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**Human adjustment & mode of living in different environment**

***Cold deserts:*** Cold deserts are located in the temperate zone of the earth, where the temperatures are cooler than the tropics but warmer than the Polar Regions. Usually, cold deserts are located in interior areas far from the coast or near high mountains with low humidity, which makes the weather dry and cold. Northern and Western China, Iran, Greenland and Antarctica are some of the places where you can find cold deserts. Some of the famous cold deserts are the Gobi, Atacama, Takla Makan and the Great Basin. Many scientists also consider Antarctica a cold desert since it is perennially cold and receives less snowfall or rain. Although the cold desert biome is sparsely populated with vegetation and animal life, it is rich in diverse organisms such as lizards, scorpions, rodents, antelopes, llama, gazelle, ibex and camels. These organisms have developed special adaptations to help them survive the harsh cold desert climate. Along with low temperatures, cold deserts have dry winds that cause the climate to become colder and lose moisture**.**

***Mountains:*** People who live in mountain areas are usually much more aware of the limitations of their environment because of the limited habitable area and environmental extremes associated with steep topography and high altitudes. Mountain environments are most significant in the Himalayas of central Asia, the Alps and their eastward extensions in Europe, the Pyrenees between France and Spain, and the chains of mountains along the western margins of North and South America.

***Plain:*** Plains are one of the most important types of physical features of earth’s surface. Plains are usually flat and low height from their surrounding areas. Most of the plains are the result of natural processes like aggradation and degradation. Some plains have elevation between 500 ft. with slight slope. Earth’s surface is comprised of approximately 40% on plains. Although, plains are called the source of human’s needs, civilization and culture. And world’s 80% population live on plains. The basic needs of human such as food, cloth and residence are mostly done by plains. However, all plains around the world have not similar characteristics. Some of World’s plains are un-inhabitant due to extreme weather conditions. For example; the plains of Tundra and Siberia and the plain areas of Sahara Desert. Plains are known as the treasure of agricultural products for their fertility and smooth surface. Plains facilitate humans to fulfil their needs of food and shelter. Because of the smooth surface of plains, agriculture is easier rather than mountainous areas. Except of some agricultural commodities, plains are more suitable for most of the crops of world. Plains are comprised on vast and wide areas that’s why with the help of advance methods, agriculture can be develop on big scale.

***Hot desert:*** The lifestyle has adapted in hot desert is nomadic lifestyle means they do not settle in one area for long. Instead, they move on frequently to prevent exhausting an area of its resources. They have herds of animals which are adapted to living in desert conditions, such as camels. Their tents are built to allow air to circulate within them, keeping them cool. Animal hair is used to insulate them, to keep the tent cool during the day and warmer at night.

***Coastal lands:*** The term “coastal regions” also covers marine fisheries because the bulk of the world’s marine fish harvest is caught or reared in coastal waters. Coastal areas help prevent erosion; filter pollutants; and provide food, shelter, breeding areas, and nursery grounds for a wide variety of organisms. Coastal regions also provide critical inputs for industry, including water and space for shipping and ports; opportunities for recreational activities such as fishing and diving; and other raw materials, including salt and sand.

***Riverine lands:*** A riverine land also includes all the humans, plants and animals that live in it, and all the things we have added to it such as buildings and roads. Everything we do affects our riverine land – from washing clothes and growing food to mining, commercial farming, and building roads or dams. The reverse is also true: our riverine land affects everything we do, by determining what kinds of plants we can grow, the number and kinds of animals that live there, and how many people and livestock can be sustainably supported by the land. One important truth about riverine lands is that we all live downstream from someone, and upstream from someone else. Anything dumped on the ground in the riverine land can end up in its rivers, lakes or wetlands. And anything released to the air can come down again, nearby or thousands of miles away.

**Emerging problems in different environment**

***Cold deserts:*** Water scarce, very low temperatures throughout the year, continuous cold dry wind are some problems in cold desert.

***Mountains:*** Difficulty in water management, occasional soil loss due to increased man-made activities, living with endangered species, decreasing plant and tree cover, change in land use and land tenure, difficult transportation, increased human habitat, difficulty in domestic waste management are the problems in mountains.

