

## PROTECTED AREAS IN MOUNTAINS<sup>1</sup>

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*ABSTRACT.*— The importance of a global Protected Areas Network in sustaining appropriate mountain development is presented in this paper. Present status of the world's "official" Protected Areas in the UN List, and the proportion that are in mountain areas, and including international designations (World Heritage and Biosphere Reserves). Current and future challenges in the management of these special areas are also commented.

**Key words:** Political recognition of mountains, Mountain Protected Areas status, policy and management challenges.

*RÉSUMÉ.*— L'importance d'un Réseau mondial d'Espaces Protégés comme un appui pour le correct développement des montagnes est ici rappelée. Aussi le statut actuel des Espaces Protégés "officiels" du Monde dans la Liste des Nations Unies est commenté, et quelle est la partie montagneuse de ces espaces, sans oublier les figures internationales de protection (Patrimoine Mondial et Réserves de Biosphère). Enfin, les problèmes actuels et futures pour la gestion de ces espaces particuliers sont également discutés.

**Mots clés:** Reconnaissance politique des montagnes, statut actuel des Espaces Protégés de Montagne, problèmes de gestion et conservation.

*RESUMEN.*— El autor destaca la importancia de una Red Mundial de Espacios Protegidos para el desarrollo sostenible de las montañas. Comenta luego el estatus actual de las Áreas Protegidas "oficiales" del Mundo en la Lista de las Naciones Unidas y qué proporción de ellas forma parte de las montañas, sin olvidar las figuras internacionales de protección como Patrimonio de la Humanidad y Reservas de

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*Biosfera. Para terminar, se discuten los problemas de gestión actuales y futuros de estas áreas tan especiales.*

**Palabras clave:** Reconocimiento político de las montañas, situación actual de los Espacios Protegidos de Montaña, problemas planteados por su gestión y conservación.

## Introduction

Mountains (using the definition and criteria of KAPOUS *et al.*, 2000), cover some 39.3 million sq. km., or about 26.7% of the Earth's surface (BLYTH *et al.*, 2002). Mountains are home to 12 % of the global population, and 26 % live in or adjacent to mountains (PRICE, 2004). They are the water "catchers" and water "towers" of the world. More than one-half of humanity relies on the water that emanates from mountains (Mountain Agenda, 1998). Their seeming immutability and grandeur has made them revered or sacred to all of the world's religions (BERNBAUM, 1990). They are magnets, attracting alpinists, writers, artists, hikers and tourists. They have been the source of our five most important food staples (RHOADES, 1985), and are now treasure-houses of most of earth's native biodiversity and endemism (HAMILTON, 1999). These, and many other values derived from mountains, mean that we should take exceeding care with this large proportion of the world's real estate.

## The Rise of Political Mountain Awareness

Only in the last decade and a half have mountains come definitely into the arena of concern of the public, NGOs, governments and international organizations. These 3-dimensional earth features have significant and unique problems and opportunities in sustainable development. Traditional mountain and upland farmers, pastoralists and other key users such as mountaineers, had long recognized the constraints on use of mountain resources; but development agencies and entrepreneurs until recently had a "flatlander myopia" and brought inappropriate lowland activities and programs into these steep, sensitive, often unforgiving, landforms. In the 1992 UNCED Earth Summit, a special Chapter (No. 13) dealing with mountains became a part of Agenda 21, and mountains took their place alongside coral reefs, tropical rainforests and deserts as a focus of concern. Awareness of the special nature of mountains, their resources, peoples and issues increased immensely, culminating in the



International Year of Mountains in 2002. A concise summary of events in this process is provided by IVES & MESSERLI (1997) in the Preface to their edited book, *Mountains of the World: A Global Priority*. This was followed in 2002 by the Global Mountain Summit (held in Bishkek, Kyrgyzstan) at which the Bishkek Mountain Platform for sustainable development was formulated. It committed to protecting the Earth's mountain ecosystems, reducing mountain poverty and food insecurity, promoting peace and economic equity, and providing support for current and future generations of mountain people (BISHKEK, 2002). The importance of Protected Areas in mountains was reinforced in the Platform.

