

ENVIRONMENTAL IMPACTS OF TOURISM

Source: United Nations Environment Program (UNEP), 2001

<http://www.gdrc.org/uem/eco-tour/envi/index.html>

The quality of the environment, both natural and man-made, is essential to tourism. However, tourism's relationship with the environment is complex. It involves many activities that can have adverse environmental effects. Many of these impacts are linked with the construction of general infrastructure such as roads and airports, and of tourism facilities, including resorts, hotels, restaurants, shops, golf courses and marinas. The negative impacts of tourism development can gradually destroy the environmental resources on which it depends.

On the other hand, tourism has the potential to create beneficial effects on the environment by contributing to environmental protection and conservation. It is a way to raise awareness of environmental values and it can serve as a tool to finance protection of natural areas and increase their economic importance.

TOURISM'S THREE MAIN IMPACT AREAS

<http://www.gdrc.org/uem/eco-tour/envi/one.html>

Negative impacts from tourism occur when the level of visitor use is greater than the environment's ability to cope with this use within the acceptable limits of change. Uncontrolled conventional tourism poses potential threats to many natural areas around the world. It can put enormous pressure on an area and lead to impacts such as soil erosion, increased pollution, discharges into the sea, natural habitat loss, increased pressure on endangered species and heightened vulnerability to forest fires. It often puts a strain on water resources, and it can force local populations to compete for the use of critical resources.

1) DEPLETION OF NATURAL RESOURCES

Tourism development can put pressure on natural resources when it increases consumption in areas where resources are already scarce.

Water resources

Water, and especially fresh water, is one of the most critical natural resources. The tourism industry generally overuses water resources for hotels, swimming pools, golf courses and personal use of water by tourists. This can result in water shortages and degradation of water supplies, as well as generating a greater volume of waste water..

In dryer regions like the Mediterranean, the issue of water scarcity is of particular concern. Because of the hot climate and the tendency of tourists to consume more

water when on holiday than they do at home, the amount used can run up to 440 liters a day. This is almost double what the inhabitants of an average Spanish city use.

Golf course maintenance can also deplete fresh water resources. In recent years golf tourism has increased in popularity and the number of golf courses has grown rapidly. Golf courses require an enormous amount of water every day and, as with other causes of excessive extraction of water, this can result in water scarcity. If the water comes from wells, over pumping can cause saline intrusion into groundwater. Golf resorts are more and more often situated in or near protected areas or areas where resources are limited, exacerbating their impacts.

An average golf course in a tropical country such as Thailand needs 1500kg of chemical fertilizers, pesticides and herbicides per year and uses as much water as 60,000 rural villagers. (Source: Tourism Concern)

Local resources

Tourism can create great pressure on local resources like energy, food, and other raw materials that may already be in short supply. Greater extraction and transport of these resources exacerbates the physical impacts associated with their exploitation. Because of the seasonal character of the industry, many destinations have ten times more inhabitants in the high season as in the low season. A high demand is placed upon these resources to meet the high expectations tourists often have (proper heating, hot water, etc.).

Land degradation

Important land resources include minerals, fossil fuels, fertile soil, forests, wetland and wildlife. Increased construction of tourism and recreational facilities has increased the pressure on these resources and on scenic landscapes. Direct impact on natural resources, both renewable and nonrenewable, in the provision of tourist facilities can be caused by the use of land for accommodation and other infrastructure provision, and the use of building materials.

Forests often suffer negative impacts of tourism in the form of deforestation caused by fuel wood collection and land clearing. For example, one trekking tourist in Nepal - and area already suffering the effects of deforestation - can use four to five kilograms of wood a day.

2) POLLUTION

Tourism can cause the same forms of pollution as any other industry: air emissions, noise, solid waste and littering, releases of sewage, oil and chemicals, even architectural/visual pollution.

