished in the next. In some areas, this tradition has broken down over recent years with the introduction of a (forest department) contract permit system that gives access to locals and strangers alike. Village leaders are anxious to reinstate Ridam.

Summarized from Don Messerschmidt 1999a.

In the Andes, many groups consider the mountains to be gods (Apus), and dramatic change is perceived to result from mother Earth (Pachamama) claiming a rebirth of indigenous communities (Fausto Sarmiento 1999a). Within

this belief system, however, is the implication that the people themselves are not directly responsible for their environment, as it is in the hands of the gods - thus contradicting outside wisdom, and perhaps leading to conflicts of approach.

### **Traditional Knowledge**

Though it is fashionable to celebrate traditional knowledge, in many cases it has not been valued, which has led to negative impacts on local peoples and to environmental degradation. Traditional knowledge, and the lessons of natural and applied science are often regarded as opposing principles, when in fact they can be complementary. "Scientific breakthroughs" in fact, are often rediscoveries of unspoken but inherent knowledge of the interaction of people and ecosystem function.

### **Knowledge of Diversity**

"There should be every kind of tree in the forest, there should be fodder trees, fuelwood trees and those which keep the soil moist. Banj, kafal, ayar, buraans will keep our soil humid and their leaves will make humus which will have organic diversity. There should be fruit trees also and trees which will supply wood for building purposes -- and the most important trees are those which will keep the environment clean: broad-leafed ones. The rest for industry, rambans, bans, ringal, and grass and creepers other than these. Creepers are the main resources for fodder. If you plant a grass creeper once then you get grass all year round."

Jagat Singh Chaudhary, quoted in Olivia Bennett 1999c.

Currently, knowledge of natural systems, both managed and wild, is not sufficient for the support of human needs and sustainability. Ways of producing practical knowledge include learning by trial and error and adaptive management, which provides theoretical insights (Kai Lee 1999e). It is critical for modern scientific research to be informed by the insights of indigenous people, not only in developing countries, but also in industrialized countries; scientists and local people need to be partners in moving towards sustainable management practices.

### **Cultural Identity**

Around the world, mountains are centers of cultural diversity. Isolation and independence have been major factors in maintaining the distinct identities of mountain people -- distinct groups can often be recognized not just at the regional scale but even from one valley to the next. The maintenance of identity is often key to maintaining, formulating, and implementing new strategies to ensure sustainable livelihoods. Recent analyses of property relations and land tenure have focused significant attention on the role of identity in mediating access to natural resources.

As mountains often become national boundaries, these can divide ethnic groups. One example is the Akha, originating in China and now found across mountainous mainland Southeast Asia. Since the 1930s, two vastly different political economies and state structures have influenced Akha access to resources and land management.

In China, after the 1949 Chinese Revolution, all Akha automatically became citizens of the New China. As citizens, they were included in land use policies that affected all rural farmers. The extension of perennials is also gradually bringing an end to shifting cultivation, which policy makers in China now regard as degrading the environment. Property rights and levels of management for forest land in China have changed many times since 1949.

In Thailand, the policy history for forests and hill ethnic minorities is quite different. In

1898, the Royal Forestry Department (RFD) was allocated all territory in the north and occupied by various groups. In the 1960s, policy makers began to call the ethnic minorities who lived in the north "hill tribes," and policies and development projects aimed at these groups were different from those targeted at other rural populations. Hill tribe identity cards identified villagers by ethnicity and village, prohibited travel outside the province of residence without approval, and precluded any formal use rights or ownership rights to land.

#### **Akha in Xianfeng Village, China**

In 1982-83, economic reform policies specified that land previously held by the commune would be allocated to villages and households. A committee of local villagers and two staff from the nearest Forestry Station gave Xianfeng about 500 mu (15 mu = 1 ha) of collective forest for house construction, so that a communally managed forest persisted into the reform period. The committee distributed four to five mu of freehold forest land to each household for fuelwood. Additionally, each household was allocated wet rice land and swidden land based on household numbers. Due to the availability of other opportunities, including good jobs in the city, a decreed reduction in swiddening has already been accomplished in many villages.

Summarized from Janet Sturgeon 1999.

#### **Akha in Payapri Village, Thailand**

Villagers have planted tea everywhere in the understory of their community forest, and for most, it is now the main source of income. As villagers try to maintain the proper balance between sunlight and shade to produce abundant tea, they have cut many trees and prevented regeneration. In Payapri only the village head has a full Thai identity card. Better-off Akha villagers rely on tea and laboring in nearby towns for their income; poorer villagers who used to

depend on the swiddens for grain face a serious loss of subsistence. Villagers with hill tribe identity cards can only find menial jobs in town, in construction, restaurants, and gas stations. Some young people go through the cumbersome process to get the provincial governor's approval to work in Chiang Mai or Bangkok, but this approval must be renewed, often every six months. Other young people, seeking to increase their incomes more rapidly, are tempted to get involved in the drug trade or other illicit activities. Summarized from Janet Sturgeon 1999.

The differences in the treatment and histories of the Akha in China and Thailand reflect the political structures of the two countries; the socialist concept of state building in China intended to include all ethnic minorities, while the Thai capitalist version involved claiming all forests as state assets, to be kept out of the hands of those who live in the hills and marginalizing them as "not Thai." In these cases, the Chinese approach has led to better opportunities for employment and less degradation of environmental resources (summarized from Janet Sturgeon 1999).

### **Maidu of Northern California**

Community-based organizations in the North American west are increasingly using identity to make new claims on their local natural resource base. Access to forests and forest resources has played a central role in the history of Northeastern California's Northern Sierra. The indigenous Maidu people have been reduced to nearly landless status and a fraction of their original numbers through 150 years of hardship including genocide, land grabs by individuals, corporations and the government, and lack of tribal recognition. Maidu now make up less than five percent of region's population and, as an unrecognized tribe, do not officially exist. Many Maidu claim, however, that their people were created together with the mountains, rivers, and forests of their ancestral homelands, thus positing a strong link between place and identity.

After losing most of their land, the Maidu lived as workers on ranches until 1923 when they were granted a Rancheria in Greenville. In the 1950s, the Rancheria was closed -- Maidu were given the land on which they lived as allotments, but most sold and dispersed across the region. In 1983, when the Rancheria was reopened, only four Maidu families remained there. Although many Indians across the region claimed they were a part of the Rancheria, they were not recognized, and only lineal descendants of inhabitants at the time of the 1928 census were accepted as members. Maidu factions were formed as a result of the inequitable access to federal subsidies. The Maidu Cultural and Development Group was formed in 1995 as an initiative to stake symbolic claims and seek recognition as stewards. The Maidu Sense of Place Map uses the Maidu names for prominent features and landmarks, which can be seen as a symbolic reclamation of place.

Summarized from Jonathan K. London 1999.

## Women's Roles

Gender issues are central to discussion of forest resource management. Around the world, there are many differences in the ways in which women and men use and are involved in making decisions about mountain forests. In developing countries, women tend to manage for diversity, choosing species with multiple values in the household -- including food, fodder, fuel, medicine, and income needs. They are primarily responsible for household activities and, in times of hunger or economic hardship, often turn to the forests to provide additional food or small-scale incomes. Men generally prefer species that are useful for timber, either for construction or for sale. They have also tended to dominate institutions relating to communal forests, interact more with extension workers and government officials, and have stronger links to the monetary economy and external markets. In difficult times, they frequently seek seasonal work away from home. In industrialized countries, work in the forests is largely the domain of men. Women foresters are gradually increasing in number, but the principal uses of forests for most women are typically recreation and, in some places, the collection of mushrooms, herbs, and other non-timber forest products.

In Nepal, the Federation of Community Forestry Users in Nepal (FECOFUN) has a requirement of 50/50 (female/male) membership (Meena Poudel 1999c). This is also the case with other forest user groups (FUG) in order to obtain the cooperation of all cross sections of society. Many user groups run by women are better organized and more successful than those run by men (Amrit Joshi 1999c). Although this does not necessarily translate into an equal opportunity for all women's views to be heard, it has empowered many women and given them the chance to participate on a level with their male counterparts. The community forestry (CF) program in Nepal (and elsewhere) aims to ensure justice to the actual stakeholders, and not just the local elite, who may not be representative of the community. Questions of caste and ethnicity are parallel to those of gender (Meena Poudel 1999b).

Generally, in Vietnamese families, men undertake heavy but irregular work such as plowing, hole digging, transport, cutting trees, carpentry, masonry, house building and off-farm jobs, while women do the planting, manuring, weeding, harvesting, drying, processing, cooking and so on. Women's work is commonly viewed as trivial and non-profit making; as it does not contribute to the family income, it is undervalued. From their daily work in the fields, women have a deep and instinctive knowledge of soil fertility, crop value, plant growth performance and profitability of farming systems. As managers of family food security, expenses (purchase, sale and credit), they have a great understanding of the current status of family economy and market changes. However, as women work for the home and family all the time, their opportunities to exchange and receive information are strictly limited. While

land tenure equity between men and women is officially fixed in law, this doesn't necessarily translate to practice. Traditionally, a married woman lives in her husband's village and shares land with his parents. Problems arise when women do not live in the village of the parents-in-law but far away: they cannot sell the plots allocated to but no longer cultivated by them. Though the potential profit they could earn depends totally on family arrangements, the voices of daughters-in-law are not as influential as that of other family members. Thus, in spite of the law, local tradition strongly affects women's land tenure rights (Thai Phien 1999).