***Plain:*** Land scarce, high population density, less per capita cultivable land etc. are some of the problems in plains.

***Hot desert:*** Water scarce, lack of agricultural opportunity, high temperature are major problems in hot desert..

***Coastal lands****:* Changes in the size, composition, and distribution of human populations affect coastal regions by changing land use and land cover. Fishing or harvesting, the destruction of mangroves, and pollution and sedimentation from human activities all can affect the coastal environment. High population density, migration and rapid urbanization are the main problems in coastal lands.

***Riverine lands:*** Monsoonal flood, river bank erosion, river course diversions etc. are the problems face by the riverine population.

Most of the plain areas are located in northern hemisphere. Most of the plain areas of Canada and USA are the result of glacial processes. World’s biggest river basins depend on these plains. For example, Indus Basin, Ganga & Brahmaputra, Yung-Ci-Kiang, Nile, Dajla & Frat, Amazon, Mississippi and many others under the processes of winds and other processes.

Except some of world’s plains which comes under extreme weather conditions, plains are known as the biggest hub of urbanization. These plain areas have suitable climate and many other facilities for human life, that’s why people like to live in plains. The dis-advantage of plains verses mountainous regions are that, people have been lazy getting things easily and without any hard work available in plains. Plains are formed by the sediment of rivers. Whereas in mountainous regions it is impossible. The erosion of soil and stream flow is slow in smooth surface areas rather than slope and mountainous areas.

The smooth surface of plains makes transportation of goods easy for humans. Whereas in mountainous areas and non-smooth surface areas there are so many difficulties for the transportation. The construction of Railways, Roads and Airports, it takes less amount and labor in plains. Rivers flow slowly in plain areas so it’s easy for the transportation by water.

Being facilitator for transportation plains have been the main hubs of trade. In plains due to the advance facilities it is easy to transport raw material to the industries and markets and industrial products to the customers. Worlds important minerals such as coal and patrol are found in layered rocks, which are available only in plains. Therefore, these minerals are the basic component of energy resources and they play a major role in the manufacturing of different industries and products. Industrial development is impossible without them.

Most of the plains in world have been changed to biggest trade centers of world due to their richness of minerals and raw agricultural materials. Most of the trade centers of world are found in plain areas such as Manchester, Tips, Bergkiri, Wairaag etc.

Although in ancient age, the biggest cities were lies near river banks and seas. And usually those were the part of plain areas. But in new age which new cities were established are also located on plains. Trade and industries developed the old cities and they are still developing because of their plain surface. For example, Karachi, Lahore, Faisalabad and Shanghai.

Most of the rivers of world flow in plains, their sources are mountains and they form deltas in plains and fall in oceans. It seems that in any plain area, taking complete benefits of river water is impossible. In our country it has been tried to get complete use of river water and we made the best system of irrigation of world. Those places which were the part of deserts are now use for agricultural land. Some rivers in plain areas are also used for hydropower. This all have been possible due the characteristics of plains. In fact we can say that plains are the worthwhile gift of nature for humans.

In the grand scheme of human history the plains as a geographic structure have a great deal of impact on humans. Plains provide ideal conditions for human settlement. All ancient civilization has developed in the plains and the plains are known as “Cradles of Civilization”. Plains are important for agricultural, industrial and cultural activities. Plains are known as the “Food Basket of World”.Coastal regions, areas that are home to a large and growing proportion of the world’s population, are undergoing environmental decline. The problem is particularly acute in developing countries. The reasons for environmental decline are complex, but population factors play a significant role. Today, approximately 3 billion people — about half of the world’s population — live within 200 kilometers of a coastline. By 2025, that figure is likely to double. The high concentration of people in coastal regions has produced many economic benefits, including improved transportation links, industrial and urban development, revenue from tourism, and food production. But the combined effects of booming population growth and economic and technological development are threatening the ecosystems that provide these economic benefits. Unless governments and users of coastal resources take action, population pressures and the associated levels of economic activity will further degrade many coastal habitats.

The challenge for policymakers and coastal resource managers is to figure out how to reap the economic benefits of coastal resources while preserving them for future generations. Addressing population issues is key to achieving such balance. This policy brief looks at how population growth, urbanization, and other factors affect coastal resources; how environmental degradation influences people’s lives; and how policymakers can integrate population and resource management issues.