Air pollution and noise

Transport by air, road, and rail is continuously increasing in response to the rising number reported that the number of international air passengers worldwide rose from 88 million in 1972 to 344 million in 1994. One consequence of this increase in air transport is that tourism now accounts for more than 60% of air travel and is therefore responsible for an important share of air emissions. One study estimated that a single transatlantic return flight emits almost half the CO₂ emissions produced by all other sources (lighting, heating, car use, etc.) consumed by an average person yearly. (Mayer Hillman, Town & Country Planning magazine, September 1996. Source: MFOE).

Transport emissions and emissions from energy production and use are linked to acid rain, global warming and photochemical pollution. Air pollution from tourist transportation has impacts on the global level, especially from carbon dioxide (CO₂) emissions related to transportation energy use. And it can contribute to severe local air pollution. Some of these impacts are quite specific to tourist activities. For example, especially in very hot or cold countries, tour buses often leave their motors running for hours while the tourists go out for an excursion because they want to return to a comfortably air-conditioned bus.

Noise pollution from airplanes, cars, and buses, as well as recreational vehicles such as snowmobiles and jet skis, is an ever-growing problem of modern life. In addition to causing annoyance, stress, and even hearing loss for humans, it causes distress to wildlife, especially in sensitive areas. For instance, noise generated by snowmobiles can cause animals to alter their natural activity patterns.

In winter 2000, 76,271 people entered Yellowstone National Park on snowmobiles, outnumbering the 40,727 visitors who came in cars, 10,779 in snowcoaches and 512 on skis. A survey of snowmobile impacts on natural sounds at Yellowstone found that snowmobile noise could be heard 70% of the time at 11 of 13 sample sites, and 90% of the time at 8 sites. At the Old Faithful geyser, snowmobiles could be heard 100% of the time during the daytime period studied. Snowmobile noise drowned out even the sound of the geyser erupting. (Source: Idahonews)

Solid waste and littering

In areas with high concentrations of tourist activities and appealing natural attractions, waste disposal is a serious problem and improper disposal can be a major despoiler of the natural environment - rivers, scenic areas, and roadsides. For example, cruise ships in the Caribbean are estimated to produce more than 70,000 tons of waste each year. Today some cruise lines are actively working to reduce waste-related impacts. Solid waste and littering can degrade the physical appearance of the water and shoreline and cause the death of marine animals.

In mountain areas, trekking tourists generate a great deal of waste. Tourists on expedition leave behind their garbage, oxygen cylinders and even camping equipment.

Such practices degrade the environment with all the detritus typical of the developed world, in remote areas that have few garbage collection or disposal facilities. Some trails in the Peruvian Andes and in Nepal frequently visited by tourists have been nicknamed "Coca-Cola trail" and "Toilet paper trail".

The Wider Caribbean Region, stretching from Florida to French Guiana, receives 63,000 port calls from ships each year, and they generate 82,000 tons of garbage. About 77% of all ship waste comes from cruise vessels. The average cruise ship carries 600 crew members and 1,400 passengers. On average, passengers on a cruise ship each account for 3.5 kilograms of garbage daily - compared with the 0.8 kilograms each generated by the less well-endowed folk on shore. (Source: Our Planet, UNEP magazine for environmentally sustainable development, volume 10, no. 3, 1999)

Sewage

Construction of hotels, recreation and other facilities often leads to increased sewage pollution. Wastewater has polluted seas and lakes surrounding tourist attractions, damaging the flora and fauna. Sewage runoff causes serious damage to coral reefs because it stimulates the growth of algae, which cover the filter-feeding corals, hindering their ability to survive. Changes in salinity and siltation can have wide-ranging impacts on coastal environments. And sewage pollution can threaten the health of humans and animals.

Aesthetic Pollution

Often tourism fails to integrate its structures with the natural features and indigenous architectural of the destination. Large, dominating resorts of disparate design can look out of place in any natural environment and may clash with the indigenous structural design.

A lack of land-use planning and building regulations in many destinations has facilitated sprawling developments along coastlines, valleys and scenic routes. The sprawl includes tourism facilities themselves and supporting infrastructure such as roads, employee housing, parking, service areas, and waste disposal.

