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GeograFF
II

High Mountain Areas and Their Resilience to Tourism Development

Visokogorska območja in njihovo odzivanje
na razvoj turizma

Irena Mrak

Ljubljana 2018

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■ Preface

Due to their specific geographic conditions, mountain regions have always been regarded by humans as areas rich in natural resources on the one hand, yet with limited possibilities for permanent settlement and survival on the other. Within mountain regions, high mountain areas have remained unsettled, and visited by people only occasionally, usually in search of natural resources and/or natural passages enabling economic and cultural linkages between mountain areas and lowlands. As a result, the primary economic uses of natural resources in high mountain areas have been mining and grazing livestock, though neither use has had much impact on the very highest areas on Earth. These saw no human visitors for a long time, until some individuals began dreaming of ascending the highest points on the planet, and such feats were made possible by improved technical equipment as well as people's own psychological capabilities. More recently, with the increase in the amount of leisure time available, the improved accessibility of mountain areas, the promotion of an active, healthy lifestyle, the wider availability of specialist and popular literature, and the desire for a connection with nature, adventure tourism and recreation have become increasingly popular and their activities increasingly diverse. Of crucial importance for such activities is the preservation of a natural mountain environment, with fresh, clean air and an attractive landscape, as well as a way of life among the local population of interest to visitors. The significance of mountain areas for health and spirituality reasons is also important.

The special importance of world mountain areas was defined for the first time in Chapter 13 of Agenda 21, "Managing Fragile Ecosystems: Sustainable Mountain Development", which made a significant contribution to the overall awareness of the importance of preserving mountain areas and carefully planning any development in such places. As this chapter notes, nearly half of the world's population is affected in various ways by processes in mountain areas. It is thus urgent that natural resources there be managed carefully, especially water resources and biodiversity (Mountain Agenda, 1999).

Tourism is one of the most rapidly developing industries throughout the world. It is also a primary source of income for the local population in many mountain areas. The annual growth in profits from tourism was 4.7 % in the 1990s, and according to several estimates it will remain over 4 % up until 2020. A significant share of the tourism industry (15 -20 %) is connected with mountain areas. Such areas play a minor role in the overall development of individual countries, but their importance in tourism is significant and exceptional (Mountain Agenda, 1999).

The heterogeneity of tourism activities in mountain regions is high, but reduced in high mountain areas due to their specific natural geographic conditions, which impede the pursuit of certain activities as well as make the area environmentally more vulnerable.

The increasing popularity and diversity of tourism and recreation activities in mountain regions are reflected in the choice of activities offered as well as in the intensity of their environmental, social, cultural and economic impacts. In high mountain areas especially, environmental impacts are intensified and spatially distributed to the extent where they have become noticeable and disturbing, and certain mountain areas are already environmentally degraded.

Studies to date of the negative environmental impacts of tourism and recreation in a broad sense show a decline in the extent and quality of natural resources, negative impacts on water, especially drinking water, depletion of energy resources and other raw materials, and degradation of the landscape. Negative environmental impacts are also reflected in air pollution due to traffic emissions, noise, solid wastes, and trail erosion affecting the soil as well as the bedrock. Water is threatened by effluents, oil spills and various other chemicals. Visual pollution is also a problem, due to the construction of tourism and recreation infrastructure that is out of place in the surrounding landscape (UNEP, 2006). In the mountains, tourism and recreation activities disturb wildlife, damage vegetation, lead to trail erosion, and cause water, air, and noise pollution. Among positive impacts, the most outstanding one is the maintenance of existing or creation of new protected areas as a response to the exceptional geographic characteristics of mountain landscapes, improved infrastructure, and better economic opportunities for the local population (Newsome et al., 2002).

The rapid and in many cases uncontrolled development of various forms of tourism and recreation in mountain areas is difficult for development planners to follow, and they usually lag behind since the environmental impacts of a particular activity can be hard to predict. For this reason, a good knowledge of natural geographic conditions in mountain areas, and of their resilience to existing tourism and recreation activities, forms the basis for assessments of vulnerability on which the sustainable development of tourism and recreation can be built. Equally important is good knowledge of the characteristics of the participants who engage in such activities, which can help in designing the range of activities offered, in assessing the extent of their environmental impacts, and in devising measures to mitigate and spatially restrict them. Measures are also dependent on the perceptions and awareness of the state of the environment in mountain areas, which has an important influence on how society in the broadest sense responds, and is hence reflected in the attitude towards environmental protection and future sustainable development.

The sustainable development of tourism in mountain areas must address several key questions. What is the actual contribution of tourism to the sustainable development of a particular mountain area? Who gains the economic benefit from tourism? Is tourism already causing the degradation of environmental resources? How is tourism impacting the local inhabitants - positively or negatively?

(Mountain Agenda, 1999) In high mountain areas, the current as well as projected future environmental impacts are most important. Because these areas are not permanently settled, they face the threat of the (ab)use and degradation of natural resources since they are all too often considered “useless areas” from the human perspective. At the same time, they are becoming more and more attractive for the development of tourism and recreation.

This book outlines the characteristics of adventure tourism and recreation in mountain and high mountain areas, and the development issues they pose. The area of the Baltoro Glacier in the Karakoram of Pakistan is presented as a case study. In recent decades, all mountain areas have been faced with the diversification of forms of tourism and recreation activities as well as growth in the number of visitors. Their specific natural geographic as well as social geographic conditions in each case crucially impact their resilience to tourism and recreation activities.

Geographic definition of mountain and high mountain areas

The definition of mountain and high mountain areas in the geographic literature varies among authors. Most define just mountain areas. In *Geografski riječnik* (Cvitanović, 2002), for example, the definition of mountain area is very precise: “prominent and vast uplifted areas where the absolute elevation is over 1000 m; the areas are massive and have a rough terrain, surrounded by broad lower areas. Based on the elevation they are usually divided into lower (1000 – 1500 m), middle (1500 – 2000 m) and high (over 2000 m) mountain areas. The summits are most often without vegetation cover and exposed to weathering, slopes are steep and shaped by erosion processes, and valleys are deep and have steep slopes. In higher mountains, forest is predominant below the permanent snow line, valley and flat areas are used for grazing livestock, and forestry is also present. Traffic is limited by the terrain; therefore tunnels are built as well as roads over mountain passes, and the valleys are bridged by viaducts. Winter tourism is becoming more and more important.” A dictionary of geographic terminology defines high mountain areas as “areas above the upper tree line” (Kladnik et al., 2005).

Given the geographic features and differences among the world’s mountain region, it is difficult to formulate uniform criteria for their definition, but we can nevertheless identify key components. The geographic definition of high mountain areas includes both constant and variable elements. Constant ones include natural geographic conditions typical for all these areas (steep terrain, glaciations and glacially formed relief, severe climate) and human activities such as livestock grazing, hunting, exploration, trekking, mountaineering and skiing. The variable elements differ among individual high mountain areas, and include geographic location, altitude, climatic tree line, and the upper limit of permanent settlement. The variable elements make possible a definition of high mountain areas within all mountain regions, where a definition based only on altitude and mountain climate is not sufficient. The human presence in high mountain areas is not permanent; therefore the upper settlement limit is one of the variable elements of the definition. Due to tourism and recreation development the human presence

in these areas is more significant but the limit of permanent settlement still does not change. It is, however, very different from area to area around the world. It depends mostly on climatic conditions, which are a function of geographic latitude and elevation. It is thus not possible to designate a standard elevation marking the zone at which the high mountain area begins for all the world's mountain areas: this changes depending on variable elements even within a particular certain mountain region.

Some examples of high mountain areas.



*Figure 1:
Cordillera Huayhuash,
Peru.*



*Figure 2:
Torres del Paine, Chile.*

Figure 3:
Julian Alps, Slovenia.



Figure 4:
Karakoram, Pakistan.



Table 1: Geographic definition of high mountain areas.

HIGH MOUNTAIN AREA	
Stable elements	Variable elements
<ul style="list-style-type: none"> ▪ relief <ul style="list-style-type: none"> ◦ relief energy, ◦ slope (over 13°; usually 32° and more) ◦ glacial relief formation (past and present) ▪ mountain climate ▪ human activities (livestock grazing, hunting, exploration, trekking, mountaineering, ski mountaineering and alpine skiing) 	<ul style="list-style-type: none"> ▪ geographic location ▪ altitude ▪ climatic tree line ▪ upper limit of permanent settlements

■ Development of mountain tourism

Mountains have always held great significance in the lives of humans. The earliest peoples avoided mountain regions, since they represented an unknown world full of danger. They believed that mountains were the dwelling place of the gods, and this belief is still present in many a place today. People ventured into mountain areas initially for economic reasons, seeking ore and salt, and armies by dint of circumstance also crossed them, in search of new territories, and trade caravans in search of new goods and markets. These activities were carried out in mountainous regions, but for the most part not in high mountain areas. The first ascents in the high mountain areas of the world's mountain ranges occurred in the Middle Ages, and were made by local inhabitants for a variety of reasons. The Incas set the record for the highest elevations achieved: they were the first to climb to an elevation of 6700 m, which even today represents a significant challenge for most mountaineers. Evidence of their presence at these heights can be seen in the burial sites and remains of human sacrifices to the sun god atop the volcano of Lulllaillaco (6723 m).

Due to their inaccessibility, steep relief, scarce food resources and inhospitable climate, high mountain areas were left largely untouched by humans for a long time, but gradually they became increasingly attractive. The first to venture there were scientists, who were interested in studying the flora, fauna, and geology, measuring the elevation of summits, and not least of all studying the adaptation of the human organism to extreme altitude. The first descriptions and maps of high mountain areas thus came into being, and scientists were joined by the first mountaineers aspiring to ascend summits and later to master steep and technically challenging faces. In the second half of the 18th century, ascents of still unclimbed Alpine peaks were of most interest, followed a century later by the first ascents (mainly by Europeans) in the Andes, and half a century after that the first ascents of the highest peaks in the Himalayas.

Slightly later, in the second half of the 19th century, trekking in the broadest sense of the word began to develop. Once again the development of this activity began in Europe and only considerably later did it spread to other mountain ranges – in the Andes and the Himalayas only after the Second World War, due to the political circumstances there, and not least because of the inaccessibility of both mountain ranges. The development of trekking led to the creation of trails and the construction of mountain huts and refuges. Descriptions of routes made possible the greater independence of mountaineers, who prior to that had always hired mountain guides, usually locals, who were most familiar with the routes to the summits.

Mountaineering, and in particular climbing, at the turn of the century expanded into the winter months, and around the same time ski mountaineering developed, a precursor to alpine skiing. The latter was oriented around skiing centers, many of them in high mountain areas, which were specially built and equipped for this purpose. In contrast, trekking remained a specifically summer activity and only in recent decades has it become more common in all seasons of the year, a trend related to the greater numbers of people engaging in it, improved access to high mountain areas, better equipment, and greater expertise in moving around in the high mountains.

The seasonal nature of mountaineering is still a characteristic of the activity outside Europe, where it is dependent on favorable weather conditions, and this makes mountaineering possible only at certain times of the year (for example, outside the monsoon period in Nepal, June – September in the Karakorum, northern and central Andes, December – February in the southern Andes, etc.). In recent decades we have seen a trend of mass mountaineering in the Alps, the Andes, the Himalayas, and the Rocky Mountains, and climbing expeditions to less accessible (geographically and financially) regions like Antarctica and Greenland. The appearance of commercial alpine expeditions and “mass mountaineering tourism” is characteristic of the immediate area of the Himalayas (Nepal, China), the Karakoram (Pakistan) and increasingly also for the Tien Shan (Kyrgyzstan).

Tourism in general is one of the largest and fastest growing global industries today. According to the World Tourism Organization (WTO), in 2010 it employed over 250 million people and accounted for more than 10 % of all capital investments. Within that, mountain tourism in various forms took up about 20 % (Ives, 2004).

In the continuation, particular attention will be given to the development of tourism and recreation in the high mountain areas of the Alps, Andes, and broader region of the Himalayas, which for decades have been destinations for tourist flows from all over the world. In this context, it should also be noted that the high mountain areas of North America are of great importance in particular to the population of the United States and Canada, and new destinations for mountain tourism such as Antarctica and Greenland are becoming more and more attractive, due to their increasing accessibility, vastness, and the fact that they have not yet been explored from a mountaineering standpoint.

High mountain areas of the Alps

The development of tourism and recreation in high mountain areas began in the Alps. The word tourism in the original meaning of the word connotes a trip of any kind. Up until the advent of mass car ownership in the mid-20th century, the word was understood to mean primarily touring on foot. The most common destinations for walking excursions and journeys were usually mountains. The Slovene language up until the 1870s, in addition to the word *popotnik* (“traveler”), also used the word *turist* (“tourist”), which meant a hill-walker (*gorohodec* or *hribohodec*) as a particular type of traveler (Dolenc, 1996).

The first known ascents in the Alps reach back to the Middle Ages, when Petrarch climbed Mont Ventoux, and Leonardo da Vinci climbed Monte Bo. In the 18th century those active in the mountains were primarily scientists and naturalists (J. J. Rousseau, B. Hacquet); in 1786 J. Balmat and M. Paccard climbed Mont Blanc (4810 m), ushering in the golden age of ascents to the highest Alpine peaks (1799 – Veliki klek/Großglockner (3798 m), 1801 – Watzmann (2713 m), 1805 – Ortler (3905 m), 1811 – Jungfrau (4151 m)). In 1822 the first association of mountain guides was founded in Chamonix (Malešič, 1996), followed by a series of ascents of the remaining Alpine giants by mountain guides leading their clients. Also of significance is the year 1857, when the first “Alpine Club”, set up for the purpose of exploring the Alps, was founded in London. Over the period 1860 – 1890 the majority of national alpine associations were founded, and in 1893 the Slovenian Alpine Club also came into being (Malešič, 1996).

Leisure activities in the Alps in the 19th century consisted of hunting, mountain tourism (walking, viewing the scenery) and mountaineering (hiking and climbing). Mountaineering especially, and hunting in part, took place in high mountain areas as well, while mountain tourism was initially limited to alpine valleys and already existing settlements. It was in these places that the first hotels, sanitariums, roads and railways were built, and eventually also mountain huts in the high mountain areas. Mountaineering and mountain tourism began to diverge – one of the foundations of mountaineering is the person’s encounter with wilderness, whereas mountain tourism brought about the increasing urbanization of the formerly natural environment in the Alps by the end of the 19th century. Mountaineering organizations were the first to realize that the mountain environment was suffering irrevocable loss as a result of all the construction, and yet it was precisely what was being lost—pristine nature—that many people came seeking in the mountains. These organizations were the first to call for the protection of particular mountain areas. Local residents for the most part supported the development of mountain tourism, since it generated income and improved access through the construction of infrastructure. Some conflicts arose between mountaineers and hunters (Keršič-Svetel, 2003).

Alpinism developed rapidly up until the Second World War, especially in climbing techniques and equipment, making possible increasingly more challenging ascents. Improved access to mountain areas through the construction of road infrastructure also enabled winter alpinism. Alpinism was given new momentum after the First World War, when the final three problems of the Alps, as they were called, were conquered: in 1931 the Schmidt brothers climbed the north face of the Matterhorn (4478 m), in 1938 A. Heckmair, L. Vörg, F. Kasperek and H. Harrer climbed the north face of the Eiger (3970 m), and the same year R. Cassin, G. Esposito and V. Tizzoni climbed Walker Spur in the Grandes Jorasses (4208 m) (Škerbinek, 1977). In 1932 the International Mountaineering and Climbing Federation (Union Internationale des Associations d’Alpinisme—UIAA) was founded. After the Second World War, climbing in particular of more difficult routes continued. Parallel with this there was a popularization of alpinism in the sense of increasingly greater numbers of people who took it up for purely recreational purposes, and at the same time there was a huge increase in the number of hikers, something which

was made possible primarily by the improved access to high mountain regions through the construction of road and railway infrastructure, cableways, hiking trails, and alpine huts and refuges. Meanwhile, leading European alpinists became increasingly active on other continents, especially in the broader region of the Himalayas and in the Andes.

After 1965 the development of mass winter tourism began to accelerate (mainly alpine skiing). This kind of development was typical for the Alps and the Rocky Mountains, but somewhat less so for other high mountain areas of the world. With the development of skiing in the Alps, visits increased during the winter months as well, and it was in fact skiing that provided the greatest impetus to the tourism-related urbanization of the Alps. Ski runs, ski lifts, and hotel complexes completely transformed the appearance of the landscape and strongly impacted the ecology of the Alpine environment as well as the way of life of local residents. Ski lifts attracted hordes of tourists to high mountain areas in the summer months as well; without them, these visitors would not otherwise have ventured there. These kinds of visitors to the mountains have a different set of values compared to those cultivated by mountaineering, whose practitioners' main desire is appreciation of the high mountain environment in its natural state. In contrast, the more recent visitors have neither the knowledge nor the skills to be able to move around in the mountains safely and self-sufficiently. They require increasingly more infrastructure, better trails, and greater comfort in the hotels and this is reflected in the increasing urbanization of the landscape. With the development of various leisure activities, pressures on the mountain environment have increased to such an extent that there is growing awareness of the need to protect the natural and cultural heritage of the Alps and to plan carefully regarding land use and development. The professional and ethical standards already applied in mountaineering are needed to ensure that leisure activities in the Alpine environment are conducted in such a way as to minimize the damage. In the second half of the 20th century, mountaineering underwent a tremendous boom and an internal differentiation (Keršič-Svetel, 2003).

All forms of mountaineering have a certain negative impact on the natural environment, and these are exacerbated when the activity is engaged in by large numbers of people. For this reason raising awareness among participants is all the more important. All mountaineering organizations give this a great deal of attention.

In 2002 the Tyrol Declaration on values and ethics in mountain sports was adopted at the international level, formulating criteria for the 21st century which clearly distinguished mountaineering from mountain tourism based on ethical standards and values, and provided guidelines for behavior in the mountain environment. Along with protecting the natural and cultural heritage, the Tyrol Declaration also stresses the spiritual values of mountains, the encounter with wilderness, hazards, and forces of nature, and responsibility, solidarity and physical effort as the means to achieve one's goals. It is a fact that mountaineering in the 21st century still emphasizes the desire to experience the mountain environment in as pristine a state as possible, even if the price for that is physical effort, discomfort, risk or even facing death. This need is facing competition from other

activities which are guided by entirely different “values”, competing for the same space (Keršič-Svetel, 2003).

Tourism in the Alps is also given a great deal of attention by the Convention on the Protection of the Alps, which provides for the preservation of the natural Alpine ecosystem and the promotion of sustainable development in this environment while also protecting the economic and cultural interests of local inhabitants. The Convention arose in response to the growing threat posed by the increasing human use of the space to the Alpine environment and its ecological role: only by balancing economic interests with ecological needs can we prevent damage which, once it occurs, can only be eventually eliminated or mitigated at very high cost. Based on these findings, Alpine nations first met in December 1989 in Berchtesgaden and agreed to conclude the Convention on the Protection of the Alps, which came into force in November 1991.

According to the convention, tourism is the most important source of income in the Alpine space. More than half the population there make a living directly or indirectly from tourism. The impacts brought by tourism on the fragile Alpine ecosystem led to the raising of a fundamental question in the protocol “Tourism: how to balance tourist and recreational activities with ecological and social needs.” The general answer is that priority must be given to those forms of tourism which have the least damaging impacts on the natural environment and local communities (Jeršič, 2003).

High mountain areas in the Alps.



*Figure 5:
Lyskamm (4527 m).*

Figure 6:

Climbing Lyskamm (4527 m), one of the less accessible four thousand meter peaks in the Alps.



Figure 7:

Besides alpine skiing and ski mountaineering, climbing and trekking have been traditionally present and are becoming more and more popular throughout the Alps.



High mountain areas of the world

Exploration of **African mountains** and the first attempted ascents were undertaken similarly as elsewhere in the world in the second half of the 19th century. The highest summit in Africa, Kibo (5963 m), which is the highest volcanic cone of Kilimanjaro, was climbed in 1889, and Mt. Kenya (5199 m) ten years later (Malešič, 1996). In recent decades Kilimanjaro has experienced mass visits. The first ascent of the highest summit of **North America**, Mount McKinley/Denali (6194 m), took place in 1913, and Alaska has also experienced an upsurge of tourism in recent years, visited by about half a million climbers and hikers per year. Aoraki/Mount Cook (3754 m) on the southern island of New Zealand was first climbed in 1894, and the highest summit of Antarctica, Vinson, (4892 m) in 1966. Hiking became popular among the masses in New Zealand after the Second World War, and the organization of trails and huts as well as the environmental and general

awareness of local residents is at an extremely high level. The network of hiking trails has been successfully included into the tourism industry of New Zealand while at the same time the negative environmental impacts of this activity have been effectively prevented through appropriate regulation and education.

The first mountain explorations and routes in the **Andes** reach back to the end of the 19th century. The volcanoes of Ecuador were among the first to be given attention. Cotopaxi (5897 m) was climbed in 1872 and Chimborazo (6310 m) in 1880. These were followed by ascents and exploration in the Cordillera Blanca in present-day Peru, and in the Cordillera Real in present-day Bolivia. The highest summit of the Andes, Aconcagua (6959 m), was first climbed in 1897.

In 1887 a French expedition led by Charles Wiener attempted an ascent of the highest summit in the **Cordillera Real**, Illimani (6480 m), but was only able to reach an elevation of less than 6000 m. In 1898 there was a successful ascent by the English expedition headed by Martin Conway, who made the ascent with two Alpine guides. There were no further attempts for 20 years, then the mountain was tackled by Germans, who in 1919 also climbed two other six-thousanders – Huayna Potosí (6088 m) and Ancohuma (6427 m). The most important landmark in the history of ascents in the Cordillera Real was in 1928, when an Austro-German expedition led by Hans Pfann made ascents of a number of summits, including the most difficult summit in the range, Illiampu (6368 m). Members of the expedition also produced maps of the range and made precise measurements of the elevations of the summits. The Germans continued with their ascents after the Second World War, joined by local Bolivian climbers, who tackled the lower summits and gave increasing attention to the development of skiing (Mihelič, 1997).

Exploration of the **Cordillera Blanca** began back in 1902, when the Englishman Enock with the help of Indian porters hiked across the range and the following year attempted to climb the highest peak, Huascarán (6768 m). He reached an elevation of 5200 m. There followed isolated attempts of routes to various summits, but the first real expedition traveled to the range in 1932. Its members were Austrian and German alpinists who succeeded in completing the first routes to some of the highest peaks (Huascarán, Chopicalqui (6354 m), Huandoy (6395 m), Hualcan (6122 m), Artesonraju (6025 m)). Two more Austro-German expeditions followed, in 1936 and 1940, to the remaining six-thousanders, and also carried out the first scientific investigations and produced the first map of the region (Mihelič, 1997).

In the **Central and Southern Andes**, the development of mountaineering was assisted greatly by **Slovenian immigrants**, who carried out numerous first ascents to summits in the vicinity of Bariloche after the Second World War. They were also successful explorers and climbers in southern Patagonia. In 1951 they founded a Bariloche branch of the Slovenian Alpine Society, and the same year a club was also founded in Buenos Aires. Among the many successful mountaineers the Skvarča brothers stand out in particular, who in the period 1960-1971 made numerous ascents in the Bariloche mountains and summited 27 previously unclimbed peaks in the area of the Patagonian ice. In 1967 Peter Skvarča became the first Slovene to reach the summit of Aconcagua (6959 m). Both brothers were scientists by profession: in 1976 Peter with his colleague Smit made the first

winter crossing of the Patagonian ice fields, and he is still active in researching the Antarctic (Eiletz, 2001).

After the Second World War there was a boom in climbing throughout the whole of the Andes region, and along with it the development of trekking began. The mountains became an exceptionally popular destination due to easier access and rapidly developing infrastructure. Trips to the Cordillera ranges, in comparison with Himalayan expeditions, took considerably less time due to rapid access as well as to lower elevations, while at the same time still offering enough of a challenge to satisfy the primary motivation of alpinists and trekkers – adventure and self-actualization. Moreover, the climbing techniques developed for rapid and technically challenging ascents in the European Alps could be transferred to the higher elevations of the steep faces in the Andes, whereas in this respect the Himalayas lagged behind, since for several decades routes were developed for mountains above 7000 and 8000 m.

High mountain areas in the Andes.

Figure 8:

Cotopaxi volcano (5897 m) in Ecuador is one of the most popular summits in the Andes.



Figure 9:

Trekking in the Andes has expanded especially in the past few decades.





Figure 10:

The highest peak of the Andes – Aconcagua (6962 m) - requires an expedition style approach, comparable to those in the Himalayas.

The broader region of the Himalayas

The first visitors to the range came in search of the mythical lands described in the religious texts of India and Tibet, according to which there existed spectacularly beautiful areas in deep hidden valleys, guarded by towering snow-capped peaks, where only fervent true believers could experience religious revelation. Numerous legends arose about these extraordinary places – true “paradises on Earth”, which also offered solutions to all the personal problems of potential visitors (for example, the Shangri-La of James Hilton’s novel “Lost Horizon”, Shambhala in Tibet). Particular mountains were regarded as sacred by local inhabitants, the dwelling place of the gods, standing out from the landscape primarily due to their shape. One of the best known is the mountain of Kailash (6638 m) in Tibet, considered the spiritual center of the region, and a sacred mountain for all Hindus. The path around the mountain even today is intended mainly for believers—Buddhists and Hindus—and it is forbidden to climb it. Similarly, Mount Everest (8848 m) is regarded by Sherpa tribes in Nepal as the Goddess Mother (Sagarmatha) and by Tibetans as Goddess Mother of the Earth (Chomolungma). In addition to the most famous mountains, there are also a number of holy sites of local significance, associated with particular mountain valleys, peaks, waterfalls, and springs, which as such are important for the local population (Zurick, Pacheco, 2006).

