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MOUNTAIN ECOSYSTEMS AND WOMEN: OPPORTUNITIES FOR SUSTAINABLE DEVELOPMENT AND CONSERVATION

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ABSTRACT

This paper provides an overview of mountain environmental problems and the role of women in conserving the mountain resource base. There is a remarkable convergence of policy objectives between the themes of sustainable development, environmental conservation, and the advancement of women. These issues are discussed and constraints and opportunities are enumerated. While both mountains and women have begun to receive more global attention in the last two decades they are not yet firmly integrated into the conservation agenda. Nevertheless, the United Nations Conference on Environment and Development, held in Rio de Janeiro in June 1992, made a crucial step in moving mountain and women's issues into better focus. A series of recommendations are made to ensure that this progress is maintained.

RÉSUMÉ

Les femmes et les écosystèmes de montagne: Possibilités de développement soutenable et de conservation. Cet article fournit une vue d'ensemble des problèmes affectant l'environnement montagnard et du rôle des femmes, en ce qui concerne la conservation de la base de ressources des montagnes. Les objectifs de la politique économique convergent d'une manière remarquable sur les thèmes du développement soutenable, de la conservation de l'environnement, et de l'avancement des femmes. Ces questions sont examinées, et les contraintes et possibilités sont passées en revue. Bien que les montagnes et les femmes aient commencé à faire l'objet d'une attention globale accrue au cours des deux dernières décennies, elles ne sont pas encore suffisamment intégrées dans l'agenda de la conservation. Néanmoins, la Conférence des Nations Unies sur l'environnement et le développement, qui s'est tenue à Rio de Janeiro en juin 1992, a pris les mesures nécessaires pour que les questions relatives aux montagnes et aux femmes reçoivent l'attention qtfelles méritent. Des recommandations sont faites pour assurer que ce progrès soit maintenu.

ZUSAMMENFASSUNG

Gebirgsökosysteme aus Fraunsicht: Gelegenheiten zu kontinuierlicher Entwicklung und Erhaltung. DieseVeröffentlichung gibt einen Überblick über Umweltprobleme im Gebirge und die Rolle der Frau bei der Erhaltung der Gebirgsressourcen. In der Zielsetzung herrscht allgemein Übereinstimmung, daß bei der Themenwahl kontinuierliche Entwicklung, Erhaltung der Umwelt und das Frauen-Engagement den Vorrang haben. Diese Themen werden im Hinblick auf ihre Grenzen und Möglichkeiten diskutiert. Obwohl in den vergangenen zwei Jahrzehnten sowohl der Bergwelt als auch den Frauen größere Aufmerksamkeit weltweit gezollt wurde, konnten sie bisher keinen festen Platz in der Umweltproblematik etablieren. Die United Nations Conference on Environment and Development, die im Juni 1992 in Rio de Janeiro stattfand, unternahm bedeutsame Schritte, die Gebirgs- und Frauenproblematiken mehr ins Blickfeld rückten. Eine Reihe von Empfehlungen wird gemacht, die sicherstellen sollen, daß weitere Entwicklungen in Gang gehalten werden.

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INTRODUCTION

... mountains possess biophysical and cultural characteristics which merit special consideration and treatment- in the matter of preservation and conservation. These include their three-dimensional nature involving steep slopes, altitudinal belts of varying ecosystem in a short distance, their different exposures or aspects and climates, and their frequent characteristics of spirituality, remoteness, inaccessibility, and great cultural diversity-islands in a sea of tamed and transformed environment.

- IUCN Guidelines for Mountain Protected Areas,1992

Today we are witnessing a remarkable convergence of policy objectives between themes of sustainability, environmental conservation, and the advancement of women. This paper explores the growing convergence of these themes in relation to one ecosystem group-the diverse and fragile environments of mountains. It identifies current challenges, constraints, and opportunities to advance women in mountain ecosystem management. Some of the ideas presented here apply broadly across gender or ecosystem lines. Many, however, are either specific or particularly relevant to mountain environments, and women's roles in managing them.

Both mountains and women have begun to receive more global attention in the last two decades, but they are not yet firmly on the conservation agenda. Tropical forests, wetlands, and marine environments are still the focus of most conservation action world-wide (Thorsell and Harrison, 1993). Women's roles and concerns in environmental conservation remain poorly understood and incompletely acknowledged.

The recent upsurge of interest in mountains began in the 1970s with the establishment of Unesco's Man and the Biosphere Programme and the IUCN (World Conservation Union) initiatives (Unesco, 1974; Dasmann and Poore, 1979). It was expanded with the development of the United Nations University-International Mountain Society program on mountain ecology and sustainable development. Since 1990, that interest has been heightened with the establishment of the IUCN Commission on Mountain Protected Areas and the inclusion of Chapter 13 (Fragile Mountain Environments) of Agenda 21 at the United Nations Conference on Environment and Development (UNCED, 1992; Mountain Agenda, 1992; Stone, 1992).

Women's environmental concerns were first highlighted in 1975, the International Women's Year, which was declared in honor of the 25th anniversary of the United Nations Commission on the Status of Women (Tinker and Jaquette, 1987). The "Decade of Women" also began at this time. At end of the decade, the United Nations Environment Programme (UNEP) sponsored a major conference in Nairobi, Kenya. One outcome of the conference was a synthesis of policies to advance women, the *Forward Looking Strategies to the Year 2000*. Many of these policies were subsequently adopted into Agenda 21 at UNCED as Chapter 24, *Global action for women towards sustainable and equitable development.*

During the last 20 years, rhetoric has been added to the policies of many organizations. In this same period, women have become poorer and have progressively lost control over even a bare

subsistence base of resources; global ecosystems (including mountains) also have deteriorated, genetic material has been lost, and the resources upon which human survival depends have dwindled.

This discussion seeks to illustrate that the "lens" through which women's involvement in environmental action is viewed needs to be re-focused, to bring women in from the periphery to a central, vital role. In recognizing the importance of women as grassroots natural resource managers and conservationists, governments and international agencies stand to gain valuable allies in their efforts to conserve mountain environments.

While all the "ways forward" are not clear, this paper offers a starting point for the development of policy and implementation guidelines appropriate to mountain environments. It is hoped that each agency will use these guidelines to raise awareness and stimulate positive action within their own organization.

BIOPHYSICAL CHARACTERISTICS OF MOUNTAIN ECOSYSTEMS

Lofty mountains ... present to every sense a multitude of objects to excite and delight the mind. They offer problems to our intellect; they amaze our souls. They remind us of the infinite variety of creation, and offer an unequaled field for the observation of the processes of nature.

- Josias Simler, *de alpibus commentarius*, 1574

In essence, nearly everything that is specific to mountains stems from the single concept of verticality. Primary biophysical characteristics of diversity, high energy, and fragility are natural consequences of high relief. Inaccessibility and marginality are inextricably linked to terrain steepness. Equally, the powerful effects of a more vertical landscape resonate in the rich diversity of culture and human adaptation, the small scale of social and production systems, and the spirituality and appeal of mountains.

BIOPHYSICAL DIVERSITY

Mountains are globally significant reservoirs of biodiversity. They contain rich assemblages of species and ecosystems, in a dense juxtaposition of ecological communities. Many endemic species have evolved over centuries of isolation from other genetic material. Climatic variations, including temperature, radiation, wind, and moisture availability, occur over very short distances. The dynamic and unstable nature of mountain environments leads to dramatic differences in successional stages of vegetation, as do variations in rock type and derived soils.

Remoteness often implies less modification by human activities. Mountains act as a refuge or sanctuary for plants and animals long since eliminated from more transformed lowlands. Serving as biological corridors, mountain ranges connect isolated habitats or protected areas. Free-standing mountains, such as Mount Kenya or Kilimanjaro, function as biological islands.