3) PHYSICAL IMPACTS

Attractive landscape sites, such as sandy beaches, lakes, riversides, and mountain tops and slopes, are often transitional zones, characterized by species-rich ecosystems. Typical physical impacts include the degradation of such ecosystems.

An ecosystem is a geographic area including all the living organisms (people, plants, animals, and microorganisms), their physical surroundings (such as soil, water, and

air), and the natural cycles that sustain them. The ecosystems most threatened with degradation are ecologically fragile areas such as alpine regions, rain forests, wetlands, mangroves, coral reefs and sea grass beds. The threats to and pressures on these ecosystems are often severe because such places are very attractive to both tourists and developers.

In industrial countries, mass tourism and recreation are now fast overtaking the extractive industries as the largest threat to mountain communities and environments. Since 1945, visits to the 10 most popular mountainous national parks in the United States have increased twelve-fold. In the European Alps, tourism now exceeds 100 million visitor-days. Every year in the Indian Himalaya, more than 250,000 Hindu pilgrims, 25,000 trekkers, and 75 mountaineering expeditions climb to the sacred source of the Ganges River, the Gangotri Glacier. They deplete local forests for firewood, trample riparian vegetation, and strew litter. Even worse, this tourism frequently induces poorly planned, land-intensive development. (Source: People and the Planet)

Physical impacts are caused not only by tourism-related land clearing and construction, but by continuing tourist activities and long-term changes in local economies and ecologies.

Physical impacts of tourism development

-Construction activities and infrastructure development:

The development of tourism facilities such as accommodation, water supplies, restaurants and recreation facilities can involve sand mining, beach and sand dune erosion, soil erosion and extensive paving. In addition, road and airport construction can lead to land degradation and loss of wildlife habitats and deterioration of scenery.

In Yosemite National Park (US), for instance, the number of roads and facilities have been increased to keep pace with the growing visitor numbers and to supply amenities, infrastructure and parking lots for all these tourists. These actions have caused habitat loss in the park and are accompanied by various forms of pollution including air pollution from automobile emissions; the Sierra Club has reported "smog so thick that Yosemite Valley could not be seen from airplanes". This occasional smog is harmful to all species and vegetation inside the Park. (Source: Trade and Environment Database)

-Deforestation and intensified or unsustainable use of land:

Construction of ski resort accommodation and facilities frequently requires clearing forested land. Coastal wetlands are often drained and filled due to lack of more suitable sites for construction of tourism facilities and infrastructure. These activities can cause severe disturbance and erosion of the local ecosystem, even destruction in the long term.

-Marina development:

Development of marinas and breakwaters can cause changes in currents and coastlines. Furthermore, extraction of building materials such as sand affects coral reefs, mangroves, and hinterland forests, leading to erosion and destruction of habitats. In the Philippines and the Maldives, dynamiting and mining of coral for resort building materials has damaged fragile coral reefs and depleted the fisheries that sustain local people and attract tourists.

Overbuilding and extensive paving of shorelines can result in destruction of habitats and disruption of land-sea connections (such as sea-turtle nesting spots). Coral reefs are especially fragile marine ecosystems and are suffering worldwide from reef-based tourism developments. Evidence suggests a variety of impacts to coral result from shoreline development, increased sediments in the water, trampling by tourists and divers, ship groundings, pollution from sewage, overfishing, and fishing with poisons and explosives that destroy coral habitat.

Physical impacts from tourist activities

Trampling Tourists using the same trail over and over again trample the vegetation and soil, eventually causing damage that can lead to loss of biodiversity and other impacts. Such damage can be even more extensive when visitors frequently stray off established trails.