COASTAL REGIONS: BENEFITS AND CHALLENGES

Because there is no common definition of what constitutes a coastal region, estimates of coastal populations vary. Most are based on an area within 60 to 200 kilometers of the shoreline and may include coastal floodplains, coastal forests called mangroves, marshes, and tideflats (coastal areas affected by the rise and fall of the tide), as well as beaches, dunes, and coral reefs.1 2

In many countries, populations in coastal areas are growing faster than those in noncoastal areas. This is a concern because population growth and the activities associated with it can degrade coastal and marine ecosystems.3 A number of worrying trends are already visible. In some areas, heavy use of fisheries has reduced endemic coastal fish stocks to 10 percent to 30 percent of the supply that existed 30 years ago.4 Half of the world’s wetlands disappeared in the 20th century, as did 50 percent of all mangroves, and nearly 60 percent of the world’s coral reefs are seriously degraded — in some cases beyond recovery — or threatened by development and other human activities.5 Pollution from industry, agriculture, and urban areas is degrading the quality of much of the world’s fresh water. These challenges are particularly acute for island countries, where coasts often comprise the entire territory.6 Such countries may also be threatened by rising sea levels, a possible consequence of climate change.

POPULATION FACTORS’ EFFECTS ON COASTAL REGIONS

Changes in the size, composition, and distribution of human populations affect coastal regions by changing land use and land cover. Fishing or harvesting, the destruction of mangroves, and pollution and sedimentation from human activities all can affect the coastal environment.

Population Density

The average population density in coastal areas is about 80 persons per square kilometer, twice the world’s average population density.7 Up to 50 percent of the population in northern Africa and Bangladesh lives in coastal areas; along the Nile Delta, the population density reaches 500 to 1,000 people per square kilometer.8 The additional demands that high population density places on the coasts have meant that higher density is associated with increased risks to marine ecosystems. But higher population densities may have beneficial effects as well: As population grows, some governments make greater investments in infrastructure such as sewer lines and sewage treatment plants that ultimately reduce levels of environmental contamination.

Migration

Migration is a key factor affecting coastal zones. The figures in China and Southeast Asia are staggering: 1,000 people arrive in China’s large coastal cities each day, and similar numbers move to the coasts in Vietnam and the Philippines. The population of Ecuador’s Galapagos Islands has grown rapidly since the early 1980s, largely due to the arrival of coastal fishermen. These fishermen sometimes unknowingly exacerbate a problem created by tankers and ocean liners. By discharging ballast water near the islands, large vessels and smaller fishing boats have introduced nonindigenous plant and animal species to the islands’ coasts.9 The situation in the Galapagos Islands also highlights how migration can contribute to the depletion of natural resources. The arrival of new fishermen, together with the introduction of new fishing techniques and increased access to credit and markets, has contributed to the overexploitation of sea cucumbers in the region.10

Urbanization

Many of the world’s coasts are becoming increasingly urban. In fact, 14 of the world’s 17 largest cities are located along coasts. Eleven of these cities, including Bangkok, Jakarta, and Shanghai, are in Asia. In addition, two-fifths of cities with populations of 1 million to 10 million people are located near coastlines.11 The urbanization of coasts brings with it coastal development (including demands for fresh water and sewage treatment) and damage to coastal ecosystems.

Urbanization has a deleterious effect on mangroves. Mangroves, forests of salt-tolerant trees and shrubs that grow in the shallow tidal waters of estuaries and coastal areas in tropical regions, line about 8 percent of the world’s coastlines and 25 percent of the world’s tropical coastlines, where they absorb the impact of storms and offer nutrients for most of the world’s marine life.12 A study by the U.S.-based World Resources Institute found that mangrove loss was strongly correlated with the growth of cities and ports.13 Mangrove forests are also cleared for timber and to make room for fish and shrimp ponds, human settlements, and agricultural and industrial development. Kenya, Liberia, the Philippines, and Puerto Rico, have lost over 70 percent of their mangroves.14

POPULATION’S INTERACTION WITH OTHER FACTORS

Nondemographic factors, including the economy, national and local policies, technology, and culture, interact with population changes to affect the natural environment. Tourism, fishing, and aquaculture are industries with major economic influences on coastal ecosystems.