The extraordinary number of ecological niches in mountains is typified by Mount Kinabalu in Sabah, which is estimated to harbor over 4,000 plant species, more than one-quarter of the number of species in the entire United States (Mountain Agenda, 1992). Proper human harnessing of specific niches can support sustainability, while thoughtless exploitation can permanently eliminate niches (Jodha, 1989a).

As a global gene bank, mountains represent food security and future resources for humanity. In addition to natural biodiversity, including medicinal and food plants, mountain communities are also the custodians of a rich diversity of crop cultivars and livestock breeds. Offering potential benefits in terms of genetic variety, disease resistance, and pest resistance, this important in-situ preservation is another global trust.

GEOMORPHIC ENERGY

Tremendous geomorphic energy is unleashed in mountains, taking forms of volcanism, uplift, erosion, landslides, glacial-lake outbursts, earthquakes, avalanches, torrents/debris flows, sedimentation, and floods. In this dynamic, high-risk environment, human infrastructures or alterations can occasionally lead to unexpected, or even catastrophic effects (Ives, 1989; Gerrard, 1990). Collapsed roadbeds and breached dams are all-too-common sights throughout the mountain world. In Rwanda, cultivation of steep slopes using methods suited to lowland agriculture recently resulted in catastrophic landslides, involving not only loss of life, property, and infrastructure, but also damage to the production base that may take centuries to recover (Byers, E., 1991).

While natural hazards constrain many activities, the geomorphic energy of water also presents great opportunity. Mountains are rich in water resources, blocking regional cloud masses which shed their moisture load to form the headwaters of valuable surface streams. Water supply, irrigation, and hydropower development, carefully undertaken, can provide benefits to both local and regional economies (Mountain Agenda, 1992; Bandyopadhyay and Gyawali, 1994).

FRAGILITY OF ECOSYSTEMS

Mountain ecosystems are fragile. Their low resilience arises primarily from steepness, low temperatures, and isolation. Soils tend to be thin, young, and highly erodible. Low temperatures cause vegetation growth and soil formation to occur very slowly. At higher altitudes, extreme diurnal temperature fluctuations require specialized survival adaptations. In this harsh environment for biological life, the time scale of ecosystem recovery may be hundreds of years (cf., Messerli et al., 1983).

Mountain ecosystems not only are subject to natural hazards, but also are more susceptible to human-initiated damage than are other types of terrain (Poore, 1992). When mountain resources or environments are impacted because of any disturbance, deterioration occurs at a fast rate. In most cases, the damage is irreversible or reversible only over a long period (Hewitt, 1988). For example, scrub juniper woodlands have recently been harvested along the popular Mt. Everest trekking route. Tree-ring counts on the remnant stumps revealed that individual trees had been hundreds of years old. Even under conditions of strict protection, these woodlands will not

recover for centuries (Byers, A., 1987). Trash disposal problems in the Mt. Everest region also illustrate this vulnerability. Normally biodegradable garbage is preserved by the low temperatures, and attempts to bury trash are highly destructive to the fragile soil surface (McConnell, 1991).

Mountains are essentially island habitats-susceptible to harm from introduced organisms. Endemic species that have evolved in isolation are easily threatened by introduced species. Oceanic island mountains are especially vulnerable. Common sources of introduction include visitors, tourists, animals, crops, and ornamental vegetation.

SOCIOECONOMIC CHARACTERISTICS OF MOUNTAIN ECOSYSTEMS

INACCESSIBILITY

Due to slope, altitude, terrain conditions, and natural hazards, inaccessibility is one of the most known features of mountain areas (Price, 1981; Hewitt, 1988; Jodha, 1989a). Its concrete manifestations have a profound effect on the social systems and economies of mountain communities.

Lack of infrastructure and services, especially in education, health, and agricultural extension, are directly linked to inaccessibility. Transport costs are high, markets are distant, and the value-added costs of goods and services severely limit production flow both in and out of mountain areas. High investment costs further limit infrastructure and economic development. Even with abundant hydropower resources, rural electrification in mountains can be prohibitively expensive.

Isolation, poor communication, and slow penetration of outside changes are another facet of inaccessibility. Communities that have existed in relative isolation for many generations may be vulnerable to exploitation by outside interests. Isolation also leads to a powerful sense of place among many Mountain cultures. The Rai people of eastern Nepal link a wealth of social norms to their natal spring; at the hour of death, their spirit is chased up the mountainside to prevent it from returning to haunt the spring (Forbes, 1993).

Inaccessibility also lends strength to the role of mountains as a human refuge. Throughout history, mountains have provided sanctuary to people fleeing aggression. When the war-like Dakota people of North America acquired the horse, their more pacific Shoshone neighbors took refuge and eventually settled permanently in the Black Hills. Switzerland is well known for its role as a mountain sanctuary, particularly during World War 11. Many of the Himalayan hill peoples originally fled from either India or Tibet. Today, militant rebel forces are typically based in mountain areas. Other illegal activities may flourish in mountain areas as well, such as moonshine production in the Appalachians during the Prohibition era in the United States.

DIVERSITY OF CULTURE AND ADAPTATION

Isolation, migration patterns, and ecosystem diversity all contribute to the rich traditions and tremendous cultural diversity of mountain peoples. In a single village district in remote eastern Nepal, six hamlets with six separate languages and religions occupy slightly different ecological zones along the rising slope of a ridge. Some experts believe that the traditional cultures of indigenous groups may be equally, or even more threatened than biological diversity (Poore, 1992).

As with biodiversity, cultural diversity is a global resource. We can turn to diverse cultures to look, for example, at methods of conflict resolution, such as the Chipko movement's contributions to peaceful protest. Diversity in social systems and gender roles offers insights to the human experience which may be of unique value as societies move toward a more integrated global community.

Stemming from ecosystem diversity is the tremendous variety of adaptive strategies of mountain peoples, both within and between cultural groups. Men and women must successfully manage a multiplicity of roles and production systems in order to survive. Typically, seasonal resources are exploited over a wide range of different ecosystems, and risk-reduction strategies are broadly applied to combat the vicissitudes of a dynamic and sometimes hazardous natural environment. Traditional land management systems in the Andes were highly successful and deliberate diversification to ensure maximum exploitation of a wide range of ecological niches, proved a skillful strategy to minimize risk (Mountain Agenda, 1992; Stone, 1992; Goland, 1993).

The profound knowledge of seasonal and altitudinal ecological linkages, fragile ecosystem management, and great micro-environmental diversity characterizes the mountain way of life. For instance, at the annual fair in Dali, Yunnan, as many as 550 species of herbal medicinal plants are brought down from the mountains for trading, as well as hundreds of food plants (Mountain Agenda, 1992). In addition to natural resource management and biodiversity, mountain peoples maintain a rich storehouse of crop and livestock varieties-now a vital world resource. Women, as primary users of subsistence resources, are especially knowledgeable about food, medicines, and other uses of the tremendous variety of local plants. Such knowledge, developed over centuries of use, has global importance.

THE SMALL SCALE OF SOCIAL AND PRODUCTION SYSTEMS

The frequent isolation of mountain communities from one another, and the need for collective action to overcome many of the challenges of a harsh environment, often give rise to strong informal institutions. Traditions and collective decisions, while generally unwritten, command great respect. Because of their distance from regional centers of power, mountain communities have typically relied on these small, informal systems for social and legal administration. Many communities have a long history of contact with outlying areas through trade or migration but these also tend to be small in scale.

Similarly, the resource base of mountain agricultural, pastoral, and economic systems is well-suited to subsistence and other small-scale, diverse production strategies. Resource management

is generally use-based rather than production-based, and traditional consumption patterns and harvesting methods are seldom destructive. These traditional methods, developed over many generations, have been sustained over a time scale similar to that of mountain ecosystem response and recovery.