Trampling impacts on vegetation	Trampling impacts on soil
Breakage and bruising of stems	Loss of organic matter
Reduced plant vigor	Reduction in soil macro porosity
Reduced regeneration	Decrease in air and water permeability
Loss of ground cover	Increase in run off
Change in species composition	Accelerated erosion
Source: University of Idaho	

-Anchoring and other marine activities

In marine areas (around coastal waters, reefs, beach and shoreline, offshore waters, uplands and lagoons) many tourist activities occur in or around fragile ecosystems. Anchoring, snorkeling, sport fishing and scuba diving, yachting, and cruising are some of the activities that can cause direct degradation of marine ecosystems such as coral reefs, and subsequent impacts on coastal protection and fisheries.

There are 109 countries with coral reefs. In 90 of them reefs are being damaged by cruise ship anchors and sewage, by tourists breaking off chunks of coral, and by commercial harvesting for sale to tourists. One study of a cruise ship anchor dropped in a coral reef for one day found an area about half the size of a football field completely destroyed, and half again as much covered by rubble that died later. It was estimated that coral recovery would take fifty years. (Source: Ocean Planet)

-Alteration of ecosystems by tourist activities

Habitat can be degraded by tourism leisure activities. For example, wildlife viewing can bring about stress for the animals and alter their natural behavior when tourists come too close. Safaris and wildlife watching activities have a degrading effect on habitat as they often are accompanied by the noise and commotion created by tourists as they chase wild animals in their trucks and aircraft. This puts high pressure on animal habits and behaviors and tends to bring about behavioral changes. In some cases, as in Kenya, it has led to animals becoming so disturbed that at times they neglect their young or fail to mate.

LOSS OF BIOLOGICAL DIVERSITY

<http://www.gdrc.org/uem/eco-tour/envi/two.html>

Biological diversity is the term given to the variety of life on Earth and the natural patterns it forms.

The effects of loss of biodiversity

It threatens our food supplies, opportunities for recreation and tourism, and sources of wood, medicines and energy.

It interferes with essential ecological functions such as species balance, soil formation, and greenhouse gas absorption.

It reduces the productivity of ecosystems, thereby shrinking nature's basket of goods and services, from which we constantly draw.

It destabilizes ecosystems and weakens their ability to deal with natural disasters such as floods, droughts, and hurricanes, and with human-caused stresses, such as pollution and climate change.

Tourism, especially nature tourism, is closely linked to biodiversity and the attractions created by a rich and varied environment. It can also cause loss of biodiversity when land and resources are strained by excessive use, and when impacts on vegetation, wildlife, mountain, marine and coastal environments and water resources exceed the carrying capacity. This loss of biodiversity in fact means loss of tourism potential.

-Introduction of exotic species

Tourists and suppliers - often unwittingly - can bring in species (insects, wild and cultivated plants and diseases) that are not native to the local environment and that can cause enormous disruption and even destruction of ecosystems.

DEPLETION OF THE OZONE LAYER

The ozone layer, which is situated in the upper atmosphere (or stratosphere) at an altitude of 12-50 kilometers, protects life on earth by absorbing the harmful wavelengths of the sun's ultraviolet (UV) radiation, which in high doses is dangerous to humans and animals. For instance, one of the reasons scientists have put forward for the global decrease of amphibian populations is increased exposure to UV radiation.

Ozone depleting substances (ODSs) such as CFCs (chlorofluorocarbon) and halons have contributed to the destruction of this layer. The tourism industry may be part of the problem; direct impacts start with the construction of new developments and continue during daily management and operations. Refrigerators, air conditioners and propellants in aerosol spray cans, amongst others, contain ODSs and are widely used in the hotel and tourism industry. Emissions from jet aircraft are also a significant source of ODSs. According to Tourism Concern, scientists predict that by 2015 half of the annual destruction of the ozone layer will be caused by air travel.

UNEP's OzonAction Programme works with governments and industries, including the tourism industry, to phase out ODSs and find safer alternatives. UNEP has developed extensive information and guidance on how many types of businesses can eliminate ODSs and contribute to preservation of the ozone layer. For further reading see the publication *How the Hotel and Tourism Industry can Protect the Ozone Layer*.