Tourism

Coastal areas worldwide are major destinations for tourism, which represents the fastest growing sector of the global economy.15 Tourism dominates the economy of some regions and small island states; for example, tourism constitutes 95 percent of the economy of the Maldives and is the country’s only source of hard currency.16 Tourism can offer some environmental benefits, such as greater appreciation of the value of natural resources. In the Caribbean, for instance, diving tourism has helped raise awareness about the need for reef conservation. But tourism can also have harmful effects (see Box 1). It can lead to unsustainable coastal development as infrastructure is built on the shoreline to accommodate tourists. In the Caribbean, official estimates say that 70,000 tons of waste are generated annually from tourism activities.17 Yachts, charter boats, and cruise ships are major sources; they bring visitors to ports that often have inadequate collection systems for dealing with the solid waste discharged by the ships. Moreover, the ships provide few long-term economic benefits for the local population, since they do not employ many local citizens.

Fishing and Aquaculture

Marine fisheries and aquaculture (the controlled cultivation and harvesting of freshwater and marine organisms) produce close to 100 million tons of fish, shellfish, and edible plants every year, providing a livelihood for about 35 million people, most of whom live in developing countries.18 Overharvesting to meet global consumers’ growing demand for seafood can deplete many species and alter the biological structure of coastal ecosystems. Many species are overharvested because the world fishing fleet is larger than it needs to be. Other problems include destructive harvesting methods such as trawling (dragging weighted nets across the sea floor to catch shrimp and bottom-dwelling fish), and bycatch (unintended catch of nontarget species).19 Modern trawling equipment scoops through sediment and rock and often kills the worms, sponges, and other species that live on the seafloor. Aquaculture, the world’s fastest growing food production activity, with an annual growth rate of about 10 percent in the 1990s, can lead to the destruction of mangroves and may lead to irreversible damage to both estuarine and offshore fisheries by introducing biological, chemical, and organic pollutants (such as antibiotics and pesticides) and by modifying habitats.20

HUMAN HEALTH, FOOD SECURITY, AND GENDER ISSUES

People who live in coastal regions may suffer the cumulative burden of environmental stress from the activities on and overcrowding of the coast and from upstream and inland development. If not properly managed, development can result in pollution, deforestation, and inadequate management of soil, water, pesticides, and fertilizers. Damming rivers can also have negative environmental effects, such as soil erosion and destruction of ecosystems that support various fish and marine mammals. When concentrated in small, confined, and overcrowded areas such as coastal zones, pollution and other problems pose greater threats to human health.

Worldwide, sewage is the largest source of environmental contamination, and discharges have increased dramatically in the past three decades. Eighty percent of marine pollution comes from land-based sources; the remaining 20 percent comes from atmospheric sources, including acid rain and marine-based sources such as oil spills.21 As coastal communities grow, sewage can become a threat to local waterways: Demand often exceeds available sewage treatment, and much of the sewage is dumped without being treated. Bathing in or ingesting sewage-contaminated water can cause infections and transmit diseases such as cholera, particularly among children under 5.22 In developing countries, more than 90 percent of wastewater and 70 percent of industrial wastes are discharged in coastal waters without being treated. The United Nations Environment Programme estimates that South Asian waters are at the highest risk of pollution: 825 million people in the region do not have basic sanitation services.23 In Mumbai, India, for instance, almost half of the city’s 12 million residents are either slum dwellers or homeless with little access to sewage and sanitation facilities. The Municipal Corporation of Brihan Mumbai, with support from the World Bank, has started the $300 million Bombay Sewage Disposal Project to collect and dispose of 80 percent of the sewage currently flowing untreated into the sea.24

Chemicals and heavy metals found in pesticide runoff and industrial effluents also damage human and marine health. The most serious concerns worldwide involve persistent organic pollutants (POPs), which can be transported in the atmosphere and have become common in the oceans. POPs tend to linger in living tissue and become more concentrated as they move up the food chain, so they are sometimes found even in people who live in remote, undeveloped regions. Evidence links long-term, low-level exposure to certain POPs with reproductive, immunological, neurological, and other problems in marine organisms and humans.25 In Mozambique, for example, more than 100 factories in and around the capital city of Maputo do not have waste treatment plants; toxic wastes, poisons, nondegradable substances, and organic matter are drained into coastal waters.26 These toxins can kill or contaminate marine life; people who eat seafood from polluted areas or who swim in contaminated waters are vulnerable to gastric and other infections.