Differing perceptions of mountain regions caused the first mythical geographical representations, in which summits are the thrones of the gods, forests are full of different demons and gods, and mighty rivers are holy and also sanctify the land through which they flow. Such beliefs have been preserved up to the present day. In addition to religious motives, the first visitors to high mountains had military and commercial motives—they hoped to conquer new and unfamiliar territory, they sought new markets and new goods to sell. It was extremely rare for someone to go into the mountains purely in order to learn about the mountain environment for its own sake. The earliest information about the mountains of Central Asia came to Europe from the soldiers of Alexander the Great, who traversed the

Hindu Kush in 325 B.C. as far as the valleys of the Hunza and Swat in present-day Pakistan. After that there was a long period with no real information about traverses and exploration of the Himalayas. Then from the 4th to the 7th centuries the Chinese were active in exploring the range. The next European to go there, who is reputed to have reached China (still unproven today), Marco Polo, avoided the highest parts of the Karakoram and the Himalayas, taking an easier route to the north of the highest peaks (Zurick, Pacheco, 2006).

The first descriptions of the mountains were produced 300 years after Marco Polo by Jesuit priests who, similar to Buddhists and Hindus, were seeking religious revelations there. The first explorers of the Himalayas (Jesuits and Capuchins) and other priests generally described the region as a "terrifying landscape, always covered by snow, and inhabited by people with savage, heathen customs which turn them away from the true God." The French priest Father Regis was the first to draw a map of the Himalayas, in 1717, based on the notes and sketches of two monks who had traveled across Tibet. Christian priests for the most part functioned as spies and their attitude towards the locals was extremely arrogant. For this reason Tibet and its allied kingdoms (Ladakh, Sikkim and Bhutan) were closed off entirely to foreigners in the mid-18th century (Cheneviere, 1993).

Tibet was highly attractive to the British in particular, to whom it was obvious that the region was controlled by the Chinese. Meanwhile, representatives of the East India Company and the Royal (British) Army broke up Mughal rule and in 1773 a decree was announced in London which became the basis for the establishment of the British Empire. A century later the empire reached from Afghanistan to present-day Myanmar. The British sent a number of expeditions to the Himalayas which succeeded in crossing the range, usually from north to south. Europeans had a great deal of difficulty in communicating with local inhabitants since the former were portrayed by the Chinese authorities as adventurers who merely lusted after gold and wanted to destroy Buddhism. Tibetans providing any form of assistance to foreigners could expect to be tortured and even executed. Due to the increasing tensions between the British and Tibet, at the end of the 18th century most of the broader region of the Himalayas became closed off to foreigners. The 19th century was the age of British imperial expansion—British scouts pretending to be monks traveled the length and the breadth of the Himalayas and acquired crucial information for the British Army, which subjugated most of the Indian subcontinent and opened up a route to Tibet (Cheneviere, 1993).

At the beginning of the 19th century the eastern Himalayas and Karakoram also began to be explored. The first real geographical investigation was led by Sir George Everest, who employed local residents in making measurements of distances and elevations. In 1852 the elevation of Mount Everest was measured - 8850 m, and in 1858 the elevation of the second highest mountain in the world, K2, was determined to be 8621 m (in fact 8611 m) (Zurick, Pacheco, 2006).

In the mid-19th century Russians also began to be interested in Tibet, and an 1872 expedition under the leadership of Nikolai Przhewalsky successfully gathered a large amount of geographical and political information about the region. Rivalry with the British intensified, and led to occasional clashes. The 11th Dalai Lama closed

Tibet again to outsiders. Ladakh, Sikkim and Bhutan preserved their autonomy in the regions where the British retained control. The war between the Russians and the British for Tibet continued up to the beginning of the 20th century, when they signed a peace treaty. In 1910 Tibet was attacked by China (Cheneviere, 1993).

This historically unstable region was rocked again by crisis in 1947, when India declared independence and the region was divided between Islamic Pakistan and Hindu India. At the same time, the Kashmir question became an acute issue, with India claiming three-fourths of the territory of Kashmir for its own. This territorial dispute remains unsettled to this day. Tibet was officially annexed by China in 1951; in 1959 the current Dalai Lama Tenzing Gyatso fled to India. Today, three regional powers – India, Pakistan and China – lay claim to the broader region of the Himalayas; the eruption of conflicts is simply a matter of time (Cheneviere, 1993).

The development of mountaineering

The first mountaineers in the Himalayas were members of British cartographic expeditions to the western Himalayas, Karakoram and Hindu Kush; these areas were more easily explored since Tibet, Nepal, and Bhutan were closed off during that time. One of the most important mountaineers of the time was Captain Godwin-Austen, who led surveying expeditions in Pakistan in the 1860s. He mapped most of the glaciers in the Karakoram and obtained data for topographical maps of the summits around K2, and in the course of this work climbed a number of lower mountains. The highest trigonometrical station was set up by W. H. Johnson, above 6000 m in Kashmir. In 1885 Francis Younghusband led a scientific research expedition into the region north of Gilgit, in the Hunza Valley—the first expedition whose main priority was to study the mountains. The report from this expedition contains a great deal of information on mountain passes and trade routes across the northern borders with India in addition to basic geographical data. Although Younghusband is regarded as the first mountaineer, he was nevertheless a colonial soldier and the purpose of his expedition was primarily of an imperial nature (Zurick, Pacheco, 2006).

The first person to travel to the Himalayas for purely mountaineering purposes was W. W. Graham, who in 1883 aspired to climb Kangchenjunga (8586 m) in the Sikkim Himalayas, and later on the mountain Nanda Devi (7816 m) in the Kumaon range. His attempts were not successful, but his accounts of the endeavor aroused the interest of the Royal Geographic Society (RGS) in London, which later supported a number of climbing expeditions in the belief that mountaineering represented a successful combination of adventure and science. The first Himalayan expedition sponsored by the RGS was to the Karakoram, led by Martin Conway. The primary purpose of the expedition was to ascertain the altitude to which a person could ascend despite the lack of oxygen. Porters from the Sherpa tribe (Nepal) were included in the expedition. The reputation of Nepal's Sherpas was validated once and for all on May 29, 1953, at 11.30, when Nepalese Sherpa Tenzing Norgay stood with New Zealander Edmund Hillary atop the highest point in the world, the first two persons to do so (Zurick, Pacheco, 2006).

The first climbing expedition to an eight-thousander was led by Briton A.F. Mummery in 1895, with the goal of ascending Nanga Parbat (8125 m). The expedition ended in tragedy with the deaths of several members including the leader. This expedition was also supported by the RGS. At the turn of the century there were several more climbing expeditions whose goal was to ascend the highest summits. One of the most famous took place in 1909, when the Italian Duke of the Abruzzi, Luigi Amedeo, organized an expedition to K2. 300 porters took part in the expedition but it was not successful. However, members reached a height of 7500 m on neighboring Broad Peak, which was the highest point attained on Earth at that time (Zurick, Pacheco, 2006).

The first expeditions to K2, Nanga Parbat, Nanda Devi and Kangchenjunga as well as to many lower peaks were extremely valuable for later expeditions, since the members of these first expeditions became familiar with the high mountain landscape and their own mental and physical characteristics at elevations above 6000 m above sea level. Given the growing knowledge of mountains and the development of climbing techniques, it was only a matter of time before an ascent of Everest was attempted. The main obstacle to the venture was the mountain's location in Nepal, which remained closed off to foreigners at the beginning of the 20th century. A committee for the ascent of Everest was formed within the RGS and successfully arranged for permission for the British to make an ascent from the Tibetan side. Thus in 1921 a reconnoitering expedition was organized, and in 1922 E.F. Norton, George Mallory and Howard Somerwell attempted the ascent and achieved a height of 8225 m, becoming the first to exceed an elevation of 8000 m, which was a tremendous physical as well as psychological achievement. In 1924 George Mallory and Andrew Irvine tried again and remained on the mountain forever; whether they actually achieved the summit before perishing remains a major mystery, to which answers are still being sought, particularly in recent years (Zurick, Pacheco, 2006).

In 1949 Nepal opened up its mountain regions and a French expedition under the leadership of Maurice Herzog completed the first ascent to an eight-thousander: Annapurna (8091 m). Three years later Mount Everest (8848 m) was climbed, then Nanga Parbat (8125 m), and the remaining Himalayan giants were all climbed by 1964. The last one, Shishapangma (8012 m), was climbed by a Chinese expedition (Zurick, Pacheco, 2006).

The influence of climbing expeditions on the development of mountain tourism was transmitted initially through a number of books describing heroic ascents of wild and still unclimbed summits, but along with this there was also increased interest in the Himalayas and their natural and social geographical features. Maurice Herzog's 1952 book *Annapurna* was the most popular mountaineering book of all time. It sold 15 million copies and was translated into 50 languages (Ives, 2004). The descriptions written by the earliest mountaineers shaped the motives for traveling into high mountain areas.

The first successful ascents of the eight-thousanders were followed by the scaling of massive rock faces. New routes were established and the first independent (solo) ascents, and ascents without the use of supplemental oxygen, were made. The

1970s and 1980s saw huge growth in mountaineering, with a leading role played by Reinhold Messner, the first person to climb all 14 eight-thousanders, without the use of bottled oxygen. The popularization of climbs to the eight-thousanders has been booming in recent decades with the growth of commercial expeditions enabling the participation of people with minimal mountaineering experience. Amateur ascents accompanied by professional mountain guides have become common, raising the issue of their appropriateness in particular from the standpoint of mountaineering ethics. Clients pay a great deal of money and set out on expeditions with inadequate preparation and lacking true motivation (Zurick, Pacheco, 2006). As a result, fatalities are common and the pressure on the fragile mountain environment is extreme.

Along with the boom in mountaineering, the number of trekkers going into all parts of the Himalayas, Karakoram, and other ranges has also grown rapidly, and the local populations of mountain regions have begun to adapt to them.

Mountaineering in the broader region of the Himalayas.



Figure 11:

*Khan Tengri base camp,
Tian Shan Mountains,
Kyrgyzstan.*

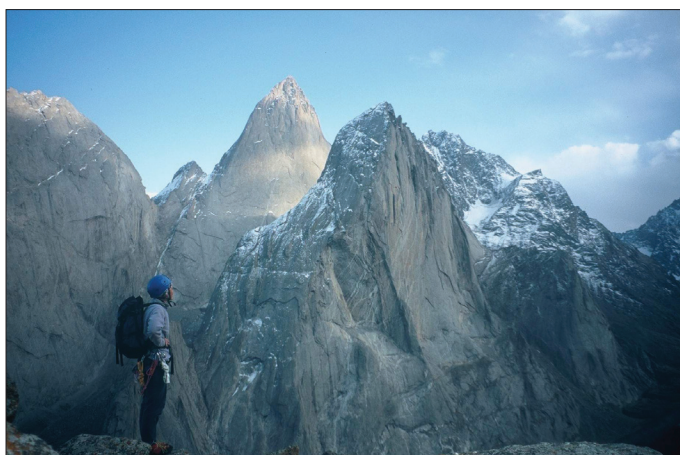


Figure 12:

*Climbing area of
Karavashin in the Pamir –
Alaj range on the border
between Kyrgyzstan and
Tajikistan.*

Figure 13:

A line of porters in the Hindu Kush range, Afghanistan.



The development of trekking

Trekking began in the 19th century in India, when British families vacationing in Kashmir, Simla and Darjeeling engaged in hunting, fishing, and walking. Trekking today is tied to the establishment of the first tourism agencies in Nepal in 1966, offering guiding services along mountain trails. At that time Jimmy Roberts started to organize the guiding of groups in the mountains of Nepal. The popularity of the activity soared each year, and today about a million people visit the region of the Himalayas and Karakoram. Trekking is best organized in Nepal, where it represents a very important part of the tourism industry. Most organized groups of trekkers are led along well-maintained trails, very often within national parks and other protected areas. Two of the oldest circular routes are Solukhumbu in the vicinity of Mount Everest and around Annapurna, north of the Pokhara Valley. The area around Mount Everest is included in Sagarmatha National Park, which was established in 1976 and encompasses 1148 km². The park includes the highest mountain in the world and many seven-thousanders, along with extensive forests of hemlock and rhododendron providing habitat for endangered wildlife species; it is also home to 3500 members of the Sherpa tribe, who, despite the large numbers of visitors, have managed to preserve their culture and traditions. They are actively included in the tourism industry, with 75 % of the tribe members employed in tourism. In recent years the most popular destination has been the region around Annapurna, which was opened to trekking in 1977 and is visited by about 50,000 tourists annually. They are attracted by the highly diverse landscape, the vegetation zones, the views of snowy peaks, and the ascent to the Thorung La pass (5416 m), which provides a taste of a real mountaineering feat. This region is also protected as part of the "Annapurna Conservation Area", which with a territory of 7629 km² is the most extensive protected area in Nepal. It is characteristic of the region (as also for the other parts of Nepal) that the trails pass through villages where local residents offer overnight accommodation and food, and hence it is possible to follow the route in smaller groups as well. Tourists are thus in regular contact with local residents. This method is greatly similar to the pilgrimages and explorations which have been

historically characteristic of the Himalayas. Trekking enables the modern exploration of Nepal, especially areas which were only recently opened up to tourists (Zurick, Pacheco, 2006).

Nepal is thus the best known trekking region, although the western part of the Himalayas (India, Pakistan) and the Karakoram as well as the other Central Asian mountain ranges also provide conditions for this activity. As already mentioned, the first Himalayan explorations took place in the western regions at the beginning of the 20th century since Nepal and Bhutan were closed off. Colonial British families at that time spent their summers for the most part in Kashmir. The region became extremely popular among trekkers in the 1970s and 1980s, but then political instability in the region (especially along the border between India and Pakistan) halted tourism for more than a decade. Trekking in this part of the Himalayas and in the Karakoram is completely different from that in Nepal. The population of the area is small and the locals do not offer tourist services in the same way that the Nepalese do. The routes are considerably wilder, rivers are hard to cross, and it is not possible to replenish food supplies each day. For this reason activities must be carefully planned in advance, similar to climbing expeditions, which means that groups hire their own porters, cooks, and guides from villages in the vicinity of the route (Zurick, Pacheco, 2006).

All forms of tourism have recognized economic and environmental impacts. To some extent religious pilgrimages and modern forms of mountain tourism (in particular trekking) are similar: "secular inspiration" for recreational trekkers in high mountain areas is comparable to the spiritual inspiration of pilgrims. Nevertheless, there is an essential difference: modern tourism in the Himalayas urgently requires "development", which means that it has an impact on fundamental changes in the way of life and social structure of traditional communities, whereas the impact of pilgrims is substantially lower (Ives, 2004). The explosion of trekking in the broader region of the Himalayas has brought tremendous changes to the landscape, reflected in the amount of waste produced, trail erosion, and deforestation due to the need for cooking and heating fuel. The presence of foreigners in remote parts of the Himalayas is also gradually influencing the "erosion" of culture and tradition. It is a long-term process, but in the last few decades it has been accelerating (Zurick, Pacheco, 2006).

The rapid development of international tourism after the Second World War was suggested as the solution to various international problems, in particular the need to reduce intercultural misunderstandings and as a form of assistance, by transferring part of the wealth generated from tourism to the poor in many tourist destination regions. Tourism brought economic opportunity to the underdeveloped regions of the world, where the natural environment and traditional culture were the most attractive factors. The demand of tourists was expected to stimulate new jobs, the creation of a market for locally produced goods, greater economic independence of local residents, improvement of their standard of living, and reinforcement of cultural consciousness and pride. The most optimistic forecasts also included raising environmental awareness and a greater receptiveness to nature conservation. Some forecasts were in fact realized, but in the last

two decades criticism has been intensifying as it becomes clear that tourism in all areas has caused more harm than good, especially in terms of environmental impacts, influence on traditional culture, economic disparities among local residents (the poor and the less poor) and impact on gender inequality, where women are generally paid less than men for the same work (Ives, 2004).

Increasingly sharp criticism of the harmfulness of mass mountain tourism has led to a search for alternatives among tourist travel organizers as well as among experts, who have begun promoting alternatives such as adventure tourism, nature tourism, ecotourism, trekking tourism, etc., all of which strive to minimize negative impacts on the environment—the label that was eventually adopted to describe this kind of tourism is “sustainable ecotourism” (Ives, 2004).

The development of mountain tourism in the broader region of the Himalayas is determined by three main factors: political circumstances, the physical accessibility of the area, and financial investments. Whereas the first two factors operate in concert, the third follows only when the political situation is stable and the accessibility of the region is the best possible. Climbing expeditions represent special cases, since they have always preceded the development of mass mountain tourism. Official permits for summit attempts were given by the authorities for each expedition separately, including for regions which were and still are otherwise strictly closed to foreigners; this occurred well before the first trekkers were able to arrive at base camps. The physical accessibility of mountain regions (the Himalayas in the broadest sense) has improved with the construction of roads and routes for off-road vehicles, and now almost all regions have been opened up to foreigners. The poor traffic infrastructure did not have much of an effect on climbing expeditions, since long access routes are the best form of acclimatization for ascents into the so-called “death zone” at high elevations. Even so, tourism in the Himalayas experienced a real boom once there was better (road and air) access. Financial investments usually come from lower-lying industrialized regions, something which has led to increasingly less control over the development of tourism by mountain inhabitants, and who accordingly also have a decreasing share in the economic benefits (Ives, 2004).

Despite the extraordinary boom in mountain tourism, pilgrimage and religious tourism remains in first place in the Himalayas in terms of the number of visitors: the Hindu holy city of Badrinath, for example, is visited annually by 500,000 believers. In the last two decades the number of domestic tourists has also increased greatly in China and India. They now outnumber foreign tourists, and their influence on the environment and local culture is becoming ever stronger (Ives, 2004).

Residents of mountain regions are increasingly included in the activities of high mountain tourism, at the same time tourists and visitors influence changes in their traditional values.



Figure 14:

Members of the Balti tribe in Pakistan usually work in summer as porters on the Baltoro glacier.



Figure 15:

Women from the Vakhi tribe in Pakistan graze their sheep in summer along the Batura glacier, a popular destination for trekkers. They like to invite women trekkers to have tea with them.



Figure 16:

Porters in the Hindu Kush did not see mountaineers for more than 25 years due to the political situation in Afghanistan. Over the last few years the number of visitors has been increasing, along with demand for porters.

Figure 17:

Porters in the Karakoram preserve their traditional dress of shalwar kameez in spite of many years of interaction with foreigners (mountaineers, tourists).



Figure 18:

Guides and attendants for trekking groups and climbing expeditions for the most part have exchanged traditional dress for western.



Figure 19:

Especially in Pakistan, women in mountain regions are not directly employed in tourism: their religion forbids contact with outsiders. This tradition is preserved in all areas, but they are indirectly included in tourism through the weaving of carpets, making of souvenirs, and similar.



Forms of tourism and recreation in high mountain areas

Most of the research on tourism and recreation in high mountain areas relates to identifying the characteristics of participants in various tourism and recreation activities in mountain and high mountain areas, in which authors focus more on mountaineering as a form of adventure recreation and less on mountaineering as a form of adventure tourism (e.g. Breivik, 1996; Loewenstein, 1999). In most studies mountaineering is covered only as part of adventure tourism (e.g. Beedie, Hudson, 2003). Mitchell (1983), for example, describes mountaineering only as a group of activities which includes climbing, trekking, various programs of physical activity in the mountains, and ski mountaineering.

Many such studies examine the motives people have for visiting mountains and taking part in particular activities, and the personality traits of mountaineers, which, we may assert, are reflected in the region. Risk-taking and seeking challenges are highlighted by researchers as crucial factors in motivation (e.g. Elmes, Barry, 1999; Ewert, 1985; Loewenstein, 1999). Also extensive is the literature on the historical development of mountaineering around the world (e.g. Ives, 2004; Cheneviere, 1993; Zurick, Pacheco, 2006) and in Slovenia (e.g. Janša 1968; Malešič, 1996), in which the authors present the chronological development of the activity, with a focus on the first attempts at ascents of the most important summits (the highest, most difficult, etc.). Mountaineering as an activity which places pressure on the mountain environment is also dealt with by a number of authors, but these for the most part concern either the broader regions of the Alps and the Himalayas (e.g. Keršič-Svetel, 2000; Ives, 2004) or focus on specific environmental impacts of the activity, for example trail erosion (e.g. Godwin, 2000; Jewell, Hammitt, 2000). The environmental impacts and economic effects of mountaineering are described in detail in a study of the protected area of Annapurna in Nepal (Pobocik, Butalla, 1998; Ives, 2004). Sanjay Nepal (2000) has studied the development of tourism in protected mountain areas in the case of the Himalayas of Nepal. The environmental impacts of climbing expeditions are described in an article by Kuniyal (2000), who also provides specific proposals for organizing them in a more environmentally friendly way.

Definition of adventure tourism

Tourism is originally categorized as belonging under the rubric of **leisure activities**, although the definition of the World Tourism Organization (UNWTO) also implies activities associated with employment. The main reason for this is that tourism is associated with traveling, whose purpose may be a cause or result of spending leisure time or conducting business.

The World Tourism Organization describes **tourism as** “the activities of persons traveling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes” (UNWTO, 2008).

The primary difference between tourism and **recreation** is that the latter does not include overnight accommodation. The activity may be the same (for example, climbing, trekking, etc.), the difference lies in the duration. Thus all three terms—tourism, recreation, and leisure—represent activities which are based on various pursuits and experiences. The main characteristics of these activities can be summarized as follows (Swarbrooke et al., 2003):

- they provide opportunities for satisfaction, enjoyment, and self-expression, making them intrinsically motivating for the individual,
- they take place during times and in places which are separate from those of everyday obligations (employment, taking care of one’s family),
- they are taken up by the individual freely and voluntarily.

Tourism and recreation consist of various activities which can take place in different geographical environments, depending on their characteristics. Given the geographical characteristics of high mountain areas, the choice of tourism and recreation activities in these areas is narrower, although with the development of various sports, equipment, and expertise it is expanding.

Mountains are an especially attractive region for various activities which are classified as **adventure tourism** (Beedie, Hudson, 2003). With respect to the basic definition of tourism and recreation, adventure tourism and recreation have quite specific characteristics and are comparable with classic tourism and recreation only in certain segments (for example, overnight accommodation, travel).

It is important to define the concept itself of “**adventure**”, which individuals interpret very differently; however, of crucial significance are just those personal perceptions, expectations, and sense of adventure, which more often than not convey quite different associations: for example, excitement, thrills, adrenaline, fear, a strenuous journey, challenge, the extreme, enthusiasm, success, boldness. The quality of the adventure, and indirectly also of adventure tourism and recreation, is based on the following characteristics (adapted from Swarbrooke et al., 2003):

- **Indeterminate outcome, uncertainty** (*reaching the summit of a mountain, completing the route one has set, swimming a dangerous section, rafting a river without an accident, and so on*): the absence of a guaranteed result of an activity enhances the excitement of doing it and the participant’s commitment. Moreover, the presence of danger increases the uncertainty.
- **Danger and risk** are directly connected with uncertainty, which in itself creates a sense of risk. The latter is caused by the exposure of participants to danger. Risk can be expressed as a physical one (various injuries, pain, death) or a mental one (humiliation, embarrassment, loss of self-confidence, loss of friends). Danger is represented by different circumstances (i.e. objective dangers—an icy section of trail, lightning strike, powerful ocean currents, etc.), and can also originate from the

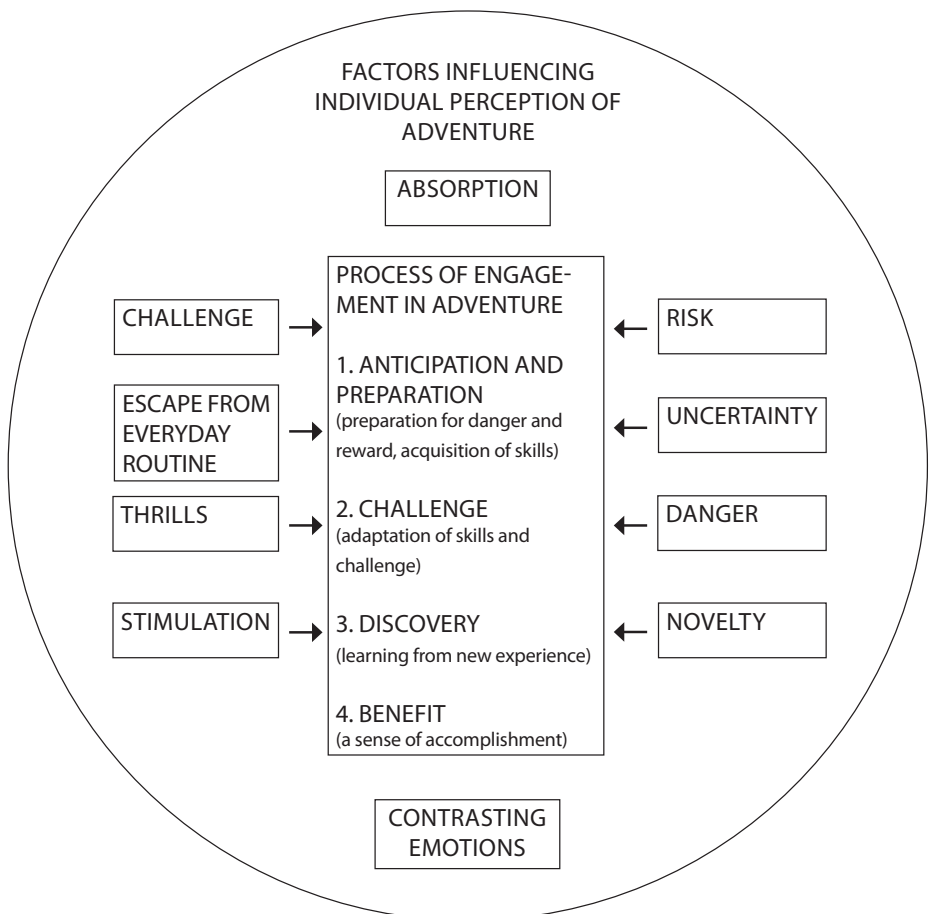
participant (subjective dangers—for example, poor physical conditioning, mental instability, etc.). The ability to face danger and cope with risk is highly dependent on the individual.