CLIMATE CHANGE

Climate scientists now generally agree that the Earth's surface temperatures have risen steadily in recent years because of an increase in the so-called greenhouse gases in the atmosphere, which trap heat from the sun. One of the most significant of these gases is carbon dioxide (CO₂), which is generated when fossil fuels, such as coal, oil and natural gas are burned (e.g. in industry, electricity generation, and automobiles) and when there are changes in land use, such as deforestation. In the long run, the accumulation of CO₂ and other

greenhouse gases in the atmosphere can cause global climate change - a process that may already be occurring.

Global tourism is closely linked to climate change. Tourism involves the movement of people from their homes to other destinations and accounts for about 50% of traffic movements; rapidly expanding air traffic contributes about 2.5% of the production of CO₂. Tourism is thus a significant contributor to the increasing concentrations of greenhouse gases in the atmosphere. (Source: Mountain Forum)

Air travel itself is a major contributor to the greenhouse effect. Passenger jets are the fastest growing source of greenhouse gas emissions. The number of international travelers is expected to increase from 594 million in 1996 to 1.6 billion by 2020, adding greatly to the problem unless steps are taken to reduce emissions. (Source: WWF)

For more information on the relationship between energy and the environment, see UNEP's Energy Program, which provides information and publications on energy efficiency and alternative energy sources to reduce the environmental impacts of energy use and of transportation.

HOW GLOBAL ENVIRONMENTAL IMPACTS AFFECT TOURISM

Natural disasters:

Catastrophes like floods, earthquakes, wildfires, volcanoes, avalanches, drought and diseases can have a serious effect on inbound and domestic tourism and thus on local tourism industries. The outbreak of the foot and mouth disease epidemic in England earlier this year (2001), for instance, has severely affected Great Britain's inbound tourism market. A BHA/Barclays Hospitality Business Trends Survey found that 75% of hotels in England, 81% in Scotland and 85% in Wales continued to be affected by the foot and mouth outbreak, and over 60% forecast a decline in business in the June-September 2001 period.

Climate change:

Tourism not only contributes to climate change, but is affected by it as well. Climate change is likely to increase the severity and frequency of storms and severe weather events, which can have disastrous effects on tourism in the affected regions. Some of the other impacts that the world risks as a result of global warming are drought, diseases and heat waves.

Malaria, the world's largest killer, has resurfaced in Spain, and it is estimated that changes in climate will result in parts of the country becoming a suitable habitat for malaria-carrying species of mosquito by the 2020s. (Source: WWF [PDF])

These negative impacts can keep tourists away from the holiday destinations. Global warming may cause:

Less snowfall at ski resorts, meaning a shorter skiing seasons in the Alpine region. In already hot areas like Asia and the Mediterranean, tourists will stay away because of immense heat, and out of fear of diseases and water shortages.

Harm to vulnerable ecosystems such as rainforests and coral reefs because of rising temperatures and less rainfall. A major risk to coral reefs is bleaching, which occurs when coral is stressed by temperature increases, high or low levels of salinity, lower water quality, and an increase in suspended sediments. These conditions cause the zooxanthallae (the single-celled algae which forms the colors within the coral) to leave the coral. Without the algae, the coral appears white, or "bleached" - and rapidly dies. The Great Barrier Reef, which supports a US\$ 640 million tourism industry, has been experiencing coral bleaching events for the last 20 years. (Source: EXN)

Rising sea levels, the result of melting glaciers and polar ice. Higher sea levels will threaten coastal and marine areas with widespread floods in low-lying countries and island states, increasing the loss of coastal land. Beaches and islands that are major tourism attractions may be the first areas to be affected.

Increased events of extreme weather, such as tornadoes, hurricanes and typhoons. These are already becoming more prevalent in tourist areas in the Caribbean and South East Asia. Hurricane Mitch in 1998, for instance, heavily affected tourism in the Caribbean. Wind damage, storm waves, heavy rains and flooding caused major losses in the local tourism sector.