### **Fruit Trees for Female Empowerment**

In many cases, women are not waiting for legislative empowerment, but simply doing what is necessary to secure their long-term future. Lieu Feng Yin, from northeast China, decided to replant a barren slope with fruit trees. She borrowed money and "contracted a mountain slope for 40 years. My husband was [working] away from home then. Some villagers laughed at me. 'Without her husband, a women wants to transform the mountain, she must be out of her mind!' I tried to persuade my husband to help me. 'You'd better come back to give me a hand in cultivating the mountain,' I said, 'What I am doing is beneficial in the long term. You see those workers in the city have their pension. Where will you get yours? From the hills of course'. At last he was persuaded not to leave home, but to plant trees with me. Last year all the 100 plum trees we planted blossomed. It looked like white clouds on the hills. Not until then did the villagers begin to realize that we were doing promising work. Many people think [migrating] is the only way to earn money. I don't think it is a solution for getting rid of poverty in long run. That's why I would rather borrow money for cultivating the mountain than let my husband go and earn money."

Summarized from Olivia Bennett 1999c.

In India, one institution involved in forest protection is the mahila mangal dal (MMD, or women's committee). The MMD in Jardhargaon, in Tehri Garhwal, Uttar Pradesh, started functioning around 1987, and was initially involved in protesting against nearby limestone quarrying and in undertaking plantation work in nurseries. Problems faced by the MMD include lack of finances, difficulty in communication due to the terrain, and above all, the burden of housework and agricultural operations on the women (Ashish Kothari 1999a).

The VFC (Village Forestry Committees) in India's Western Ghats are seen as exclusively adult groups. Many VFC presidents are men, and men dominate most of these committees though women are primarily affected by such programs. In some communities, the class/caste divide further complicates the gender and equity conflict; the women of the so-called backward classes depend more heavily on the forests than those of the higher castes and richer communities. Women's involvement is perceived as problematic by some

foresters; it is felt that they are nearly impossible to approach for reasons of their shyness and the risk of accusations of sexual harassment. To solve these difficulties, Joint Forest Management has been developed, based on recognition of the failure of traditional forestry, and the need to work towards rural development which includes women's empowerment (OXFAM 1999).

### **Economics, gender and traditional medicine in Northern Vietnam**

Ethnic minority women in mountainous northern Vietnam have historically played an important role in cultivating, collecting and marketing medicinal plants and herbal drugs. Economic renovation has increased both domestic and international demand for medicinal herbs over the last decade. Decollectivization and allocation of land to individual households, with title being granted to the male head, are shifting formal land tenure rights toward men and creating new gendered patterns of land use. Government-sponsored reforestation and cash crop projects in the mountains are now competing with existing land uses including medicinal plant production. These developments raise important questions about the effects of economic renovation policies and programs on the long-term sustainability of medicinal plant supply as well as women's continued participation in the market.

The resultant shift from a secure wage and salary employment to less secure household and informal sector work means that women have less social contact, an increased burden of productive labor, and fewer opportunities for skill development. The gender gap has also emerged in education since economic renovation, as sons are favored. While female-headed households are not significantly worse off than male-headed households are, adult women's nutritional and health status is poorer. Women are also receiving land of lower quality through the reform process.

For rural minority women, many of the urban realities related to income, occupational and leadership disadvantages are not applicable. They appear not only to be maintaining access and control, but also to be deriving increased benefits from the marketing of medicinal plants. If women are to sustain economic gains from this market, potential threats such as a declining resource base due to overharvesting and competing land use claims must be addressed. Land and housing rights for women are necessary for full participation in the medicinal trade (Jennifer Sowerwine 1999).

### **Chipko**

The Chipko movement, starting in the Indian Himalaya, is perhaps the best-known example of protest against the "development" of mountain forests against local interests. In 1973, the first successful resistance to forest felling at the Mandal forests was an economics-based protest by Dasholi Gram Swarajya Sangh, a local Gandhian organization. A year later, more vociferous

yet non-violent resistance by a group of women, led by Gauro Devi, the head of the local village women's association, in the Reni forests of Garhwal Himalaya, was triggered by the news that local forest had been auctioned, for cutting, to a sports-goods company from the plains.

### **The Theme of Chipko**

Raturi, the folk-poet of Chipko, expressed the central theme of opposition:

"Embrace the trees in the forests  
And save them from being felled!  
Save the treasure of our mountains  
From being looted away from us!!"

Summarized from Jayanta Bandyopadhyay.

After the demise of the contract felling system, and the establishment of the public-sector Forest Development Corporation, local village cooperatives participated in forest cutting, and the fundamental basis of the Chipko movement was greatly reduced. Much of the success of the movement in obtaining tacit political support lies in the capacity of the leadership to mobilize the vocal and urban environmentalists. Chipko thus has its roots in the hard economic struggle for survival while its image has been enhanced with ecological labels.

Whether or not the Chipko movement was based on gender conflict is a very sensitive and subjective issue. It should not, in fact, be an issue at all -- both men and women have played significant roles, and women activists consider that the movement was strengthened by female-male collaboration against inappropriate management practices. That women were seen to be the initiators of the movement was circumstantial: Gauro Devi stated that "It was not a question of planned organization of the women of the movement, rather it happened spontaneously. Our men were out of the village so we had to come forward and protect the trees" (Jayanta Bandyopadhyay 1999).

### **Management Structures and Institutions**

One of the key characteristics of the world's mountains is the mixture of private and communal ownership and management of resources. A large proportion of the world's mountain forests, grazing land and water management systems (e.g., irrigation systems) is communally owned and managed. To some extent this is because the most efficient way to manage these resources; but in addition, communal management provides an essential complement to the choices of families about what to grow and harvest on their private land, which is typically more fertile than the communal land. In this context, it is worth noting that, in communities where production is mainly of annual subsistence food crops to meet immediate consumption needs, the prospects for marginal farmers are limited, being dictated by their daily



household and farm requirements; long-term investment is barely possible and therefore not a priority.

On both private and communal land, mountain people grow trees to meet their specific household needs, which often change over time. Their choices are influenced by factors such as availability of land and labor; types of trees available; techniques for, and risk involved in, growing them; and markets for both forest products and employment of family labor. Forestry interventions with the objective of stabilizing and improving smallholders' farming systems are more likely to succeed if they are based on an appropriate policy framework and provisions that remove the constraints to tree growing than if they are based solely on direct incentives (Yam Malla 1999).

### **The Diversity of Approaches**

It is worthwhile to compare how the central issues are handled in different places, and how historical, cultural and physical influences affect the processes. These examples from three continents reveal some of the diversity of approaches, showing the complex interconnections between ownership, regulation, and the provision of technical assistance -- and the benefits of a long-term perspective.

### **Successful Management Components in the Swiss Alps**

Some of the critical components of sustainable forest management in Switzerland have included:

- Resolution of inter-village conflicts and rural-urban conflicts in a context of favorable development (import of coal, industrialization);
- A social organization (community forestry) handing over power and accountability to local people;
- Well-balanced communal decision-making processes backed by forestry laws helped to overcome the influence of outside commercial forces and interests;
- Reorientation of the Forest Service from "policemen" to advisors was possible due to the introduction of realistic wages, allowing foresters to make a living;
- Long-term posts for District Forest Officers and Forest Guards (sometimes up to 40 years -- coming to know literally every tree and farmer in the district); and
- Adaptation of silviculture to local conditions and environmental constraints (increasing natural regeneration to minimize risks, selective felling).

While most forests are locally owned (communities 68%; private 26%; Confederation and Cantons 6%), the powers of the owners are tightly controlled in the interests of society as a whole, which is understood to include future generations. Although the owners have the right to harvest and profit from mountain forest resources, national or local funding is usually available (and needed) for appropriate management in order to fulfill protective and welfare

functions, as defined in regulations and legislation. These subsidies are paid as "forest protection."

Reinvestment in local communities is a vital part of the process of sustainable management and accountability. The division, or parceling, of national and community forests into smaller units has not been problematic as the units have remained large enough (at least 100 ha, generally more) for effective and appropriate management. Private forests did suffer to some extent, but Swiss foresters widely believe that private ownership of forests is not appropriate for a resource needing planning cycles well beyond the life span of a human individual.

Summarized from Christian K  chli 1999.

### **Management Plans in Papua New Guinea**

All but 2% of the forests (over 280 identified types) of Papua New Guinea, considered by many to be the most species-rich in the region, are under constitutionally guaranteed clan group ownership. Landholdings are small and ecologically diverse, and ownership is complex. Forest legislation requires comprehensive involvement of local communities in forestry planning, although timber companies routinely flout environmental stipulations and contractual obligations to landholders.