Fragile mountain ecosystems offer marginal potential for large-scale commercialization and limited replicability of experiences from the lowlands. High-intensity use of resources can permanently damage the inherent capacity of the production base.

Mountains are rich in unique, often narrowly defined, production niches. Traditionally they provide timber, fuelwood, bamboo, herbs, flowers, essential oils, and ceremonial, medicinal, and edible plants. Small-scale harvesting of many of these products for local use has been sustained over many centuries. However, new balances must be found as production is expanded to supply cottage industries or outside markets. For example, Gorkha Ayurvedic, a small cooperative which produces medicinal herbs in Nepal, has found that traditional forest herbs must be cultivated in fields, agroforestry areas, or woodlots, if they are to be harvested sustainably. Small-scale production for external markets can bring considerable benefits to mountain regions, if carefully undertaken. Access to credit and assistance in production, design, and especially marketing are often necessary inputs.

MARGINALITY

Mountain regions are characterized by political and economic marginality with respect to surrounding lowland areas and regional centers of power. The people generally have little or no voice in national affairs, even on issues that affect their own resources or communities directly. Access to external markets is often available only on unequal and unfavorable terms of trade.

Throughout history mountain regions have been net exporters of resources to the plains. The economic trusts of minerals, forests, water, and recreation are frequently viewed as valuable national or regional assets. Primary resources have been extracted with minimal consideration of the rights of local property owners or the impacts on local populations. Many mountain areas have, at some point, experienced marginalization or disinheritance of their peoples due to extractive activities. For example, coal mining operations in the Appalachian mountains a century ago disinherited thousands of mountain farmers, and even today the economic returns from mining are largely diverted to surrounding metropolitan centers. Similar scenarios are common in the timber and hydropower industries.

Another aspect of marginality is the harsh environment for biological life in mountains. Larger amounts of energy-human, biomass, and from other sources-are needed to sustain life and for economic development in mountains than in the lowlands (Cecelski and Bajracharya, 1993). Low temperatures, difficult terrain, and reduced oxygen levels at high elevations all contribute to greater biological energy requirements. People need more caloric energy to survive the cold, and tasks such as carrying water or plowing require more energy than in lowland areas; low air pressure greatly increases cooking times for staple foods; homes must be heated for much of the year.

Mountains commonly occupy trans-boundary areas between nations -another form of marginality. This can result in a confusing political or economic climate for communities whose national boundaries cross traditional trade routes, or cut through culturally linked areas. Often there may be unwitting illegal activity. Also a national military presence may be imposed on local populations.

SPIRITUALITY AND APPEAL

The breath of my mountain is my heart

- Maori proverb

Sacred places, pilgrimage sites, and areas of taboo abound in mountains. There is a universal tug on the human spirit exerted by the sight of soaring crystal peaks, or mysterious hidden valleys. Religious leaders or sacred traditions can also be powerful allies in promoting conservation. Buddhist lamas and laminis have played a noteworthy conservation role in the Himalayan ranges. More than a hundred years ago in New Zealand, Maori people, fearing exploitation of sacred peaks by European sheep farmers and others, found a unique solution: the Tongariro Mountains were given into the stewardship of Queen Victoria, and New Zealand's first national park came into being (Lucas, 1993). Similarly, in the central mountains of Venezuela is an area held sacred to the goddess of nature, who will enhance the welfare of people provided they do not enter it. It was relatively easy to designate this a protected area (Poore, 1992).

Freda du Faur, the first woman to climb Mount Cook, said in 1910, "The overmastering love of the mountains is something which wells from within, and will not be denied." The high scenic value and recreation potential of mountains can bring significant economic benefits. Careful management is needed both to maintain these recreational values and to capture benefits locally. Overuse in confined corridors requires intensive management for waste disposal, infrastructure maintenance, and fragile ecosystem protection.

There are many references to the role of mountains in nurturing the human spirit throughout time. Whether this is through sacred, religious, spiritual, aesthetic, or adventuring experiences, the renewal of the inner spirit is an important benefit that mountains offer to humanity.

CONTEMPORARY STRESSES ON MOUNTAIN ECOSYSTEMS

The mountains and steep uplands of the world are under assault ... The assault does not primarily come, as often suggested, by the unbridled population increase of backward and ignorant mountain dwellers who are wasting away the soils, forests, and wildlife and thereby inflicting damage on the downstream areas and on society in general. Rather it comes from development pressures arising exogenously and fueled by planning or unplanned actions by 'flatlanders' in government agencies, in corporate boardrooms or offices, and in international funding or assistance institutions.

- L. S. Hamilton, Parks, *Peaks and People*, 1993.

CONTRIBUTING CAUSES

The increased role of market forces, the side effects of public interventions, and population pressure are underlying causes of present negative trends in mountains (Repetto, 1986). Historically, adaptive mechanisms of mountain peoples have been centered on local ecosystems and resources. In the last four decades, however, change has been more externally driven. Development interventions, large infrastructure projects, and growing market pressures have pushed self-sufficient economies towards commercialization, often with negative consequences. Some typical threats to mountain environments arise from agricultural expansion, construction of dams and roads, commercial and illegal logging, mineral and hydrocarbon exploitation, tourism, and activities related to war and insurrection (Sneed, 1993).

Increased extraction of resources from mountains (water, electricity, timber, minerals, people) has induced greater marginalization of mountain peoples. Moreover, outside influences will continue, with improved access and communications, health care, education, tourism, migration, and the return of local people who have seen other places. Pressure for economic integration with lowland and/or international communities will also increase. Along with economic opportunity, there are many risks, including outmigration (especially of young men), devaluation of tradition, alienation from land, breakdown of social fabric, and rapid cultural, economic, and environmental change.

Tourism can bring significant economic benefits both locally and nationally, but it also places great demands on fragile mountain ecosystems and isolated cultures. Frequently, tourism is accompanied by trends toward intensive cash-cropping, excessive fuelwood cutting, and a dramatic increase in livestock numbers into once-stable traditional systems. For instance, prior to receiving protected status in 1992, the pristine Barun Valley of eastern Nepal had begun to experience such stress: yak herders had cleared some alpine pastures to plant vegetables for sale to mountaineering expeditions, and had begun wholesale burning of ancient juniper woodlands; the dead juniper scrub was then lightweight to carry, and fetched exorbitant prices at the Makalu base camp.

Population growth, a pivotal issue in environmental conservation, is particularly rapid in certain mountainous countries such as Rwanda, where some mountain regions settled within the last two decades now have populations as great as 700 people per square kilometer. Rwandan women bear an average of 14 children and the national population is increasing at 6 percent per annum (Weber, 1987). Extremely severe deforestation is often associated with areas of high population density as, for example, in the Guatemalan highlands and the Bolivian Altiplano (Luetke-Entrup, 1993).

The seriousness of unchecked population growth cannot be overstated, but it should not be entirely blamed for resource depletion. Domestic firewood consumption is only a minor contributor to global deforestation (Sarin, 1989). In Tanzania, 90 percent of all industrial fuel comes from wood (Dankelman and Davidson, 1988). Likewise, in traditional mountain fanning systems, the contribution of agriculture to erosion is negligible. Most erosion is due to commercial farming, road building, and natural processes (Tinker, 1993). However, in newly settled mountain areas, migrants unfamiliar with local ecosystem processes may apply

management techniques suited to more robust lowland areas, and lose the carrying capacity of their land quickly and permanently.

Globally, war and its effects are significant negative social and ecological forces. Mountain peoples and ecosystems are not spared in this regard. In addition to direct acts of war, guerrilla fighters and those fleeing aggression often take refuge in mountains, upsetting ecological balances and social structures.