According to the Spanish Forestry Service ICONA, between 1985 and 1994 almost 250,000 hectares of forest burned. In recent years the number of forest fires has increased following periods of extreme dryness. Now, large areas of forest and parkland may be closed off to visitors. (Source: WWF)

EFFECTS OF OTHER INDUSTRIES ON TOURISM

<http://www.gdrc.org/uem/eco-tour/envi/three.html>

Impacts from other industries often have a more dramatic effect on the environment and can seriously affect tourism.

Oil spills, like the oil tanker disaster that occurred off the Galapagos Islands (Ecuador) in January 2001, can cause severe short-term damage to tourist attractions. In that case, a freight ship loaded with 160,000 gallons of diesel fuel and 80,000 gallons of other petroleum products ran aground on the coast of San Cristóbal and spilled nearly

all of its load. Unique local marine and land species and the tourism potential of the area were badly affected.

Agricultural runoff or industrial discharges can cause water pollution and may cause algae blooms like those that occurred in the Adriatic Sea in the early 1990s. In spite of improved control of sewage from tourism developments, the Mediterranean sea floor is increasingly carpeted with these quick-growing invaders, many rising 30 inches or more above anchoring runners. They appear equally adept at colonizing rock, mud, and sand in a virtually continuous swath that can extend from the beach out to a depth of about 150 feet, smothering coral reefs, fish and other sea flora and fauna in the process.

Destructive practices such as blast fishing, fishing with poisonous chemicals like cyanide, and muro-ami netting (pounding reefs with weighted bags to scare fish out of crevices) directly destroy corals. They can also destroy a major draw for tourists.

Cyanide fishing was formerly used only to gather tropical fish for aquariums. Now the demand for live fish in restaurants in Hong Kong and other Asian centers is also driving this devastating practice. The market for live fish is now estimated at more than \$200 million annually. Each year, an estimated 330,000 pounds of cyanide is sprayed on Philippine coral reefs alone. Cyanide fishing operations are moving from the over-harvested and devastated reefs of the Philippines to destroy remote and pristine coral reefs in eastern Indonesia, Papua New Guinea, Palau, Tuvalu, the Federated States of Micronesia, and other nations in the Western Pacific.

Source: University of Denver

HOW TOURISM CAN CONTRIBUTE TO ENVIRONMENTAL CONSERVATION

<http://www.gdrc.org/uem/eco-tour/envi/four.html>

The tourism industry can contribute to conservation through:

1) Financial contributions

-Direct financial contributions:

Tourism can contribute directly to the conservation of sensitive areas and habitat. Revenue from park-entrance fees and similar sources can be allocated specifically to pay for the protection and management of environmentally sensitive areas. Special fees for park operations or conservation activities can be collected from tourists or tour operators.

The tour operator Discovery Initiatives, which is a member of the Tour Operators Initiative for Sustainable Tourism Development, makes an annual financial contribution to the Orangutan Foundation of some US\$ 45,000. The money is earned from only 5 tour groups of 10 people each visiting the Tanjung Puting National Park in Central Kalimantan. The park is under huge pressures from deforestation and river pollution from unrestricted gold mining. This money directly funds park staff and rangers, rehabilitation efforts for young orangutans, and the care center. It provides almost the only economic support for saving this park, where the park fees are officially only the equivalent of 12 pence a day.

-Contributions to government revenues:

Some governments collect money in more far-reaching and indirect ways that are not linked to specific parks or conservation areas. User fees, income taxes, taxes on sales or rental of recreation equipment, and license fees for activities such as hunting and fishing can provide governments with the funds needed to manage natural resources. Such funds can be used for overall conservation programs and activities, such as park ranger salaries and park maintenance.