Contaminants and activities that destroy coastal habitats and ecosystems also contribute to the loss of the marine fauna on which many people rely for food and income. Maintaining a healthy coastal habitat is critical because most of the world’s fish produce their young inshore and feed on organisms in coastal waters. Breaking the marine food chain reduces vital supplies of protein for about 1 billion people, most of whom live in developing countries.27

Yet restricting fishing rights and access to coastal waters in order to project marine fauna may harm vulnerable groups of people. Poor women depend especially heavily on fish and fishing. They tend to fish close to the shore and use the catch to feed their families, whereas men typically engage in large-scale commercial fishing offshore or in major inland water bodies.28 Operating on a smaller scale, women who fish earn only 40 percent of what men earn for fishing in El Salvador. The situation is similar in rural Honduras, where women earn about half of what men do.29

Being less visible in their work, women are also less likely to have access to decisionmakers or to be consulted about the management of natural resources. In the early 1990s, community leaders in El Salvador informally banned fishing in estuaries due to concerns about the overfishing of shrimp and other sea life in the estuary. Women were not consulted in this process and lost a vital source of household protein and income.30 Women usually have different access to and control over land and water in coastal zones: Fewer than 5 percent of beneficiaries of land reform in El Salvador and Honduras were women.31

INTEGRATED COASTAL MANAGEMENT

Managing population pressures in coastal zones is difficult because those regions encompass many physical, social, and regulatory divisions. In addition, multiple competing economic sectors, including tourism, fishing, agriculture, aquaculture, forestry, manufacturing, oil and gas extraction, waste disposal, marine transportation, and real estate development have interests in coastal zones. Governments usually manage each sector separately, if at all. Consequently, many coastal nations have experienced rapid uncontrolled development along their coastlines.

In a growing number of countries, coastal zone managers are adopting integrated, multidisciplinary approaches to resource management that incorporate the perspectives of all stakeholders, including governments, the private sector, nongovernmental organizations (NGOs), and individuals. Integrated coastal management (ICM), an internationally accepted approach to managing resources that is based on the United States’ 1972 Coastal Zone Management Act, allows policymakers and planners to take population issues into account when looking at the pressures, threats, and opportunities facing coastal areas. ICM has been endorsed repeatedly in international conferences, including the 1992 UN Conference on Environment and Development in Rio de Janeiro, Brazil, and the 2002 World Summit on Sustainable Development in Johannesburg, South Africa.

ICM attempts to forge a balance between users of water and natural resources while ensuring that long-term environmental health and productivity are not compromised.32 Countries may use ICM to address the depletion of coastal and ocean resources; deal with pollution that endangers public health; distribute the economic benefits of using the coast and ocean; or develop and manage coastal and marine areas that are not yet being exploited.

At least 107 of the world’s 134 coastal developing nations are involved in some type of ICM effort at the national or subnational level.33 In general, the most successful ICM efforts share several characteristics:

Multiple stakeholders, including representatives from all levels of government, NGOs, indigenous groups, communities, and the private sector;

A strong scientific foundation to inform the management process;

A formalized mandate and funding mechanisms;

Formal decisionmaking that incorporates social, environmental, and economic data;

Public participation starting at the initial stages of policy formulation and program development;

Community-based management initiatives to develop community experience, build support, and provide information about regional or national programs;

Capacity building of local experts through training, education, and applied research;

Strong outreach services that provide information and education to all levels of management; and

Regular collection of reliable data to measure the success of management initiatives.34

FUTURE STEPS IN ADDRESSING POPULATION ISSUES IN COASTAL REGIONS

Managing coastal areas requires concerted multisectoral efforts by government institutions at all levels, the private sector, and community groups, as well as sustained political support. Achieving a balance between top-down legislative authorities and bottom-up community involvement requires understanding issues and maintaining strong links with stakeholders in the area.