ECOLOGICAL EFFECTS

In fragile mountain ecosystems, scenarios of unsustainability emerge quickly and in a more pronounced manner than in relatively resilient lowland areas Jodha, 1989b). Increased landscape instability and degradation, reduced natural biodiversity, and loss of crop cultivars and livestock breeds are some of the indicators of the present ecosystem imbalance in mountains. '

Of the 14 "hotspots" of mass plant species extinction, seven are either in mountains or have at least half of their area in mountains: the uplands of Madagascar, the lower Andean slopes, the eastern Himalaya, the uplands of the Philippines, the eastern montane forests of Tanzania, the Western Ghats in India, and the montane forests of Sri Lanka (Mountain Agenda, 1992). Part of the reason for high extinction rates in mountains is the large number of vulnerable endemic species.

SOCIAL EFFECTS

The social effects of current trends in mountain regions are not all negative. In many regions, there is increased access to education, health, and other services, and in a few areas successful entry has been made into the market economy. However, the vast majority of mountain regions in the developing world have experienced an increase in absolute poverty, especially of women and children. Marginalization of most mountain cultures and communities is also increasing. Outmigration, especially of young men, takes a heavy toll on the social fabric of mountain communities.

Especially in the context of recent changes, mountain peoples have not been able to organize among themselves adequately to manage their own resources and orient development initiatives to their own advantage (Cecelski and Bajracharya, 1993). - Devaluation of tradition and disintegration of local institutions is a common result of unsuccessful interaction with outside forces. A frequently documented example is the abandonment of local forest protection systems near newly built roads. Knowing that outsiders are unlikely to respect traditional informal agreements, local people experience alienation from their land base and engage in short-term profiteering.

SURVIVAL AND SUBSISTENCE EFFECTS

During the last 50 years, disconcerting trends have emerged in mountain subsistence communities. Persistent negative changes relate to crop yields, availability of mountain products, the economic well-being of mountain people, and the condition of the environment and natural

resources. The extent and severity of landslides has increased, irrigation and water supply shortages are common, and the diversity of mountain agriculture has been reduced. A greater amount of time is spent in fodder and fuel collection and, significantly, the inter-seasonal hunger gap (food deficit period) has been extended (Jodha, 1989b). Fuelwood shortages are particularly acute in the mountainous areas of Asia and the Andes (WRI and RED, 1986).

With increased pressure on the resource base, it is difficult to continue traditional adaptations that require a high land-man ratio, such as long fallows and rotations; as these are shortened and agriculture is extended to marginal areas, there is a concomitant decline in the productivity of the subsistence base. Common property resources such as public or communal forests and grazing land, of particular significance to women and the poorest segments of communities, are especially endangered as they become privatized, overused, and degraded.

Malnourishment, infant mortality, cold stress, and associated health problems are intimately linked to the reduction in food and fuel availability in mountains. Yet, it is unlikely that the match between mountain resources and human needs can be re-established solely on the traditional pattern of essential self-sufficiency. New patterns that reinforce long-term subsistence use while incorporating certain added social and economic norms must be found.

GENDER ROLES IN MOUNTAIN ECOSYSTEM MANAGEMENT

The forest is like a second home for us. We go there for fodder, for fuelwood, for bedding and feed for the animals, for shoots and roots for us. We go there for materials-bamboo, timber-to build the very place we call a home.

- a young woman from Benchhong, Nepal, 1993

TRADITIONAL GENDER ROLES

Traditionally, mountain women are accustomed to a significant level of resource control, and a clear voice in the affairs of the household and community. Sexual division of labor tends to be less strict than in lowland areas, and caste or class distinctions play a comparatively less important role in defining women's work. It is conceivable that lower reproduction rates of traditional highland women are also linked to their higher status in the community. In Nepal, women of the Tibeto-Burman cultures, who have traditionally inhabited high mountains, exhibit a greater freedom of action, more participation in the market economy, and are more immediately responsive to extension proposals than are women of the Indo-Aryan groups, who have migrated to the hills much more recently (Acharya and Bennett, 1983).

MEN'S WORK AND WOMEN'S WORK

Nevertheless, there are strong dichotomies between men’s work and women’s work. In agriculture, men generally have the primary responsibility for tilling the soil and irrigating. Women, on the other hand, fertilize the fields, plant and transplant crops, weed, and harvest. During peak labor times, men and women work together. Animal husbandry tasks also tend to be

divided along gender lines. Men take primary responsibility for high or summer pasturing, while women collect fodder, care for animals, and are responsible for grazing in agricultural fields or near home.

In forestry, women tend to manage for diversity. Preferences for tree species are based on multiple utility within the household, including food, fodder, fuel, medicine, and income needs. Men's preferences are more often based on usefulness as timber, either for construction purposes or for sale.

Men interact with government officials and extension workers, and often have links to the monetized economy and external markets. In times of food deficiency or economic stress, men will frequently seek seasonal work outside their own community.

Women interact primarily with family and neighbors. In addition to their major involvement in agriculture and resource management, women take responsibility for food processing, cooking, carrying water, and child care. In times of hunger or economic hardship, women tend to turn to the resource base for food or small-scale economic activities to supplement household incomes.

WOMEN AND SUBSISTENCE

> *At the micro level it is increasingly understood that in most countries women have the primary responsibility for the management of the natural resource base. They are the custodians of indigenous knowledge...*
>
> - Sharon Capeling-Alakija, Global Assembly of Women and the Environment Newsletter, 1992

Women in mountain areas play a predominant role in the management of subsistence resources. The diversity of ecosystems and small-scale production strategies necessary for survival in mountains lead to a multiplicity of women's roles and a profound knowledge of ecosystem process and potential.

Collective resource management through informal women's groups is common, through labor exchange groups and joint travel to seasonal use areas. As primary providers of basic needs, women can be counted on to have the long-term future of the household as a motivating force. Likewise, women's groups can be relied upon to seek sustainable benefits for the community.

Animal husbandry is a linchpin of sustainable ecosystem use in mountains (Denholm, 1993). Animal dung is essential as fertilizer to sustain agricultural productivity on thin, fragile mountain soils. This critical re-cycling of nutrients between ecosystems by livestock is largely women's work. In the High Andes of Peru, livestock grazing is central to the multiple. tasks performed by women. A typical scene is a Quechua woman, her baby bundled on her back, taking her spindle and wool in her hand, and her llamas and sheep to the pastures up the ridge; on the return trip, she pulls out some shrubs and picks up some dung for fuel (Cecelski and Bajracharya, 1993).

Mountain women work long hours to provide the basic needs of their families. They share agricultural and livestock tasks fairly evenly with men, but add an additional 4-5 hours each day

for basic domestic needs. Comparison of mountain and plains communities in Nepal shows that hill women work significantly longer hours in subsistence natural resource management than do plains women, and do a higher percentage of such work compared to men.

Poor women bear an even greater work burden. Women of poor households in several surveyed mountain communities in Nepal performed labor in the forest sector to the virtual exclusion of men (98%), and contributed 60% of labor in the animal husbandry, agriculture, and water sectors (CWD, 1988). Women, especially poor or landless women, are principal users of community-owned resources, and the first to suffer if these are restricted or degraded.

WOMEN ENTREPRENEURS AND NATURAL RESOURCE USE

Mountain women have traditionally engaged in small scale entrepreneurial activities based on the use of natural resources (Baer, 1990). This non-domestic forest economy can be critical to meeting household subsistence needs.

Many traditional income-generating activities involving mountain women depend on ample supplies of energy or biomass. In addition to direct sale of firewood or fodder, income is acquired through livestock products (requiring fodder), cheese and butter processing, beer and liquor brewing, processing of agricultural products, raw materials for crafts, charcoal making, and the collection and processing of many non-timber forest products.