A WWF/World Bank initiative is providing support for the growing number of community-based foresters who retain tenure of forest resources and undertake small- to medium-scale timber operations while investigating opportunities for expanding certification of these activities (i.e., forestry that meets independent, performance-based, internationally accepted standards for social and environmental responsibility in forestry operations). The aim is to enhance the economic viability of community forestry, with an emphasis on sustainable production, while increasing protection of fragile forest biodiversity and the environment. As current policy is developed solely around facilitating industrial-scale production, a framework is needed which caters for community forestry -- and takes account of conservation areas and biodiversity "hotspots" - - either by adapting the existing regulations, or by designing a separate code of practice.

Summarized from Paul Chatterton 1999.

### **Community Control in Mexico and Honduras**

In Mexico, the participation of local communities is central in the management of the forest resources available to them:

- A locally elected Communal Property Commissioner designates communal reserves;

- Communal decisions are made on land-use zoning policy. One community built a communal fence bisecting the village land and separating livestock-grazing areas from maize crops; this reduced the pressure on forest resources, as previously farmers had fenced off each maize plot individually;
- Communities impose bans on the cutting of tree species becoming critically scarce; and
- Communities maintain strict controls on the entry and activities of outsiders.

While these measures have been effective, large areas in many communes and ejidos are communal in name or theory only, fenced off and managed individually on a private basis. In Honduras, almost all ejidal land is now privately managed, with some institutions in the south of the country attempting to promote community control of resources. Consideration of the ability of communal systems to develop and change is therefore a significant part of the planning and decision-making process.

Summarized from Adrian Barrance 1999c.

## Local Participation

Local participation in both decision-making processes and the implementation of management plans is crucial for sustainable resource management. In Nepal, local involvement is achieved in many areas via the formation of forest user groups (FUG) who are supported by the government in the form of the District Forest Officer. This program has realized the transfer of benefits from central to local levels in that the FUG have the right to harvest timber from their managed areas (Anand Bhattarai 1999b).

Self-determination and local mobilization are ever-present trends in the development of management schemes across the world, and in the case of Joint Forest Management in India (S. Palit 1999b, OXFAM 1999), the greatest success has been achieved by integration of this government-led initiative with autonomous community groups. Sometimes, however, programs do not take into account existing community groups and their management structures, which can lead to conflicts of interest and further marginalization of mountain groups. Building on existing organizations and networks -- where these are equitable -- can be beneficial to all involved as it implies wide participation and representation, and shared accountability.

Although the ideal behind the creation of user groups and village committees is democratic representation, this has not been fully achieved; unequal access to forest resources and decision-making power is common amongst disadvantaged groups. Some projects have been initiated specifically to combat the unjust situation of disadvantaged caste, gender and ethnic groups -- valuing forests purely in economic and ecological terms contributes to inequity as forests have different values for rural users. Village-level democracy and conflict resolution

initiatives are increasing and are effective elements in many management systems (Ashish Kothari 1999a).

### **Community Forestry in Jardhargaon, India**

Jardhargaon is a hill village in India's Tehri Garhwal. While the successful implementation of local management has improved the quality of the forests, there are problems and complications: cohesion in the village organizations is erratic; hunting, while reduced, is still widespread; women remain essentially underprivileged, and some conservation-based decisions may cause further hardships. Additionally, a severe lack of funds means forest guards have sometimes not been paid for long periods. Attempts to sustain the movement through local-level processing and sale of biological resources have run into difficulties of marketing and quality control. More progressive community members are trying to resolve these issues through democratic conflict-resolution.

Summarized from Ashish Kothari 1999a.

The Nepal Agroforestry Foundation focuses on marginal farmers as the intended beneficiaries of its program. Nevertheless, internal monitoring indicates that successful agroforestry activities have tended to benefit farmers with larger landholdings (B.N. Regmi and Ben Vickers 1999). Agencies must realistically assess the target beneficiaries of management projects and investigate alternative methods of addressing social equity.

### **Legal Structures**

Lack of effective legal power is a frequent problem for self-determined local groups; in some instances, revision of operational plans is aimed at providing legal representation within the management framework. Community forests can, in most cases, be more effectively protected and managed by village/communal groups than by government inspection units; however, in the Vietnamese highlands, for example, farmer participation is not yet legally mandatory and suitable ways to involve farmers in participatory development are lacking (Thai Phien 1999).

In 1999, the European Union implemented the legally binding Rural Development Regulation, negotiated between countries and providing financial subsidies for the ecological stability and sustainable management of mountain forests in relation to rural development (Pier Carlo Zingari 1999d). At the national scale, in France, the legal situation in communal forests is derived from rights of usage from Roman times. The communes are the owners of the land and are responsible for the implementation of environmental policies at a local level. A Forest Charter between the communes and the National Forestry Authority now exists (Pier Carlo Zingari 1999b).

In Switzerland, a 1988 report by the Swiss Group for Mountain Populations noted that mountain areas, and their assets and constraints, were not accounted for by existing legal instruments (Pier Carlo Zingari 1999f). Local enterprises require a legal basis of support, and a recent overview found that two of the reasons for the current success of Swiss mountain forestry were local accountability, and the backing of forestry laws for balanced, communal decision-making processes (Christian KÜchli 1999).

These various examples show that legislation must clearly recognize rights with regard to decision making, profit sharing, and responsibility. The role of legal structures as they affect mountain communities and environments is discussed in more detail in the Mountain Forum report "Mountain Laws and Peoples."<sup>5</sup>

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<sup>5</sup>Lynch, Owen and Gregory Maggio. 2000. "Mountain Laws and Peoples: Moving Towards Sustainable Development and Recognition of Community-Based Property Rights. A General Overview of Mountain Laws and Policies with Insights from the Mountain Forum's Electronic Conference on Mountain Policy and Law." Mountain Forum, The Mountain Institute, and the Center for International Environmental Law. Franklin, West Virginia, USA. Available on the Mountain Forum web site at: [http://www.mtnforum.org/resources/library/mlp\\_01.htm](http://www.mtnforum.org/resources/library/mlp_01.htm)

### **Land Tenure: Rights and Responsibilities**

Perhaps of most significance for local groups is the security of their ownership, tenure, or management rights for their mountain forests. For the people of Jadhargaon, in India's Tehri Garhwal, the main strength of an initiative for forest protection is the conviction that the forest is theirs; it provides them with fodder, fuelwood, water and clean air, and therefore it is their responsibility to conserve it not only for the present but also future generations (Ashish Kothari 1999a). This understanding is an integral part of any successful scheme, and indeed is reflected in the move away from top-down and towards bottom-up management programs.

The Hills Leasehold Forestry and Forage Development Project in Nepal addresses the issues of tenure and responsibility by enabling subsistence farmers to lease, on a long-term basis, blocks of degraded land. Regeneration of the land expands the resource base available while helping to reverse ecological decline (Frits M. J. Ohler 1999).

### **Community Forestry in the Highlands of Vietnam**

In many areas, highland farmers are unsure of their land tenure rights. A useful way forward is to place certain land under community management so it will be available for periodic adjustment of land tenure, accommodating changing population dynamics. Community land and forests are part of the traditional

highland tenure system. In development programs, the emphasis is generally on vegetation cover and timber products only, but it is important to also consider short-term profit. Highland people, particularly poor families, prioritize products bringing them immediate income such as bamboo shoots, firewood, medicine and fruit. Forests also provide valuable fodder, hunting and cattle rearing areas; it is unrealistic to strictly prohibit access for local people, and local cooperation in conservation efforts will be affected.

Summarized from Thai Phien 1999.

Land tenure is also of major concern with regard to forest management in industrialized countries. For example, in the southern Appalachian Mountains of the USA, forests are owned both privately and by state and federal governments. Until 1911, forest land was privately owned and extensively logged; during the following 50 years, the federal government bought up about 7 million acres (out of 42 million acres) of severely degraded forest land in order to stabilize the land and encourage forest regeneration. Local people use these national forests extensively. However, when a 1976 federal law required public participation during the preparation of land management plans, the participants tended to be outsiders concerned mainly with recreation. Indigenous people, many of whom suffer from poverty and lack of education, felt intimidated and excluded from the process. There is now local participation and most of the Appalachian national forests are preparing the second round of land-use plans. These are being directed towards biodiversity conservation and sustainable use and away from extractive uses. Yet management along these lines on only the fragmented 7 million acres of public land will be insufficient for biodiversity protection, which requires management strategies for the entire landscape. This may well lead to challenges to the rights and responsibilities of private landowners, given the wide perception that private land ownership should not be regulated (Christina Bolgiano 1999).

### **Technical Investment**

The successes of community forestry in mountain areas may be viewed as stemming directly from the willingness of government forestry agencies to shift from direct involvement in production and logging, to service provision and technical investment in rural communities. This shift should include the whole chain of decision-making and operations in forestry, from land allocation to harvest and marketing. As an example, in China government agencies are moving from direct involvement to service provision for rural communities, but the shift has not yet encompassed the whole gamut of forestry policy-making and activities. Seedling production and sale are controlled by state agencies while tree nurseries are primarily private or farmer concerns; lack of access to quality seedlings affects the efficacy of farmer decision-making (Claude Saint-Pierre 1999a).