Efforts to balance local interests with national legislation need to consider the socioeconomic context of coastal populations and what role demographic patterns play in the region. Policymakers and program managers can take several steps to address and integrate population concerns into their coastal management efforts.

Include Population Data in Baseline Studies on Coastal and Marine Resources

Baseline studies assessing the threats to coastal areas should include data on population and the environment, indigenous peoples’ concerns, applicable legislation and the agencies involved, gender concerns, and socioeconomic characteristics of the areas. These studies can be conducted using either exhaustive research or rapid assessment techniques. Data can then be applied with simple participatory tools to quickly assess coastal and marine resources and identify critical threats, such as the extent of fishing and any destructive fishing practices (see Box 2).

Incorporate Population and Gender Dynamics Into Planning

Coastal resource managers and policymakers need to integrate health, population, gender, and nutrition considerations into ICM by determining the characteristics of beneficiaries and stakeholders, NGO capacity, and opportunities in specific areas. For example, women in coastal areas may have unmet need for family planning — that is, they may want to limit or space their future births but may not be using contraceptives.35 Helping women reach their family planning goals can protect the environment by limiting population growth, but addressing family planning needs must be coordinated with several sectors, particularly the health sector.

Several strategies can be used to incorporate population and gender dynamics in planning project activities:

Staggered introduction. A program is established in one sector, and another program in a different sector is later incorporated into the first activity.

Simultaneous introduction. A number of programs are introduced at the same time, and stakeholders consider multiple issues at each stage.

Bridge approach. Single-sector activities support one another but are conducted by different staff.

Symbiotic method. Program activities are dependent on one another and are conducted by the same staff.36

In the Philippines, for example, projects have used a combination of these models to build links across sectors. ICM projects developed out of separate single-sector programs, such as those introducing ecologically sound fishing practices and improving the quality and availability of couples counseling on family planning, and later evolved into integrated programs in which project staff worked with local communities and external experts to coordinate integrated population, health, and environment programs (see Box 2).

Monitor and Assess Human Impacts on the Marine Environment

Integrated management of the marine environment and its natural resources requires greater emphasis on acquiring, analyzing, and using environmental data from a variety of disciplines. It also involves improving the exchange of data between the science and management communities and focusing more on demographic and socioeconomic factors that contribute to marine pollution and coastal degradation.

Population estimates for coastal riverine lands could provide useful information for coastal managers, especially if the data describe population dynamics on a larger scale. In the United States, the National Oceanographic and Atmospheric Administration has developed the Coastal Assessment Framework, which uses census data and mapping programs to provide managers and analysts with a riverine land-based system for collecting and organizing resource-use data and developing coastal management strategies.37 Many problems with water quality and ecosystems are best solved at the riverine land level, which encompasses the full area that drains into a particular body of water.

The Caribbean Coastal Marine Productivity Programme (CARICOMP), a regional network of marine laboratories, parks, and reserves that studies land-sea interactions, strives to identify which changes in coastal systems are caused by human disturbances and which are simply long-term natural variations. The program focuses on understanding the structure and function of mangroves, seagrasses, and coral reefs, the primary coastal ecosystems in the Caribbean. CARICOMP is one example of a functioning international program for monitoring the coastal marine environment and can be used as a model for other countries or regions.38

CONCLUSION

Demographic factors, especially migration, are major considerations in how people use coastal regions. Understanding how population issues can be integrated into coastal management will help policymakers, program managers, and communities design more viable and sustainable strategies for using and safeguarding the world’s coasts and the resources they provide.

With both money and technology, desert areas can be developed to cater for modern lifestyles. Las Vegas, in the Mojave Desert, is one of the fastest-growing cities in the USA. The city of Las Vegas is lush and green in comparison with the surrounding desert.

This is possible because 90 per cent of the water Las Vegas needs is imported from the Colorado River. The remaining 10 per cent comes from ground water. The demand for water is not sustainable and the city has started to plan to reduce the demand for water. One way is that new homes have restrictions on the amount and type of lawns that they can have. The authority also recycles water where it can.