- **Challenge** represents a combination of uncertainty, danger, and expectation of difficulties. Challenge is also not dependent solely on the degree of uncertainty, but also on the skills, capabilities, and expertise of the individual. Colin Mortlock (1984) studied the connection between risk and competence in the context of adventure and developed a typology of degrees of adventure, in which an adventure with a low level of danger is comparable to a game—simple and pleasant. But when the nature of the activity exceeds the skills and abilities of participants, there is a high probability of accidents and even tragedy.
- **Anticipation of reward** (*summitting a mountain, climbing a route, etc.*): participants in adventure activities expect a certain reward and personal benefit that comes from participation alone, and which in large measure is a consequence of the desire of the individual and their self-motivation. The reward may be simply an exceptional story, photograph, or particular objects (souvenirs, rock fragments, etc.). In any case the feeling of personal benefit is essential, since otherwise the adventure could turn into an obligation.
- **Novelty**: most adventure activities include an element of doing or trying something new and unfamiliar. This is what attracts a large share of participants, who want to try or be something “different” and “out of the ordinary”.
- **Stimulation and excitement**: adventure is a stimulating and very intense experience in which participants are exposed to an environment and circumstances which stimulate their senses, feelings, and minds. Intensive stimulation creates enthusiasm, but the actual degree of stimulation and consequently also enthusiasm is once again highly dependent on the individual.
- **Escapism and separation** (*e.g. from the usual groups of tourists*): or also an escape from everyday routine into something special, unusual, and at the same time significant for the individual, a feeling which is greatly enhanced by an exotic environment in which the activity takes place.
- **Exploration and discovery** are at the core of every adventure activity. Given that the world today has been in large measure very well explored already, modern adventures are more carefully planned, specialized, and technically demanding, and involve primarily a form of “inner” discovery which participants want to experience.
- **Absorption and focus** are characteristic of every adventure, generally requiring a mix of skills and effort on the part of participants.
- **Facing feelings and emotions** (*e.g. at the top of a mountain, along challenging climbing routes, the overcoming of various obstacle in trekking, coping with unforeseen events in a group—for example, injury and/or death of participants, etc.*): every adventure is also an emotional experience. A certain measure of feeling and mental effort is invested by participants even before the activity has begun (*e.g. dreaming, worrying, hoping, trusting*), which contributes to their resolve to take part. Uncertainty and risk as well as the difficulty of the activity also contribute to

the participants' successful coping with contradictory feelings and emotions— e.g. dread and enthusiasm, joy and despair, fear and enjoyment. In the absence of these kinds of experiences we cannot make reference to adventure.

The characteristics outlined above are interrelated and interdependent: where all are present, true adventure is guaranteed. Adventure, of course, is what the individual interprets it to be, something which is a personal construct based more on mental and emotional perceptions than on physical capabilities. Nevertheless, adventure tourism and recreation require active involvement from participants, which can be on a physical, intellectual, emotional or spiritual level. These different levels can be intertwined; which one comes more into play depends on the type of adventure activity. In any case the essence of every adventure is that it demands a certain degree of effort and commitment from participants, and mental and physical preparation are very important (Swarbrooke et al., 2003).

Figure 20: The process and characteristics of the adventure experience.



Source: Swarbrooke et al., 2003.

The fact is that adventure tourism and recreation are distinguished from other forms based on a number of characteristics, but the essential distinguishing characteristic, which is crucial for these kinds of activities, is **risk**. As we have stated, it is risk that is the main driving force or feature of adventure activities from the participants' perspective, since this makes the uncertainty of the outcome greater, thereby increasing the attractiveness of adventure activities.

Risk can also be understood in a broader sense, since in the case of adventure tourism and recreation, risk appears in different areas. These kinds of risks are of crucial importance in planning the development of adventure tourism and recreation in a particular region: which of the recognized risks is more strongly present or even primary depends on the geographical features of a region.

Figure 21: The risks of adventure tourism and recreation.



Source: Swarbrooke et al., 2003

In high mountain areas, the **risk to the environment** and **the risk of participants** and as a result also of rescuers are in the foreground, something which needs to be specially considered in planning adventure activities in these regions.

The psychological profile of participants in risky sports (climbing, diving, ski-jumping, etc.), which belong in the category of adventure activities of tourism and recreation, reveals that they are emotionally stable individuals who are capable of controlling their emotions: they are stable, patient, relaxed, and give the appearance of calm and contented individuals who tolerate stress well even in risky situations and when faced with sudden changes (Kajtana, 2003).

Some authors focus in particular on the risk posed to individuals, based on many tragic events, the result mainly of carelessness and poor decisions on the part of individuals and sometimes also of the organizers of the activity, or failures of the technical equipment required for most such activities. Risk is also posed by natural disasters and the possibility of terrorist attacks. Accidents which occur during adventure tourism and recreation are the result of the mutual interaction of objective (environmental) and subjective dangers (Swarbrooke et al., 2003). Among the most successful providers of adventure services are those who succeed in reducing the level of risk while still preserving a high level of thrills and excitement (a principal feature of every adventure activity). This is not just an ethical feature; it also ensures the sustainability of their business (Cater, 2006).

A model of risk management for mountain adventure tourism consists of many phases (Swarbrooke et al., 2003):

1. **Avoidance of objective dangers**, which can be foreseen in the planning phase of an adventure activity. Here a good knowledge of the environment in which the activity takes place is of crucial importance.
2. **Risk reduction** through the inclusion of people familiar with a particular area, who also have the required expertise, which can influence risk reduction, since they are capable of making the right decision at critical moments.
3. **Risk transfer**, which means for example the transfer of risk to third parties, in this case an insurance company, by means of accident insurance.
4. **Risk retention** is in certain cases intentional and is usually associated with risks which are low in frequency and severity.

Appropriate **risk management** can have a positive indirect influence on reducing environmental risk, although this should be an obligatory element in all planning of adventure activities, not only in high mountain areas but also more generally. Reducing the risk of adventure activities to the environment is not cited separately by authors, but only in the context of recognized environmental impacts and the effects of particular activities on environmental elements. They highlight the **importance of ethical practices in both the planning of and the actual participation in adventure activities**.

Given the rapidly growing supply and demand of adventure activities, there is likewise a growing **environmental risk**, as a result not only of the ever increasing numbers of tourists but also of their dispersal throughout the space.

We refer to **adventure tourism** when a trip and leisure activities are organized based on the desire to create an adventure experience. This is based on a complex set of different emotions; first and foremost it is about tremendous excitement and a desire for an event which provides a complete break from everyday life. An adventure experience includes intellectual, physical, and emotional risks and challenges, and ensures inner satisfaction based on enjoyment, learning, and personal growth of the individual (Swarbrooke et al., 2003).

Given its characteristics, it is a fact that **adventure tourism requires a particular geographical environment** for its realization (mountain areas, rivers, lakes, sea, etc.). This environment with respect to its natural geographical features is highly sensitive and there exists that much more a possibility of its degradation from the inappropriate and especially the uncontrolled development of a wide variety of adventure activities.

Adventure activities include the following: **physical activities** which are based on certain specific skills and expertise (e.g. climbing, diving, etc.); activities which enable **contact with nature** in the broadest sense (e.g. trekking, bird-watching, rafting etc.); activities which enable **contact with different cultures**, way of life, religion; **long journeys** on foot, using different animals, or vehicles. Regions where such activities take place are as natural as possible and removed from areas of permanent settlement; participants generally describe them as "unusual" or "exotic." These are regions whose natural resources support the activities, which involve risk, challenge, discovery, etc. while also pushing one's physical and mental limits. These limits are extended through the acquisition of relevant knowledge and experience, drawing the participants into new and more demanding adventures, adapted to the degree of remoteness of the area in which the activity is set; the level of skills and expertise required; the degree of effort and resourcefulness needed (Swarbrooke et al., 2003).

Most authors distinguish activities of adventure tourism and recreation also based on where they take place: on the surface or underground, in water, in the air, or a mixture (Pomfret, 2004).

Although there are many activities which can be recognized as being adventure ones, some authors assert that those which are planned in advance should not be categorized as adventurous, since the very meaning and understanding of the word "adventure" involve some degree of uncertainty of outcome (Price, 1978; Miles, Priest, 1999). Nevertheless, the majority of activities are marketed, advertised, and sold as "adventure", "adrenaline", and similar.

Given the increasing diversity of adventure activities, the definition of this kind of tourism and recreation will gradually undergo a change, which will also be a consequence of the expansion of such activity to environments which are not typically regarded as "adventurous".

Swarbrooke et al. (2003) thus anticipates that soon an artificial environment will also be regarded as "adventurous"; especially urban areas, and adventure activities will also be expeditions whose objective is nature conservation, journeys aimed at spiritual enlightenment, hedonistic and sex tourism, etc.

Forms of adventure tourism and recreation in high mountain areas

The activity attracting the greatest numbers of participants in high mountain areas is **mountaineering** taken in the broadest sense of the word: according to the definition of the International Mountaineering and Climbing Federation (UIAA), it includes three large groups of activities – hiking, climbing, and ski touring. These are further defined in more detail based on how and where they take place.

Table 2: Mountaineering according to the definition of the International Mountaineering and Climbing Federation (UIAA).

hiking	climbing	ski touring
<ul style="list-style-type: none"> ▪ along marked trails ▪ cross-country hiking ▪ winter hiking in the mountains (above the snow line) ▪ trekking 	<ul style="list-style-type: none"> ▪ along marked and fixed routes ▪ free climbing on natural faces ▪ aid climbing on natural faces ▪ ice climbing ▪ dry tooling ▪ sport climbing on natural faces ▪ sport climbing on artificial climbing walls ▪ bouldering 	<ul style="list-style-type: none"> ▪ ski touring ▪ ski mountaineering ▪ snowboard mountaineering ▪ competitive ski touring

Source: adapted from Keršič-Svetel, 2003

Of the activities listed above, the following predominate in high mountain areas: **hiking along marked trails and cross-country hiking, winter hiking in the mountains** (above the snow line) and **trekking, climbing along marked and fixed routes, sport climbing on natural faces, aid climbing on natural faces, ice climbing, dry tooling, ski touring, ski mountaineering, and snowboard mountaineering**. Activities that have been historically present in high mountain areas are hiking in the broadest sense and climbing on natural faces placing protection along the way, while all the other activities developed later, particularly in recent decades.

Besides mountaineering, downhill skiing along groomed ski trails is also present in high mountain areas, along with a range of more modern forms of activity which reflect the development of sports and technical equipment, new knowledge, and the desire for physical exercise, something which is “missing” from most people’s everyday lives. Most often these are activities such as paragliding, mountain biking, driving off-road vehicles and snowmobiling, and heli-skiing.

Characteristics of mountain tourism and mountaineering

There have been a number of attempts to formulate a **definition of mountain adventure tourism**: most researchers present it as a form of adventure tourism which is a result of an attractive natural environment—mountain regions. Nevertheless, mountain adventure tourism is not just one-dimensional; several factors must be taken into consideration, with a particular focus on the active participation of the potential mountain tourist (physical activity of varying degree) and for this very reason it is closer to work than to vacation. Through their activities, mountain tourists can positively affect or transform their self-image (for example, weight loss, tanning, stress reduction) and consequently also their way of life (Beedie, Hudson, 2003).

Mountain adventure tourism also has an important business character. As with other economic activities, in mountain adventure tourism there is also a significant element of competitiveness and an attempt to dominate the market by large agencies and companies, in which opportunities for smaller ones are to be found primarily in their ability to adapt rapidly to demand and to specialize (Beedie, Hudson, 2003).

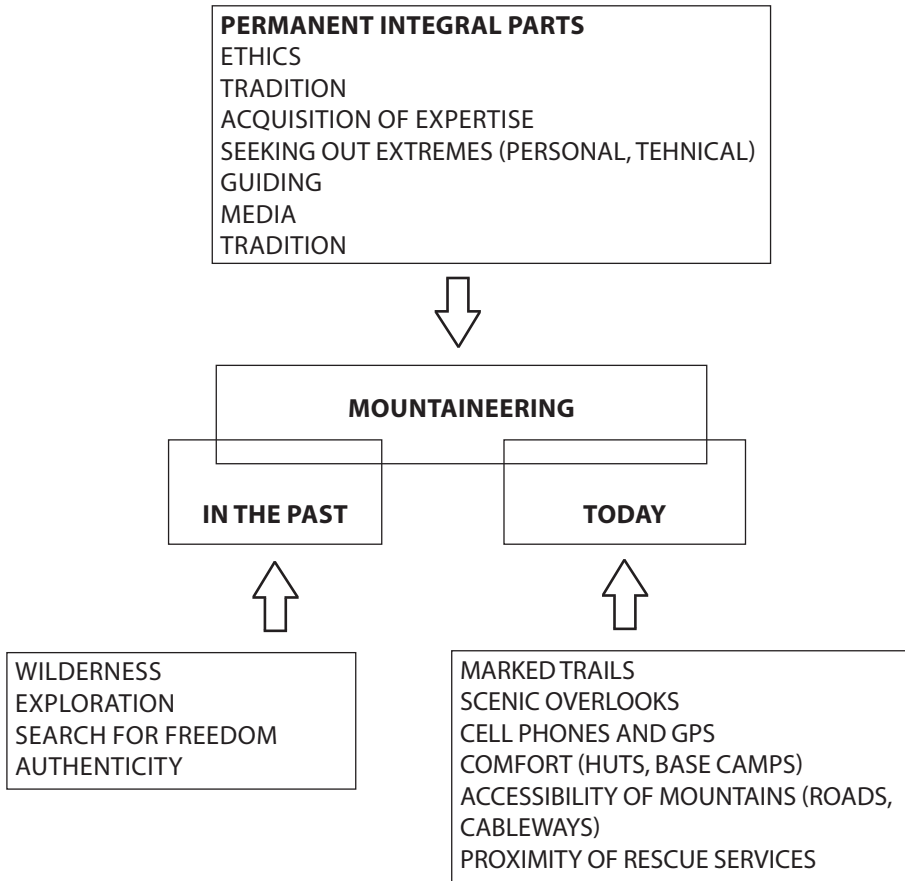
A rigid definition of mountain adventure tourism is not possible at this time, but we can assert with some confidence that a complex mix of social, economic, and cultural factors influences the development of the activity: mountain adventure tourism and increasingly diversified forms of recreation in the mountains are becoming more and more interconnected with rapid development. The frames of mountain adventure tourism and various forms of recreation are not fixed but are adapting to the complexities of the activities themselves, and this is reflected most visibly in environmental impacts. Concern over these impacts elicits cautions from many different formal and informal associations (e.g. Mountain Forum) (Beedie, Hudson, 2003), as well as Mountain Wilderness (International Association for the Preservation of Mountain Wilderness), CIPRA (International Commission for the Protection of the Alps), UIAA (International Mountaineering and Climbing Federation), and similar bodies.

Based on its characteristics, mountaineering in the broadest sense **falls in the framework of adventure tourism and recreation**, two subgroups which we treat separately with respect to their features, but which nevertheless **are frequently intertwined, and often recreation is an integral part of tourism.**

Both activities are tied to the same natural resources and use the same infrastructure and equipment, impact the environment in the same way, and cause similar psychological and social responses among the participants (Hall, Page, 2002; Williams, 2003). **Spatially and temporally, tourism and recreation in high mountain areas are less and less separated**, as a consequence of the accessibility of travel, technology and the uniformity of the market offer for both groups, i.e. recreationalists and tourists. One's place of permanent residence also plays an important role: in mountain regions, mountaineering is a way of spending leisure time for area residents, i.e. a form of recreation, while for visitors, especially those from more distant places, it is a way of spending their vacation, i.e. a form of tourism. The first group of people may wish to spend their vacation in a different mountain region, and recreation in their local mountains helps them in their vacation activities when they become tourists.

This very **emergence of ever new activities within mountaineering causes an increasingly blurred boundary between tourism and recreation**. Consumer culture causes mountaineering to be somehow subordinated to tourism and is therefore becoming less and less recognizable as an independent activity (Chaney, 1996).

Figure 22: Characteristics of mountaineering in the past and today.



Source: adapted from Beedie, Hudson, 2003.

In the past mountaineering was engaged in mainly by various explorers, who were attracted by the **wilderness and authenticity of the mountain landscape and the feeling of freedom** which it offered. Mountains offered the possibility of **new discoveries** (scientific, expert, and economic), a test of **their abilities**, and not least of all also a means of discovering individuals' **mental and physical limits**. Classical mountaineering had a complete tourist character, if we compare it with established definitions of tourism as an activity. Moreover, before the expressions "gornik" and "planinec" (deriving from words meaning "mountain") were used in the Slovene

language, the expression “tourist” was used to describe someone who went on a mountain “tour”—i.e. a climb in the mountains.

Today we can still assert that the majority of mountaineers continue to seek freedom, wilderness, and authenticity of the landscape in the mountains, but in contrast to the first mountaineers they are unwilling to relinquish a certain **degree of comfort** to which they are accustomed in everyday life. At the same time they also demand a greater **feeling of safety**, which is provided by trail signposting, the possibility of using cell phones, compasses, maps, route descriptions, etc. and the presence of a rescue service in the most critical situations. Nevertheless, in the framework of mountaineering there have remained stable integral parts which have taken shape over the course of the development of mountain activities in terms of content, and which have been improved along with them, but they remain constants. Thus **the constant acquisition of knowledge about mountain regions, techniques of movement in mountains and the development of equipment** are of essential significance for mountaineering. Parallel with this, guiding is developing, which on the one hand represents an economic opportunity for the local population of mountain regions and on the other enables access to mountains to people who themselves lack adequate knowledge for safe movement in such places but aspire to gaining knowledge of these kinds of regions and take part in activities in them. A permanent feature in mountaineering is also represented by different media which can indirectly convey knowledge while also influencing the popularity of mountaineering, which we can see particularly in the last decade.

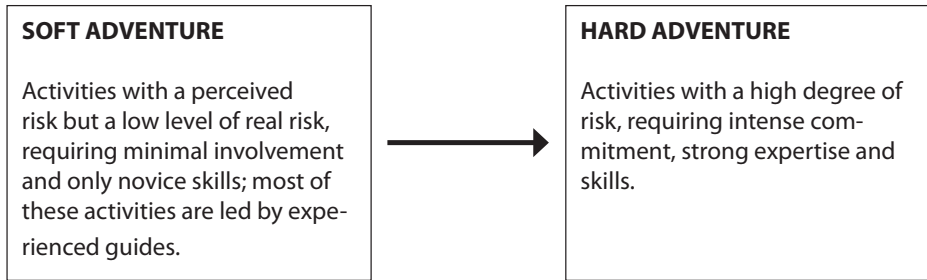
The classical conception of mountaineering as an activity which includes walking and climbing has changed greatly in the last few decades, and the activity itself has become much more heterogeneous. Thus for example climbing is today understood more as sport climbing, abseiling has become an independent activity (though still under the general heading of mountaineering), walking in “exotic” mountain regions is called “trekking” or experiential hiking, and new activities have begun to appear especially in the mountains – canyoning, mountain biking, bungee jumping, and so on (Beedie, Hudson, 2003).

Mountaineering is regarded as a **high-risk form of recreation** since it includes objective dangers and a certain level of uncertainty (Ewert, Hollenhorst, 1999). It is this **riskiness** that arouses in participants certain feelings which those who have mastered the activity experience as something positive, while in others it engenders feelings of uncertainty and fear (Robinson, 1992). Despite the presence of objective risk, the majority of mountaineers have the feeling that they do not expose themselves to danger since they believe that they have control over what happens. Constantly improved technical equipment also gives them a feeling of increased safety (Beedie, Hudson, 2003). In general, mountaineering enables “reward” to participants, such as for example arriving at the summit of a mountain, a feeling of physical rejuvenation and invigoration, and acquisition of new technical expertise. Mountaineers are frequently prepared to endure and risk various kinds of effort and situations for the sake of achieving these rewards (e.g. altitude sickness, snowblindness, exhaustion, frostbite, etc. /Loewenstein, 1999/).

Along with rafting, diving, and mountain biking, mountaineering is classified as a **hard form of adventure activity** (Beedie, Hudson, 2003). The primary motives for such activities are risk and challenge (Lipscombe, 1995). Among **soft adventure activities** are for example camping, gentle hiking, cycling, observing wildlife, horseback riding, canoeing,

and water-skiing. Soft activities are those with a perceived risk but with a lower actual level of risk and requiring a minimal level of determination, expertise, and skills. These kinds of activities are usually less demanding physically (Millington et al., 2001; Beedie, Hudson, 2003). The motives of these kinds of recreationalists are to escape from everyday routine, experience a new environment, learn more about themselves, try something new, feel excitement, enjoy companionship (Lipscombe, 1995; Ewert, 1989).

Figure 23: The continuum of “soft” and “hard” adventure.



Source: Hill, 1995; cited in Swarbrooke et al., 2003

We can also define **soft and hard adventure within mountaineering**, in which mountaineering expeditions, climbing, and strenuous hiking belong among the latter, and hiking along marked trails and guided commercial expeditions are included in the former. The improved social as well as actual, physical accessibility of hard adventure mountaineering activities is causing them to shift towards the field of soft adventure mountaineering activities, which is most of all a result of the increasing tourist character of mountaineering. The boundary between daily life in predominantly urban areas and the exceptional experience of adventure holidays is becoming increasingly blurred, especially given the transfer of habits and various technical aids to the “adventure” environment. Most people in more developed countries are accustomed to a comfortable life in cities, and thus some among them are attracted to activities in an environment which is less predictable (Beedie, Hudson, 2003). However, their habits travel there with them, and hence only rarely do these kinds of tourists leave the “urban framework” (Greenway, 1995).

The findings from several studies show that the **average age of mountaineers** is 41 years, and 77 % are older than 30. For the most part these are people with stable mental and physical traits, more educated, regularly active, motivated, and materially well situated, but nevertheless belonging predominantly to the “middle class”. Generally speaking, they are people with little free time, hence during their vacations they want to cram in as much experience as they can in that time, and be maximally active. Precisely for this reason they increasingly tend to opt for packages provided by specialized tourist agencies which get them to the desired destination in the shortest possible time (Beedie, Hudson, 2003).

The offer is adapted to the needs of tourists (for example, different types of food, hot water, internet connection, satellite telephones, etc.) at the places of destination as

well; as a result, the romantic image of mountain regions where one can still experience and discover pristine wilderness is largely a thing of the past.

On the other hand, most mountaineers do not consider themselves “tourists” since they feel that mountaineering is “something more”, requiring a certain set of skills and in particular a greater degree of exposure to risk and danger. Thus some authors distinguish between **mountaineering** and **mountain tourism**, with the difference between the two being that the first is engaged in by experienced individuals whose primary motive is for example achieving the summit of a mountain, who are independent and who only in this way can achieve personal satisfaction through a certain level of risk and competitiveness, while those participating in the second one make use of the knowledge and services of mountain guides (Csikszentmihalyi, Selega, 1990; Priest, 1990). Another aspect is that mountaineering, in contrast to “tourism”, of necessity means increased physical activity and effort and is hence more comparable to work than to vacation, which is one of the basic features of tourism (Beedie, Hudson, 2003). Achieving high elevations, climbing difficult routes and so on require great investments (preparation, physical effort, expertise, time, money), which can turn into a particular form of cultural capital (Bourdieu, 1986). This is shown in “being different” and increased standing of the individual in society (Beedie, Hudson, 2003).

Based on the definition of adventure tourism and recreation, **both mountaineering and mountain tourism fall under the heading of adventure tourism and recreation**. The setting in which they take place is the specific geographical environment of high mountain areas. They encompass adventure activities having comparable environmental impacts, but of varying intensity. Mountaineering and mountain tourism **are distinguished from one another primarily in terms of the duration of particular activities, the numbers of participants and their personal characteristics and consequently also according to the impacts they have on the environment as well as social and economic effects, which of course are also manifested outside the high mountain areas in which the activities take place**. In practice, environmental impacts are dependent on the intensity of the activity – particularly the numbers of people pursuing particular individual activities, their environmental awareness, and the types of impacts associated with a given activity (for example, equipping of protected trekking routes, mountain hostels, etc.).

Nevertheless, we can reasonably assert that **mountaineering involves more than “just” tourism and recreation**: it also means a **way of life for a particular social group whose lifestyle is closely connected to mountain areas, which not only offer such individuals with a space in which to spend their free time but also have an impact on their psychological development, their perception of the environment and quite emphatically on their environmental consciousness**. Mountaineers often “adopt” mountain areas, cultivating a personal relationship with them, and are willing to take active part in campaigns to protect them when they are threatened by planned or actual impacts resulting in degradation of the area. The rapid development of mountain adventure tourism, and in particular its introduction of greater comfort, has brought about a changed attitude towards the risk-adventure-challenge relationship and towards awareness of environmental fragility.

The first people to draw attention to environmental problems in the mountains were mountaineers, who consciously distinguish themselves from “mountain tourists” and attribute most of the blame for the problems to the increasingly greater numbers of visitors brought about by the development of mountain tourism. Thus some mountaineering expeditions have presented themselves and also in practice strive to operate as “environmentally friendly”, since “true mountaineers” consider themselves as **stewards of the mountain environment** (Johnson, Edwards, 1994; Beedie, Hudson, 2003).

Three crucial elements have influenced the rapid development of mountain adventure tourism and in turn also had an effect on mountaineering: **leaving the development of activities to experts, the rapid dissemination of promotional materials, and the application of technology to a high adventure environment** – these three crucial elements have made possible a sort of “soft transition” from the normal, everyday, domestic urban environment and the extreme environment in which adventure holidays take place. Most people live in urban settings, insulated from a “hostile” environment in heated buildings with hot water, electricity, beds, access to safe and hygienic food, and other comforts. Nevertheless an element of their personality rebels against this way of life, as reflected in the desire for adventure activities in the “wilderness”. At the same time, they tend to take their “habitus” with them, and most tourists very rarely or never leave behind their urban framework on their journey to the “wilderness” (Greenway, 1995).