Non-timber forest products include many essential subsistence items such as fodder, fertilizer, and soil. Both subsistence and small-scale commercial use is made of honey and wax, flowers, seeds, leaves, wild fruits, fibers and flosses, bamboo, rattan, cane and grasses, oil seeds, tans and dyes, gums and resins, pine oleoresins, rubber, drugs, spices, aromatics and insecticides, lac, sandalwood, and seeds for propagation. Sustainable harvesting and processing of these resources can generate significant income for women and community cooperatives.

GENDER ROLES: FORCES OF CHANGE

Contemporary stresses in mountain ecosystems and communities are profoundly affecting the status of women and their ability to provide for their families. In a few cases, women have been able to organize to protect their traditional rights and to gain access to new resources of education and income. In much of the developing world, however, women’s status is declining rapidly as their work becomes less visible and less valued. The erosion of traditional subsistence livelihoods and support networks, along with depletion of natural resources and loss of common property resources, has greatly intensified the work load of women. It has been extremely difficult for women to acquire new opportunities in the increasing market economy; the common shape of their lives throughout the developing world is that of poverty and a tremendous work burden.

CHANGES IN HOUSEHOLD SURVIVAL STRATEGIES

As roads and markets penetrate mountain communities, more and more men are withdrawing from agricultural work to participate in external labor or commercial markets. As the presence of market economies strengthens, there is likely to be dramatically less decision making power accorded to women. Their traditional subsistence roles no longer lie within the circles of power. Traditional resource management knowledge is quickly de-valued, and soon lost.

Cash crops may displace food grown by women for their families and preclude them from traditional conservation practices. Tending the cash crops adds an extra burden to their already tiring day. The income from these crops, however, is often controlled by men, and frequently does not find its way into the household economy. Women also suffer increasing isolation as cash crops are introduced and traditional labor exchanges deteriorate due to overburden of work and privatization of profit (Mehta, 1993).

As subsistence agriculture becomes less viable, household needs for extra income (in cash or kind) become greater. Women often engage in a variety of small-scale "informal sector" income-earning activities, particularly food or beverage processing and trade. Thus, they often manage to maintain a minimum family income even during economic crises or drought. In one Altiplano village in the Peruvian Andes, for example, women’s diversified income from sale of agricultural and livestock products, handicrafts, and petty commerce contributed 50 percent of household income in normal times, and more than 75 percent during a recent economic crisis (Alcantara et at, 1986).

MIGRATION PRESSURES

Outmigration, primarily of men, is another strategy for survival in response to resource depletion. Women become in effect heads of households-but with only limited access to credit, agricultural extension, and other services. In one study of both mountain and plains communities in Nepal, the mountain communities had a migration rate of 20 percent, while the plains had less than 2 percent. In both cases, 85 percent of the migrants were men (CWD, 1998). Another study in the high mountains of western Nepal recorded that 73 percent of men and 35 percent of women migrated due to reduced agricultural productivity and depletion of natural resources (Schuler, 1981).

A poignant story illustrates the possible consequences of migration. Forty years ago in a small ward of Banskharka village in Nepal, all households contributed equally to buy a common forest land. Due to male outmigration, five of the eight contributing households are now headed by women. Recently, the village chief allowed the remaining three male-headed households to register these common lands as their personal property. The female-headed households were powerless in their attempts to maintain even use rights to these lands (Hobley, 1987).

HEALTH

As agriculture, forest, and water resources decline, the health of women is affected, as are their abilities to provide basic needs to their families, and their contributions to productive

employment, Many households cope with natural resource depletion by increasing female labor inputs. Women work longer hours, and daughters are often taken out of school to help. Women usually eat "last and least," so their nutritional status is already precarious. Cold stress, one of the main health hazards among high mountain populations, is linked to restricted food supply and reduced fuel for space heating.

Many nutritious subsistence foods, such as whole grains and legumes, are inedible without cooking. Reduced fuelwood supply, and the accompanying shift to less nutritious foods, clearly contributes to malnutrition. In the densely populated mountains of Rwanda, 62 percent of families cook only once a day and 33 percent cook even less frequently (Dankelman and Davidson, 1988).

WOMEN AS CHANGE AGENTS

Women are increasingly being recognized as key agents of change and as important allies to conservation initiatives. There is a natural convergence of interests between women's needs, and the need to conserve mountain environments. Women maintain a rich storehouse of technical environmental knowledge which can be mobilized in the problem-solving process. In addition to their profound knowledge of fragile ecosystem management and sustainable resource use, mountain women have a remarkable ability to work together. In caring for children, women also have a powerful influence over future attitudes toward the environment.

Concern for conservation action is very strong among rural mountain women, since they are the first to suffer as resources diminish. Healthy forests and grazing lands, with firm tenure or use rights, provide them and their children with a secure future. Access to new social and economic opportunities can make this future bright.

CURRENT DEVELOPMENT ISSUES AFFECTING MOUNTAINS AND WOMEN

> *The dominant situation characterizing most of the mountain regions in developing countries ... is the widening gap between development efforts (indicated by investment and public intervention) and corresponding achievements.*
>
> - N. S. Jodha, 1989

Most current development interventions concerning women and the environment may be divided into two types: high investment programs that marginalize women and women-specific programs that are themselves marginalized (Pradhan and Rankin, 1990). Despite the dominant role of women in the use and management of natural resources, development projects and government policies have largely ignored women and their activities. Women's perspectives continue to be excluded from mainstream research, development policies, and planning forums. Many government and donor agencies officially, albeit separately, recognize women and environmental issues. Only a few of these organizations link women and the environment in the implementation of their policy making.

TENURE AND USE RIGHTS TO NATURAL RESOURCES

> *The least powerful elements of society suffer first from loss of access to natural resources-women with their primary responsibilities for household subsistence.*
>
> - Sarah Warren, Aga Khan Foundation, 1992

When women and men can secure stable tenure or usufruct rights to natural resources, their full participation in management and decision making can be ensured (Warren and Hambly, 1992).

Tenure insecurity at the household level may be linked to changes in national policy, technology, markets, and other factors. Women have an extra level of insecurity added to this. Within the household, husbands may shift rights to another wife, or life-cycle changes (marriage, child-bearing, widowhood, divorce) may change the rights of a woman. In addition, land-use change can affect women's tenure rights.

Both land and tree tenure are a complicated mix of responsibility and control. Women often control kitchen gardens next to the house and may have traditional rights in communal forests; but frequently they do not control other land even if they contribute most of the labor. Non-timber products from forests are often women's responsibility, but the tree itself (i.e. planting new trees or felling mature ones) usually lies in the male realm (Bruce, 1989).

In community forestry initiatives, the recognition of women as household representatives would achieve a breakthrough in sustainable resource management. In the mountains, married women are stable members of the community, whereas men often migrate seasonally. It is women who manage forest resources and who suffer most when access is diminished. If women were granted formal control over forest resources it would solidify or raise their status within the community.

POPULATION GROWTH

> *Poverty rates will drop and birthrates will decline only when action is taken to increase women's control over productive resources.*
>
> - Jodi L. Jacobson, Worldwatch Senior Researcher, 1992

The integration of women's development, family planning, and environmental concerns is both natural and obvious at the community level (Dankelman and Davidson, 1988). Conventional approaches to development issues often reinforce gender bias by undervaluing women's work and granting males disproportionately greater access to land, credit, and other resources. This encourages child-bearing as a woman's primary route to social status and economic security. The most direct and significant actions to ease the population crisis may be to increase women's access to education, training, land ownership, and credit, thereby giving them significantly more control over their own lives (WorldWIDE News, 1992). Education increases the average age at marriage, an important determinant of fertility rates; the non-formal education of married women heightens their awareness and ability to discuss important issues openly, and enhances their status within the community.