## The Involvement of China's Forestry Agencies in Seedling Production

*Eucommia ulmoides*, a species whose bark and leaves have medicinal properties, is a multi-purpose tree, providing a ready supply of poles in addition to leaves which can be used as pig fodder if not sold on the market. It is actively promoted by forestry planners, and is being planted across huge areas of southern China, generally intermixed with annual crops on terraces and slopes close to farmers' houses. In spite of the market risks, this species is often planted on the best small plots. *Eucommia* seedlings are easily grown from seed, and local authorities have promoted small individual nurseries in remote areas -- seedling supplies are therefore easily and conveniently available to farmers. In this case, farmers are making the best use of the resources at their disposal -- choosing to rely on a species that is not so lucrative as some, but with a guaranteed supply of seedlings.

Summarized from Claude Saint-Pierre 1999a.

Traditional agroforestry systems and knowledge of a rich array of native species are often ignored by field technicians. Promotion of plantations on degraded or marginal land for both commercial opportunities and environmentally valuable purposes (watershed protection) is often injudicious and not backed up by technical expertise. Degraded upland slopes are not usually suitable for plantations but are the land type most closely associated with the promotion of reforestation. Also, plantations encouraged or developed as part of government programs tend to be primarily of exotic species of greater value to forest departments than the local people (Glen Galloway 1999, OXFAM 1999). However, natural forest regeneration, especially on degraded land, tends to require more technical proficiency than plantation management.

Effective training of both local people and agency staff is an issue that has been addressed with varying levels of success. Technical concerns must be complemented with activities aimed at strengthening local groups, for instance in basic accounting and administration. There is a lack of knowledge on the exploitation of forest resources for profit in both local and global markets, as foresters tend to concentrate on technical aspects and pay less attention to socio-economic issues. Further advice and assistance will be needed from external agencies to redress this imbalance; user groups will often be major suppliers of forest products in the future and should be allowed to base their forest management on a commercial basis where relevant. Market concerns are immediate when managing natural forests; emphasis should be placed on identifying and accessing favorable markets.

## Community Forestry

### Community forestry planning

Community forestry (CF) should be regarded as a process, not an objective. Central to community forestry are social and institutional issues, for which a strictly technical approach is not an appropriate substitute. While tree growing and harvesting tend to be individual (private) activities, community tree growing can be successful where there is a substantial support network.

It is important to reconsider the widely accepted concepts of plantations and silvicultural management, as local peoples' perceptions vary greatly according to their own experience. Several years ago in Honduras, for example, farmers planted trees as part of a food-for-work based forestry extension program. These trees are now managed in a similar way to that applied traditionally to naturally regenerated trees, aiming to find a balance between tree and food crop production; the resultant system challenges accepted wisdom on the characteristics of forest plantations. As farmers tend to attempt to achieve this type of balance, adaptable forms of agro-silviculture should be promoted in order to embrace both traditional and technical knowledge and management methodology. Educational institutions should provide a greater breadth of education so that forestry students not only appreciate cross-boundary factors but are also able to apply their knowledge within individual and local frameworks (Adrian Barrance 1999g).

Table 2. Comparison of community forestry programs

Program	Issues
<b>Community Resource Management Framework (CRMF), Philippines.</b>  Based on individual farm and family labor, not on a community perspective.	The community recognizes the rights of use (mainly by farmers) of the forest resources.  <i>Challenges:</i>  - no consideration of a balance between forest conservation and farm expansion  - no control over influx of new migrant farmers  - damaging encroachment of market economy has altered traditional subsistence practice
<b>Hills Leasehold Forestry and Forage Development Project (HLFFDP), Nepal.</b> Poor families lease degraded land, can increase income potential.	This project has succeeded in its aims of raising the incomes of families below the poverty line and contributing to the improvement of ecological conditions in the hills.



	<p><i>Challenges:</i></p> <ul style="list-style-type: none"> <li>- largely successful, but not in forests above 2000m; colder conditions require a different approach</li> <li>- insufficient attention paid to capacity strengthening of user groups</li> </ul>
<p><b>Joint Forest and Planning Management (JFPM), India.</b> Sustainable management model, government initiative.</p>	<p>The program generally acknowledges that local communities need the forests for survival, and has been most successful where integrated with community groups.</p> <p><i>Challenges:</i></p> <ul style="list-style-type: none"> <li>- large areas of forest given to commercial, ecologically detrimental projects in spite of government's conservation program</li> <li>- plantations created are mostly of exotic species</li> <li>- Village Forest Committees are only registered in degraded areas; many forest-dependent communities are excluded</li> </ul>
<p><b>Van Suraksha Samiti (VSS), Jardhargaon, India.</b> Mobilization of villagers to protect their forests – ban on green wood cutting.</p>	<p>Has achieved female representation and forest regeneration.</p> <p><i>Challenges:</i></p> <ul style="list-style-type: none"> <li>- successful, but resurgence of wildlife populations is causing livestock and crop damage</li> <li>- lack of effective legal power on the part of the VSS</li> </ul>

(Ashish Kothari 1999a, OXFAM 1999, Frits M.J. Ohler 1999, Benedicto Q. Sánchez 1999a)

Technical input should start with the establishment of needs, priorities, strengths and weaknesses of the various forest resources, in addition to determination of usage patterns and related information. Participatory inventories, such as those conducted by Forest User Groups (FUG) in Nepal, can be used as a basis for defining management objectives; a community production plan can then be drawn up. Without a baseline reference, it is difficult to assess environmental changes occurring over time in forest ecosystems -- though traditional systems are often best, rapid changes in

resources as a result of population pressure may mean that customary management procedures require modification. Basing management practice on baseline data empowers the FUG in negotiations with the forest department. Most FUGs do not use their resources efficiently as they are managed very conservatively and this may even reduce environmental and socio-economic benefits. There is a need for rapid, low-cost inventories giving quantitative information appropriate to community forestry and specifically of use to the FUG. While such resource assessment must be participatory, modern technology -- such as Global Positioning Systems (GPS) and Geographical Information Systems (GIS) -- could be effectively integrated, though this requires external funding to be viable (Gavin Jordan 1999).

### **Suggestions for Community Forestry Research in Thailand**

Traditional structures and organizations established by villagers already exist in the highlands of Thailand. Social forestry should build on them as a base; for example, as government extension only reaches to district level, village extension networks could be developed using existing organizations. Research should investigate methods of land allocation (to household, groups and communities); forest management (management teams, combining production and protection); factors governing farmer-adoption of new options; strategies for sustainable land use; and models of social forestry involving the participation of women.

Summarized from Thai Phien 1999.

### **Positive outcomes**

One of the more tangible benefits of various programs and initiatives for community forestry is the empowerment of women. Many groups have female representation, and women are able to exercise some control over the management of the resources they use. Numerous women's groups and savings cooperatives have been formed in many areas enabling local financial investment in future schemes. There is, however, a risk that men may become increasingly excluded from development initiatives as the natural resource sector becomes perceived as a women's issue; there is thus a need for reinforcing the inclusion of men and also their involvement in the resolution of unequal work distribution.

### **Nepali Credit Schemes**

Savings and credit cooperatives (SCC) represent the common interests of a larger proportion of the Forest User Group (FUG) than is otherwise possible at general assemblies. As the SCC is comprised mainly of women's savings groups, it can act as a pressure group for the inclusion of more women in the FUG committee, and encourage a focus on gender development within the user group program.

Summarized from B.N. Regmi and Ben Vickers 1999.

Another important outcome is the change in attitude of local groups and government agencies or departments. While there is sometimes a feeling that joint management programs have increased workload and brought few rewards, field staff and local people have developed partnerships based on the realization that their mutual involvement is beneficial.

### **Institutions for Agroforestry**

In many heavily populated mountain regions, agroforestry systems have been in existence for centuries, if not millennia, as part of intricately linked systems of land use that include agricultural land, grazing land, and trees both on these types of land and in forests. Agroforestry is often the best option to ensure the maximum production of biomass -- wood, non-timber forest products, and fodder -- through intensifying the use of smaller units of forest and pasture land. Similarly to institutions for the management of mountain forests, institutions for agroforestry are increasingly taking holistic approaches to the entire landscape of interconnected agricultural and forest ecosystems from which mountain people typically derive their livelihoods. In this context, security of land tenure is a critical issue; people are rarely prepared to make long-term investments in terms of planting trees unless they know that they will derive the expected benefits.

At the global scale, two institutions focus particularly on mountain agroforestry: the International Centre for Research in Agroforestry (ICRAF) in Kenya, and the Tropical Agricultural Research and Higher Education Center (CATIE) in Costa Rica. There is a great diversity of agroforestry systems across the world's mountains; the following examples illustrate some of the key issues in developing sustainable agroforestry.