WIDESPREAD ENVIRONMENTAL PROBLEMS

The following are qualitative descriptions of the most pressing environmental concerns facing most mountain areas.

Water Management

Mountains are often the major water sources for surrounding continental areas. An accumulating snow pack in the winter melts in the spring and summer, helping to even out the runoff through the year. If there are glaciers, they provide even greater water storage and regular runoff, but with climate change and global warming, they are fast disappearing. Dams are often built in mountain areas to generate hydroelectric power and for flood control.

To maintain these important functions of mountains in water management, care must be taken to maintain vegetation cover in riverine lands, or erosion and landslides or avalanches may result. Mountain lakes and streams are naturally poor in nutrients and are particularly susceptible to pollution.

Soil Loss

Steep mountain slopes are particularly susceptible to soil loss through erosion if the vegetation cover is damaged or removed. Soil is very slow to regenerate in mountain areas, so eroded areas may be permanently degraded. The productive soil is not only lost from the mountain slopes, but it pollutes streams, reducing habitat for fish, and fills lakes and reservoirs. Many dams have lost their usefulness prematurely because the lake behind the dam filled with sediment from upstream, reducing its capacity. In an extreme case, denuded mountain sides may cause landslides, cutting roads, burying villages and damming rivers, with the possibility of later catastrophic flash floods downstream when the dams finally break.

Endangered Species

The problem of the conservation of nature is particularly critical on mountains where limited populations may be particularly vulnerable to over-exploitation or changing environmental conditions. High altitude species may have be restricted to small mountain areas, and have nowhere to go if their habitat is damaged.

While a number of countries have made great efforts in setting aside protected areas, the needs far exceed the means. Visitor impacts need to be managed carefully to avoid degrading the fragile mountain environment and losing the species for which protection was intended.

Plant and tree cover

Another major environmental concern for the future of mountains is the maintenance of plant and tree cover where the growing season is short, growth very slow, and damage to the land takes a long time to heal. This contributes to many subsidiary problems such as flooding, soil erosion, and loss of habitat for endangered species mentioned above. While many countries have tree replanting programmes, these have often not restored natural mountain communities but are aimed at commercial timber production.

Land Use and Land Tenure

Mountains often have conflicts between uses in limited accessible areas. Space for construction is limited, leaving villages with little room to expand. Land suitable for agriculture and animal pasture may be scattered and not easily accessible. The problems are accentuated by such things as tourism development. This requires comprehensive planning and careful allocation of land to the most appropriate use or combination of uses.

Climate change

Climate change is becoming a major challenge for mountain areas, as they are particularly susceptible. Warmer temperatures may mean less snow and more rain and flooding in winter, and drier summers. Species may shift to higher altitudes, and the highest mountain species may have nowhere to go and become extinct. The thawing of mountainsides that were formerly frozen all year round may destabilize slopes and produce serious rockfalls. Glacial lakes may fill to overflowing, burst and produce catastrophic flash floods.

COMMON ENVIRONMENTAL CONCERNS

The above problems are the most widespread in their impacts within most mountain areas, and thus rank first in priority. Another group of concerns affect some important mountain areas. They are frequently given high priority at a national level.

Transport

Transportation is always a challenge in mountains. In rural areas, walking and pack animals may still be the primary form of transport, making it difficult to bring goods into the villages and to take products to market. Roads and railways are expensive and difficult to build up steep mountain valleys. Tunnels and bridges are often necessary. Heavy snowfall, avalanches, landslides and floods may block the roads. Communities may be totally isolated. Helicopters may have to be used in emergencies.

Human Habitat

There are also problems of the human habitat in most mountains, particularly involving housing and sanitation. House construction is difficult on sloping terrain and must be strong enough to resist winter snow and cold. It is not easy to provide mountain villages with collective sanitation, and wastes are easily washed into streams and water supplies.

SIGNIFICANT LOCALIZED PROBLEMS

A third group of environmental concerns are not as widespread as those above, affecting only a few mountains, but they are significant in the local areas affected.