The objectives of the International Planned Parenthood Federation (IPPF) are illuminating in terms of addressing population issues. They are: to enable women to work together, to teach them skills through training, to improve the status of women, and finally, to improve the welfare of families through increasing family-planning knowledge and practice. In Sindhu Palchok District of Nepal, the IPPF Family Planning Association has successfully combined family planning with environmental action. A widespread concern about diminishing forest resources was translated into a popular fodder tree plantation program, followed by a remarkable acceptance of family planning. The birth rate in this area is now almost one-half the national average (Hamand, 1987).

MODERNIZATION, TECHNOLOGY, AND COMMERCIALIZATION

The implications of modernization and infrastructure development on the environment and on equality have not been seriously considered by the development agencies. Evidence suggests that high-investment programs and large-scale commercial development have increased the magnitude of resource problems (Pradhan and Rankin, 1990; Mies, 1990). Extractive industries, large infrastructure development, and road expansion are major causes of environmental degradation and marginalization of mountain communities.

Technological innovations, particularly in food processing and other labor-reducing applications, can bring important benefits to mountain communities. Many modem technologies, however, are either inaccessible to the poor or ill-suited to mountain environments. No technological innovation will be sustainable in mountain ecosystems if it leads to agricultural dependence on external inputs (e.g., fertilizer), adds to mass production of high-weight, low-value products with a largely external market, ignores linkages between diverse activities at different elevations, or promotes mono-cropping Jodha, 1989b). There is a need for new options, more effective than the traditional, yet more accessible than the modem.

Another controversial issue is the degree to which mountain economies can be successfully integrated with regional or global ones. While integration may be inevitable, and would be desirable under ideal circumstances, the highly unequal terms of trade suggest broader market interactions may not be advisable. Conversely, it is sometimes through the interventions from outside that mountain communities, and especially women, are able to regain control of an environmentally and economically sustainable future.

OTHER ISSUES

In traditional cultures, relationships between the ecosystem and people embrace cultural identity, spirituality, and subsistence practices, which frequently contribute to maintenance of biological diversity. These relationships have too often been ignored and even destroyed by resource conservation and management initiatives (McNeely, 1992).

Furthermore, attention should be directed to the intellectual rights of those with knowledge of the use of medicinal or otherwise useful plants, and those who provide genetic source material. These are seldom if ever recognized in the marketing of mountain products.

A constant point of tension between donors and implementers of aid is the short duration of project implementation and of funding cycles. Many programs are scheduled to be completed in 5-10 years, a short period in which to develop sustainable community structures, and a tiny fraction of the time scale of ecosystem response and recovery in mountains.

Finally, it must be recognized that the sustainable use of natural resources is inseparable from patterns of consumption. There is a significant and increasing awareness of the negative effects of consumption activities in the industrialized world on environments that are far removed, in rural and mountain areas.

CONSTRAINTS TO WOMEN'S INTEGRATION INTO ENVIRONMENTAL INITIATIVES

Environmental initiatives will be significantly strengthened as women are increasingly integrated at all levels. Many organizations have made a policy commitment to do this, but have had limited success. There are a number of commonly encountered constraints to be considered in planning for greater participation by women in environmental programs.

ACCESS TO INFORMATION, RESOURCES, AND DECISION MAKING

Effective planning and decision-making processes in environmental management require input from those who use and depend on the natural resources and these are often women. Women have limited access to information, education, and training, yet they have pressing needs for technical and ecological information, and for training in leadership skills. They also require access to extension resources and markets.

Ownership and tenure rights to land, trees, water, and other natural resources are seldom held by women or women’s groups, and this severely limits their ability to control the benefits produced through their own labor. Due to their lack of legal rights to property, women often experience great difficulty in obtaining credit, material inputs, or funding for environmental or development initiatives. Yet, it has been repeatedly demonstrated that loan use and repayment by women, in mountain areas and elsewhere, is reliable and is superior to that of men; this should encourage banks to support women’s initiatives (ADB/N, 1986).

GENDER AWARENESS AND INSTITUTIONAL SUPPORT

There is a general lack of appreciation of the remarkable environmental management skills of women in mountain communities (Dunsmore, 1988). When planners and project staff recognize this and integrate women's concerns at many levels, it will lead to greater project success.

Standard training and academic curricula in the natural resource studies seldom include women's concerns or contributions. Subsistence needs are generally relegated to a brief discussion of "minor forest products" or home economics. Graduates of such programs may need to be re-educated about small-scale, diverse production systems (largely managed by women) which are suited to the fragile ecosystems of mountains.

Incorporating women throughout the program design and implementation phases is not easy. Significant resources of time and personnel must be committed to recruit and support capable women. The rewards, however, include increased sustainability and greater social and environmental effectiveness. In eastern Nepal, for example, the newly established Makalu-Barun National Park made a commitment to hire female game scouts and rangers. In order to fill 5 of the 12 scout positions with qualified women, park wardens had to travel to remote villages and conduct over 250 individual interviews with both men and women. Once the women were hired, significant resources were dedicated to supporting them effectively, such as providing companions during remote travel, more frequent home visits, strict policies regarding sexual harassment, and additional living quarters.

AVAILABILITY OF TRAINED OR PROFESSIONAL WOMEN

The number of women who are trained, or available for training, in the natural resource or environmental disciplines is very limited. There is also a scarcity of female accountants, bankers, and policy makers. Once a core group of women is established in an organization or project, however, it is easier to recruit other qualified women through existing staff networks and the "safe" culture that is propagated.

For women to participate in any development or conservation intervention, they must be able to make time in a very burdened work day. It is important to address household subsistence needs and reduce women’s unpaid labor burden, for example through the installation of water taps, to enable them to become involved.

FACTORS INFLUENCING PROJECT SUCCESS OR FAILURE

LOCAL vs. EXTERNAL DRIVING FORCES

The success of conservation and development interventions is intimately linked to their degree of local control and commitment. The highest success rates are achieved by community-initiated projects, followed by those of local NGOs, national NGOs, and international NGOs. National governments have an uneven record, with occasional successes, but a majority of programs implemented do not meet their objectives. Bi-lateral or multi-lateral organizations face the most challenges in achieving success, due to the great distance from stakeholders, short funding cycles, and the inertia of a large bureaucratic regulatory and planning organizational base.

The focus of much bi-lateral aid spending has shifted away from projects designed to help the poorest and towards large-scale prestige projects that tie development assistance to exports and the promotion of foreign policy objectives (Dankelman and Davidson, 1988). Both national policy and foreign aid in the Andes, for example, concentrates on developing export-oriented economies, thus marginalizing small hill farmers (Mountain Agenda, 1992).

In the Virunga volcanoes of central Africa, a Belgian assisted pyrethrum cultivation project, designed to boost national exports and provide jobs to overflowing settler populations, inadvertently disinherited the local Twa people; in replacing rich forests with pyrethrum

monoculture, the fragile soils were disrupted, and formerly perched streams of water disappeared into the underlying lava rock. The present inhabitants now suffer greatly from lack of water. In addition, a globally critical ecosystem, that of the endangered mountain gorilla, was largely destroyed.

Locally-driven initiatives are much more likely to address real needs, both environmental and socioeconomic. For instance, in the Dominican Republic, local women's groups rehabilitated degraded hillsides left behind after destructive timbering practices. Their techniques of small-scale gardening proved both self-sustaining and soil-conserving (Chaney, 1985).

UNDERSTANDING THE LOCAL CONTEXT AND PRIORITIES

A thorough understanding of local ecosystem processes, community organization, and local priorities is an essential ingredient of almost all successful development or conservation initiatives. Unless the initiative is entirely locally-driven, this must be accomplished through a commitment of significant resources in terms of personnel and time.