Mountain tourists in all their activities in the mountains make a transition **from the phase of “tourist” to the phase of “true mountaineer”**, based on their experiences in the mountains. These experiences are associated with fear, anxiety, and exhaustion, but they are also dependent on the competence and knowledge of the individual. As mountain tourists gain experience, the perception of risk is reduced and the feeling of competence is enhanced. In this way ordinary tourists may become “true mountaineers” (Priest, 1992). Despite this it is essential in mountain tourism to take into account the fact that activities in the mountains demand a certain expertise, since the specific environment requires caution. Thus Beedie (2002) refers to what he calls a **“client continuum”**, in which the “tourist” is on the left-hand side and the “mountaineer” on the right-hand side. As participants acquire the appropriate knowledge over time, they move from left to right. The exact position on the continuum depends on many factors, associated primarily with the characteristics of the participants themselves. It is increasingly apparent that the whole of the left-hand, tourist end is moving rightwards, a result primarily of the introduction of the urban framework (from which participants in mountain activities come) into the mountain environment. Thus the question once again arises of the dividing line between mountain tourism and mountaineering (Beedie, 2002). The essence of mountaineering lies in “peak experience”, which enables personal satisfaction based on a challenge that requires balancing risk and competence. One effect of the emergence of mountain adventure tourism may be to change this balance accompanying “peak experience” (Beedie, Hudson, 2003).

The boundary between mountaineering and mountain adventure tourism in the world’s high mountain areas (especially in the broader area of the Himalayas) **is becoming increasingly blurred**, since today anyone who can afford it can take part in a climbing expedition, once the exclusive domain of experienced climbers.

However, there is an essential difference in the manner of approaching the mountain. For the first type of approach, represented by **commercial expeditions**, participants are accompanied by an experienced mountain guide with appropriate training, who in this way bears a certain measure of responsibility and ensures that the greatest possible number of clients reach the summit. How they get there is not important, and the principle of “the end justifies the means” is applied, which means that these kinds of expeditions among other things use supplemental oxygen at high elevations (above 7000 m), fixed ropes and porters, who for the most part come from the Sherpa tribe of Nepal. The Sherpas also work in other high mountain areas outside Nepal, most often as high elevation porters. The commercial expeditions tackle high mountains in the classic, so-called Himalayan style, by establishing high-altitude camps on the mountain for acclimatization purposes. The camps are set up by porters, who also carry most of the clients’ equipment and usually do not go to the summits themselves. Clients, accompanied by a mountain guide, fully supported by high elevation porters, and only minimally participating in equipping the route to the top, attempt to reach their chosen summits. In contrast to “tourist” expeditions, “true” mountaineering expeditions reject this kind of approach as unacceptable. Particularly during the period in which Reinhold Messner was active (the 1970s and 1980s) **new principles in alpinism** were introduced, in which it is paramount that **ascents are made without supplemental oxygen, without porters, and using the rapid, alpine-style of climbing, in which high camps are not set up beforehand, routes are not equipped with fixed ropes, and the environmental impact in this way is minimal.**

The rapid development of mountain adventure tourism has come about mainly due to heavy **advertising** by various agencies (with itineraries prepared in advance) and the increasingly frequent **media presence of mountaineering**, in various forms – documentaries, reality shows, and so on. The internet has also contributed hugely to its popularization, greatly facilitating the search for information about packages offered as well as about the world’s high mountain areas, while at the same time enabling the ongoing monitoring of mountain expeditions and enhancing a sense of actual participation in a particular event.

The primary purpose of tourism is to market tourism products to a group of consumers. In the case of tourism in high mountain areas, this is seen at the national level in the sale of climbing permits (for example, in Nepal these range from \$1500 for lower (6000 - 7000 m) summits to \$70,000 for Everest), and for permits for adventure trekking in “fragile” mountain environments (Beedie, Hudson, 2003). Specialized agencies have begun to offer packages aimed exclusively at mountain tourists, who need, expect and are willing to pay for comprehensive service. This includes everything – from arranging for permits, transportation, porters, food, and equipment to the constant presence of mountain guides. It is a response of the market to the **lifestyle changes** brought about by longer working hours, such that mountain tourists do not have time to organize their own vacations. Since they have little time but ample money, a complete tourism package is the best option for them.

The destination areas, in this case high mountain areas, also adapt to the needs of tourists. The last permanent settlements (for example, Namche Bazaar in Nepal,

Huaraz in Peru, Karimabad in Pakistan, etc.) are generally better equipped with all necessary and expected tourist infrastructure (hotels, restaurants, telephone, internet, etc.). At the same time, tourists retain a “romantic” longing for the exploration, discovery and journey through genuine, remote, and “unspoiled” mountain areas.

The development of mountain adventure tourism has also been accelerated by the **rapid development of technical equipment**. For example, tourists buy the most modern equipment (ice axes, trekking poles, boots, etc.) in the expectation that it will make them better mountaineers. At the same time, they skip over certain stages of mountaineering preparation (going from easy to increasingly more difficult approaches, routes, ascents) and decide to attempt a challenging and exotic destination in the high mountain environments of the Himalayas, the Andes, etc., after just a few fairly simple climbs. And this is what has led to the general acceptance of all manner of approaches to the summit, or to what we could call an uncaring and uncritical attitude towards summiting a peak - for the general public, for example, how one reaches the summit of an eight-thousander is not important – with a guide, supplemental oxygen, etc. – whereas to mountaineers this is of critical importance. However, the latter do too little to make the public aware of the issue.

True mountaineers are in essence closer to the first visitors to the mountains – pilgrims: for both groups the goal is clear, as is the manner of achieving it. **Mountain tourists are closer in the way they operate to the first explorers.** Mountaineers reject cooperation with mountain guides on their expeditions, preferring to rely on their own experience and knowledge. Mountain tourists are dependent on mountain guides, including for accurate information about the mountain they are tackling and the availability of assistance in case of accident. Both groups overlap in certain segments nowadays – for example, both can find the same information about the mountain, both require the assistance of local tourist agencies or federal officers, as required by national regulations. But the two groups differ substantially in the manner of their approach to the mountain (Beedie, Hudson, 2003).

In both cases **the cultural capital of the individual is increased as a result of the increased physical capital of the individual**, and this has an influence on social reputation. This active engagement in a sport and its associated physical activity is one of the ways of achieving status in society (Bourdieu, 1986; Javier, Maguire, 1994). The individual usually aspires to the social field offering the greatest potential capital, which in mountaineering means the highest mountain, and the longest and most difficult routes demand a greater investment on the part of the individual, which at the same time also means greater benefits in the form of cultural capital (Bourdieu, 1986). Eight-thousanders by their very nature require the appropriate physical capital and at the same time attract an increasing number of mountaineers due to the sheer size of the mountain and history of attempted ascents, with which individuals today can identify and in this way acquire social status. Clearly the highest mountains represent the greatest symbolic capital, and these are becoming increasingly accessible to the masses.

This popularization has led to the **“urbanization” of mountain regions and negative environmental impacts**. As authentic natural areas disappear, demand for them increases, among those who can afford it financially and recognize the symbolic

capital contained by such regions as a value. Consequently some established mountaineers are warning of the rapid degradation of the natural environment as well as of local tradition, and propose limiting access as a solution. On this point the conflict between established mountaineers and tourists who through mountain tourism want to become true mountaineers is clearly evident (Beedie, Hudson, 2003).

The phenomenon of adventure tourism has at least two consequences – the first is that mountains, which once were regarded as the dwelling of evil creatures, have become **regions where one can accumulate cultural capital**. And the second is that it is just this **potential which is sold as a product by tourist agencies**. Mountain adventure tourism will continue to develop at the expense of true mountaineering, whose development in certain segments will stall out and be preserved only in museums as a relict (Beedie, Hudson, 2003). This fact is a consequence above all of a generally changed way of life for modern humans and their desire to cope with risk in nature and in themselves. More than ever before the active role of mountaineering associations will be required, to preserve and maintain mountaineering ethics and not least of all influence the sustainability of all activities in the high mountains.

The motives and habits of visitors to mountain regions

People's aspirations, desires, and motives operate at three levels. The first is represented by instinctive motives associated with the survival and preservation of the individual (biological and instinctive needs). The second level is represented by motives governing the individual's relationships with others, interpersonal relations and social coexistence (social motives and morals). At the third level are motives regulating one's personal and spiritual growth, self-actualization and search for meaning (spiritual ideas and values).

Motives very rarely operate in isolation from one another: they are joined together in complex and dynamic wholes, as an aspiration for (Ferjančič, 2002):

- exploration and knowledge,
- creation,
- self-affirmation and validation,
- social contact and sociability,
- affection, friendship, and love.

High mountain areas due to their natural geographic features for a long time were not of interest to humans, although they held a certain attraction due to their remoteness and mysteriousness. The motives of the earliest explorers to high mountain areas were related to **discovery of the unknown**, since these types of areas were far away from permanently settled regions. The first explorers were also drawn by the **unknown economic value** of high mountain areas, which in some cases turned out to be rich deposits of minerals and semi-precious and precious stones; they were also attracted by the **high elevation** and in general the **fascinating natural mountain environment**.

Today the original economic value is of less interest due to the high cost of extracting resources, involving a lot of manual labor and high transport costs. But in recent decades high mountain areas have become of interest as **a leisure destination**, and this has also led to the rapid development of various tourism and recreation activities, along with the associated infrastructure.

The motivation of mountaineers as sports enthusiasts can be divided into two classes (Ledinek, 2000):

1. **intrinsic or inner motivation**, which the individual acquires from experiencing a feeling of certain capabilities and competence and mastering some activity through the possibility of independent decision-making,
2. **extrinsic or external motivation**, which is the result of a desire for reward (recognition, popularity, higher public profile, money), and sometimes also fear of failure.

Motivation varies with age and is also dependent on gender (Burnik, 1976). Generally speaking, inner motivation predominates among mountaineers and particularly trekkers, as shown by the primary motives for their involvement in the activity. External motivation and the combination of both types is more present among climbers and alpinists, whose achievements are more easily assigned a value and more prominent.

A study of the motives of 11-year-old children showed that the primary motives for hiking in the mountains were "nature, wildlife", "socializing with classmates", and "beauty of the mountains". The most off-putting factors which discouraged them from hiking were "heavy backpack" and "strenuous walking". Two thirds of the children responded that they enjoyed going to the mountains and they preferred to spend their free time in nature rather than at home. They preferred going to the mountains with their families rather than with their school: what they liked best about it was spending time together with their parents and what they liked least was that their parents "watch over them too carefully" (Burnik et al., 2007).

Motives for going to the mountains can be classified into several groups (Kristan, 1992):

1. **desire to discover the unknown, the new** (exploring the mountain environment, seeing and experiencing something new),
2. **specialized research and scientific motives** (investigation primarily of the natural geographical environment),
3. **economic motives** (exploitation of natural resources; grazing, forestry, mining, hunting, herbalism, etc.),
4. **nationalist and political motives** (the case of the establishment of the Slovenian Alpine Society),
5. **emotionally romantic or aesthetically hedonistic motives** (desire for the aesthetic experience of nature, painting, photography),
6. **health and hygiene motives** (finding relaxation and a balance between work and non-work, outdoor recreation as a counterweight to urban life, weight loss, health rehabilitation, etc.),

7. **sports motives** (testing and affirming one's capabilities in the "struggle" with the mountain, a desire for a feeling of strength, success, accomplishment of a noticeable or exceptional sporting achievement, summiting a challenging peak or following a difficult route, achieving a first ascent or original route, reaching the summit of a mountain which friends and acquaintances have climbed, relishing the physical effort involved, etc.),
8. **desire for adventure and excitement** (risk-taking, coping with attractive uncertainty, thrill-seeking through undertaking daring and risky ventures),
9. **desire for affirmation and validation** (becoming famous, expressing oneself through unusual, daring or risky ventures),
10. **desire for compensation** (making up for various failures and inadequacies in everyday professional or personal life at lower elevations),
11. **desire for identification** (self-affirmation, discovering one's limits, positive self-concept, "enjoying who you are", "respecting who you are"),
12. **escape into solitude** (escape from various everyday problems),
13. **social motives** (entertainment and fun in the company of others, relaxation in the absence of "valley" conventions and rigidity).

A study by the Faculty of Sport at the University of Ljubljana **on the motivation of Slovenian mountaineers in 1976 and 2000** has shown that the motives have partially changed, but the most important ones have remained the same. The results show that the most important motive is the "beauty of nature" and "a more authentic connection with nature"; hence, the **emotionally romantic** or **aesthetically hedonistic motives** are primary. These motives were cited by 65.9 % (in 2000) and 66.6 % (in 1976) of respondents. Health and hygiene motives were in second place in 2000 (11.5 %), and in third place in 1976 (7.8 %). The motive "escape into solitude" was in third place in 2000 (9.3 %) and in fourth place in 1976 (7.2 %). The most important motives clearly have remained the same over the years, with the exception of the motive "I enjoy overcoming long distances or high elevations through effort, will, and my own strength," which was in second place in 1976 (8.7 %), but only in fifth place in 2000 (3.7 %). Results thus show that **the most important motive for mountaineering is nature**. It is clear that people are increasingly turning to the mountains for relaxation, for a balance between life energy and conflicts, and for socializing (Burnik, 2003).

It is well established that regular sporting activity reduces and prevents many negative effects of the modern way of life. **Participation in sports also has an influence on our mental well-being**. Enjoyment of the activity, which we could interpret as intrinsic motivation, also contributes to this. This means that there is an absence of any external reward, and that people take part in a sports activity purely for the sense of enjoyment that it offers. **In our case people find enjoyment primarily in admiring natural beauty and in contact with nature, but some of their enjoyment also derives from the satisfaction of achieving the goals set**. Considering that mountaineering for most people is still a seasonal activity which they normally do not take part in every day, from the experiential aspect this activity is extremely welcome since it leaves lasting positive effects at the emotional level, which have a positive influence on a person's

self-image. Sometimes fear and stress also accompany a mountaineering activity, especially when people set unrealistic goals. Such situations and emotional states run counter to a feeling of well-being, satisfaction, and health (Burnik, 2003).

Ethical basis: the environment, adventure tourism and recreation, mountaineering

Ethics (*ethos*, *Gr.: habit*) in its original form means the manner in which people behave towards others as well as set criteria as to how they should. Ethics incorporates a collection of values which influence the actions of the individual and are included in his or her value system (Curry, 2006). Individuals and their formulated opinions and principles have a strong influence on ethical bases and principles. In today's world these are most commonly shaped by the influence of the media, influential groups, public institutions, and professional bodies.

Environmental ethics

Even the earliest civilizations had systems of environmental ethics which were reflected in all interrelationships and impacts—not just among individuals but also between nature and the cosmos. This “collective memory”, as it was called, also has representatives in contemporary society, but nowadays for the most part we are not aware of it. Modern-day society is excessively anthropocentrically oriented, which means that the natural environment is completely subordinated to humans and their activities. This is what has led to the environmental crisis, as reflected in increasingly greater pollution of environmental components, the depletion of natural resources, and also climate changes (Curry, 2006). Principles of environmental ethics, which include above all a responsible attitude towards the environment, have become more important than ever before.

Particularly over the last century, the relationship between society and the geographic environment has changed, especially in terms of intensive and extensive human impacts on the natural environment. Parallel with this, however, there has also been increased understanding of how the geosphere functions and the negative effects of human activity, which in turn has led to changes in thinking about the responsibility of humans for preserving a safe and healthy environment for humankind as well as other species. A sense of responsibility towards future generations has also been established (Plut, 2008).

Most authors highlight the global “ecocrisis”, which can be represented by the following equation: $E = P \times LS \times T$, in which E is the ecocrisis, P is the population of the world, LS is lifestyle, and T is technology, which includes, for example, per capita energy consumption, pollution and so on. In order to overcome the ecocrisis, changes will be needed in all the fields mentioned, exclusively in the direction of halting or reducing the values (global population as well as a decrease in irresponsible general consumption) (Curry, 2006).

Environmental ethics requires a new way of thinking about humankind's relationship with the living world and explicitly emphasizes an ethical responsibility towards ecological conditions for future generations. A crucial aspect of environmental ethics is moral relations between humans and other species as well as with the natural environment, which also includes non-living elements. In keeping with this, environmental ethics also demands a complex valuation of the geographic environment (Plut, 2008):

1. geographic environment – high quality and healthy spatial arena: environmental protection;
2. geographic environment – a limited repository of natural resources (energy and raw materials) and recipient of emissions and wastes: conservation of natural resources or environmental resources;
3. geographic environment – existential necessity of providing ecosystem services or environmental services: conservation of nature and landscape.

The prevailing anthropocentric attitude towards the environment notwithstanding, environmental ethics is gradually gaining in importance, in particular through ever better knowledge about the negative environmental effects of human activities and the awareness that natural resources in the broadest sense are finite.

The ethics of adventure tourism and recreation

The breadth and complexity of ethics are also reflected in the case of **adventure tourism and recreation in high mountain areas**. Ethical principles should apply both to **providers of** as well as to **participants in adventure tourism and recreation activities**, although greater responsibility lies with the participants—it is their demand that affects the supply of adventure activities, and their respect for ethical principles in the target destinations is of crucial importance. But it often turns out to be the case that it is participants who most frequently ignore ethical principles, which among other things is related to the fact that vacations represent a situation in which one feels unconstrained by rules and the need to behave responsibly (Swarbrooke et al., 2003). A typical example of this kind of behavior are **mountaineering expeditions to the world's high mountain areas**, in which we cannot distinguish between "true mountaineers" and "mountain tourists", since in both cases it often happens that participants leave their environmental awareness and ethical principles more generally behind. This can be seen in the huge quantities of all kinds of waste and remnants of climbing equipment (tents, ropes, etc.) that they leave in base and high elevation camps. Participants most often justify their behavior by citing extreme fatigue, extreme weather conditions, and similar life-threatening conditions which make cleaning up after themselves impossible. The solution is to be found in the careful advance planning of the expedition and anticipation of all conceivable scenarios.

Experience shows that **prohibitions and sanctions** are least effective, while the greatest power for positive change lies with the media. In general it is the case that adventure tourism has positive (economic) and negative (environmental) effects, while social effects can be positive or negative. Impacts are more intensive in remote

and more natural areas, and especially in developing areas. Characteristic of adventure tourism is that it takes place in sensitive natural geographic environments or in sensitive social centers and for this reason can have considerable negative impacts (Swarbrooke et al., 2003).

Mountaineering ethics

Mountaineering ethics combines environmental ethics and the ethics of adventure tourism and recreation. It is a set of values and beliefs which influence mountaineers and to some extent guide mountaineering activities. Mountaineers accept decisions based on these values in all forms of this activity, including especially **where and how** the activities take place, the kind of **attitude of mountaineers towards the mountain environment** and in what direction mountaineering as an activity should develop (The Mountaineering Council of Scotland, 2008).

The primary motives of people who go to the mountains are at a certain point very similar, but nevertheless for the most part they have quite different reasons, depending on the traits of each individual. Every mountaineer values their experiences in the mountains differently, but increasing numbers of them annually spend large sums of money and much of their time in a desire to become a member of the climbing elite (Birrer et al., 2007), even though their activities remain in the framework of mountain adventure tourism. Commercial expeditions, as they are called, have become an important part of the tourism industry, while also having a fundamental influence on the popularity of mountaineering in high mountain areas as well as on the increase of risk for mountaineers. And here, too, the question of mountaineering ethics is raised, since it is being changed by these types of activities in the mountains.

Thus in mountaineering the basic ethical principle of "truth" applies, which means that mountaineers must always report credibly about their actions in the mountains (lying about summiting a mountain is entirely comparable to lying about a career accomplishment). Throughout history **ethical principles** have been formulated in mountaineering, though they are still understood very subjectively, and the majority of mountaineers consider their actions in the mountains ethical when they are in conformity with the principle of "doing the right thing."

Mountaineering, which at the outset represented mainly scientific exploration and discovery, has over the past 100 years acquired the characteristics primarily of a sports activity, and it also includes a certain degree of competitiveness. This is most reflected in the organization of mountaineering expeditions to high mountain areas. Thus for example the classic "military style" ensures a higher probability of success on the mountain, but these kinds of tactics require the inclusion of large numbers of porters (to base camp as well as above it), bottled oxygen, numerous technical aids for overcoming crevasses, setting up camps at high altitudes, and along with this large quantities of organic and inorganic waste. Today most mountaineers believe that this approach is at odds with the philosophy and meaning of climbing. Hence large expeditions are no longer considered to be doing "the right thing", a view which has been reinforced partly by the huge boom in commercial expeditions, which cater primarily to the inexperienced (Birrer et al., 2007).

Rapid technological development, improved accessibility of mountain regions, and higher incomes have made it possible for thousands of people with little mountaineering experience to reach high mountain areas, and this has begun to change mountaineering consciousness and values.

It is true generally of mountaineers that they are conscious of their responsibility to **protect the mountain environment**, but the conditions in base as well as higher camps indicate just the opposite. Despite the fact that environmental consciousness is at a considerably higher level today compared to a few decades ago, it seems that time has stood still in the high mountains. The current state indicates that one of the fundamental rules of mountaineering—**“Leave no trace”**—is being generally ignored. This is in part a consequence of critical situations in which survival is at stake and in such cases it is physically impossible to operate in keeping with this rule, but on the other hand the sheer numbers of visitors to high mountain areas are affecting the environment, and in the highest mountain ranges of the world the mentality of “the end justifies the means” is still prevalent.

Mountaineering ethics touches on among other things also the definition of mountain summits and when a person has actually reached the summit of a mountain. According to the basic definition, the summit is the highest point on the mountain, but for quite a few mountains we refer to several summits—the main summit and sub-summits (for example, Kilimanjaro, and Noshaq in the Hindu Kush). The fact remains that only the highest point “counts”, something which is especially important in climbing all 14 of the eight-thousanders, many of whose highest points are extremely difficult to reach. For this reason quite a few mountaineers claim to have reached the “top” when in fact they have climbed one of the sub-summits. Such an act is of course counter to mountaineering ethics, but it is difficult to prove. Despite the rapid development of technology, sincerity and truthfulness are still paramount among mountaineers, but reports of their achievements are expected to be supported by photographic documentation.

Within mountaineering ethics, “risk”, which accompanies all mountaineering activities, is specially defined. In recent years there have been increasing incidents of injury and death among inexperienced mountaineers as a result of the growing popularity as well as the changing ethical principles in mountaineering. There have been more and more cases of “non-assistance” on the highest mountains (most often on the highest mountain in the world, Mt. Everest), when injured climbers are left to fend for themselves (usually resulting in death) despite the presence of other, healthy climbers in the immediate vicinity. The justifications provided most often relate to their own fatigue as well as the futility of offering aid since the victims are beyond help, as well as to the fact that all participants are risking their lives and investing large sums of money and a great deal of time in pursuit of their goal (the summit of a mountain), and are thus prepared to sacrifice all ethical principles. Statistics on the success of rescue missions, which are quite discouraging, partially support their arguments. The inclusion of local residents, who work mainly as porters for the expeditions, should be particularly highlighted. They are often neglected and poorly equipped by expedition organizers, and less well cared for in the case of accidents than are the “official” members of the expeditions (Birrer et al., 2007).

Climbing methods in the mountains have been undergoing constant change as mountaineering has developed, in parallel with the development of equipment and the expansion of knowledge about both mountain environments as well as the physical and mental capabilities and limits of mountaineers. **The style of climbing and approach to summits** has been gaining increasing importance in recent decades, and development is moving exclusively in the direction of expeditions whose goal is to make **rapid alpine-style ascents**, without supplemental oxygen and with minimal environmental impact. The same is true of trekking and climbing more generally, in which the ideal is to leave as little equipment or traces on the rock or ice as possible.

General ethical principles of mountaineering despite everything are not clearly written anywhere and are more or less left up to the judgment of mountaineering groups and individuals. Mountaineers are expected to preserve traditional values of mountaineering in various geographical regions, and these include in particular an awareness of the impacts and consequences of different mountaineering activities as well as the avoidance of using, for example, off-road vehicles, cableways, animals, helicopters, etc. Individuals are expected to be aware of their abilities and take responsibility for their actions, both towards fellow climbers as well as towards the mountain environment and mountaineering as a sport (Birrer et al., 2007).

Thus the **motives** as well as the **ethical values of mountaineers and mountain tourists** are of essential importance in their behavior in the high mountain environment and consequently also on the state of that environment. The high mountain environment, as we have already noted, is quite specific, as are the activities of humans within it. For this reason the **establishment of a system of values** (including a degree of environmental consciousness) is crucially important from the environmental aspect and consequently from the aspect of the sustainable development of tourism and recreation. **Perceptions** are equally important, since they along with values make an essential contribution to the establishment of sustainable development.

The state of the environment in the world's high mountain regions reflects not only the environmental consciousness and perception of visitors and providers of adventure tourism and recreation activities, but also the environmental awareness of the broader society which is closest to the high mountain area and as such is responsible for the development or preservation of high mountain landscapes. Differences among high mountain regions are large and connected with the political system and level of development of the countries in which they are located. Moreover, considering the exceptional and "global" importance of high mountain areas, a large share of responsibility for their development and/or conservation is also borne by different international organizations (for example, IUCN – the International Union for the Conservation of Nature, UNEP – the United Nations Environment Programme, WTO – the World Tourism Organization, and others).