The Seychelles in the Indian Ocean is introducing a US\$ 90 tax on travelers entering the Seychelles. Revenue will be used to preserve the environment and improve tourism facilities. (UNEP, report to the CSD, 1999)

In West Virginia (US) a whitewater rafting tax is collected from everyone who participates in a commercial rafting trip. The fee goes toward studying the environmental impacts of rafting. In addition, the rafting companies participate in several river cleanup days each year. (EPA)

In Belize, a US\$ 3.75 departure tax goes directly to the Protected Area Conservation Trust, a Belizean fund dedicated to the conservation of the barrier reef and rainforest. (The International Ecotourism Society)

For Costa Rica, for example, tourism represents 72% of national monetary reserves, generates 140,000 jobs and produces 8.4% of the gross domestic product. The country has 25% of its territory classified under some category of conservation management. In 1999, protected areas welcomed 866,083 national and foreign tourists, who generated about US\$ 2.5 million in admission fees and payment of services.

2) Improved environmental management and planning

Sound environmental management of tourism facilities and especially hotels can increase the benefits to natural areas. But this requires careful planning for controlled development, based on analysis of the environmental resources of the area. Planning

helps to make choices between conflicting uses, or to find ways to make them compatible. By planning early for tourism development, damaging and expensive mistakes can be prevented, avoiding the gradual deterioration of environmental assets significant to tourism.

Cleaner production techniques can be important tools for planning and operating tourism facilities in a way that minimizes their environmental impacts. For example, green building (using energy-efficient and non-polluting construction materials, sewage systems and energy sources) is an increasingly important way for the tourism industry to decrease its impact on the environment. And because waste treatment and disposal are often major, long-term environmental problems in the tourism industry, pollution prevention and waste minimization techniques are especially important for the tourism industry. A guide to sources of information on cleaner production (free) is available [here](#).

3) Environmental awareness raising

Tourism has the potential to increase public appreciation of the environment and to spread awareness of environmental problems when it brings people into closer contact with nature and the environment. This confrontation may heighten awareness of the value of nature and lead to environmentally conscious behavior and activities to preserve the environment. For instance, Honduran schoolchildren from the capital city of Tegucigalpa are routinely taken to visit La Tigra cloud forest visitor center, funded in part by eco-tourist dollars, to learn about the intricacies of the rainforest.

If it is to be sustainable in the long run, tourism must incorporate the principles and practices of sustainable consumption. Sustainable consumption includes building consumer demand for products that have been made using cleaner production techniques, and for services - including tourism services - that are provided in a way that minimizes environmental impacts. The tourism industry can play a key role in providing environmental information and raising awareness among tourists of the environmental consequences of their actions. Tourists and tourism-related businesses consume an enormous quantity of goods and services; moving them toward using those that are produced and provided in an environmentally sustainable way, from cradle to grave, could have an enormous positive impact on the planet's environment.

-Protection and preservation

Tourism can significantly contribute to environmental protection, conservation and restoration of biological diversity and sustainable use of natural resources. Because of their attractiveness, pristine sites and natural areas are identified as valuable and the need to keep the attraction alive can lead to creation of national parks and wildlife parks.

In Hawaii, new laws and regulations have been enacted to preserve the Hawaiian rainforest and to protect native species. The coral reefs around the islands and the marine life that depend on them for survival are also protected. Hawaii now has

become an international center for research on ecological systems - and the promotion and preservation of the islands' tourism industry was the main motivation for these actions. (Source: Mundus)

Grupo Punta Cana, a resort in the Dominican Republic, offers an example of how luxury tourism development and conservation can be combined. The high-end resort was established with the goal of catering to luxury-class tourists while respecting the natural habitat of Punta Cana. The developers have set aside 10,000 hectares (24,700 acres) of land as a nature reserve and native fruit tree garden. The Punta Cana Nature Reserve includes 11 fresh water springs surrounded by a subtropical forest where many species of unusual Caribbean flora and fauna live in their natural state. Guests can explore a "nature path" leading from the beach through mangroves, lagoons of fresh water springs and dozens of species of Caribbean bird and plant life. The Punta Cana Ecological Foundation has begun reforesting some parts of the reserve that had been stripped of their native mahogany and other trees in the past. Other environmentally protective policies have been put into effect at the resort, such as programs to protect the offshore barrier reefs and the recycling of wastewater for use in irrigating the grounds. The fairways of the resort's new golf course were planted with a hybrid grass that can be irrigated with sea water. The grass also requires less than half the usual amounts of fertilizer and pesticides. The resort has also established a biodiversity laboratory run by Cornell University.