#### **Gia Lai Agroforestry Extension Project, Vietnam**

The Ba Na are one of 54 ethnic minority groups of Gia Lai province in Vietnam's central highlands. Human-influenced deforestation is one of the biggest regional problems. The objectives of the Gia Lai Agroforestry Extension Project, funded by the New Zealand Overseas Development Administration (ODA) since 1997, are to: (i) improve the ability of female and male smallholder farmers to better organize grassroots-level resource management, (ii) build the response capacity to rural development needs and opportunities within the Extension Service, Gia Lai Women's Union and the farming community, (iii) increase food security amongst people, especially the Ba Na, in the project area.

Village Development Committees (VDC) are set up in each village; farmer groups are created under each VDC for each micro-watershed. A separate

Women's Union has been formed and is actively involved with sanitation, cultivation of fruit trees and pepper, establishment of vegetable gardens, and other relevant programs to raise nutritional standards. Farmers are encouraged to plant tree legume species and become involved with seed collection for trade, and small wood lots have been established through local youth organizations and farmers groups. Agroforestry is not a new concept for Ba Na farmers; land improvement technologies such as contour planting and agri-silvicultural practices are currently being assessed.

As extension staff tend to make decisions for themselves and overlook the farmers' consensus, the project is providing Ba Na language training to all extension staff in an effort to reduce communication problems. The number of female extension workers is very small, but there are some literate young Ba Na women in the villages who speak and write Vietnamese and are able to take on officiating positions in the VDC and groups. It is hoped that the provision of land ownership certificates and establishment of community forest management will contribute to food security for the Ba Na through land improvement and sustainable on-farm activities (Manohar Shrestha 1999c).

### **The Nepal Agroforestry Foundation**

The Nepal Agroforestry Foundation (NAF) is a voluntary, non-governmental, non-profit institution founded in 1991 by leaders of community-based organizations and farmers of Dhading, Kavre, Ramechhap, and Sindhupalchok districts. The main focus of the NAF extension process is to supplement existing agroforestry technology so that farmers can become self-sufficient and confident with the techniques. NAF has been expanding its program through grassroots organizations using the following extension steps:

- i. Needs assessment: detailed preliminary investigation of the existing problems and opportunities in a target area, conducted in collaboration with local partner organizations;
- ii. Cross-visits/exposure: cross-visits for interested farmers to nearby on-farm agroforestry demonstration sites for discussions with experienced farmers;
- iii. Home nursery training: a one-day home nursery training for interested farmers to facilitate the successful establishment of multi-purpose tree species and grasses;
- iv. Farmers' group formation: if a farmers' group does not yet exist in the community, farmers are encouraged to form their own groups, to meet regularly and assist one another in the production and protection of fodder trees and grasses. The group selects a leader farmer based on ability and time availability; and
- v. Training of trainers (TOT): leader farmers selected by their groups are given a 10-day TOT course. They are trained to provide advice and

motivation to other farmers in the group and continue with the promotion of agroforestry techniques after the end of the NAF program.

NAF provides technical and material support to farmer groups through local NGOs for three years. These NGOs are responsible for the development of an agroforestry demonstration farm with a major role played by farmer leaders, and assist with long-term continuation of the development program (B. N. Regmi [and Ben Vickers] 1999).

### **Agroforestry in Majhitar**

The village of Majhitar in Dhading district is a NAF demonstration site where women are actively involved in the conservation of the local hill forest areas, having participated in on-farm agroforestry development for eight years. The women's development office requested NAF to help in developing agroforestry systems in the village. Most farmers involved in agroforestry development are women.

About a third of group members are self-sufficient in terms of fodder, and a fifth in fuelwood. They have formed a local NGO; Majhitar Community Development Center. The Majhitar farming system reflects an all-inclusive approach to farming that has remained largely unchanged in the area for hundreds of years while the applications of agroforestry systems have altered with the changing patterns of land tenure and dwindling resources.

The strategy of planting lines of multi-purpose trees and grasses on bunds between crop production areas has a range of benefits: the provision of fodder, fuelwood and crops; strengthening of the terrace riser; improvement of soil stability and reduced nutrient leaching. The emphasis on farmer-to-farmer research, training and extension has played a significant role in the success of the program. The agroforestry systems have resulted in a diverse range of products. Increasing farmers' interest in short-term cash crops might drive the commercialization of agroforestry systems: this may increase the level of cash income but, conversely, might increase the dependency of farmers on outside sources for goods and services. This is not currently a problem in the Majhitar area but may be a concern for the future.

Summarized from B.N. Regmi 1999.

### **Policies for Mountain Forests**

A wide variety of policies affect mountain people and the forests on which they and billions of others depend. Directing these policies in ways that contribute to sustainable mountain development requires detailed understanding of the broad range of relevant environmental, economic, political and social factors and of the potentials of the different options in moving towards desired goals. Given the long lifetime of most mountain trees and the changing functions of

mountain forests, policy-making for these forests has to be a dynamic, flexible and reflective process. A policy made in one century may lead to the effects that were desired then but may be quite inappropriate in the next century when economic and social circumstances have changed -- as shown by the example of existing laws in the Indian states of Maharashtra, Karnataka and Andhra Pradesh, dating from the period of British rule, against the conversion of agricultural land for non-agricultural purposes but not vice versa (Anand Bhattarai 1999a). This section provides some illustrations of the importance of understanding this historical context, and of current trends in mountain forest policies in different parts of the world.

### **Ownership and Governance Patterns**

Patterns of ownership and administration are key contexts for understanding, developing and implementing policies. As noted previously, there is a complex patchwork of private, communal, and state ownership of forests in many mountain ranges. Both these and the broader context of regional and national policies are subject to change in many parts of the world -- natural disasters, political upheaval, and population displacement, as well as social reform and economic priorities of governments can all contribute to reorganization of management and ownership structure.

One region where significant changes have taken place in the past decade is the former Soviet Union. Before it was dismantled, decisions relating to Kyrgyzstan were taken in Moscow in accordance with central planning policy. While Bishkek, the Kyrgyz capital, is now the administrative center, there is some degree of responsibility at the *leshov* (State forest farm) level, resulting in local decision-making and implementation processes. The *leshov* population has been greatly influenced by population movement; the workforce comprised Russians, ethnic Germans and then Chechens between the 1950s and 1970s, and Kyrgyz have recently become the majority group. Kyrgyzstan and many of the other states of the former Soviet Union provide examples of the phenomenon of refugee peoples seeking sanctuary in mountain areas, bringing their own technical knowledge and cultural tradition -- such population movements influence indigenous practices (Jane Carter 1999a).

Across the mountains of western Europe, examples of effective sustainable management systems have existed for centuries, both under private ownership and through the great variety of communal ownership and management systems. The example of the French forest communes underlines the pertinence of such common property regimes. Under legislation based on usage rights dating back to Roman times, 11,000 local forest communes account for 3 million hectares (20% of the total) of forest, mostly in the mountains and playing significant roles in local development. While the communes own and manage the land locally, the State is responsible for technical management. Mayoral duties include responsibility for management that is beneficial to all.

All the forest communes formed a voluntary association in 1933. Its aims are to democratically represent communes at a national level; to provide ongoing training to local activists; and to contribute actively to local forest development and sustainable forestry. These aims have been enshrined in a Forest Charter between the communes and the National Forest Authority. The role of communes has taken on a European perspective since 1990, with the creation of the European Federation of Local Forest Communities (EFLFC) followed by the adoption of a European Mountain Forest Charter. There is a great deal to be learned and gained from local community mechanisms; even where they have been dismantled or swept aside by central powers they remain a part of local culture. This is the basis for European Observatory of Mountain Forests, established by the EFLFC (Pier Carlo Zingari 1999b).

### **European Observatory of Mountain Forests (EOMF)**

The EOMF aims to use the experience of all people with an involvement in mountain forests -- local communities, individuals, owners, workers, managers, entrepreneurs, researchers, schoolchildren, teachers, families, trainers, users and the public -- to share their views, concerns and ideas about sustainable management and local development. Planning ahead and taking a long-term view is also vital in order to identify future opportunities and effectively deal with upcoming problems.

Summarized from Pier Carlo Zingari 1999a.

In Central Europe, where patterns had been quite similar to those of western Europe, the political circumstances after World War II led to a general curtailment of ownership rights in communist countries. Since the collapse of communism, ownership is gradually reverting to the original proprietors. In Slovakia, 83.3% of the requested area (940,000 ha) had been returned by the end of 1996. Forest management is controlled by state enterprises founded by the Ministry of Agriculture; the interests of the Union of Owners of Private, Community and Municipal Forests are manifested through their regional associations.

### **Slovak Policies for Biodiversity and Sustainable Forestry**

Slovak government policies have considerable provision for biodiversity protection and ecologically sustainable forestry. The National Biodiversity Policy encompasses several directives including; development of relevant data bases and implementation with regard to sustainable management practices; increasing the proportion of naturally regenerated forest; promoting a holistic approach in forestry planning processes; monitoring and assessing the changes and impacts on the development of forest ecosystems.

Summarized from Libor Jansky 1999d.