Tourism

In some mountain areas, tourism is now replacing agriculture as the primary economic activity. While summer hiking and mountaineering have limited environmental impacts, winter sports such as skiing require construction of ski lifts and clearing of slopes which can seriously modify the mountain environment. The concentrations of seasonal populations of tourists can overstretch water supplies and waste disposal facilities, and require construction of hotels and other facilities that may only be seasonally occupied. The employment created for mountain inhabitants may also only be seasonal, but can help to maintain mountain communities that might otherwise be depopulated.

Mining

Mining is the most significant economic activity in some mountain areas with important mineral resources, and it is inevitably accompanied by serious environmental problems. These include the disposal of mine wastes, tailings and processing wastes, erosion problems and the pollution of rivers in mined areas, loss of natural habitat, and the abandonment of unusable wastelands once the mining has ended. While new mines today are generally subject to strict environmental controls, older mines and areas abandoned after earlier mining continue to present serious environmental problems.

Domestic Waste

One problem in mountains where transport is limited and the same watercourse may serve several communities is the safe disposal of domestic wastes, particularly human wastes and sewage. Treatment facilities are difficult to construct and may only reach a small population because of the terrain.

SUSTAINABLE USE OF MOUNTAIN RESOURCES

The above problems all contribute in one way or another to the most critical environmental issue facing mountains: the sustainable use and management of their limited resources. Population growth as such is not always the most important factor; many mountain communities have seen their populations decline through emigration. Nevertheless, human activities are leading everywhere to a gradual (or not so gradual) erosion in the resource base on which the local residents depend for survival. Since the limits to resources are much closer in mountain areas, there is less room for error.

It is clear that the solution of these problems of the environment and of sustainable resource use will require management skills and a good scientific understanding of the mountain environment. Unfortunately, skilled people and scientific infrastructure are sorely lacking in some mountain countries.

If the peoples of mountains are to ensure for themselves a satisfactory environmental future, they must take measures to reverse the steady erosion in their resource base and to stabilize their populations within the carrying capacity of their land and resources, even if this means modifying what they see as deeply held cultural values. They must increase efforts to restore damaged resources, and to achieve comprehensive management of different resource uses and development activities. This will be very difficult, as it requires questioning some of the development assumptions and goals copied from lowland areas. It is clear from the above list of environmental concerns that mountains require unique forms of development adapted to the limitations of the environment, and drawing as much from the traditional societies that successfully lived within those limits for generations as from the modern world.

Most animals living in cold deserts have developed adaptations to combat the falling temperatures. These adaptions may be in the form of thick fur, scaly skin or the ability to store water in their bodies.

Animals living in cold or temperate deserts have thick exoskeletons to protect them from the cold dry winds.

Bactrian camels found in the Gobi and Takla Makan deserts have thick and coarse, hairy coats to keep them warm during the cold winters, and they shed these thick coats as summer sets in. Bactrian camels also have thick eyebrows, eye lashes and nostril hair to prevent sand from entering their eyes and nose.

Like Bactrian camels, many reptiles live in cold deserts. They often have thick and spiny exoskeleton to prevent loss of water while their cold blood regulates their body temperature according to the surrounding temperature.

Animals such as the Peruvian fox have thick fur coat that protects against cold winds. Cold desert animals have a layer of fat that acts as insulation to prevent loss of body heat.

Desert Camouflage

Camouflaging is a survival technique used by animals to protect themselves from predators. The accumulation and melting of snow changes the landscape of cold deserts drastically. Many cold desert biome animals camouflage to match their changing surroundings.

The ptarmigan bird is an excellent examples of this. Ptarmigans have brownish feathers during the warm summers when the landscape is brown and muddy. The bird molts into white feathers during winter months when the ground is covered in snow.

Burrowing

A common adaptation in temperate desert animals is burrowing during extreme weather. Animals such as lizards, snakes and rodents burrow themselves under layers of sand and use their body heat to keep themselves warm.

Water Conservation Methods

Like hot deserts, cold deserts are also arid and water scarce, which makes it essential for desert animals to conserve water in their body. Bactrian camels are known for having two humps for storing fat that can be converted into energy and water when needed.

Animals living in cold deserts biome are uricotelic, that is, they convert their excreta from urea to uric acid to retain water in their body.