Environmental, social, cultural and economic impacts of tourism and recreation in mountain areas

The impacts of tourism and recreation can be seen environmentally as well as socially and economically. Environmental impacts are usually associated with the area in which the activities take place, though there is of course also a global dimension to them (e.g. the impacts of air travel on the state of the atmosphere, etc.); economic and social impacts can also be present in the regions from which participants originate. The impacts of both types of activities are highly complex and usually dependent on the kind of activity and the geographic environment in which they take place as well as on the characteristics of the participants – these have an impact on the environment as well as on the economic and social conditions of a given region. At the same time, experience acquired through taking part in such activities influences the participants themselves, which can then be reflected in their home environments.

Environmental impacts

Negative impacts of tourism and recreation arise when the extent and intensity of activities are greater than the carrying capacity of the area, and the limits of acceptable changes are exceeded. Uncontrolled tourism represents a potential environmental threat throughout the world, since it can cause extreme pressures on a particular area as reflected in soil erosion, a general increase in environmental pollution, the loss of natural habitats, increased pressure on threatened species and increased vulnerability of an area to forest fires. It also often has a negative impact on water resources and forces the local population to compete for vitally important natural resources (UNEP, 2006).

Tourism also negatively impacts **water resources**, particularly drinking water, which is one of the most sensitive natural resources. Excessive water use for hotels, swimming pools, golf courses and personal consumption can lead to water shortages and the degradation of water resources as well as an increase in effluents. Tourism affects **local resources** such as energy, food, and various raw materials which are present in finite quantities. The seasonal nature of tourism is a problem, since the number of people in a particular area may increase tenfold or more over a brief time period. This intensifies pressure on natural resources in order to satisfy the high demand of visitors to the area.

Among the negative impacts of tourism it is worth noting especially the degradation and depletion of other natural resources such as fossil fuels, minerals, fertile soil, wetlands, and wildlife. Degradation is a consequence mainly of the construction of infrastructure designed to serve tourism, which irrevocably degrades the land and depletes local sources of building materials.

There is also strong pressure from tourism on forests, as reflected in the problem of deforestation due to increased demand for fuel and for new areas for the cultivation of food (*example: a single trekker in Nepal consumes 4-5 kg wood/day*) (UNEP, 2006).

Tourism causes the same forms of **pollution** as any other industry: various types of emissions into the air, noise, solid waste, water pollution from sewage, oils and chemicals, and architectural and hence visual pollution.

Air pollution and noise result primarily from increased air, road, and rail traffic due to greater numbers of tourists and their growing mobility. 60 % of air traffic is connected with tourism, which indicates the large contribution of this activity to air pollution. Traffic emissions along with manufacturing and energy consumption contribute to acid rain, global warming, and photochemical pollution. Tourism likewise increases noise pollution through an increasingly diverse array of activities (all terrain vehicles, four-wheelers, heli-skiing) having an especially negative impact on wild animals, which may change their patterns of movement due to increased noise.

Pollution from solid waste is the most pressing issue in areas with a large concentration of tourism activities and an attractive natural environment, where solid waste improperly disposed of can become the greatest polluter of the natural environment. Examples in mountain regions are well known: mountaineering causes large quantities of solid waste, since trekkers and climbers leave behind trash, oxygen canisters, camping equipment, etc. This kind of practice degrades the mountain environment in a way which is typical of urban areas, but in contrast to the latter, in the mountains there is no system of waste collection or appropriate disposal. Hence some of the most popular trekking routes in the Andes and the Himalayas have become known as the “Coca-Cola route” and the “Toilet paper route.”

Sewage from tourism infrastructure threatens local water resources and consequently also rivers, seas, and lakes in the vicinity of tourist regions. Fecal matter threatens the health of people as well as animals.

Visual or aesthetic pollution is also typical of tourism infrastructure, which is usually an alien element in the environment architecturally and not in keeping with the traditional architecture of a region. This kind of pollution usually results from a lack of appropriate spatial planning and building codes, making possible inappropriate construction and equipping of tourism buildings and facilities (UNEP, 2006).

Mountain environments have ecosystems with high biotic diversity, and this is one of the main attractions for visitors there. Yet tourism itself can result in the degradation of these very ecosystems, which function as a geographic whole – they include all living organisms (humans, plants, animals, microorganisms), their habitats (soil,

water, air) and the natural processes that maintain them. Threats to and pressures on these kinds of regions are huge precisely because of their exceptional attractiveness, and come from visitors as well as developers. The best known cases are mountain regions in Europe and the USA, where mass tourism and recreation are far greater threats to the environment than even primary activities such as mining. Since 1945 visits to the ten most popular mountain national parks in the USA have increased by a factor of 12, while the European Alps are visited annually by 100 million tourists. Some formerly less accessible mountain regions are also receiving increased numbers of visitors, such as for instance the Indian Himalayas, which are visited annually by 250,000 Hindu pilgrims, 25,000 trekkers and at least 75 alpinist expeditions. The greatest negative impact is on the forests, which are a source of heating fuel for local residents, on vegetation in general, and the large quantities of wastes (UNEP, 2006).

Natural features, wildlife and plants are the most important attractive elements of the mountain environments but are also very vulnerable in the case of uncontrolled tourism and recreation development.



Figure 24:

Water importantly adds to the overall positive experience in performing recreation activities in the mountain environment.



Figure 25:

Alpine ibex (Capra ibex) is often seen by mountaineers throughout the Alps.

Figure 26:

Alpine dryad (Dryas Octopetala) is one of the most common plant species in the Julian Alps. Plants add importantly to the overall attractiveness of the mountain environment.



Contact with the natural environment is of crucial importance for **adventure tourism and recreation**, since it is the environment which most often is the primary attractive factor for participants. The prevailing impacts of this kind of tourism and recreation on the environment are negative, but one of the few positive ones, if not indeed the only one, is its influence in protecting the natural environment. The attractiveness of the natural environment for visitors gives it a monetary value, and protecting it requires certain financial resources. As a rule adventure tourism and recreation take place outside classical tourist areas, which means that environmental impacts are spreading to relatively wide regions. In the case of **trekking** it has been found that the frequent and mass use of trekking routes causes degradation of the vegetation and soil compaction, which over the long run means a reduction in biotic diversity and increased soil erosion (Newsome et al., 2002). When trekkers walk off trail, these impacts are reduced at points, but are spatially more widespread. The most common damage to vegetation consists of breaking and damaging of stems, decreased growing potential of plants, reduced capacity for regeneration, loss of the plant cover, and changes in species composition. The damage to soil can stem from loss of organic material, reduced soil porosity, lower permeability of the soil to air and water, increased runoff and resultant accelerated erosion.

Table 3: Overview of negative environmental impacts of mountaineering.

Natural resource	Impact	State of the environment
Relief and bedrock	<ul style="list-style-type: none"> ▪ construction of infrastructure (e.g. mountain hut or other building, mountain trails, tent sites) 	<ul style="list-style-type: none"> ▪ removal of bedrock ▪ altered relief
	<ul style="list-style-type: none"> ▪ use of technical aids in some mountaineering activities (climbing equipment – pitons, bolts) ▪ special equipment for protected routes (pitons and steel cables) 	<ul style="list-style-type: none"> ▪ damage to rock cracks from driving in pitons ▪ damage to bedrock from drilling (bolts, pitons) ▪ partial removal of bedrock in making protected trails
Soil	<ul style="list-style-type: none"> ▪ mass use of mountain trails ▪ off-trail hiking 	<ul style="list-style-type: none"> ▪ increased erosion in the area of the trail, creation of new trails and potentially increased erosion cross-country ▪ changed properties of the soil (compaction)
Water	<ul style="list-style-type: none"> ▪ effluents from mountain huts and other facilities 	<ul style="list-style-type: none"> ▪ pollution of surface and underground water
	<ul style="list-style-type: none"> ▪ increased water consumption 	<ul style="list-style-type: none"> ▪ potential impact on drying up of water resources
	<ul style="list-style-type: none"> ▪ performance of some activities in or on water which occasionally accompany mountaineering (canyoning, swimming) 	<ul style="list-style-type: none"> ▪ changed chemical and physical properties of surface and underground water
Plants	<ul style="list-style-type: none"> ▪ removal of vegetation during the construction of infrastructure and the performance of some mountaineering activities (e.g. climbing – removal of plants from rock crevices, canyoning – damage to vegetation during descents along mountain streambed channels) 	<ul style="list-style-type: none"> ▪ removal of and/or damage to plants ▪ potential reduction in the number of plant species
Animals	<ul style="list-style-type: none"> ▪ performance of mountaineering activities along and off mountain trails – the presence of humans and noise have negative impacts on the lives of wild animals 	<ul style="list-style-type: none"> ▪ potential impact on changes in the feeding, reproduction, and general movement of animals
Air	<ul style="list-style-type: none"> ▪ helicopter flights, panoramic flights 	<ul style="list-style-type: none"> ▪ potentially increased air pollution
	<ul style="list-style-type: none"> ▪ increasing popularity of trips to the mountains and increased traffic in mountain regions 	<ul style="list-style-type: none"> ▪ noise and light pollution, especially in the vicinity of mountain huts and along mountain trails
	<ul style="list-style-type: none"> ▪ excessive lighting of mountain huts 	
All natural resources	<ul style="list-style-type: none"> ▪ dumping of organic and inorganic wastes (human feces and urine, food scraps, plastic bottles, remnants of climbing equipment, etc.) 	<ul style="list-style-type: none"> ▪ general pollution of the environment, especially around buildings and trails ▪ negative impact on ecosystems

*Examples of negative human impacts in the mountain environment.**Figure 27:*

More comfort in mountain huts is usually inevitably connected to intensified pressures on the mountain environment.

*Figure 28:*

The construction of protected trails damages the bedrock.

*Figure 29:*

Trail erosion is the consequence of the (over) use of mountain trails.





Figure 30:

Most of the base camps in the Himalayas are heavily polluted with the waste of numerous mountaineering expeditions.



Figure 31:

High camps on normal routes are dumps of organic and inorganic wastes.



Figure 32:

Trash burning on the Baltoro Glacier.

Social and cultural impacts

The social and cultural impacts of tourism in mountain regions are usually understood as the impact on the population of the regions in which the tourism activities take place. The social and cultural impacts of tourism occur in both directions, meaning that through participation in activities tourists are also exposed to influences. In the visitor-local resident relationship, the latter are usually in a subordinate position in that they are more susceptible to the acceptance of different social and cultural influences, which are difficult to identify and measure since these kinds of changes are hard to define. Influences also occur when tourism introduces changes into the value systems and behavior patterns of the local population. As a result changes appear in the structure of the community, family ties, the traditional lifestyle of the community, customs and moral principles. Despite the negative impacts, tourism can also have a positive influence on the establishment of peace and increasing the pride of a local community (e.g. in customs, the landscape, etc.) and on maintaining employment in the local environment, which helps prevent emigration to cities (UNEP, 2006).

Among the **negative social and cultural impacts of tourism**, the most important is **change or loss of identity and values**. Tourism can change the local culture into a commodity, which means that over time customs, celebrations and even religious rituals become adapted to the expectations of tourists. When a region becomes a tourist product, there is demand for souvenirs, tourist events and other products, and this can lead to fundamental changes in the values of individuals and the community. Sacred places and objects likewise become a commodity. The second most important impact among the negative social and cultural influences of tourism is the **standardization of what is offered**, which means that the landscape, accommodation, food and drink, while still being special and “new”, must not be too novel, since it must meet the needs and expectations of tourists. This can lead to a certain degree of uniformity in regions which are geographically highly diverse. Loss of **authenticity** is also commonly a result of the development of tourism, along with **response to tourist demand** (e.g. adapting souvenirs, textile patterns etc.).

Tourism involves the mobility of people to different regions, and as a result the establishment of relations among people who would not otherwise come into contact. This leads to the intersection of different cultures, ethnic and religious groups, values, ways of life, languages, and levels of development. These kinds of contacts can bring about the depletion of the social carrying capacity (beyond the limits of acceptable changes in the social system) and the cultural carrying capacity (beyond the limits of acceptable changes in the culture of local residents) of a local community. The attitude of local residents to the development of tourism can meanwhile pass from a phase of enthusiasm during which visitors are warmly welcomed, through a phase of apathy, and finally to a phase of opposition and even animosity in which there is a markedly hostile attitude towards visitors.

Cultural conflicts are due primarily to **economic disparities** between visitors and local residents. Visitors usually come from social backgrounds with consumer patterns and lifestyles considerably different from those of the local community.

Moreover, while traveling they spend more money and behave differently compared to their actions in their home environment. Local residents in some cases after coming into contact with such visitors have a desire to live in the same way, and this leads to social and sometimes ethnic conflicts. It often happens that visitors fail to respect **local customs and moral values**, which causes the creation of stereotypes about the outsiders among the local residents.

In less developed countries local residents are usually employed in low-wage jobs (as cleaners, waiters, gardeners, etc.) while the better paid jobs go either to foreigners or to nationals from urban centers. This state of affairs just serves to exacerbate intolerance and cultural gaps. Even in cases where tourism improves the local economy and the purchasing power of local individuals, it cannot resolve local social and economic problems (UNEP, 2006).

Examples of adapting the sale of goods to tourists.



Figure 33:

Typical souvenirs in one of the markets in the highlands of Ecuador.



Figure 34:

The local population sells the gemstones and jewelry to a few tourists that visit the Hopper Valley in the Karakoram.

Figure 35:

The souvenirs at the Boudhanath (Kathmandu) area are adapted to local and international tourists. Some tourists try to integrate into the country by wearing the local dress.



Figure 36:

*Posing for tourists for money:
Quechua woman in
Cuzco, Peru*





Figure 37:

*Posing for tourists for money:
Sadhu, Kathmandu,
Nepal.*



Figure 38:

*Will interaction with
increasing numbers of
tourists change their
traditional values and
culture?
Wakhan Corridor, Hindu
Kush, Afghanistan.*

Economic impacts

There are recognized positive economic impacts at the national, regional, and local levels as the result of tourism. Given the rapid growth of this activity, it is enjoying increasing status in society generally. This status is especially important in various decisions by national, regional, and local authorities, which are increasingly frequently settled in favor of tourism. The activity directly and indirectly affects all the structures (economic, political, social) and inhabitants of a region, hence also in the mountain regions investigated here.

The economic impacts of tourism are quite diverse; they are most direct at the primary level of the tourism sector: accommodation, catering, transportation, retail. At the secondary level tourism has an impact on most other economic activities. Economic analyses of tourism are usually based on changes in sales, income, and employment. The economic impacts of tourism may be **direct** (effects on the tourism industry itself– direct sale of tourism products), **indirect** (changes in the structure of the economy in a given region and response to demand; changes in sales, income, and employment in branches which support the tourism industry) and **caused** (increased sales in an area where those employed in tourism in the same region “give back” a large share of their income through everyday consumption) (Stynes, Propst, 1992).

Although tourism and recreation provide employment to the local population, this can lead to a monostructural supply of jobs, including many that require little education. Seasonal unemployment is also a problem, since tourism is an activity which is still of a highly seasonal nature (Cigale, 2004).

The economic impacts of mountain tourism are not limited to the target destinations, but also affect the regions from which participants come, since they usually use the services of businesses (tourist agencies, vendors of the clothing and equipment they will need for engaging in the activity, etc.) in the home environment. In general these economic impacts are usually positive in the destination areas, although there is also a possibility for the entire profit to be taken by the providers of the services.

Among the **positive impacts of mountain tourism** are the following:

- inflow of financial resources into the local economy,
- direct and indirect creation of jobs,
- taxes and income to local and central authorities,
- development of small and medium-sized and family businesses which are adapted to the specific needs of mountain tourism.

On the other hand, there are also **negative economic impacts of mountain tourism**:

- seasonal demand, which can result in underuse of infrastructure (lack of return on investment),
- much of the money goes for investment in facilities and infrastructure to support mountain tourism, which means that local communities and providers of services may face a shortage of funding for health and education,

- some local economies in less developed countries may be overly dependent on mountain tourism, at the expense of other sectors (Swarbrooke et al., 2003), while at the same time being more exposed to risk and vagaries in the market.

Given that high mountain areas do not offer regular employment, the social and economic influences and impacts affect the areas (mountain as well as lowland) from which visitors and providers of services come.

Work in mountain tourism is seasonal and is annually influenced by numerous factors such as the overall world economic situation, political conditions at the destination, weather and climate, natural hazards, destination popularity, etc.



Figure 39:

A yak driver in Tibet.



Figure 40:

Camels carrying loads to Muztagh Ata base camp.

Figure 41:

Every summer hotels and transportation facilities in the Karakoram make a profit from mountaineering expeditions.



Figure 42:

Porters in Noshaq base camp waiting for their payment (Hindu Kush, Afghanistan).



Figure 43:

Donkeys are the main means of transport for treks and expeditions in the Andes.





Figure 44:

The Tian Shan mountains are usually reached by helicopter, carrying clients as well as all their equipment and supplies.



Figure 45:

During the climbing season the Aconcagua base camp at Plaza de Mulas is equipped with numerous facilities – e.g., a grocery store, pubs, showers etc. -- provided by locals from nearby settlements or by tour operators who are usually based in Mendoza.



Figure 46:

Locals at Fairy Meadows are well aware of the economic opportunity but in order to maintain their traditional lifestyle, tourism infrastructure is strictly kept away from villages so tourists have almost no chance to interact with the inhabitants.

Methodological approaches

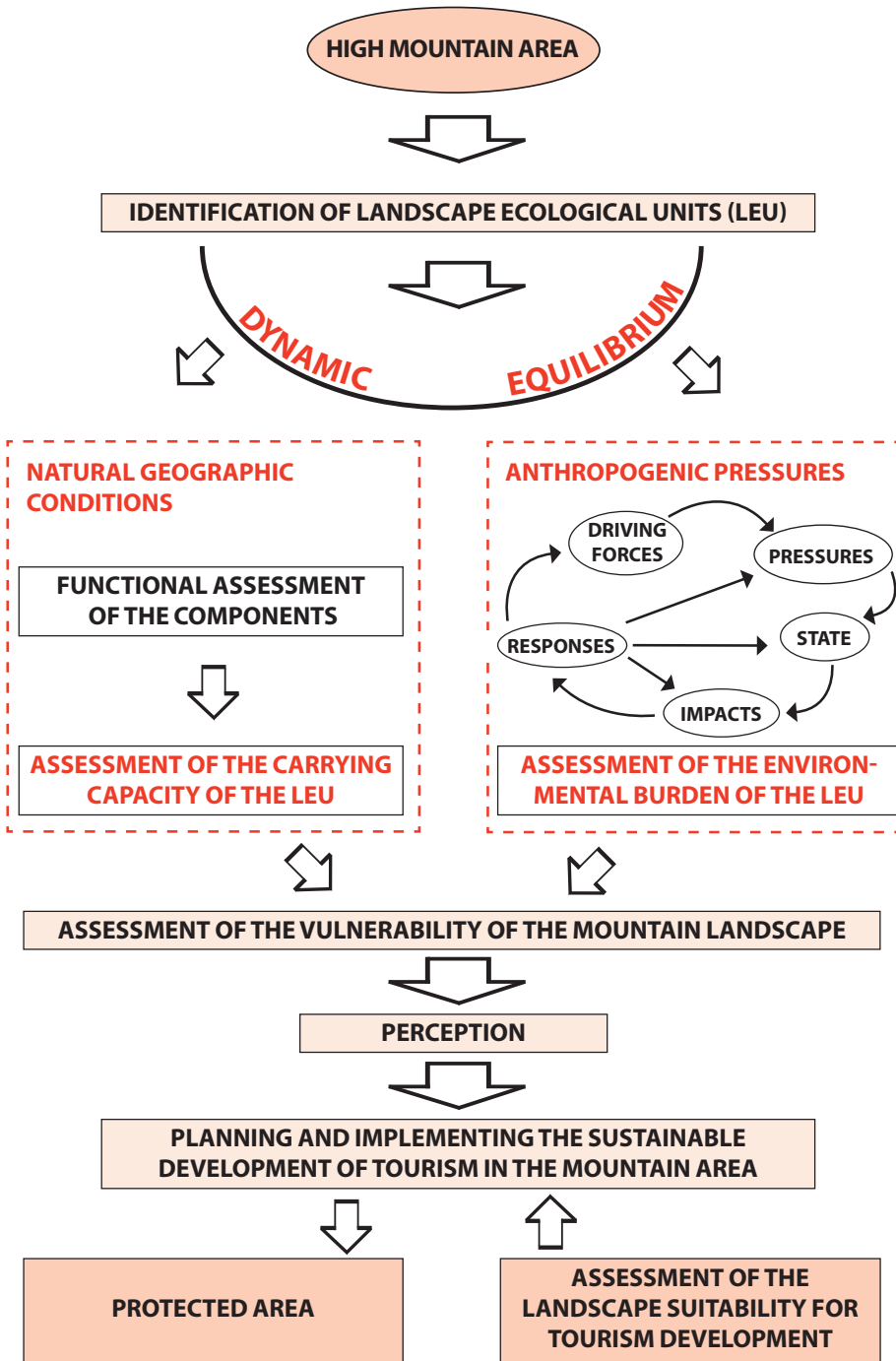
Due to their specific geographical characteristics, mountain areas require a specific approach in planning for the sustainable development of tourism and recreation. In high mountain areas, environmental parameters are foregrounded, and human pressures on them these days are limited to activities connected with adventure tourism and recreation. We can also identify social and economic parameters to a certain extent, but these are displayed more in the regions of origin of the visitors to high mountain areas. These visitors have an influence on the high mountain landscape in keeping with their values, knowledge and level of ecological consciousness.

The most important goal of the sustainable development of tourism and recreation in high mountain areas is the maintenance of a **dynamic equilibrium**, between natural geographic conditions and processes on the one hand and human pressures on the other. The latter should never be too intensive, since the high mountain environment requires more time to neutralize impacts and is more difficult to regenerate, due primarily to **high altitudes** and hence **severe climate conditions**. The maintenance of equilibrium of the “ecological scale” is thus more challenging than in other environments, and carefully planned sustainable development is essential.

A model of sustainable development for tourism and recreation in high mountain regions is based on an **assessment of the vulnerability of the high mountain environment**, which is achieved through **the functional valuation of natural geographic conditions** and arising from this an **estimate of carrying capacity** and the recognition and accurate identification of **anthropogenic pressures** and their environmental impacts. For the latter the **DPSIR framework** was used in this model. This framework enables rapid identification of **driving forces** (activities connected with tourism and recreation), their **pressures** on the high mountain environment, the **states** of environmental components, **impacts** on ecosystems, relief and the geological substratum, and consideration of **responses**, which stem primarily from **perceptions** of the state of the environment on the part of visitors to mountain and high mountain regions. Perceptions can have an important influence on the planning of sustainable tourism and recreation, and for this reason they are given greater weight in this model.

An assessment of the vulnerability of the mountain environment is crucially important for the **planning** of future sustainable tourism and recreation in which **protected areas** are highlighted as an instrument for achieving the kind

Figure 47: A model for the sustainable development of tourism and recreation in high mountain areas.



of development desired. In the concluding part of the model the emphasis is on protection (either the maintenance of existing protected areas or the protection of new areas), which also includes the planning of development in the frameworks designated by legislation, in which an appropriate **management plan** involving all stakeholders is based. The management plan is a broader document which specifies all areas of the management of a region; with respect to tourism and recreation it is important that it specifies the activities that can be developed in a particular region and anticipates the (possible) cleanup of sites where the current degradation (resulting from tourism and recreation) of the environment is greatest.

The development part of the management plan must anticipate visitor trends and resultant environmental pressures, and devise ways of managing them. Ongoing monitoring of the development of new activities in adventure tourism and recreation, which in high mountain areas are becoming increasingly diverse, is extremely important. It is important that the development part be explicitly oriented towards sustainability, with priority given to the environmental component; social and economic impacts should also be anticipated, but these in any case are directed outside the high mountain areas.

Landscape ecological division

The first step in devising a model for the sustainable development of tourism and recreation in high mountain areas is the creation of a landscape ecological division, by means of which we can determine the optimal homogenous units within a landscape ecological type (for example, high mountain areas). These units enable expert assessments of carrying capacity and pressures as well as vulnerability, even in the frequent absence of specific data.

The landscape ecological division is based on a basic analysis of natural geographic conditions by means of which we obtain information about the characteristics of the **geological substrate** (lithological and tectonic structure), **relief conditions** (elevation, slope, exposure, geomorphological processes), **climate** (amount of precipitation, temperatures, type of climate), **water conditions** (characteristics of surface water flows, underground water conditions, river regimes), and **soils** (soil types and their characteristics) and **vegetation** (plant communities and their growing conditions).

Characteristic of the landscape ecological division is that the elements which have the greatest impact on the living world and hence also on human activity and use of the space are in the foreground, while the functional characteristics of the landscape are in the background (Špes et al., 2002). Taking into consideration the dominant elements of the landscape which have a greater influence on human activity and landscape use (Špes et al., 2002), the landscape ecological division of high mountain areas is based first of all on **relief conditions**, in which we also take into account the geological substrate and **hydrological features**. The remaining landscape elements are also studied and taken into consideration, but they are of secondary importance in the division.

The selection of criteria for classification on the basis of relief includes **altitudinal zonation, slope, and exposure**, but their use is dependent on the size and variability of the high mountain area under study. The criterion used for hydrological characteristics is **the presence of surface water**, which may occur in different aggregate states – liquid (streams, rivers, standing water) and/or solid (ice). In determining the landscape ecological units (LEU) we take into account at least one relief criterion and the hydrological one. The size of the LEU can vary and is also dependent on the extent and variability of the high mountain area under investigation.

In this way we determine the carrying capacities of the LEU on the one hand and anthropogenic influences and impacts on the other, and based on both we prepare an assessment of vulnerability, for specific LEUs as well as ultimately for the entire region studied. In the process differences among individual units, which influence the final combined assessment of the vulnerability of the high mountain landscape, are revealed.

Functional valuation of environmental components and assessment of the carrying capacity of landscape ecological units

Natural geographic conditions represent the framework within which human activities, which apply pressure to particular environmental components, take place. Knowledge of natural geographic conditions and of the mutual interactions of individual elements is crucial for an analysis of anthropogenic influences and impacts as well as for the final assessment of vulnerability.