Forests in Slovakia are generally regarded as a vital renewable resource (Libor Jansky 1999d). The Forestry Section of the Ministry of Agriculture defines strategy and policy for forestry development; regional forest offices supervise compliance with legislation, approve forest management plans and assign protection and special-purpose forests. These forest offices supervise and evaluate the management process, and have decision-making powers. National policy disallows exploitative use of local property rights for profit. There are various groups and schemes involved with forest protection and preservation across Slovakia, including the civic association People and Water, focusing on offering alternatives for water resource use in forested watersheds. Political turmoil, and the resultant transitional state of the country, is the cause of the biggest problem for mountain forest protection and conservation: lack of financial support (Libor Jansky 1999b).

### Chinese Land Tenure Systems

The four types of forestry land use systems are based on current forestry policy and law:

1. household hill forestry, generally involving hills used in two ways: farmer household-use forestry hills (mostly bare land near to the village) and household responsibility hills (degraded forest land);
2. collectives or communities (mostly referred to as "public mountain forests" at the village and township level);
3. state-owned forests, often called "state-owned forest farms";
4. collaborative, consisting of individual farmers and their community; or community and enterprise/ individual/community/state, etc.

Farmers' rights of use and management of different types of forests and trees follow rules and conditions related to forest product type, location, forestry policies and implementation; farmers are not permitted to cut timber trees for their own use without government certification. Collection of fuelwood, mushrooms and fodder, in addition to animal husbandry, are largely allowed in any forestry land use system, subject to location.

The "household-use forestry hill" management, cutting and protection policies are not effectively implemented at either community or local government level in remote mountain areas. Farmers have greater rights of control and use in these regions, typified by rich forests, low population and long-term residency of ethnic populations. In contrast, in mountains which are relatively near townships or cities, and characterized by high densities of population, good transportation, growth economy and information exchange, policy is well implemented by local governments and forestry stations. As a result, farmers' rights to control and use forest and trees are limited.

Summarized from Lai Qingkui 1999a.

### Forest policies and perceptions in the Tibet Autonomous Region



The forests of the Tibetan Plateau are crucial to regional and international water regimes. Nearly a billion people live downstream in the basins of Yangtze, Yellow River, Mekong, Salween and Tsangpo-Brahmaputra, all originating on the plateau. In recent decades, the forests were considered solely as a source of timber, and the timber industry is the most important source of cash for many local administrations. All too often the hydrological functions of these forests have been severely compromised and disregarded. Ecological conditions are an important factor regarding the extent and permanence of human impact. Forest grazing and slope burning, mostly to clear shrubs, is still common. Recent economic reform poses new risks -- an increase of livestock for new markets is increasing pressure on grazed forests.

All forests in the Tibet Autonomous Region (TAR) of China are officially owned and controlled by the state. However, some villages use nearby forests as if they were collective forests, relying on them for a range of resources; the rights to these types of forest uses are poorly defined and not protected by law. The Chinese government cited deforestation in the upper catchments of the Yangtze as a major cause of disastrous downstream flooding in 1998 -- though whether or not there was a simple causal relationship is open to question. According to Chinese authorities, all logging ceased by September 1998, and in December 1998 the government of the Tibet Autonomous Region announced a reforestation campaign and issued a logging ban. While the recent bans and announced reforestation programs herald a major change in policy, the abruptness and the far-reaching consequences of a total ban will inflict hardship on local people, county administrations and their economy (Daniel Winkler 1999).

The TAR forestry office is preparing two plans for submission to the State Forestry Bureau and the State Council: the first calls for a complete logging ban along the upper Yangtze River; and the second calls for afforestation along the middle and lower Yarlung Tsangpo, in the arid regions around Shigatze and Lhoka and reforestation in Linzhi Prefecture. It proposes zoning forests into "marketable product forests" and "public welfare forests." The latter will primarily provide ecosystem services and will not be logged. It further calls for more efficient logging methods, as three cubic meters of wood are consumed for every cubic meter of timber produced; and for a gradual reduction in the annual quota for timber cuts. It is difficult to acquire accurate information on implementation of forestry policies and logging bans, and official and unofficial estimates on timber export vary greatly. Although official figures imply that current cutting rates are sustainable, deforestation seems to be accelerating. Sustainability is based on forest regeneration, but successful reforestation is seriously lacking. The forest department relied mainly on natural regeneration for decades; results were unsatisfying due to intruding livestock. In addition, funds and infrastructure are insufficient.

Funding from the central government for the Yarlung Tsangpo protection plan is not guaranteed; there is a widespread perception in Beijing that logging in the TAR is so minimal that there is no need for a forest protection policy; and that logging in the TAR only began "five or six years ago." In fact, a forestry bureau and the first state logging company were established in 1965. Forestry scientists and officials believe the natural forests of the eastern TAR are not included in the National Natural Forest Protection Project because the lower reaches of the river do not lie within Chinese borders; thus the state would obviously be less concerned with potential negative impacts of deforestation.

Linzhi prefecture is officially closed to foreigners and few domestic visitors come. The primary reason for tight security is the prefecture's position on a contested border with India. Indeed, more than half of the tropical forest claimed in the Pemako region (Metok county) is under Indian control. This region has also recently been the site of several exploration missions by foreign scientists and explorers, and Chinese scientists and journalists. One result of the resulting media attention has been to generate large-scale engineering schemes making use of the water from the Yarlung Tsangpo (Emily Yeh 1999).

### **Setting and Maintaining Priorities**

In developing countries, the stated goal of outside agencies is often to promote democracy, i.e., to ensure that people have the power to influence the decisions that affect them. However, this process can become subverted in order to reinforce the traditional status quo -- something that the institutions involved must acknowledge (John Metz 1999b). Further, the policy and financial support of many international organizations emphasize economic development, which commonly leads to the inequitable distribution of benefits. Their projects are often technical and not allied closely enough to either national policy planning or institutional development. This disparity between the operational realities "on the ground" and the outcomes of international conferences is especially marked in countries where provincial administrations and institutions lack power. In Vietnam, Mozambique, Colombia, Indonesia, Myanmar and Laos, as well as in many other places, the problem is intensified at the district, commune, or village levels (Sabu George 1999e). This requires action both by donor agencies and recipients -- whether governments or NGOs -- to ensure that stated goals are achieved. NGOs can play pivotal roles in the process of setting and implementing policies and in acting as watchdogs. Two examples from California and Nepal show some of the possibilities.

### **The Quincy Library Group (QLG), California**

The QLG is a consensus-based coalition of local elected officials, environmentalists, timber industry and labor union representatives, and other civic leaders in California's Northern Sierras. Their plan combines a range of

environmental protection measures with a more reliable supply of forest products through thinning and small group selection timber harvesting. The QLG area has its own maps (now legalized in California's QLG bill), a forester representing regional socio-economic concerns, and liaison with the three national forests in the QLG area. If justified and selected through a process under the National Environmental Policy Act (NEPA), the QLG proposal will become an official component of the Land Management Plans of the three national forests.

The QLG has consistently used its political connections, which stretch far beyond the town of Quincy, to go over the head of the local forest leadership, and influenced the bureaucratic structure of the Forest Service to declare the QLG area as a new administrative unit and redistribute the flows of appropriations and special budget allocations for QLG-type activities in this region. The QLG has thus inserted itself as a powerful, if vaguely defined, component of the administrative hierarchy. The QLG bill was introduced in 1995, and has been perceived as particularly threatening to the Forest Service by exacerbating the chronic tension between legislative control and administrative autonomy.

The QLG is deemed both too local to justify its role in national forest management, and not local enough in that the size of its area is inappropriate for a community-based pilot project. Local environmental opponents fear that they may be engulfed by the QLG as the sole voice for the community, while local environmentalists in other regions fear they may be overwhelmed by timber industry interests in new QLG-type efforts. Although the QLG may be less environmentally threatening than claimed by their adversaries, the new political space opened up by the QLG may be occupied by less benign manifestations of local or corporate control in the future. Summarized from Jonathan K. London 1999.

### **FECOFUN, Nepal**

While Nepal's 1993 Forest Act recognized Forest User Groups (FUGs), many FUG members are unaware of their rights and responsibilities. The Federation of Community Forest Users in Nepal (FECOFUN) was founded by and for community FUGs to combat this state of affairs and reinforce the role of FUGs.

FECOFUN has a unilateral policy on gender balance and representation, and supports self-determination in all aspects of FUG activities by providing mediation, advocacy, awareness raising and training. FECOFUN has been instrumental in a number of cases:

1. opposing a regressive amendment to the 1993 Forest Act proposed by the government in 1997. The amendment has now been postponed.
2. mounting a three-part opposition to the Bara Forest Management Plan (BFMP) proposed by a multinational corporation, Enso International:

- a. a global publicity campaign over 18 months focused attention on the issues and attracted support from many organizations and individuals,
- b. in cooperation with a Finnish NGO, FECOFUN advocated to the Finnish Government and local NGOs in Helsinki that the BFMP should consider the needs and interests of the local users,
- c. home-visit and small group discussion programs were organized to apprise FUGs of their rights and responsibilities.

The Finnish Government decided eventually not to involve Enso International in the Bara Forest Management project. FECOFUN then sent four facilitators to Bara for one month to help support FUG formation.