### Mountain Protected Areas

Biological diversity, water resources, soil, cultural and spiritual values of mountains are all maintained best in some kind of protected area status. Protected areas in this sense, are those where there is not unbridled exploitation, where some degree of restraint is required in human use, in the interest of natural or metaphysical values. IUCN, the World Conservation Union defines Protected Areas (PAs) as: "Areas of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means" (IUCN, 1994). There are some 104,791 of these PAs, and they cover just over 12 % of the world's terrestrial surface (CHAPE *et al.*, 2005). They span many kinds of situations, with varying degrees of human intervention, from wilderness areas and national parks to multiple use areas and lived-in protected landscapes. The various IUCN Categories based on function and management are given in Table 1.

Mountains, as defined by KAPOS *et al.* (2000), are well represented in this global network, with over 21,400 sites, and almost 28% of the area (Personal communication, UNEP-WCMC, 2003). It should be recognized that several

Table 1. Protected area categories and management objectives (IUCN 1994).

- I Strict protection
  - a. Strict Nature Reserve
  - b. Wilderness Area
- II Ecosystem conservation and recreation (National Park)
- III Conservation of natural features (National Monument)
- IV Conservation through active management (Habitat/Species Management Area)
- V Landscape/seascape conservation and recreation (Protected Landscape)
- VI Sustainable use of natural ecosystems (Managed Resource Protected Area)



mountain PAs are very large. Greenland National Park is around 97,200,000 ha. Sites designated under the Antarctic Treaty are not included. Moreover, these are well distributed throughout the Udvardy Biogeographical Provinces of the world (UDVARDY, 1975).

Mountains are well represented within the internationally important sites, designated under the World Heritage Convention. THORSELL & HAMILTON (2004), using a more restrictive definition that eliminated "low" mountains, small areas, and only IUCN Categories I through IV, found 72 World Heritage Mountain Sites, with a potential for another 28. Another important international programme involves the designation of Biosphere Reserves under UNESCO's Man and the Biosphere Programme, where zones of conservation-friendly resource use and management buffer core zones of more strict protection. As of 2001, there were 391 Biosphere Reserves, 190 of which were in mountainous areas (UNEP-WCMC, 2002).

Many assessments cover only "high mountains" and those with a minimum of human land use modification, though many of them will have quite intensive visitation by tourists, mountaineers and hikers. They are most often in the ownership or under the control of some level of government (IUCN Category I-IV). The importance of the Category V and VI areas must not be discounted. Grazing, forestry operations and many kinds of agronomic use such as orchards, vineyards, and terraced annual crops can be conducted in nature-friendly and non-resource-polluting ways. Important cultural values are often maintained in mountainous Protected Landscapes. Agro-biodiversity, as well as much wild native biodiversity, can be conserved if sustainable land uses are in place. Water and soil resources also can be safeguarded by proper husbandry of forests and agricultural lands. Most of this nature-friendly management will be carried out by private landowners or communities, often using traditional practices that have proved their sustainability over generations. Some will be in National and State forest management areas or community forestry units. As wild areas, even in the mountains succumb to development, much of the hope for tender loving care of mountain environments rests in proliferation of these Categories V and VI areas of protection. And, as secular forces erode ancient cultural belief systems, mountains once protected *de facto* by reverence, awe or taboo need to come under formal secular protection in all kinds of Protected Areas.

### Challenges for Mountain Protected Areas

A major weakness in the mountain PA global system is that most of the units are discrete, covering single mountains. Moreover, many Mountain