One method of mobilizing local knowledge is through currently popular participatory rural appraisal techniques. While this is a valuable assessment technique, it should extend over a long enough period of time to allow the community to develop confidence in the facilitators. It is essential to include a woman on the team, and establishment of local contacts may still be difficult and time-consuming.

Neglecting to understand local conditions can quickly lead to failure of even the most well-designed projects. In Mali, for example, government foresters were directed to control erosion by building berms and planting trees on slope contours. A young forest officer discussed this plan with those who had the permits to farm the land, and they approved. The project received Forest Department approval and was ready to be implemented. However, the site was in fact already planted and terraced with crude stone walls, and erosion was minimal. The farmers, all women, were not even aware of the action taken by the male household permit holders; the project would have cut through the walls, and in a few years trees would have shaded cultivated land. Fortunately, this project was stopped in time-but many conservation efforts have similar negative consequences for women farmers (Hoskins, 1989).

SECTORAL VS. INTEGRATED APPROACH

At the local scale, projects that are small-scale and multi-sectoral are the most effective for resource management, and are most beneficial to women (Pradhan and Rankin, 1990). By targeting an area or community rather than a sector, and by incorporating local initiatives significant results can be achieved.

Sectoral approaches can increase their chances of success by allowing a degree of flexibility, particularly in establishing points of introduction. Save the Children, a non-governmental organization in Nepal, begins its successful community forestry programs with literacy classes for women. From the beginning, the literacy material is formatted to provoke discussion of environmental issues (e.g., "I" for landslide). After two full years, with classes meeting every

night for two hours, the committed women in these classes form users groups. Since 1990 more than 150 users groups have taken on community projects, and many have been granted legal control of community forests by the government (Acharya, H., 1993).

In mountain regions, where services are lacking and extension agents are scarce, sectoral field officers can dramatically increase their credibility and effectiveness if they are willing to assist communities with their most strongly felt needs. Their sectoral activities can then be taken up with increased confidence.

There is obviously a need to build institutions at all levels, and on a larger scale the sectoral approach is often more efficient than an integrated multi-agency approach. For larger institutions and infrastructures to be successful in terms of ecosystem conservation and women's concerns, decision making and control of resources need to be firmly delegated to field officers and on-site personnel. Likewise, women should be fully integrated at all levels.

LEVEL OF EXTERNAL INPUTS

Financial and technical development inputs have obvious implications for sustainability, particularly in fragile mountain ecosystems. Agricultural interventions, focusing on high-yield (high input) crops, hybrids, or other "improved" seed introduction, have contributed to reduced diversity and resilience of mountain agriculture. Pressures from lowlands towards mono-cultures, mechanization, and external inputs such as chemical fertilizer have not proved suitable in the diverse, unstable environments of mountains. Larger-scale commercial production has had negative impacts on both women and mountains. External agricultural inputs can contribute to a reduction in food security through the loss of important crop cultivars and genetic stock. In Zimbabwe, for instance, traditional millet seeds were used by one woman who was too poor to purchase the introduced "improved" seeds. Later when droughts caused others' crops to fail, her crop survived. A women's organization was able to purchase 25 bags of her traditional seeds and distribute them to other women in surrounding villages (van Brakel, 1986).

INTEGRATION OF WOMEN

Despite extensive rhetoric to the contrary, planners still prefer to address women in specialized women-specific programs (Pradhan and Rankin, 1990). Projects that target women, however, seldom include resource issues. Rather, the focus tends to be on extension of women's perceived household roles, such as cottage industries or improved cooking stoves. Yet, success in ecosystem management interventions is dramatically increased when project staff have a high awareness of gender issues and a commitment to the full integration of women.

The Pakhribas Agricultural Centre made little progress in vegetable growing extension work with male farmers in eastern Nepal for its first six years. In 1986, however, when the emphasis was switched to women (the actual vegetable growers), the number of gardens increased from 75 to 210 in a single year (PAC, 1987).

Most environmental training programs, whether in agriculture, forestry, energy, or water sectors, include only token or no participation from women. However, the potential for positive action is

large: training can be a dynamic tool for stimulating information exchange and an effective means of bringing women into environmental and resource management initiatives. Successful training can revive and strengthen traditional skills and knowledge; it can also help to eliminate women's sense of isolation and to build confidence. Training in ecosystem management issues brings the highest rewards when it also includes topics such as leadership, decision making, and new technologies (Dankelman and Davidson, 1988).

DISTRIBUTION OF BENEFITS

Without greater participation in decision making and conscious attention to tenure and use rights, natural resource management projects may directly increase the work burden of women, while reducing their relative status in the community. Likewise, income-generating programs that do not address the distribution and control of community and household income frequently increase women's work burden and decrease their life options.

The Small Farmers Development Programme, sponsored by the Agricultural Development Bank of Nepal and UNICEF, supports a village-based natural fiber (lokta) paper production initiative in eastern Nepal. Women perform the bulk of the work but their participation in the decision-making process is negligible, and increased male incomes have not contributed substantially to household needs (Baer, 1990). Greater attention needs to be given to the distribution of development benefits, and to the power of women to make decisions about their own work.

RECOMMENDATIONS AND POLICY GUIDELINES TO ADVANCE WOMEN AND MOUNTAIN ENVIRONMENTS

Women have a vital role in environmental management and development. Their full participation is therefore essential to achieve sustainable development.

- Principle 20, Rio Declaration, 1992

The benefits of integrating the advancement of women with environmental protection to mountain communities are diverse and fundamental. They include strengthening resource use and subsistence rights, maintaining cultural integrity, reducing poverty and marginalization, and conserving overall environmental quality.

A major convergence of policy agendas can be recognized regarding conservation of mountain ecosystems, sustainable development, and the advancement of women. A focus on women is a pivotal part of the establishment of sustainable development and food security, the fight against marginalization, and biodiversity conservation and ecosystem management.

Integration of women must be specified at the policy level in order to institutionalize women's traditional roles as environmental managers (Pradhan and Rankin, 1990). While the need to incorporate gender-sensitive perspectives has become a litany in development policy rhetoric, there has been little if any success in transforming this rhetoric into action.

INTERNAL AGENCY CONSIDERATIONS

The decentralization of planning and administration within agencies can contribute substantially to effective conservation and sustainable development in mountain regions. Field offices should be allowed flexibility to plan for locally changing conditions, rather than pressured to achieve predetermined targets within fixed budget cycles.

Donor agencies have achieved very limited success in integrating women into their own institutions (Yudelman, 1987). Gender issues cannot be effectively addressed if they are of concern only in the "target" community. In-house training is needed to increase staff and management awareness of gender issues, and women need to be integrated into decision-making positions at all levels.

The lengthening of funding cycles to provide more stable financial support would promote long-term project success, particularly in the inaccessible, tradition-rich, and diverse ecosystems of mountains. Flexible allocation at the field office level can help to avoid "locking in" nonproductive programs. Donors could also play a more supportive role in the transition of good programs from one funding cycle or theme to another.

PRESSURE POINTS FOR CHANGE IN NATIONAL GOVERNMENT POLICIES

National governments should enhance decentralized decision making (UNCED, 1992). A commitment by national governments to decentralize is critical at all levels, and across all sectors. In other words, political liberalization should be accompanied by similar progress in the economic and social service sectors. As efforts are made to delegate decision making and resource control, accountability and responsibility must be strengthened at the most local level.

Given favorable policy support at the national level, communities can have the freedom to organize and take collective decisions. Locally-derived management strategies and integrated program approaches are most effective in controlling environmental degradation. Such approaches should inform, and be supported by, government policy and program design (Pradhan and Rankin, 1990).

As the main users of natural resources, women make daily decisions regarding the management of land, water, forests, and livestock. Women's activities and knowledge should be recognized as directly relevant to national level policies, and as valuable assets in meeting national and project goals for environmental protection.