3. organizing a campaign of awareness-raising and information dissemination to fight against rules issued by the government with regard to the Timber Corporation of Nepal (TCN). The rules state that TCN reserves the sole right to harvest and sell the timber from forests in 33 districts, with no caveat or provision for community forestry. Under these rules, no other company can sell timber wood or agricultural equipment. These rules will have negative impacts on farmers and FUG.

Summarized from Amrit Joshi 1999b; Hari Prasad Neupane 1999a, 1999b.

## Forest Certification

Forest certification is a recent approach to ensure that forest products are produced in a sustainable way. Its aim is to motivate producers by linking them to consumers who will pay more for products that are certified as having been produced sustainably. To some extent this is working, with growing consumer demand for certified timber in timber importing countries, particularly in Europe and North America. Certification can enhance the image of timber producers and clarify their commitment to sustainable management, and also help to raise standards of forest management through the review and inspection of field operations. In this way certification can complement the legislative and regulatory actions of governments in working towards sustainable forest management.

The Pacific Islands are characterized by dependence on forest resources for subsistence, economic and cultural needs. Shifting cultivation, insecure land tenure, and the small size of land holdings are typical. Drastically degraded forest ecosystems and social dislocation are results of large-scale commercial logging for export that has brought little financial revenue to resource owners. Forest certification, as a mechanism by which small farmers can regain control of sustainable forest livelihoods, has promise.

There is a steadily growing interest in certification in the Melanesian countries, initially driven by NGO and development projects working with small scale, community-based producers, but now including some larger commercial timber

producers. Most progress has been made in the Solomon Islands and Papua New Guinea, with around 96,000 ha and 20,000 ha respectively already certified under the Forest Stewardship Council system.

Table 3. Implementing certification in the Pacific region

Rank / Identified problem or constraint to certification	Possible approaches to solutions
1. High costs involved	<ul style="list-style-type: none"> <li>- Develop regional assessment capacity</li> <li>- Adapt certification to regional conditions</li> <li>- Group certification</li> </ul>
2. Low awareness of certification	<ul style="list-style-type: none"> <li>- Hold workshops with all stakeholders</li> <li>- Nationwide awareness campaign</li> <li>- Develop publicity materials, pamphlets, etc.</li> </ul>
3. Land disputes	<ul style="list-style-type: none"> <li>- Legislation e.g. Native Land Trust Board in Fiji, or proposed Land Recording Bill (Solomon Is.)</li> <li>- Local land conferences</li> <li>- Mediation by traditional authorities (Council of Chiefs)</li> <li>- Get MOU signed by Chiefs representing disputing parties</li> <li>- Church participation</li> </ul>
4. Lack of technical knowledge and training	<ul style="list-style-type: none"> <li>- Technical assistance</li> <li>- Intensive training at all levels: regional, national, provincial, local</li> </ul>
5. Commitment from resource owner for good forest management	<ul style="list-style-type: none"> <li>- Awareness program on sustainable certification and environmental issues</li> <li>- Financial incentives through timber sales and project assistance</li> <li>- Form cooperatives to operate on a long-term basis</li> </ul>
6. Major timber industries do not see market advantage in certified products (e.g. SE Asia Australia)	<ul style="list-style-type: none"> <li>- Change in future markets may change attitudes to certification e.g. Fiji's mahogany markets may be to US and Europe and this may increase the need for</li> </ul>

	<p>certification</p> <ul style="list-style-type: none"> <li>- Improved market and outlook information is needed and may lead to higher interest in certification</li> <li>- Research and dissemination of information on higher prices for certified products</li> </ul>
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(Summarized from Andrew Tolfts via Elizabeth Byers 1999f)

## European Forest Policies

In Europe, local-level sustainability has political, economic, environmental, social and cultural implications in a wide context, as demonstrated by institutional arrangements for mountain forests which are, or have begun to be, successful. Some of these are at the pan-European scale (an area which includes both Europe and the whole of the former Soviet Union); others concern the European Union (EU) or the Alps.

The first Ministerial Conference on the Protection of Forests in Europe was in Strasbourg in 1990. Strasbourg Resolution 4, on "Adapting the management of mountain forests to new environmental conditions" has been signed by 25 European countries and the European Commission. The second conference was held in 1993 in Helsinki, and produced frameworks for biodiversity and sustainable management. At the third conference in Lisbon, in 1998, ministers sanctioned the European Observatory of Mountain Forests (EOMF), together with FAO and the International Union of Forestry Research Organizations (IUFRO), to promote the sustainable management of European mountain forests. One key outcome has been the formulation of Pan-European Operational Level Guidelines which include ecological, economic and social issues to be considered in national and local policies (for the democratic implementation of sustainable forest management) within a non-legally binding but highly consultative and balanced framework.

## European Mountain Forest Action Plan

A recent consultation of the signatories to Strasbourg Resolution 4 identified the main issues with regard to forest protection and sustainable management. Mountain forests have been confirmed as environmentally, culturally, politically, socio-economically, technically and scientifically important; each country has recognized principal issues of its national policy, and requested further inputs. The development of a Europe-wide coordinated Mountain Forest Action Plan as a framework for cooperation on, and implementation of, specific actions is widely supported. Common objectives are:

- Sustainable management and development, integrated and adapted to global changes;

- Promotion of multifunctionality and compensation of management constraints;
- Enforcement of knowledge (ecological and socio-economic);
- Prevention of risks;
- Protection of natural resources and conservation of biodiversity; and
- Implementation of international commitments.

Common actions are:

- Elaboration of information, training and research programs;
- Exchange of experiences and personnel;
- Identification of methods and tools of analysis (socio-technical options, cartography, data base);
- Valuation and promotion of existing and new measures; and
- Elaboration of a code of conduct for the conservation of biodiversity.

Summarized from Pier Carlo Zingari 1999f.

The European Commission (EC) has underlined the significance of the multifunctional nature of European forests -- they represent a secure source of income in remote regions experiencing socio-economic problems and provide the most effective, least expensive and most aesthetic protection against natural threats such as erosion, floods and avalanches. Pressures on European mountain forests are many and varied; pollution, fires, climatic change, vulnerability of forest stands to storms, damage from increasing game populations, and consequences of the abandonment of silvicultural practices due to lack of revenue. A central concern is atmospheric pollution; severe climatic conditions, the sensitivity of upland ecosystems, and the advanced age of a number of stands are relevant aspects of forest health.

## Rural Development Regulation

The EC's 1999 Rural Development Regulation is a legally binding regulation providing, uniquely, financial support for ecological stability and sustainable local development. By means of a bottom-up process based on local community contracts, the EC financially compensates the cost of providing sustainably produced goods and services from forests classed as "general interest" (multifunctional). Thus, where a mountain forest fulfills contractually designated functions, the local communities, owners and/or local authorities are entitled to an annual co-funding grant per hectare.

Summarized from Pier Carlo Zingari 1999c.

NATURA 2000 will be a system of protected sites across Europe which are valuable in terms of biodiversity, and derives from the EC's legally binding Habitats Directive. Many of these sites are in mountain areas. Implementation of the directive began with the compilation of a list of potential sites by experts and researchers. As a result of insufficient consultation of local people, land or forest owners, farmers and other users, this has led to conflict. The main points raised are:

1. Who makes the decisions, and on what basis, about the identification and ecological relevance of the sites?
2. Who is responsible for implementing protection, and how is it to be achieved?
3. Who meets, and how, the cost of protection?
4. Why was a wide consultation basis neither proposed nor established?

The situation is currently at an impasse, with the directive not applied and many countries hesitant. This case highlights the apparent gap between what is provided by science, and what is decided by national administrations.

### **Mountain Forests in the Alpine Convention**

The Alpine Convention's Protocol on Mountain Forests is an international agreement involving eight Alpine countries and the European Commission. One of the aims is to provide a framework for sustainable mountain forest management at the Alpine scale, to be developed at the local level through the adoption of codes relating to coordination of methodology and objectives. Alpine Convention Protocols are to be ratified by participating governments and are not legally binding. Although the forest protocol was signed by most of the Alpine states in 1996 and 1998, none has yet ratified it. Summarized from Pier Carlo Zingari 1999h.

There are large numbers of users and groups in Europe's mountain forests. The need for sustainable management is widely acknowledged, yet traditional knowledge and practices are decreasing while there is a growth in (much less holistic) scientific facts. Objective data are greatly outnumbered by subjectively based information, and while funding credibility and continuity are vital for the increase of knowledge and sustainable management systems, a more collective effort is required in order to achieve the aims of the various recent policies (Pier Carlo Zingari 1999b, d, h).

### **International Initiatives**

In other parts of the world, broad regional initiatives such as those in Europe do not yet exist, though they were proposed in the various continent-wide intergovernmental consultations on sustainable mountain development taking place from 1994 to 1996. At the global scale, the signatories to the Convention on Biological Diversity endorsed the idea of examining cooperative sustainable mountain development with regard to biodiversity in 1996, and are likely to follow this up in the near future with a working group on Article 8j concerning indigenous and local communities. The active work program on forest biodiversity would welcome inputs on mountain forests (Ashish Kothari 1999e).