A functional valuation of environmental components is based on an analysis of existing data about relief conditions (elevation, slope, exposure), climatic and hydrological features, soils, vegetation and wildlife, with greater attention being given to the leading factors of relief and hydrological features.

Elevation is analyzed using the most accurate possible digital elevation model (DEM) or based on satellite images, which are useful for less accessible remote high mountain areas for which accurate DEMs are not available or data are difficult or impossible to obtain. Depending on the size of the area studied, altitudinal zones of 100 m or 200 m are designated and the minimum, maximum, and prevailing elevations as well as altitudinal zones are identified. The criterion of elevation is especially useful in high mountain areas for which very high (5000 m and higher) elevations and large altitude differences (2000 m and more) are characteristic. Using this criterion we can indirectly estimate the intensity of certain geomorphic processes (for example, weathering of the bedrock and the likelihood of landslides and avalanches) which are tied to climatic conditions.

Slope of the surface can likewise be calculated using a DEM and data from satellite images, and these data help in estimating the intensiveness of some geomorphic processes, primarily erosion and denudation. Slope of the surface is also a selective factor for tourism and recreation, with an important influence on the heterogeneity of activities (e.g. walking, climbing).

An estimate of the carrying capacities is prepared based on categorized data, in which capacity is greater when slopes are smaller.

Data on **exposure** are also obtained using a DEM analysis and satellite images, divided into 10 classes (**flat, north:** 0-22.5°, **northeast:** 22.5-67.5°, **east:** 67.5-112.5°, **southeast:** 112.5-157.5°, **south:** 157.5-202.5°, **southwest:** 202.5-247.5°, **west:** 247.5-292.5°, **northwest:** 292.5-337.5°, **north:** 337.5-360°). The representation of shaded slopes (with northern, northeastern, and northwestern exposure) and sunny slopes (with southern, southeastern, and southwestern exposure) is important for the assessment of carrying capacity, since ecological conditions vary depending on exposure, and regeneration capacity is greater on sunny slopes.

With respect to **hydrological features** the most important piece of data is the presence of surface water, which can appear in different aggregate forms. Water is a sensitive environmental component in which pressure is quickly detected. The self-cleaning capacity of water is dependent on whether it is free-flowing (stream or river), standing (lake), or ice (glacier); rapidly flowing waters have a greater self-cleaning capacity.

Estimates of carrying capacity are prepared for particular environmental components and their characteristics, and based on all the estimates we provide a complex estimate of the carrying capacity of the LEU. In so doing we also take into account remaining environmental components which are not evaluated separately but are indirectly included in particular estimates as well as in the combined one (for relief the geological substrate and soil, for water the geological substrate, climate, and plant and animal life). The combined estimate is not just the arithmetic mean of all the preceding partial estimates; it is based on the dominant criterion and supported by information about the mutual interactions of all environmental components.

Environmental carrying capacity or the **self-cleaning and regeneration capabilities** of its components are assessed using four classes (Špes et al., 2002):

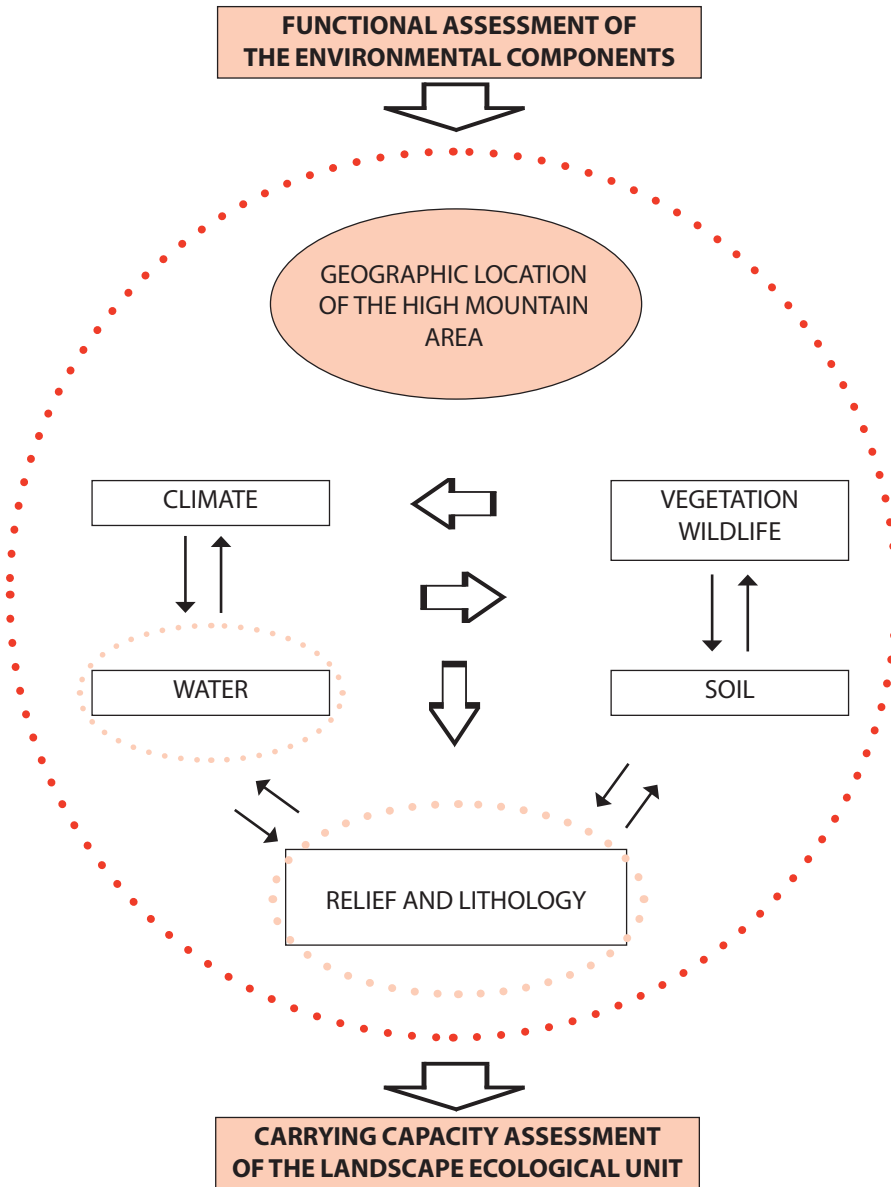
Class 1: **high** carrying capacity, high self-cleaning and regeneration capabilities of the landscape-forming components;

Class 2: **moderate** regeneration capability;

Class 3: environmental carrying capacity is **low**, self-cleaning and regeneration capability of the landscape-forming components with respect to selected physical geographical indicators is reduced;

Class 4: environmental carrying capacity is **very low**, environmental components have a weak or greatly reduced self-cleaning and neutralizing capability.

Figure 48: Functional valuation of environmental components and assessment of carrying capacity of landscape ecological units in mountain regions.



Analysis of anthropogenic influences and impacts in the high mountain landscape

For an analysis of anthropogenic influences and impacts in the model of sustainable development of tourism and recreation in the high mountains we used the DPSIR

framework used by the European Environment Agency to determine the state of the environment. The DPSIR framework enables a broader interpretation of anthropogenic impacts of tourism and recreation in mountain areas than the otherwise established functional valuation of social geographic indicators used in studies of environmental vulnerability. The framework consists of five parts: **Driving forces** – **Pressures** – **State** – **Impact** – **Responses**.

Driving forces are socioeconomic factors and activities which cause an increase or limitation of pressures on the environment. These can be for example the extent of economic, transportation, or tourism activities. **Pressures** comprise direct anthropogenic pressures and impacts such as emissions of pollutants or use of natural resources. **State** refers to the current state and development of phenomena in the environment such as the levels of air, water, and soil pollution, species diversity in a particular geographic region, and availability of natural resources (e.g. wood or fresh water). **Impacts** are the effects of the changed environment on the health of people and other living beings. **Responses** are the responses of society to environmental problems. These can be specific policies of the government such as taxing the use of natural resources. Also important are the decisions of companies and individuals, e.g. investments by businesses in monitoring pollution or buying of recycled goods in households (ARSO, 2008).

The DPSIR framework in mountain areas: Among the driving forces activities connected with adventure tourism and recreation can be included; pressures are represented by participants in the activities, who produce waste and noise; the state is pollution and degradation of environmental components, which needs to be confirmed through field work and, based on it, findings and conclusions made regarding the impacts on high mountain ecosystems, relief, and geological substrate. We also define the presence of possible responses to the state of the environment which are present in the form of already existing protected areas and in various policies for improving the state of the environment.

Through field work and partially with the help of a literature survey we focus on identifying influences and impacts of the **driving forces** (activities of tourism and recreation) in the mountains. In this way we determine primarily the **pressures** (for example, number of visitors, amount and types of wastes), the level of pollution and alteration of natural geographic conditions, i.e. the **state** within the DPSIR framework. The state is defined using an **assessment of pressure**, divided into four classes: (adapted from Špes et al., 2002)

Class 1: environmental pressure is **small**, insignificant;

Class 2: environmental pressure is **moderate**;

Class 3: environmental pressure is **high**, landscape-forming elements are under pressure;

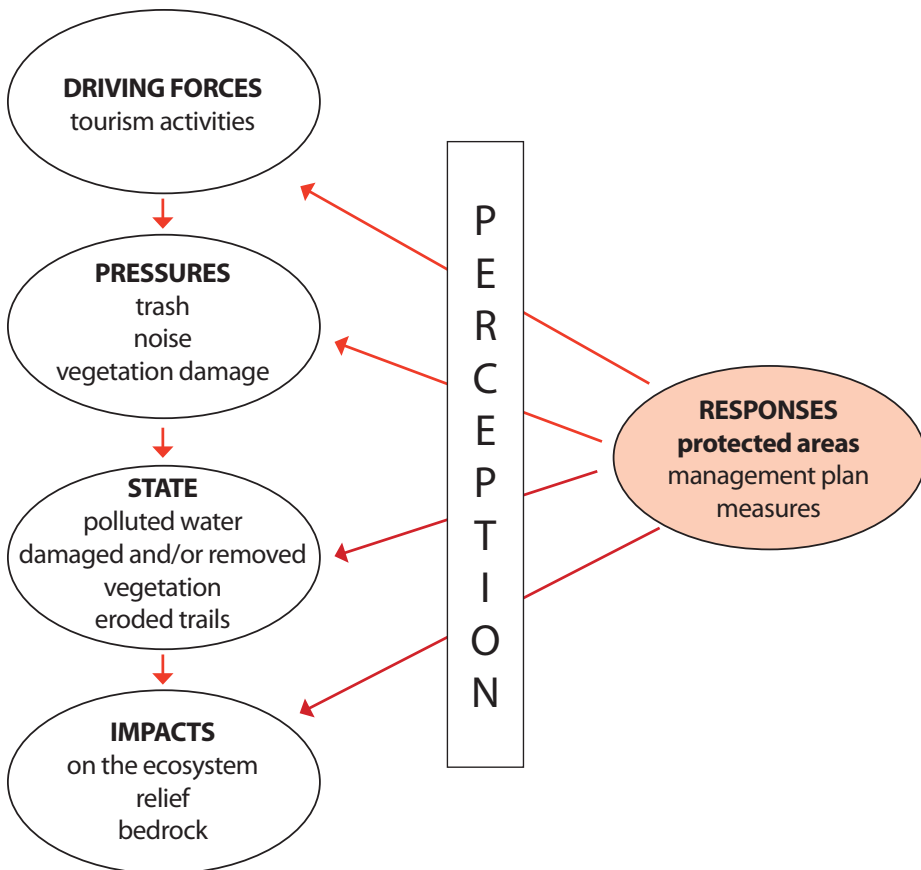
Class 4: environmental pressure is **very high**, environmental components are under high or critical pressure.

The estimate of pressures partially takes into account recognized **impacts** of tourism and recreation activities in the mountain environment. These are limited to impacts on the ecosystem, relief and geological substrate, conditionally extending also to impacts on human health in cases where there is an extremely polluted environmental component which humans need to use in the course of their activities in the mountains (e.g. water).

An important contribution of applying the DPSIR framework to the model of sustainable development of tourism and recreation in mountain areas is the part that is devoted to the identification of **responses**. These reflect the perception of the state of the environment and the level of ecological consciousness of participants in and providers of activities in a given mountain area as well as the responses of local, regional, and national bodies which are involved in any way with the development of a particular mountain area. Perception in the model of sustainable development of tourism and recreation in mountain areas appears in two places – it is first embedded in the DPSIR framework itself, among responses, and secondly it is included before the segment on the planning and achievement of sustainable development of tourism and recreation in mountain landscapes, since it is crucial for the concluding part of the model.

In the established DPSIR framework, perception is not separately included, but it is clear in the case of the analysis of human influences and impacts in the mountains that it is necessary to consider it since it directly and indirectly has an influence on all segments of the framework.

Figure 49: The DPSIR framework for mountain areas.



Assessment of vulnerability of the high mountain landscape

Using an assessment of vulnerability of the high mountain landscape we can determine whether there is a dynamic equilibrium between the carrying capacity of the LEU and anthropogenic influences and impacts.

Planning for the sustainable development of tourism and recreation in the high mountains is based on a combined assessment of the vulnerability of the mountain landscape.

In order to achieve sustainable development it is crucial to keep the “ecological scale” in equilibrium. On one side of the scale is the carrying capacity of a particular landscape ecological unit, on the other are anthropogenic impacts, pressures which can according to their weight (extent and intensity of impacts) load the “scale” only up to the point to where the equilibrium is again established (Špes et al., 2002).

The activities of adventure tourism and recreation in the mountains have the greatest impact on water and relief, and indirectly also on the bedrock. They also have an impact on other natural geographical elements (soil, vegetation, wildlife) but due to the specific climate conditions in high mountain areas these impacts are present to a lesser degree.

Using an assessment of carrying capacities and an assessment of pressures on the high mountain environment, and using a broader interpretation of the DPSIR framework, we have formulated a **combined assessment of environmental vulnerability**, using the classes below (Špes et al., 2002):

Class 1: environmental vulnerability is **low**, the capability of landscape-forming components is not very threatened;

Class 2: environmental vulnerability is **moderate**; the capability of landscape-forming components is moderately threatened;

Class 3: environmental vulnerability is **high**, the capability of landscape-forming components is strongly threatened;

Class 4: environmental vulnerability is **very high**, the capability of the environment and its components is excessively (critically) threatened.

The sustainable development of tourism and recreation in high mountain areas is based on the combined assessment of the vulnerability of the mountain landscape.

Perception

In the mountains the level of ecological awareness and perception of environmental problems on the part of the providers of services as well as, most importantly, their customers, i.e. participants in particular activities, is of the utmost importance, and it needs to be included and considered as a specific segment in the planning of sustainable development of tourism and recreation.

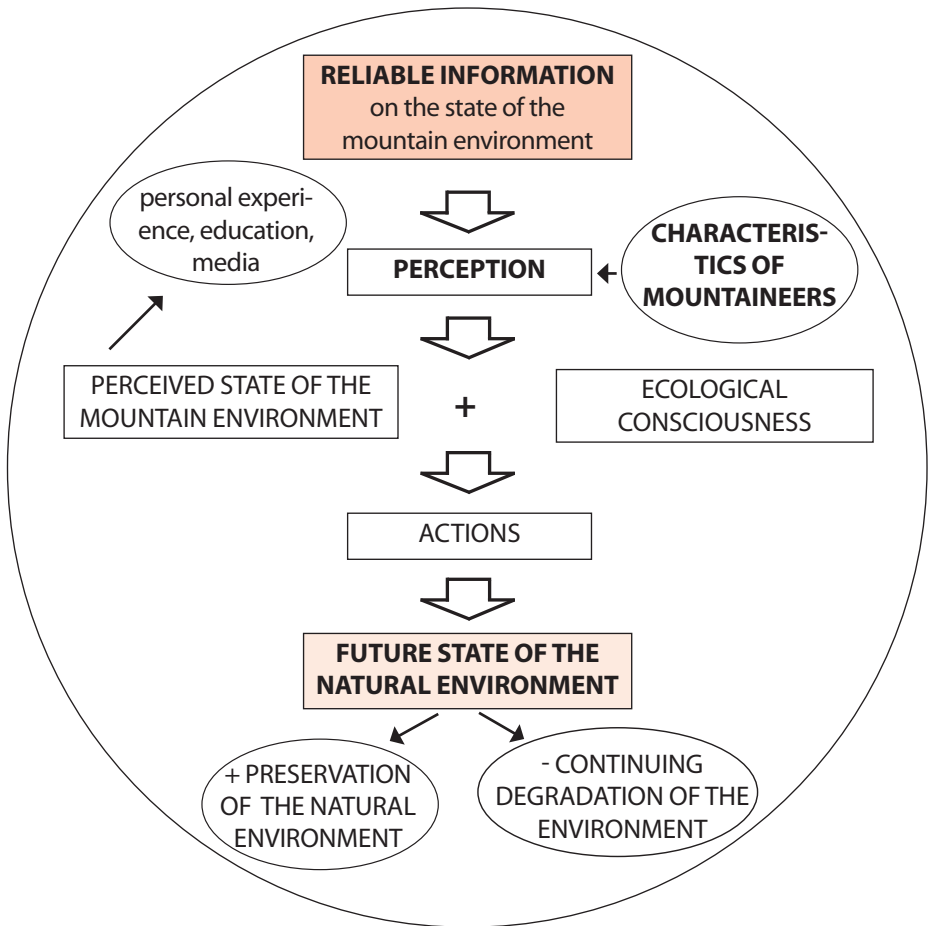
Based on **ecological consciousness** and **perception of the environment**, the individual, group, and society shape an attitude towards the environment and towards current ecological problems in their immediate vicinity as well as more widely. The attitude and responses to the consequences of one's own actions does not always correspond to the actual state and extent of human impacts on the landscape. Access to objective information, ensuring the participation of the public in decision making and along with this raising of environmental consciousness and changing habits and activities that have negative impacts on the environment are crucial. These are all part of the main tasks of a "sustainable society" (Špes, 2008).

Information about the state of the high mountain environment has a major influence on the perception of the environment and the level of ecological awareness. It is important that this information be as objective as possible. It is based on information transmitted by the media, through the educational system, and the personal experience of each individual. Important here are the **characteristics of mountaineers** – what attracts them to the mountains, their motives for going there, which activities they take part in, and how often, are all factors which indirectly influence the perception of the state of the high mountain environment and ecological consciousness. Taken together these indeed influence the behavior patterns of mountaineers in the high mountains and over the long run the state of the high mountain environment. **Behavior patterns** are a direct response to the perception of the state of the high mountain environment and influence in particular its future state. They are in part dependent on the individual's personality, in part influenced by rules and policies made possible by the protection of a particular area.

Perception is also important in the next step within the sustainable development model for tourism and recreation in the high mountains – the planning and achievement of sustainable development. Perception of the environmental state is also important among the **local population** in the nearest (to the particular high mountain area) mountain areas. They are the ones who are directly involved in tourism in high mountain areas (as facilities providers, support staff and similar) and therefore their perception of the environmental state as well as of the overall sustainable development of tourism in mountain areas is of crucial importance.

The establishment of protected areas as well as an assessment of the suitability of the environment for adventure tourism and recreation activities are dependent on the ecological consciousness of planners and are a reflection of general social values.

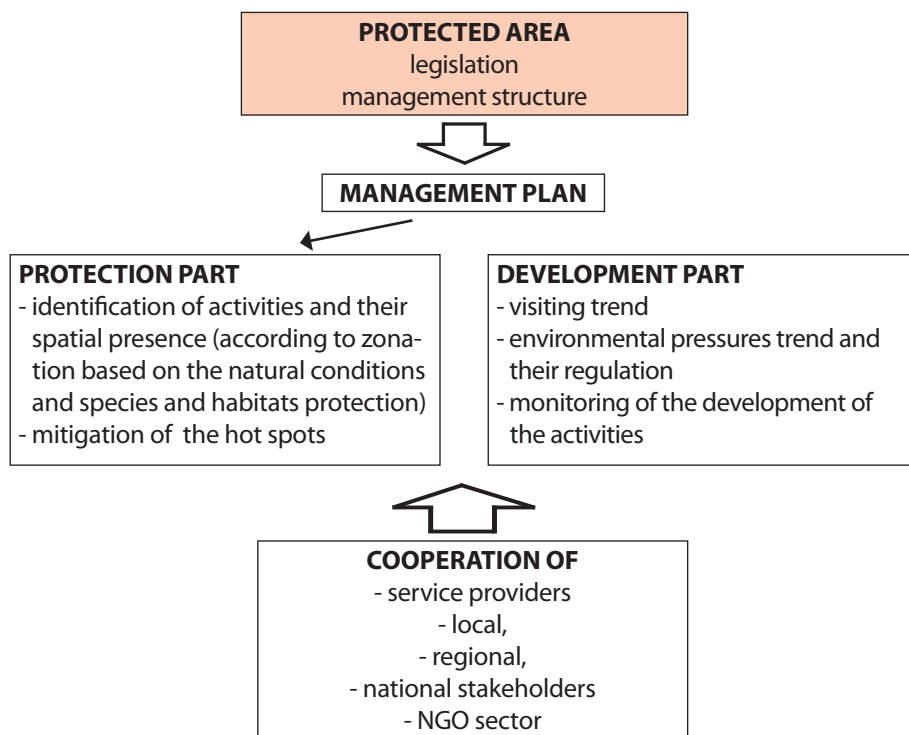
Figure 50: Perception of the high mountain environment.



Planning and achievement of the sustainable development of tourism and recreation in mountain areas

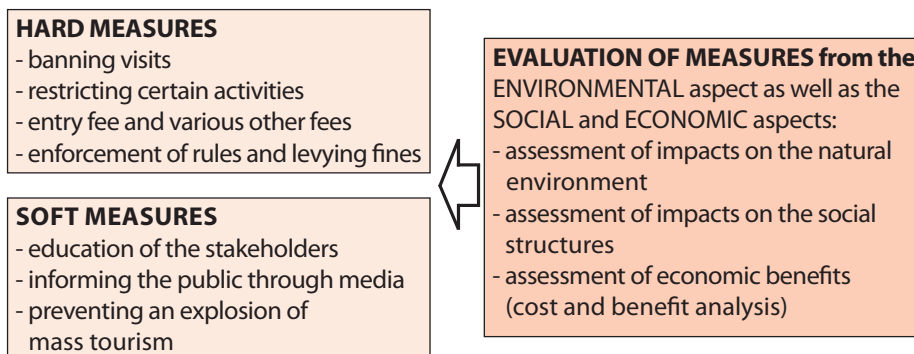
Planning and achievement of the sustainable development of tourism and recreation in mountain areas are foreseen first of all by the **protection of mountain areas** and the maintenance of existing protected areas. Only legally established protection enables the design and implementation of policies which lead to the achievement of sustainable development. As we have already seen, perception is highly important also in the planning phase.

Figure 51: Protected areas in the planning process.



The final segment of the sustainable development of tourism and recreation in high mountain areas is represented by **measures**. These come into being in response to the state of the environment and the perception of it, and are a kind of final result of natural geographic conditions, human activities, and their environmental impacts. They represent activities aimed at improving the state of the environment and, through wise planning, the opportunity for sustainable planning as well as ultimately the achievement of the sustainable development of tourism and recreation in high mountain areas.

Figure 52: Measures.



These can be specified as **hard** and **soft measures**. Among the first is a **complete prohibition of visitors** and carrying out of activities in areas which are degraded to such an extent that they need time for regeneration, or the sensitivity of environmental components is so high that they cannot withstand visits in any form; this is followed by **restricting visitors** and/or **placing restrictions on certain kinds of activities** which have been shown to have a negative impact on a particular environmental component.

Among **hard measures** we also consider the introduction of entrance fees and charges for, e.g., the summits of mountains. The funds thereby obtained must be used for the operating needs of the protected high mountain area. The last hard measure is the enforcement of rules, and levying fines on those who violate them; enforcement must be consistent, and the funds thereby obtained likewise returned to the protected area. Among **soft measures** are the education of all stakeholders - providers and customers, the local population living closest to the protected area, local, regional, and national institutions – and general efforts towards raising awareness about environmental problems in high mountain areas through a variety of media.

Some measures can already be evaluated in the planning phase and we determine their financial as well as wider economic and also social and environmental impacts.

An analysis of costs and benefits provides an estimate of the relative economic success of alternative policies compared to costs and benefits over a specific time period. The analysis identifies the most successful policies from the standpoint of social welfare, which includes monetary and other values (Stynes, 1999). Such analyses are a basic tool for evaluating the economic benefits of projects; in principle it is also necessary to evaluate in this way the financial, economic, and social impacts on the environment. The goal is the identification and valuation (in monetary units) of all possible impacts, since in this way particular costs and benefits of a project can be defined. Results can be determined as a whole, and conclusions reached regarding the desirability of a project and its economic justification. The analysis consists of a **financial** and an **economic analysis** (Navodilo pri uporabi metodologije pri izdelavi analize stroškov in koristi, 2006).

The purpose of the **financial analysis** is a calculation of indicators for the financial results of a project. Usually this is done from the standpoint of the investor (the investor in and/or owner of a project). In the framework of the financial analysis all income and all costs which the project will cause during the period of its operation are estimated. The basis for the length of the period treated is usually defined by different guides (e.g. Guide to cost-benefit analysis of investment projects – European Commission, June 2008).

In the case of a financial analysis the project is judged from the standpoint of its profitability. Criteria for the evaluation of profitability of the project are as follows:

- net current value is positive;
- relative net current value is greater than 0;
- the internal level of profit is greater than the discount level used.

Based on the criteria cited the profitability of private/business investment projects is evaluated. Typical of most public projects is that they do not satisfy any of the criteria

cited. This is understandable since a basic assumption is that the private sector invests in successful, profitable ventures. Public investments in development are usually not geared towards generating profit, but rather bringing positive impacts to the environment in which they take place.