Tourism has had a positive effect on wildlife preservation and protection efforts, notably in Africa but also in South America, Asia, Australia, and the South Pacific. Numerous animal and plant species have already become extinct or may become extinct soon. Many countries have therefore established wildlife reserves and enacted strict laws protecting the animals that draw nature-loving tourists. As a result of these measures, several endangered species have begun to thrive again.

In the Great Lakes region of Africa, mountain gorillas, one of the world's most endangered great apes, play a critical ecological, economic and political role. Their habitat lies on the borders of northwestern Rwanda, eastern Democratic Republic of Congo and southwestern Uganda. Despite 10 years of political crisis and civil war in the region, the need for revenue from ape-related tourism has led all sides in the conflict to cooperate in protecting the apes and their habitat.

Establishment of a gorilla tracking permit, which costs US\$ 250 plus park fees, means that just three habituated gorilla groups of about 38 individuals in total can generate over US\$ 3 million in revenue per year, making each individual worth nearly US\$ 90,000 a year to Uganda. Tourism funds have contributed to development at the local, national and regional level. The presence of such a valuable tourism revenue source in the fragile afro-mountain forests ensures that these critical habitats are protected, thus fulfilling their valuable ecological function including local climate regulation, water catchment, and natural resources for local communities.

(Source: UNEP Great Apes Survival Project and Discovery Initiatives)

4) Alternative employment

Tourism can provide an alternative to development scenarios that may have greater environmental impacts. The Eco-escuela de Español, a Spanish language school created in 1996 as part of a Conservation International project in the Guatemalan village of San Andres, is an example. The community-owned school located in the Maya Biosphere Reserve, combines individual language courses with home stay opportunities and community-led eco-tours. It receives around 1,800 tourists yearly, mostly from the US and Europe, and employs almost 100 residents, of whom around 60% were previously engaged in mostly illegal timber extraction, hunting and milpas, or slash-and-burn agriculture. Careful monitoring in 2000 has shown that, among the families benefiting from the business, the majority has significantly reduced hunting practices, and the number and extension of "slash-and-burn" agricultural plots. Furthermore, as most families in the village benefit directly or indirectly from the school, community-managed private reserves have been established, and social pressure against hunting has increased.

Awareness raising and alternative employment:

The orangutan viewing centre at Bohorok, Indonesia

Observing wild and semi-wild orangutans in their natural habitat is a significant environmental education opportunity for large numbers of domestic visitors. To enhance this education experience, the existing station at Bohorok, North Sumatra is to be transformed from a rehabilitation center into an orangutan viewing center, thus offering another, crucial contribution to the sustainable conservation of the rainforest ecosystem. By developing ecotourism for orangutan viewing under the new project, all visitors will gain a rewarding personal experience from orangutans, wildlife and the rainforest ecosystem in general. This will increase their awareness of the importance of rainforest conservation. Moreover, tourism will continue to provide a major source of income for the local population, thus promoting sustainable forest utilization as a genuine alternative to timber exploitation and the poaching and trade of wildlife. (Source: Sumatran orangutan conservation program)

5) Regulatory measures

Regulatory measures help offset negative impacts; for instance, controls on the number of tourist activities and movement of visitors within protected areas can limit impacts on the ecosystem and help maintain the integrity and vitality of the site. Such limits can also reduce the negative impacts on resources.

Limits should be established after an in-depth analysis of the maximum sustainable visitor capacity. This strategy is being used in the Galapagos Islands, where the number of ships allowed to cruise this remote archipelago is limited, and only designated islands can be visited, ensuring visitors have little impact on the sensitive environment and animal habitats.