National economic and political interests need to be balanced with basic needs of mountain populations. These interests may conflict directly with a rhetorical commitment to participatory management and promotion of women. The environmental and social impacts of extractive activities, and equitable terms of trade for mountain peoples and products, should be carefully assessed. Timber production, for example, should not come at the expense of subsistence needs.

ROLE OF NGOs AND NGO/GOVERNMENT PARTNERSHIPS

Experience has shown that many NGOs (non-governmental organizations) have been successful in initiating dialogues with local residents, and in overcoming the problems associated with factionalism and the hurdles posed by locally influential individuals. Success has been based on long-term commitment, flexibility, motivation, an integrated (non-sectoral) approach, and an emphasis on organizing and facilitating rather than technical promotion. The role of NGOs as catalysts and intermediaries therefore needs to be encouraged, and the support of the government to this end is very important. The complementarity in the functioning of NGOs and government agencies needs to be identified and acted upon (Cecelski and Bajracharya, 1993).

NGOs play a critical research and development role, in undertaking innovative programs which are frequently both high-risk and resource-intensive. Once proven, successful approaches are taken up by larger agencies and donors. The cross-subsidy of NGOs to large agencies includes not only tested ideas but, perhaps even more important, trained and talented personnel. NGOs provide a critical training forum for local personnel. The best-trained staff of NGOs continually move on to higher paying and higher profile jobs, typically with larger organizations or donors. This valuable contribution builds sustainability and innovation across many sectors.

GUIDELINES FOR PROJECT DESIGN AND IMPLEMENTATION

Effective development planning should maximize the natural linkages between sound ecosystem management, women's status, and sustainability. It must also incorporate the constraints and comparative advantages of mountain ecosystems.

UNDERSTANDING THE LOCAL CONTEXT

The great diversity of mountain ecosystems, cultures, and adaptive strategies requires a significant commitment of time and personnel in order to develop appropriate environmental initiatives. Project staff must understand the local ecological systems and stresses, the existing environmental management strategies, cultural norms, community organization and sub-groups, existing formal or informal leaders, and gender roles. They should consider the differential access to both the resource base and decision-making power within a community based on political or economic status, caste, gender, or other factors. Non-formal tenure or use rights must be acknowledged.

In addition, it is vital to understand the nature of changes, whether physical, biological, cultural, or socioeconomic, that affect the area. Project staff must have adequate time to become familiar with the people of the project area and to build confidence and understanding.

Through gender analysis, an understanding may be gained of the technical knowledge of both women and men about the natural environment and their relationships to forestry, wildlife, agriculture, livestock, and water resources. Such an understanding makes women’s work more visible (Gurung and Banskota, 1993).

STRENGTHENING COMMUNITY ORGANIZATIONS

We don't need to be taught about fodder and fuelwood. We learn about that from the time we Learn to walk and carry a small load. Teach us how to read and write.

- Rai woman from Simle, Nepal, 1993

To initiate local action in conservation or development opportunities, and to ensure that project activities reach their intended beneficiaries, significant resources must be committed to facilitating and strengthening community organizations. Local people must be encouraged to articulate their own needs, and to seek solutions on their own. Programs should reinforce local management systems, particularly local female leadership, and incorporate such existing infrastructure into program design.

Community organizations may need the help of outside facilitators and here NGOs have been particularly effective. Initiating and nurturing community organizations should begin at the level of resource users with common interests.

Existing women's organizations are likely to be highly knowledgeable, but lacking in power and resources. Where there are no women's organizations non-formal education (literacy) classes can be initiated to build confidence and encourage critical thinking on issues, and also to become venues for dissemination of information.

Sustainability must be a primary factor and the long-term managers of the environment are the married women, often the only stable, fixed members of households in mountain communities. Men are frequently absent for trading, distant livestock pasturing, or employment, and young women generally leave the community at marriage. Participation of married women and their interest in long-range resource management programs is more easily assured than that of men even though they have many constraints on their time (Denholm, 1993).

TABLE 1.
Some indicators of sustainability in mountain ecosystem

Biophysical	Biodiversity maintained or enhanced; no increase in erosion or landslides.
Agriculture	Diversity of crop cultivars maintained; erosion stabilized; land holdings not fragmented; reliable crop yields; decreased dependence on non-local inputs; shift away from intensive cash-cropping or monocropping; increased extent of fallowing, crop rotation, and intercropping.
Animal Husbandry	Diversity of livestock breeds maintained; overgrazing controlled.
Women's Status	Access to and control over social, economic, and natural resources improved; work burden reduced; family planning adopted.
Community	Water available for domestic and agricultural use; decreased time for fodder, fuel, and food gathering; decreased use of imported fuels; diversified resource management practices; better health; local institutions strengthened; respect for social sanctions as opposed to legal measures; decreased migration.

The strengthening of local institutions must be based on the concept of decreasing dependence on external assistance. Technical and financial inputs should be offered only where they are clearly sustainable.

In addition to the catalytic role of literacy programs, training can be a powerful tool in mobilizing women's environmental knowledge. Skill development programs should incorporate managerial and technical skills, and not emphasize typically female occupations. Training needs are most strongly felt in the development of women's public communications skills, leadership skills, strategic planning skills, and in confidence building; and outside experts are not the only instructors; community or farmer exchanges are also a valuable resource. Mentoring by local women who have achieved community action is particularly valuable.

ACCESS TO RESOURCES

Women and men need legal and secure rights to cultivate land and use natural resources. In particular, mountain communities, with their traditional reliance on a dynamic and fragile subsistence base, must maintain firm control over these resources.

INTEGRATED APPROACHES

In mountain regions specific areas should be targeted for development, and community organizations and linkages should be fully developed before they are applied to wider geographical areas. There are very few extension agents and services in remote hill areas, so that one extension officer will have many tasks and may serve more as a facilitator than a specialist.

THE SMALL SCALE OF PRODUCTION SYSTEMS

Mountain environments are well-suited to small-scale, diverse production strategies. Attempts to introduce large-scale interventions, extractive industries, or commercialization are likely to have significant negative environmental and cultural effects.

Due to the unstable and dynamic nature of mountain environments, the development of infrastructure such as trails, roads, bridges, and dams may be costly to maintain and less suited to mountain areas.

The introduction of commercial cultivation into mountain areas may undermine present agricultural stability. The new products must be of relatively high value and low weight if they are to be successfully marketed.

Although cash crops may help local economies, careful monitoring to ensure sustainability is required and it is essential that the benefits of trade should be felt by the local mountain people.

FULL INTEGRATION OF WOMEN INTO PROJECT DESIGN AND IMPLEMENTATION

Women should be fully integrated into all phases of project design and implementation. Extra resources may be required to recruit, train and support qualified women.

MONITORING AND EVALUATION

Internal monitoring of projects should become a regular p art of planning and implementation, not an extraordinary event that takes place once or twice a year. Table 1 lists indicators of sustainability to be included in the assessments of mountain ecosystems. Monitoring and evaluation must consider not only gender and equity but also satisfaction of basic needs, equitable sharing of benefits, and attainment of self-reliance. Results that were not intended or predicted, such as possible changes in *de facto* tenure or use rights due to project interventions, should be fully assessed.

Communities should be assisted in evaluating programs as a step toward assuming management on their own. This monitoring should include gender and equity analysis and methods of evaluation should not depend on the literacy of the program reviewers (Narayan, 1993).

CONCLUSION

Mountain ecosystems and the pivotal role of women in managing them merit special consideration in development and conservation policy. Primary emphasis needs to be placed on understanding the tremendous diversity, limited scale of production, and fragility of mountain environments. Women's integration into environmental initiatives builds sustainability across many sectors, and may be strengthened through community organizations, secure access to resources, and recognition of their vital role in mountain resource management.

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