### **Recommendations from the Intergovernmental Forum on Forests (IFF)**



Running concurrently with the electronic conference was the third meeting of the IFF in Geneva. Recommendations resulting from the IFF discussion on "Assessment, Monitoring and Rehabilitation of Forest Cover in Environmentally Critical Areas" are especially applicable to mountain forests. They include:

- Increasing cooperation and coordination of activities concerning environmentally critical zones and more systemic collection of information on initiatives and activities;
- Improving division of labor (among various players) and responsibility distribution to avoid overlap;
- Catalyzing concrete activities through further documentation and dissemination of information on technologies and best practices;
- Promoting information on approaches and procedures for practical use of existing financial mechanisms to effectively support action;
- Promoting networking, information and mobilizing of all civil partners; and
- Providing greater support to international programs and conventions regarding fragile ecosystems, particularly the Convention to Combat Desertification (CCD) and Agenda 21 chapters 12 and 13, which address concerns of poorer communities.

Summarized from El Hadji Sène 1999.

## **Implications and Recommendations for Policy and Action**

The 101 contributors to this electronic conference provided a rich range of examples and experience from across the diverse mountain regions of the world. There are two central conclusions:

1. Mountain people rely on the whole landscape for their livelihoods. Consequently, policies and institutions for mountain forests and agroforestry must recognize interactions between agricultural land uses, forests and trees.

2. Every strategy for ensuring that mountain people derive sustainable livelihoods from their forests and trees must be tailor-made for the local physical, biological, cultural and political environment -- and ways of responding to change must always be included.

In a changing world, flexibility is a keyword, and we need to recognize that much is unknown about the ways in which nature and man either interact or operate independently -- it is often not possible to predict the consequences of actions and procedures. Strategies for the use and management of mountain forests must always recognize that uncertainty is a fact of life in mountain areas in a world increasingly influenced by global forces. In this context, fifteen recommendations for policy and action can be made. These are presented below.

**Recognize the importance of mountain forests.** Mountain forests are multifunctional, and the benefits they provide are shared by a diverse range of stakeholders, both in the mountains and further afield. The production function is often much less important than the protective and welfare functions. Mountain forests are the most effective, least expensive and most aesthetic means of protecting watersheds and against natural hazards. These benefits should be acknowledged and protected in international and national policies and legislation, which ensure that financial and other support is provided to mountain people to compensate them for appropriate mountain forest management.

**Respect the need for long-term approaches.** Mountain forests are dynamic ecosystems. They require long-term planning because mountain trees have long lifetimes, and regeneration can take decades to centuries. Policy-making for mountain forests must therefore be dynamic, flexible, and reflective, based on clear understanding of the changing attitudes, perceptions and demands of farmers, forest owners and other stakeholders towards mountain forests both in the context of rural development and in relation to the downstream goods and services they provide. This requires comprehensive information on options for the use and management of mountain forests, both in terms of generating income and employment and with regard to the forests' protective and welfare functions, which change in relation to demographic trends and pressures for specific resources or services. At every scale, the impacts of policies should be measured and monitored in terms of all of the functions of mountain forests.

**Consider the long-distance effects of policies and projects.** A major source of environmental degradation and conflict in mountain forests is the movement of lowland farmers into upland areas. Policies to minimize degradation of mountain forests must be linked to policies relating to land tenure and use in lowland areas. When governments or agencies plan development/forestry projects, their potential impacts on traditional and other existing land uses must be clearly evaluated.

**Apply full-cost pricing of resources.** Timber, water, and other resources taken from mountain areas are often exploited in ways that are adverse to the interests of mountain communities. Local communities often pay high costs directly related to this exploitation -- from polluted water sources to degraded forests and sacred sites. Outside interests typically fail to take into account the full social, environmental, and economic services provided by mountain forests, the costs to mountain people of commercial resource exploitation, or the downstream effects of exploitation on lowland areas. Full-cost pricing should be reflected in the price of concessions and other fees, helping to reduce exploitation to sustainable levels. A crucial first step is to analyze and quantify economic incentives and benefits.

**Reinvest forest revenues in mountain communities and their environments.** Large-scale commercial extractors, and some local companies, seldom provide affected mountain communities with any significant benefits beyond employment. Obligatory reinvestment of profits derived from the utilization of mountain forest resources would help reduce disparities in income and social infrastructure.

**Support community-based property rights.** People who have a strong stake in mountain forests are likely to manage them sustainably; the willingness to plant and care for trees depends on the security of tenure rights. Original, long-term (i.e., indigenous) occupants of mountain areas should be recognized as the owners of the mountain forests in their vicinity. In most cases where property rights are not yet formally defined or individuated, this should include full legal title and recognition of traditional and communal property rights.

**Build on traditional institutions for community decision-making.** In most mountain regions of the world, communal and/or cooperative structures for forest management have long traditions. To ensure wide participation and representation, and shared accountability, structures and institutions for the management of mountain forests should build on existing organizations, networks, and management structures. A well-balanced communal decision-making process backed by legislation can help to overcome the influence of negative outside commercial forces and interests on mountain forests and communities.

**Decentralize power and accountability.** Social organizations which support the power and accountability of mountain people should be developed or strengthened. User groups and their organizations must have the legal status and authority to enforce their codes and rules, and sufficient funding to ensure that legislated and policy goals are achieved. Women, and all ethnic, caste, and user groups should be represented in decision-making structures. Local NGOs need resources (financial and otherwise), time, and good communications both locally and with the outside, particularly because of the difficulties of communication in mountain areas and their distance from centers of power.

**Build alliances with lowland partners.** Local mountain forest associations can develop partnerships with lowland institutions such as NGOs, public interest groups, and government agencies, to gain access to markets, decision-making power, information and financial resources. Such partners have crucial roles to play in providing mountain people with information about markets for their forest products, helping communities organize themselves, defining and implementing policies, reinforcing policy support, and acting as watchdogs. In the mountains, effective and efficient communication networks are crucial in this regard. As increased income often leads to increased deforestation and degradation of natural resources, low-impact agriculture and agroforestry must be linked to market development. Certification can be an approach to raising

standards of forest management -- but markets must exist and provide additional income to cover the costs of certification.

**Recognize the cultural foundations of sustainable forest management.** The sacred and other cultural values of mountain people can provide an important foundation for the sustainable management of mountain forests and trees. While these values may be invisible and non-measurable, they must be accounted for in policy and program development. The maintenance of cultural identity can be key to maintaining, formulating and implementing new strategies to ensure sustainable livelihoods based on mountain forests and trees.

**Protect intellectual property rights of mountain people.** Due to interlocking global patterns of extraction and exploitation, international action is required to ensure that mountain people benefit from the exploitation of their local knowledge of forest resources and biodiversity.

**Foster complementarities between local and scientific understanding.** There are many complementarities between traditional/community knowledge, values, and priorities and interdisciplinary expert/outside scientific information. For instance, plantations have many values, but the species must be chosen and managed carefully to ensure the intended benefits, both locally and downstream. The choice of species must be based on research on which local trees can provide desirable (and if possible, multiple) benefits, rather than relying on species (often exotic) which happen to be known to foresters. **Develop efficient energy resources for mountain people.** Wood is the main fuel for most mountain people. Consequently, dependence on this energy source needs to be lessened by providing other energy sources. These can be supported through taxes on tourism or from governments -- but local people must be able to sustainably meet their own needs from available resources.

**Build transboundary cooperation.** Mountain forests, cultures, and economies are usually not contiguous with international frontiers and domestic boundaries agreed to or created by national governments. Some issues, such as long-distance air pollution and climate change, have direct and indirect influences on the health and development of mountain forests but cannot be addressed at local or national scales. Cooperation between neighboring states is necessary for promoting the well being of mountain peoples and forests. This cooperation can also promote peace between states and recognition of shared values and objectives. International forest assessments need to specifically consider mountain forests. They should consider their location, extent, condition, status, related socio-economic issues, and changes over time in all of these.

**Ensure that experts communicate equitably.** Outside "experts" involved in formulating and implementing policies and projects must be familiar with local situations and have the trust of local people in order to fully involve them in

providing information and participating in decision-making. Mediators must address all issues, not be biased or oriented towards a top-down approach, and be aware they may not have all the relevant information. Non-local people must be able to communicate directly with local people; this may require language training.

Mountain forests are important at the global level and also to the local communities -- both upstream and downstream -- that depend on them. Policies and actions that link community initiatives to conservation and to outside resources or partners show great promise in creating a sustainable future for mountain forests and populations. Significant challenges still exist, and these must be recognized and addressed by local communities, national policy, and international cooperation.

## References

The references cited in the text are direct contributions to the "Mountain People, Forests, and Trees" e-conference. The e-conference is archived in full on the "E-mail Discussion List" section of the Mountain Forum web site at <http://www.mtnforum.org/emaildiscuss/mpft/mpft.htm>.

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## Notes to readers

The E-conference was held from April 12-May 14, 1999.

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