A financial analysis enables more precise forecasting as to whether funds will be sufficient to cover future expenditures. It makes it possible for us to check and ensure a balance of cash flows (providing for financial coverage) and calculate indicators of the financial returns for an investment project based on discounted cash flows which rely exclusively on the economic unit which activates the project (company, agency, or similar). For nonprofit projects the **economic analysis** is more important than the financial one. Its framework can be used to judge whether society (the environment) is in a better position if the project takes place or not, and whether the implementation of the project is desirable for the wider community or not. The answer to this question is provided by economic indicators which are the result of an analysis of social benefits and other positive impacts which can be expressed as a value. The criteria for judgment are:

- the economic current value is greater than 0;
- the ratio between social benefits and the value of the investment is greater than 1;
- the economic level of return is greater than the discounted level used.

In the **economic analysis** we use economic values in order to express the price that society is prepared to pay for a good or service. The economic analysis assigns a value to all items based on their value in use or their opportunity costs for society (Priročnik za analizo stroškov in koristi investicijskih projektov, 2004; Navodilo pri uporabi metodologije pri izdelavi analize stroškov in koristi, 2006). The third part of the cost-benefit analysis is tied to **effects which cannot be assigned a monetary value**. It provides a broader illumination of the environmental and social benefits, improved state, etc. forecast for the project. For this part a wide selection of general statistical data on the environment and the social and economic conditions of the particular area in which the project takes place is needed. Based on the financial and especially the economic analysis we predict an improvement in the state of the environment and an impact on the social and economic conditions in the region treated. Forecasts of the future development of the project need to be formulated for the period corresponding to the economically useful life span of the project, and is long enough as to encompass likely long-term impacts. Based on international experience the **reference time period** (economic period) for environmental projects is 30 years. (Navodilo pri uporabi metodologije pri izdelavi analize stroškov in koristi, 2006). The cost-benefit analysis is a basic tool for evaluating the **economic benefits of projects**. In principle all impacts, i.e. financial, economic, social, environmental, etc., are assessed. The goal of the cost-benefit analysis is the identification and evaluation of all possible impacts, since in this way costs and benefits of the project are determined. Results are found as a whole (net benefits) and the final result of the analysis is the conclusion as to whether the project is desirable and worth investing in. Costs and benefits are valued according to the rule of differential values, i.e. the difference between the projection "with the project" and the projection "without the project."

In the cost-benefit analysis it is necessary to define the level of the analysis in such a way that the effects of the project on the environment in which it takes place are considered. Costs and benefits can arise and overlap in different geographical areas and for this reason it is necessary to determine which costs and benefits be considered. This is usually dependent on the scope and field of operation of the project. Effects can be found at the local, regional, or national levels, and in the case of larger projects even the international level.

Regardless of the geographical features of high mountain areas, characterized essentially by great sensitivity of natural geographic conditions and the absence of permanent settlement, it makes sense to include an **economic component** in the model of sustainable development of tourism in some cases. The cost-benefit analysis can provide important insights into specific proposed measures, financial as well as especially in the economic and wider social sense. This kind of definition and analysis of measures is not tied exclusively to mountain regions but extends also to wider “supporting” geographical regions from which the people included in the tourism activity in the high mountains come, who are to a certain extent dependent on the activity for their livelihood or the activity represents additional income for them.

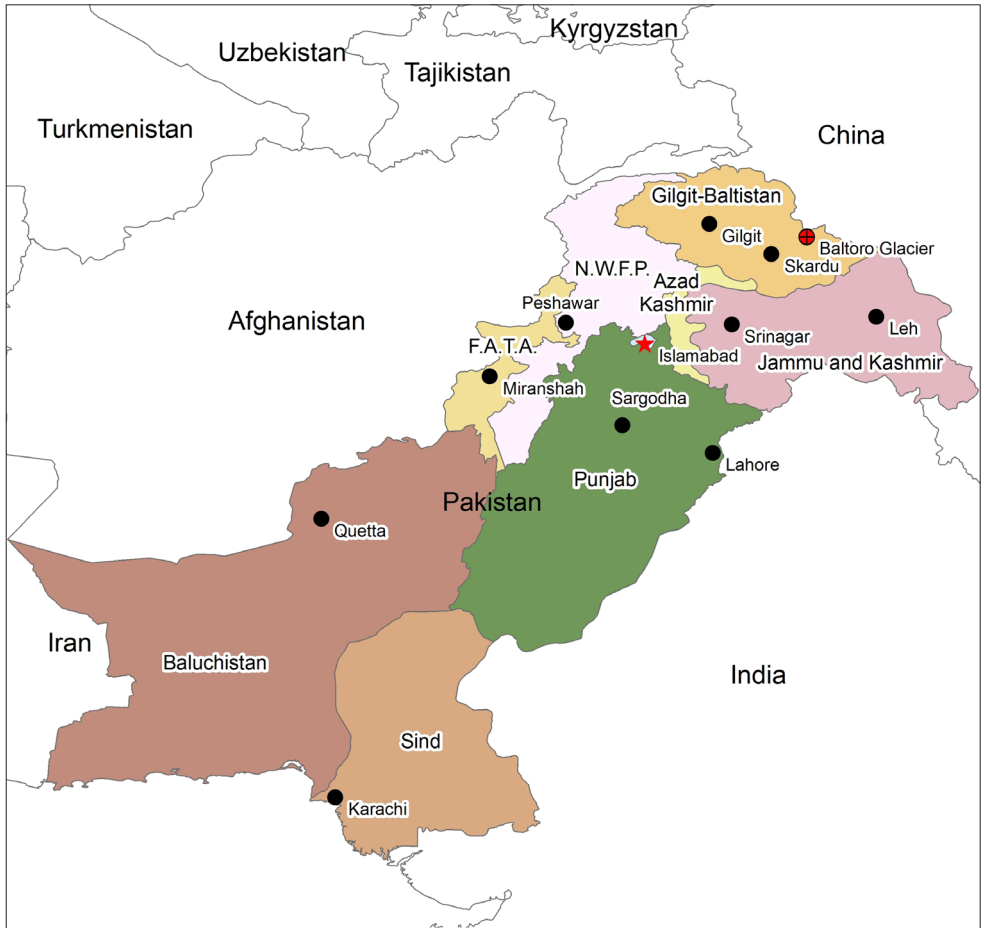
In the case of tourism in high mountain areas, the actual social and economic effects appear in nearby mountain regions as well as in the areas from which the participants come. In our case, the resilience of the nearby regions is highlighted. Resilience is understood as the capability of regional structures to absorb the disturbances (in our case tourists), and to adapt to the new phenomenon while also retaining the existing environmental, social, cultural and institutional capital. Resilience can be studied at various levels – global, regional and local - and this also suggests the research approach: to examine regional resilience in the case of high mountain tourism, qualitative data were obtained through field observations and in-depth interviews with main stakeholders involved in tourism (tour operators, guides, cooks, porters) as well as with representatives of regional and national institutions. The qualitative analysis of the responses provides additional information to support the regional resilience assessment in the case of mountain tourism and its development.

High mountain areas and their resilience to tourism development: example of Baltoro Glacier in the region of Gilgit-Baltistan

The Karakoram extends 350 km parallel to the Himalayas, from the Siachen Glacier in the east along the border between Pakistan and China to the Ishkamun River, which divides the Karakoram range from the Hindu Kush in the west (Ives, 2004). The development of tourism in the region of the Karakoram has been influenced in large part by the natural geographic conditions, most notably by the high concentration of tall mountains – four of them above 8000 m: K2 (8611 m), Gasherbrum I (8063 m), Broad Peak (8047 m) and Gasherbrum II (8035 m) – over a relatively small area. The longing to ascend the world's highest peaks in the mid-20th century became a driving force for the development of tourism in this region, which was at first limited to exploration and mountaineering expeditions, and only considerably later was followed by a boom in trekking as one of the most popular forms of adventure tourism in the broader region of the Himalayas more generally. The exceptional growth in the numbers of visitors was made possible by the construction of the Karakoram Highway (KKH) in 1978. The number of tourists, for example, to the Hunza Valley was barely 302 in 1979, but by 1985 this had soared to 5361, and a similar trend also occurred in the area of the Baltoro Glacier (Ives, 2004). The construction of the KKH also had a major impact on local societies as well as on their behavioral patterns. The road enabled out-migration and consequently significantly impacted change in the region (Kreutzmann, 2007). Politically the area lies in Gilgit-Baltistan (formerly known as the Northern Areas). Gilgit-Baltistan borders Afghanistan to the north, China to the northeast, the Pakistani administered state of Azad, Jammu and Kashmir to the south, and the Indian-administered state of Jammu and Kashmir to the southeast. The territory consists of two Baltistan districts (Ganche and Skardu) and five Gilgit districts (Astore, Diamir, Gilgit, Ghizar and Hunza-Nagar). The main political centers are Gilgit and Skardu. Gilgit-Baltistan covers a territory of 72,496 km² and has an estimated population of 1.8 million (UNPO, 2011). Despite the substantial population growth, out-migration is also significant in order to increase the household incomes as well as to diversify their sources (Kreutzmann, 2007).

The region of the Baltoro Glacier lies in the central Karakoram (Gilgit Baltistan), whose vast relief units consist of the Skardu Basin and the Indus, Shigar, and Braldu Valleys. The Baltoro Glacier forms the headwaters of the Braldu River. The central Karakoram range lies at the contact area of the Indian and Asian tectonic plates, which is reflected in high relief energy and very tall peaks, more than 60 of which exceed an elevation of 7000 m. The powerful tectonic action also influences the

Figure 53: Location of Gilgit- Baltistan and the Baltoro Glacier in Pakistan.



Source: <http://www.naturalearthdata.com>, 2012

formation and direction of river valleys and consequently also the glaciation of the entire region. The Skardu Basin (2200 m) arose at the intersection of the Indus Valley (SE – NW) and the Shigar Valley (NW – SE) and is one of the largest flat areas in the Karakoram. It is filled predominantly with glacial and fluvial glacial sediments, and partially lake sediments, on which the largest settlement in the province of Baltistan took shape – Skardu, which is also a major point of departure for numerous mountaineering and trekking expeditions in the central Karakoram. The Shigar Valley, which is 4-5 kilometers wide, leads to the area of the Baltoro Glacier, and continues into the Braldu Valley past the settlement of Hyderabad. The Braldu River acquires its name at the confluence of the Dumordo River, which flows from beneath the Panmah Glacier, and the Biaho River, which flows from beneath the Baltoro Glacier.

The Skardu Basin and Shigar Valley.



Figure 54:

The Skardu basin is filled with glacial and fluvio-glacial sediments.



Figure 55:

The Indus River has enough space for flooding mostly in summer when the glaciers melt and the area receives monsoon-driven precipitation.

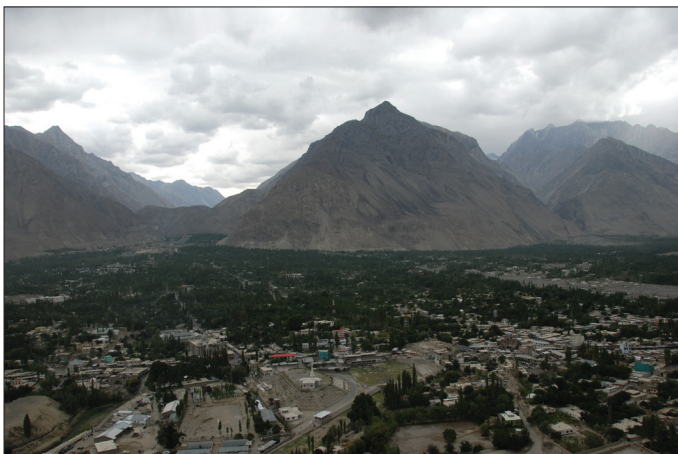


Figure 56:

The main settlement in the Skardu Basin is Skardu (2500 m). Average annual rainfall in the area is 204,2 mm.

Figure 57:

The past glacier erosion is seen in the relief characteristics of the Shigar Valley and the Skardu basin.



The climate of the central Karakoram ranges from moist continental to cold and semi-arid. It is characterized by changing weather patterns and large seasonal temperature differences. Summers can be hot, with temperatures up to 32°C, and winters are cold, with temperatures down to -10°C (data from the meteorological station in Skardu). Temperatures as well as precipitation are highly dependent on the altitudinal zone and local relief. In the area around Skardu the average amount of precipitation from December to May is 167 mm, with a maximum in March (45 mm). The average amount of precipitation from June to November reaches 73 mm, with a minimum in November (11 mm) (Rao, 2003), and the average yearly amount is 204.2 mm (for the reference period 1960-90) (Ahmed, 2003).

Four climate zones can be distinguished based on elevation (Khan et al., 2003):

- Zone IV (under 3000 m): very dry and windy area;
- Zone III (3000 – 4000 m): colder, semi-arid zone with warmer summers and snow cover from 3-8 months;
- Zone II (4000 – 5500 m): cold and moist zone, with snow cover from 8 - 11 months; Zones II and III are periglacial areas; freeze-thaw cycles may last from 2 – 12 weeks;
- Zone I (above 5500 m): area of permanent snow and ice (Hewitt, 1989); above 6000 m precipitation is solely in the form of snow, equivalent to 2000 mm/year.

Two thirds of the snow precipitation falls on the entire region of the central Karakoram in winter and spring, a consequence of weather fronts from moderate geographical latitudes, while one third is contributed by the Indian monsoon (Hewitt, 1989).

The central Karakoram is known for the most extensive glaciers outside the polar regions (e.g. Biafo Glacier is 67 km long, Baltoro is 60 km long (Iqbal Khan, 1994). In previous ice ages, glaciers reached all the way to the Skardu Basin (Ahmed, 2003), as evidenced also by the remnants of glacial sediments in the Shigar Valley and the shape of the basin itself.

Accumulation of snow and ice in present-day glaciers takes place mainly during the winter period in the form of snowfall and avalanches, which contain a large portion of rocks and boulders, as seen in the thick covering of the glaciers. When the rock material is greater than the ice and snow, rock glaciers are formed (Belden, 2008). The rate of movement of glaciers ranges from 100 to 1000 m/year; according to some data the greatest speed of travel can even be as much as 30 m/day (Ahmed, 2003). The data in any case indicate active and intensive glacial erosion and the rapid transport of material.

The thickness of the covering of the surface of glaciers with supraglacial moraine material influences the annual ablation rate and the formation of glacial streams. The moraine cover protects the ice from thawing, and hence in some cases (including the Baltoro Glacier) the terminus of the glacier is at lower elevations than it would be otherwise (Shroder et al., 2000). The supraglacial moraine material also protects the glacier from climate changes, and some glaciers in the Karakoram have even advanced in recent years (e.g. the Liligo Glacier, which flows south from the Baltoro Glacier) (Hewitt, 1998).



Figure 58:

Moraine material over the glacier surface protects Baltoro Glacier from rapid melting.

Thawing of glaciers has a crucial influence on the **hydrogeographical conditions** of the central Karakoram. The Indus River reaches its highest water level in July and August (40 – 70 % of the annual flow). The annual outflow of the Indus at Skardu (at the confluence with the Shigar and Shyok Rivers) is 240 mm, which is more than the average annual precipitation; the difference is due to snowmelt (Ahmed, 2003; Belden, 2008).

The Karakoram rivers rise considerably due to the melting of glaciers in the summer months.

Figure 59:

The Indus River has strong erosion impacts in the area of the Karakoram and frequently floods in southern Pakistan.



Figure 60:

The Biaho River near the Baltoro Glacier terminus.



Climatic conditions are also reflected in the **vegetation**. Semi-desert types of plants are typical at lower elevations, and agricultural cultivation is limited mainly to heavily irrigated fans and older river terraces. The area under cultivation in the region of the central Karakoram amounts to only 2 % of the total; half of that is suitable for growing cereals, fruits, and vegetables. The annual growing season is from 307 days in Gilgit (1450 m) to only 195 days in Misgar (3102 m); therefore irrigation is of crucial importance (Ahmed, 2003, Kreutzmann, 2005). The glacial meltwater is mainly used leading from glacier streams along the artificial channels all the way to the fields in the vicinity of the settlements which were in many cases set up on the fluvial fans.

The natural vegetation at higher elevations (up to 4000 m) consists mainly of shrubs, followed by a zone of more or less scattered areas of grassland, and along the lateral moraines communities of alpine grasses up to an elevation of 4900 m.

Settlement in the central Karakoram extends to an elevation of about 3000 m; in addition to a modest extent of crop cultivation, inhabitants make a livelihood from raising livestock. High-lying pastures where the herds are grazed in summer enable an additional source of fodder for the permanent villages lower down the valleys (Kreutzmann, 2007). On the other hand, rapidly developing tourism is gaining an increasingly important share of the family income. Many of the men, especially from the area of the Shigar Valley, work as porters, cooks and also guides in mountaineering expeditions and trekking groups during the summer months.

Opportunities for sustainable tourism development in the area are certainly present, but both the advantages as well as the constraints should be taken into the account. Among the main advantages is the provision of off-farm employment, additional income from the services sector, reduction of out-migration, increase of the overall income of a location, catalyst effects in favor of secondary and tertiary beneficiaries from the tourism industry and diversification of economic activities. To some extent tourism can also contribute to cultural and natural heritage protection. On the other hand, tourism develops over various phases from the “profitable phase” in which the incomes are far greater than the ones from agriculture, over the phase of tourism infrastructure construction, linked with great profit expectations all the way to the saturation point when the large numbers of tourism entrepreneurs (as well as tourists) can lead to loss of income and investments (Kreutzmann, 2007) as well as to environmental degradation.

The **Baltoro Glacier area** studied is one of the highest regions in the world, with the greatest relief energy and slopes, and the greatest density of peaks. It lies above the climatic timberline of 3500 m and above the upper limit of settlement of about 3000 m. The region of the glacier is part of the central Karakoram (politically part of Gilgit-Baltistan) and represents one of the most glaciated as well as highest regions on Earth: at its accumulation zone it is surrounded by four peaks above 8000 m, including the second highest mountain in the world—K2 (8611 m). It is one of the most typical as well as attractive high mountain areas in the world, where the number of visitors has been increasing every year.

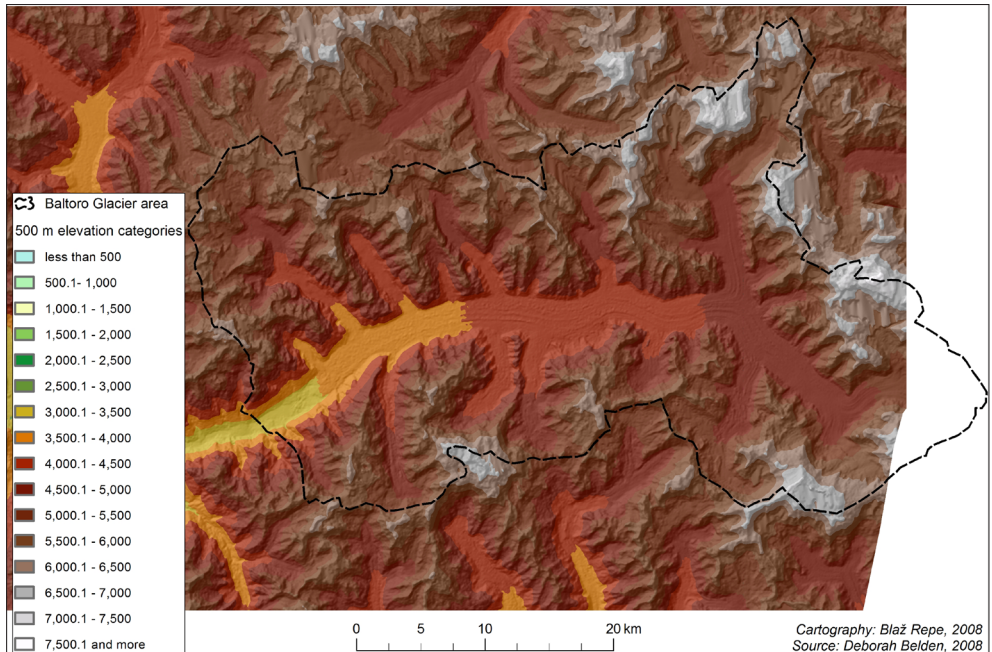
Landscape ecological division of the region of the Baltoro Glacier

The area of the Baltoro Glacier begins at the glacier terminus (3400 m) and encompasses the headwaters of the Biaho River, which is entirely filled by the Baltoro Glacier and its side glaciers. The slopes are also part of the headwaters, reaching up to 8611 m. The area measures 1302 km². Most of the area is made up of glaciers, of which Baltoro is the main one. The name “Baltoro” starts at the confluence of the Abruzzi and Gasherbrum Glaciers. The Baltoro Glacier has eight right-hand and

seven left-hand side glaciers which together with their slopes make up the area of the Baltoro Glacier. The width of the Baltoro glacial valley is up to 2000 m, and the average inclination of slopes is between 35 and 47°. The surface of the glacier has a thick covering of moraine material, and the average slope of the glacier is 5°, which increases at the end to 11° (Belden, 2008). The lithological composition is represented mainly by magmatic and metamorphic rocks (predominantly granite and gneiss) of varying ages; sedimentary rocks (sandstone, breccia, limestone) are also present to some extent. The area is also tectonically active, as can be seen also in geological maps showing the lithological composition, in which there are often discordances due to faults, among other things.

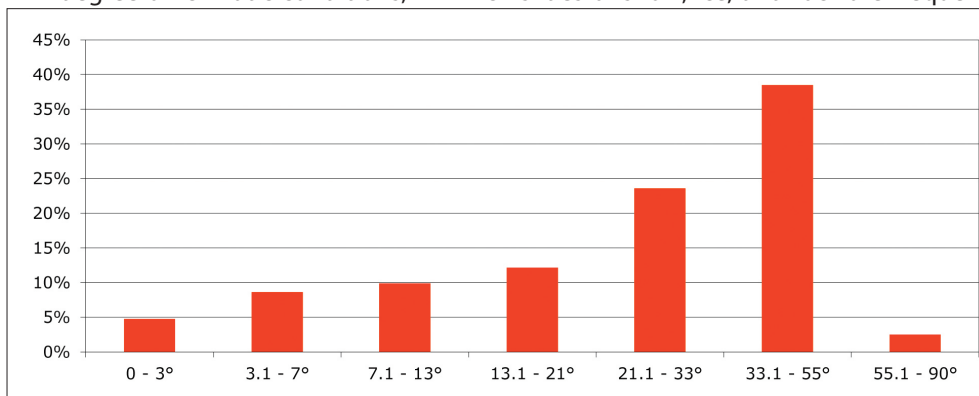
The prevailing elevations are between 4600 and 6000 m, to which valley glaciers also reach. Among them are slopes which in the northeast and east reach over 8000 m, in the south 7800 m and in the north up to 7200 m.

Figure 61: The elevation characteristics of the Baltoro Glacier area.



Although the average slope of the Baltoro Glacier is 5°, it is not homogeneous, and the slope on the surface in places can reach considerably greater values. For the whole area, the slope category of 33.1 - 55° is predominant, which means that geomorphic processes are highly intensive and there is very strong denudation.

Especially at elevations above 6000 m, the processes are also dependent in large degree on climatic conditions, in which slides of snow, ice, and rock are frequent



due to snowfall and steep slopes.

Figure 62: The slope inclination characteristics of the Baltoro Glacier area.

The Baltoro Glacier flows from east to west. Thus over the whole of the area eastern exposures are predominant, followed by southwestern, western, and northwestern, with northern ones least common, and there is also a minimal share of entirely flat surfaces.

The outer boundary of the entire area of the glacier is the watershed of the Biaho River (headwaters); within it three landscape ecological units (LEUs) were identified based on natural geographic features for the purposes of further study, in which pressures and vulnerability of the LEU were determined from the standpoint of adventure tourism. The basic criteria for LEU regionalization were **elevation, slopes and glaciations/presence of valley glaciers**:

- 1. Baltoro Glacier valley:** up to an elevation of 5200 m, small slopes predominate, the valley is filled with ice covered with supraglacial moraine material on which surface streams are formed in the warmer months (June-September);
- 2. side glaciers:** up to an elevation of 6200 m, small to moderate slopes predominate, the surface of the glacier is only partly covered in debris, in the upper parts the surface is ice and/or snow throughout the year;
- 3. slopes:** above the main and side glaciers to an elevation of 8600 m, slopes are steep, over 33°, partially covered with slope glaciers; where slopes are steepest bare rock predominates.

The LEU of the Baltoro Glacier with 125 km² makes up a good 10 % of the entire region. Side glaciers represent 195 km², or 15 % of the entire region, while slopes, comprising 982 km² or 75 %, are the most extensive LEU.

Figure 63: LEU of the Baltoro Glacier area.