Protected Areas were established to protect the summits and highest elevations, –the scenic bits, or peaks with spiritual or recreational value. These are inadequate to safeguard the water source areas of mountains, and the high biodiversity of lower elevations on mountains. Nor can such peak parks contain and maintain all of the important mountain ecosystems: puna, páramo, mountain meadows and wetlands, cloud forests, upper montane rainforests, tree-line ecotones, bamboo forests and so forth. Ideally, Mountain PAs should extend all the way to the lowlands, and if possible, “summits-to-the-seas” for the complete gamut that is best to accommodate natural or climate-change-induced species migration altitudinally. Badly needed is connectivity for these “sky-islands”, along the ranges, or in biogeographic clusters. Linkages through the landscape of conservation corridors of connections can effectively enlarge the PA, thereby better protecting the full suite of biodiversity, including large wide-ranging carnivores as “umbrella” species. Moreover such connectivity is greater insurance for migration of species and genes in the face of climate change. A number of these corridor initiatives are now in place, such as the 3,200 km long Yellowstone-to-Yukon in the US and Canadian Rockies, or the Condor Bioreserve constellation in Ecuador. Expansion and connection from summits to lowlands is also a “must” for climate change response, as in the conservation corridor from the Indian Royal Manas Tiger Reserve in the tropical lowlands through a series of parks and conservation areas in Bhutan to the crest of the Himalayas in Jigme Dorji National Park. There are at least 38 such corridor or “cluster” initiatives around the world in mountains.

Mountain protected areas need to be as large as possible to meet the threats common to all PAs, but in particular to meet some problems that are particularly acute in these high landscapes. Suffice it to say here that four of these are most serious in mountains:

1. Long distance transport of air-borne pollutants is affecting mountain PAs more than other kinds of PAs due to their cloud interception orographic effect (*e. g.* acid and particulates precipitation), and by the concentration of persistent organic pollutants due to the process of cold condensation. (Note, the latter also operates for high latitude PAs.)
2. Climate change affects mountains to a greater extent, because the altitudinal life zones are “telescoped” in space more than in the lowlands. Thus, for warming effects, plants and animals must shift rapidly to higher elevations with decreasing area available due to the generally conical shape, with communities at the top having no place to migrate. The melting glaciers already attest to major impacts, as does the receding area of alpine vegetation



3. PAs in general need to be as large as possible to accommodate large natural or anthropogenic disturbances. Mountains are renown for their high degree of natural disturbance because of tectonic factors and their steep slopes. Volcanism, earthquakes, climate extremes, high rates of both surface and mass erosion (both of which can be aggravated by human action), rockfall, torrents, avalanches, glacial outburst floods, all bespeak of a dynamic landscape with impacts on biota and humans alike. To maintain biological diversity and the evolutionary process, especially in the face of such disturbances requires that PAs be very large. Such size is also essential for conserving the large far-ranging "umbrella" species such as bear, wolverine, condor, wolf, and mountain cats such as snow leopard, cougar and lynx
4. The heterogeneity of habitats, and the limited size of these because of topography and climate differences over short distances has led to very high endemism in flora and fauna (limited range endemic birds for instance). And, it is the small size of these individual habitats that makes them more vulnerable to irreparable damage than in the less diverse landscapes of the lowlands. Endemic extinctions are serious threats to mountains, and PAs here play important roles.

The high, amazing, and valuable cultural diversity of mountains is well known, based often on mountain isolation, though it is sadly, eroding. Mountain PAs can help to maintain cultural practices and identities. Of particular relevance in this connection are the high number of sacred peaks and holy forests, springs, and caves in mountains that can be given protection in PAs, thus helping to maintain cultural elements of the landscape. (See BERNBAUM, 1990)

Mountains, because of their relative remoteness, and inaccessibility are havens or sanctuary for free spirits, dissidents, rebels, guerillas and illegal traffickers in drugs or endangered flora and fauna (HAMILTON, 2001). Tension is common, and conflict also. Another function which mountain PAs can perform, when they are abutting on national or sub-national borders, is to promote cooperation in transfrontier resource management. They can reduce cultural and political tensions as each partner works to conserve biodiversity, water resources, and fight fires, pests or alien species. Where outright border hostilities exist (a common characteristic in mountains, which often form frontier boundaries), designation of international Parks for Peace has resolved issues (SANDWICH *et al.*; 2001), such as in ending the border location war between Perú and Ecuador in 1998 with the establishment of the Cordillera del Condor Reserves on both sides of the "existing" border. Many mountain frontier areas where conflict and tension exist can benefit by the



creation of these non-hostile areas dedicated to nature conservation. There are currently around 169 complexes of internationally abutting PAs, in 113 countries (ZBICZ, 2001). I estimate that at least 42 of these are in mountains.

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