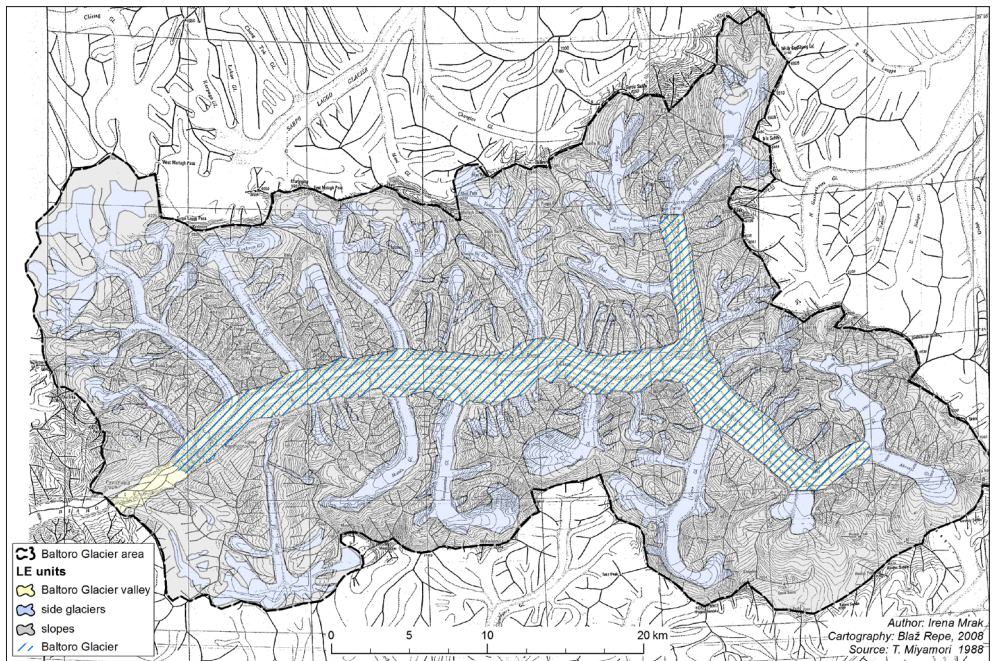


Figure 64: Slopes are the largest LEU of the Baltoro Glacier area.



Estimate of the carrying capacity of the Baltoro Glacier area

The **carrying capacity** of the LEU was estimated with regards to the natural characteristics in the area. The estimation is based on the aspects of **relief/slopes, relief/elevations, and water**, in which the criterion used was the presence of surface water flows. The basic relief elements (elevation, slope, exposure) were analyzed in more detail for each LEU, and for the purposes of the estimate other natural geographic features were also indirectly considered – primarily the lithological substrate, glaciation and local climatic conditions, which are influenced mainly by elevation, and in the case of climatic conditions also by the water situation. Based on separate estimates of carrying capacity from the standpoint of the specified criteria, a combined estimate for the individual LEUs was formulated.

Table 4: Estimate of carrying capacity of the Baltoro Glacier area by LEU.

LEU	Relief/slopes	Relief/elevations	Water	Combined estimate of carrying capacity	Explanation
Baltoro Glacier	2	3	3	3	The combined estimate of carrying capacity is small due mainly to the presence of water flows on, in, and under the glacier.
Side glaciers	2	3	2	2	The combined estimate of carrying capacity is moderate. Compared to the preceding LEU there are fewer surface water flows, and glaciers are less extensive.
Slopes	3	4	1	3	The combined estimate of carrying capacity is small mainly because of high elevations and steep slopes, which significantly reduce the regeneration capability.

For the “Baltoro Glacier” LEU the lowest carrying capacity was estimated from the aspect of elevations and water. Due to the severe mountain climate, processes are very slow, which means that regeneration in the event of possible degradation is very difficult, and a lot of time is needed. Surface flowing water, which is more sensitive to possible pollution, is most heavily represented in this unit. In the “side glaciers” LEU, the lowest carrying capacity was from the aspect of elevations, for the same reason as for the “Baltoro Glacier” LEU, and from the aspect of slopes and the presence of flowing water the carrying capacity is moderate. The “slopes” LEU was found to have the smallest carrying capacity from the aspect of elevations, since these are some of the most extreme elevations on Earth, associated with equally extreme climatic conditions. Any pressure on this environment can cause irrevocable damage.

Characteristics of the carrying capacity of the Baltoro Glacier area LEU.

Figure 65:

Streams are characteristic for the surface of the glacier in the summer season, and at this time there is also the most intensive vertical flow of water.



Figure 66:

The subglacial stream at the glacier mouth of the Baltoro Glacier, which represents the main runoff from the whole of the area studied, greatly increases in summer.



Figure 67:

The slopes are partially covered by snow and ice; where slopes are steepest, there is mainly exposed bedrock. Surface water flows are smaller and appear only on warm summer days.



Analysis of anthropogenic influences and impacts in the Baltoro Glacier area

Anthropogenic influences on the glacier are dispersed and connected with the activity of **high mountain tourism (D)**, while impacts are concentrated at points in trekking camps and base camps, which represent “hot spots” of pollution. It is in these places that the negative influences and impacts of tourism (**P**) are most visible – for example, large quantities of organic and inorganic wastes, cutting of shrubbery, trail erosion, noise, and so on. Along the path across the glacier the negative impacts are minimal and located in the narrow belt along the path, where there occasionally appear animal carcasses and inorganic wastes. Calculations of the values of nutrients which remained in the area studied in 2006 indicate a heavy load (**S**) on the main glacier, which for this reason is losing its attractiveness for visitors.

Nevertheless, in future we can expect a continuing trend of growth in the numbers of visitors, since the motives for visitors do not change regardless of the critical ecological state of the area. Visitors are prepared to accept even this kind of situation as part of the price for the opportunity to view the second highest mountain in the world, even if they are critical of it, though in future this could become a limiting factor for the development of tourism in this area.

Table 5: The DPSIR framework for the Baltoro Glacier area.

driving forces	pressures	state	impacts	responses
HIGH MOUNTAIN TOURISM (mountaineering expeditions, trekking groups, research expeditions)	GROWTH IN VISITS ORGANIC WASTES (human and animal feces and urine, carcasses, food scraps) INORGANIC WASTES (plastic bottles, cans, wooden and metal boxes, gas canisters, remains of equipment) NOISE (visitors, helicopter flights) KEROSENE (heating, spills)	POLLUTION OF WATER AND AIR NEGATIVE IMPACTS ON VEGETATION (cutting of shrubbery, creation of trails), ANIMALS (disturbance), RELIEF (erosion of trails)	REDUCED ATTRACTIVENESS OF THE AREA <ul style="list-style-type: none"> ▪ visual (polluted camps) ▪ general – pollution is cited as the most disturbing issue in the reports of expeditions and trekkers LONG-TERM DECREASE IN VISITS TO THE AREA	INTRODUCTION OF AN ECOLOGICAL TAX CREATION OF CENTRAL KARAKORAM NATIONAL PARK PROHIBITION ON BURNING OF SHRUBBERY ACTIVATION OF NGOs (installation of toilets in camps, organization of cleaning expeditions, seminars for porters and guides)

The main motive (indirectly **driving forces - D**) for visiting the area is a view or ascent of K2 (8611 m), and along with this the desire to reach high altitudes, whether on the mountain of K2 or other nearby mountains, accomplishing internationally renowned sporting feats, a desire for adventure, affirmation, and validation, and partially also

a desire for identification. The motive is reflected in the numerous mountaineering, trekking and research expeditions which represent the driving forces in the DPSIR framework. Because of its ability to satisfy many different motives, the Baltoro Glacier area has a long history of attracting visitors. The numbers are steadily increasing; occasional fluctuations in recent years have been due primarily to international events (e.g. the terrorist attack in New York on September 11 2001) and unstable internal political conditions in Pakistan.

The geographical location of the glacier in the vicinity of the politically controversial Pakistan-Indian border means that visits are monitored, and thus data on the numbers of visitors to the area annually (**P –pressures**) are available. The Alpine Club of Pakistan records data on the number of mountaineering expeditions and the number of their members, and about groups and the number of trekkers.

Increasing numbers of tourists have been recorded from the 1950s onwards, and tourism is becoming the main source of income for local residents living near the glacier (Ives, 2004). The area is most easily reached on foot, and requires 12-18 days of active hiking from visitors, which includes the approach to and crossing of the glacier, to the foot of particular mountains and the descent back to the starting point. For this kind of activity the assistance of locals is required: they work as porters, cooks, and guides, and help visitors transport equipment and food. Under pressures from the standpoint of tourism activity on the glacier we considered both the actual number of visitors and estimated the number of people who usually accompany an individual group. Their number (porters, guides, cooks, helpers, etc.) is dependent on the size of the group of visitors. Based on data on visitors and on estimates regarding the number of people accompanying them we calculated how many people actually cross the Baltoro Glacier in one year, and how long the average stay on the glacier is.

The number of visitors in recent years has increased due mainly to growth in the number of trekkers, whereas the number of mountaineering expeditions has grown somewhat more slowly. In 2003 the number of visitors was considerably reduced due to the 2001 terrorist attack on New York; the event for some years afterwards affected world tourist flows, including visits to the Baltoro Glacier (and Muslim countries in general). In 2004 there was a noticeable increase due to the 50th anniversary of the first ascent of K2 (8611 m), which was achieved by members of an Italian mountaineering expedition in 1954. It was commemorated at a ceremony at the base camp beneath the mountain, and throughout the summer there were many groups of trekkers, mainly from Italy, honoring the anniversary by visiting the area. Data for 2006 show a situation characterized by annual growth in the number of visitors, and this trend continued in 2007. Among pressures we can also include the bodies of humans and animals who have died on the glacier, and due to the difficult access of the whole of the LEU have remained there.

The number of deaths has risen as visits have increased, but it is dependent primarily on weather conditions in a particular season. Thus in 2008 11 climbers, who wanted to take advantage of the rare opportunity to ascend the summit, died on K2 on one day (*NB: in the period from May to September in a typical season an ascent of the peak is only possible during a maximum of three periods of good weather, meaning 4-5 days of favorable conditions*)

Table 6: Visits to the Baltoro Glacier in 2003, 2004 and 2006.

groups of visitors		2003	2004	2006
EXPEDITIONS/ALL (Pakistan)	no. of expeditions	54	56	87
	no. of members	466	605	627
EXPEDITIONS/BALTORO	no. of expeditions	35	37	48
	no. of members	315	400	420
	no. of crossings of Baltoro	630	800	840
AVERAGE NUMBER OF MEMBERS		8-9	10-11	10-11
NUMBER OF PORTERS (average of 10/expedition member to base camp and average of six/expedition member on the way back)		5,040	6,400	6,720
	no. of crossings of Baltoro	10,080	12,800	13,440
COOKS, HIGH ALTITUDE PORTERS, GUIDES average of 5/expedition		175	185	240
	no. of crossings of Baltoro	350	370	480
CROSSINGS OF BALTORO—total for EXPEDITIONS		11,060	13,970	14,760
NUMBER OF TREKKERS		377	1,721	2,445
	no. of crossings of Baltoro	754	3,442	4,890
NUMBER OF PORTERS (average of 4/trekker, including cooks and guides)		1,508	6,884	9,780
	no. of crossings of Baltoro	3,016	13,768	19,560
CROSSINGS OF BALTORO - total (TREKKERS)		3,770	17,210	24,450
CROSSINGS OF BALTORO – total for ALL		14,830	31,180	39,210

Source: Alpine Club of Pakistan; Islamabad, 2006; estimates and calculations I. Mrak.

Table 7: Number of attempts and number of mountaineers who died on the four eight-thousanders above the Baltoro Glacier up until 2003.

peak	number of attempts up until 2003	number of deaths
K2 (8611 m)	198	77
Gasherbrum I (8063 m)	195	21
Broad Peak (8047 m)	255	18
Gasherbrum II (8035 m)	650	17
total	1,298	133

Source: Alpine Club of Pakistan, 2004.

Eight-thousanders in the Baltoro Glacier area

Figure 68:
K2, 8611 m.



Figure 69:
Broad Peak, 8047 m.



Figure 70:
Gasherbrum I, 8064 m.





Figure 71:
Gasherbrum II, 8032 m.

Base and higher camps in the Baltoro Glacier area



Figure 72:
Broad Peak base camp.



Figure 73:
*Camp IV at 7400 m on
Gasherbrum II.*

Figure 74:

Camp III at 7000 m on
Broad Peak.



The environmental **state (S)** is different for each LEU, since first of all the duration of stay is quite different for the area of each individual unit. The stay is longest on the Baltoro Glacier, where the pressures are also both most extensive and intensive. Stays on the side glaciers and slopes are much shorter, and hence the burden is not as heavy. However, because of the higher elevations, it is not insignificant, since the self-cleaning capability of these areas is less compared to that of the main glacier.

Figure 75: Assessment of the burden on trails and climbing routes in the Baltoro Glacier area.

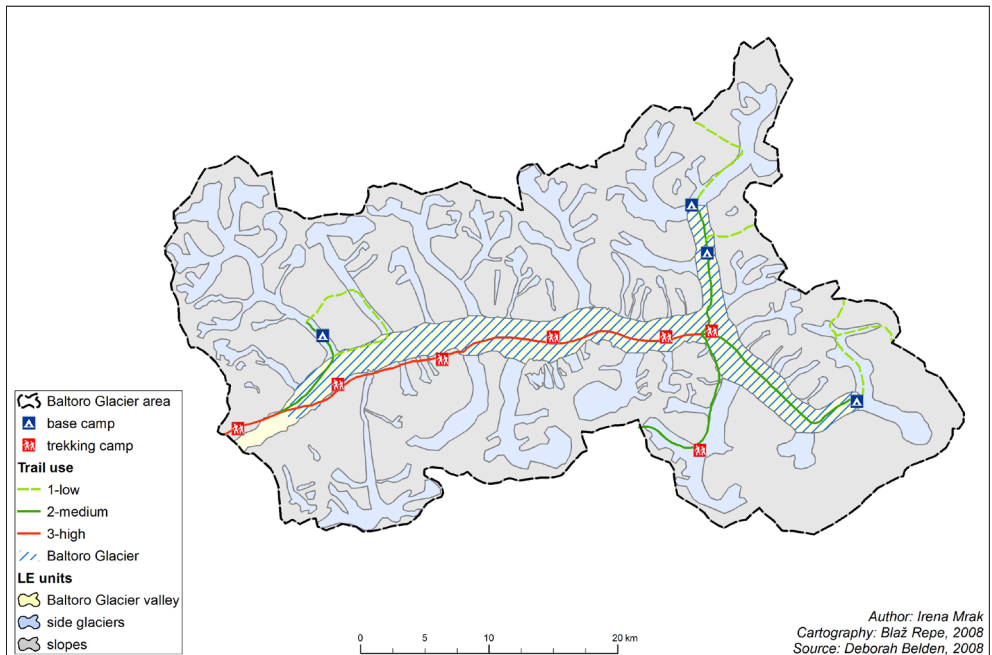


Table 8: Quantities of nutrients in the Baltoro Glacier area in 2006.

LEU	N (kg)	N/km ²	P (kg)	P/km ²	K (kg)	K/km ²
Baltoro Glacier	3577	28 kg/km ²	377	3 kg/km ²	753	6 kg/km ²
side glaciers	14	0.07 kg/km ²	1.5	0.008 kg/km ²	3	0.015 kg/km ²
slopes	96	0.09 kg/km ²	10	0.01 kg/km ²	20	0.02 kg/km ²
total	3692	2.8 kg/km²	389	0.3 kg/km²	777	0.6 kg/km²

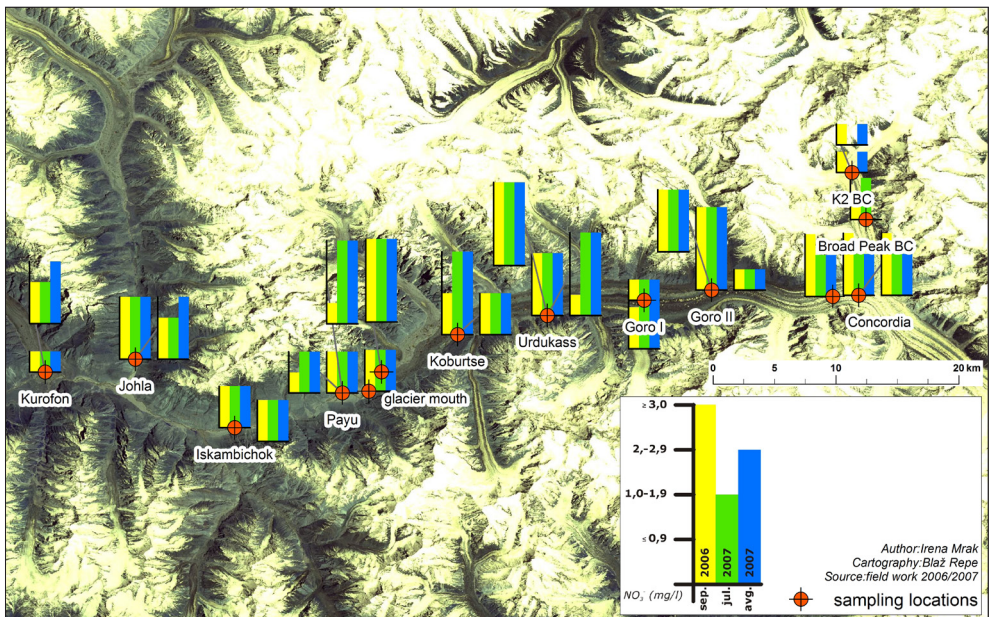
The values calculated indicate that the greatest burden occurs on the Baltoro Glacier, and as expected the lowest burden is on slopes, since these comprise both the largest and the least visited LEU. The burden (S) on some natural geographic elements was determined through field work, in September 2006 (after the tourist season) and in July and August 2007 (at the height of the season).

In order to determine the physical and chemical properties of streams the oxygen content, pH (Map 30), and content of nitrates, ammonia, and phosphates were measured, using the Visicolor Eco tests (Machery-Nagel GmbH&Co.KG), which are suitable for work in the field. For determining nitrate levels in the water tests with a sensitivity of 1-120 mg/l NO₃⁻ were used, and for determining phosphate levels, tests with a sensitivity of 0.2-5 mg/l PO₄^{-P}, and for determining ammonia content, tests with a sensitivity of 0.2-5 mg/l NH₄⁺. The greatest difficulty in the work was posed by the low temperatures of the water, since tests require the temperature of the water samples to be at about 18°C. Field analyses of 82 samples from surface water flows in the area of the Baltoro Glacier were performed.

Locations were selected along the length of the glacier, in all the trekking camps and main base camps for expeditions as well as at some intermediate locations along the main route across the glacier. Camps represented "hot spots" of pollution; their extent and intensity increase as one moves towards the higher base camps – i.e. from the terminus of the glacier towards the accumulation zone. In the analyses of the water's properties we found that phosphates were not present anywhere, and the values for ammonia were very low. With respect to oxygen content (in mg/l) the lowest values were found in the area of Concordia and the base camp below Broad Peak. Both of these are the most populous camps, where there is a large concentration of trekkers, porters and draft animals from May through the end of September. Nitrate values were highest in the main glacial stream at the terminus of the glacier. Equally high values (5 mg/l) were measured at the same location twice in 2007, which indicates that organic material is being flushed out with surface streams through the body of the glacier into the subglacial stream, which has a lower self-cleaning capability than the surface streams. The presence of nitrates is the result of large quantities of organic wastes from large numbers of visitors, while at the same time a portion of the nitrates likely enter the water from the air, and the sources of pollution may be several hundred km distant. Despite the intensiveness of impacts in the upper accumulation zone of the glacier, the effects of tourism on water quality are reflected most in the lower part of the glacier, which is a consequence of water flows on the surface of the glacier, in the body of the glacier itself,

and beneath it. Water in the liquid state on the surface of the glacier is the result of thawing in response to air temperatures above freezing. Surface streams flow out through the glacier “body”, which is dependent on the structure of the ice itself (primary permeability) and on the presence and distribution of holes and channels in the ice mass. In this case the flow of water through the glacier is comparable to the flow of water through limestone, i.e. karst areas. Water has a harder time penetrating through old ice, where there is little airspace between crystals and it is less well connected than between the crystals of fresh snow. For this reason the main flow of water exploits the secondary permeability of empty cracks and channels in the ice, ranging in size from a few millimeters to a few meters. Water penetrates up to the bedrock, where it merges with the water that results from the friction of the mass against the bedrock. The combined stream flows in the direction of movement of the glacier towards the glacier mouth (Benn, Evans, 1998). In this way nitrates also pass through the mouth; the highest values of nitrates were measured in the sub-glacial stream of the Baltoro Glacier, by the glacier mouth.

Figure 76: The values of nitrates along the Baltoro Glacier (September 2006, July and August, 2007).



The impacts of pressures (II) on the remaining natural geographic elements in the area studied are more difficult to measure and can only be estimated. We found pressures along the trails and in trekking, base, and higher camps in the area of the glacier, resulting from large numbers of visitors. Among the main pressures is an increase in the amount of organic wastes (human and animal feces and urine, animal carcasses and human bodies, food scraps), inorganic wastes (plastic bottles,

Burdening of the Baltoro Glacier.



Figure 77:

Porters use kerosene stoves for preparing food on the route across the glacier. Excess kerosene usually ends up on the glacier and is not carried back down to the valley.



Figure 78:

The remains of yaks which were killed after serving the supply needs of one of the climbing expeditions below the mountain of K2 in the summer of 2007.



Figure 79:

Burning of wastes at the conclusion of an expedition is still the most common practice. In this way tourist agencies save money on porters, who would otherwise have to carry the wastes to the valley.

cans, metal and wooden boxes, gas canisters, remains of equipment – tents, sleeping bags, rope, etc.), increased noise pollution (visitors, helicopter flights) and kerosene burning and spills.

Helicopter flights and their associated noise pollution are frequent in the case of accidents and for the supply of military outposts along the glacier. These military outposts represent a constant source of pollution since they are populated throughout the whole year; however, data regarding the number of soldiers is confidential. The ecological state in the area of military outposts is considerably worse than in the tourist camps, and we can thus assert that the military also contributes to the pollution of the glacier, but to what extent we cannot at this time evaluate.

For the other components, such as soil and plants, we only observed damage to plants as a result of tourism (cutting of shrubbery, trampling of the herbal layer). A negative impact on vegetation was strongly present up until the end of the 1990s. Porters cut down shrubbery for cooking fuel along the path to the glacier and the slopes along its sides. The vegetation was cut down practically in its entirety in a couple of decades, hence at the beginning of the 21st century the mandatory use of kerosene was introduced, which mitigated the cutting of shrubbery. At the outset, porters rejected the use of kerosene since it doesn't have the same "home" effect as natural fire, but today it is in general use, although some cutting of shrubbery still occasionally occurs. Kerosene thus represents one of the potential pressures on water and the glacier generally in case of spills, which tend to happen at the end of expeditions and the end of the tourist season, when most expeditions pour kerosene into glacial crevasses or burn it, since its transport back to the valley is not considered worth the high costs of paying porters. Among the long-term impacts of pressures we can thus point to the reduced attractiveness of the area, and consequent decrease in visits.

Table 9: Assessment of burden according to LEU.

LEU	class	explanation
Baltoro Glacier	4	Large numbers of visitors to the LEU are already having a strong negative impact on the natural geographic conditions and consequently also on the self-cleaning and regeneration capability; the level of burden is already very high, as shown by the state of water and pollution of the surface.
side glaciers	2	Visitors are relatively few in number, but still moderately burden the environment, as evidenced mainly in camps on the Vigne Glacier under the Gondogoro-La pass and in the base camp for the Trango Towers.
slopes	1	This unit within the whole of the area of the Baltoro Glacier is least burdened, which is due solely to the fact that it experiences the smallest number of visits.

Pollution in the area of the Baltoro Glacier.



Figure 80:

Animal corps near one of the trekking camps on the Baltoro Glacier.



Figure 81:

Trash left in Gasherbrum base camp.



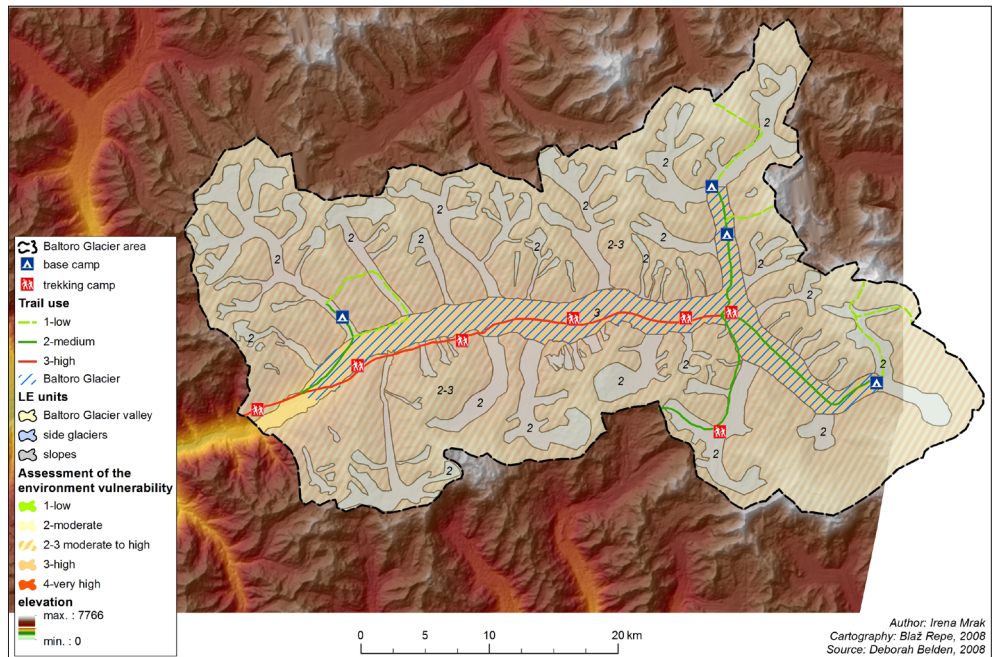
Figure 82:

Camp II on Broad Peak Normal Route.

The **assessment of environmental burden** of the LEU uses four classes:

1. the environmental burden is **low**;
2. the environmental burden is **moderate**;
3. the environmental burden is **high**, landscape-forming elements are burdened and already polluted;
4. the environmental burden is **very high**, environmental components are highly burdened or critically polluted.

Figure 83: Estimate of the burden in the area of the Baltoro Glacier.



Responses (R) to the state of the environment of the Baltoro Glacier area include the establishment of the Central Karakoram National Park in 1993, and increasingly frequent cleanup campaigns undertaken by the Alpine Club of Pakistan, supported mainly by international non-governmental organizations.

The response of the world mountaineering public has been growing; through a variety of media, it is sounding alarms about the critical state of the environment in the Baltoro Glacier area, and appealing to all who visit there to act responsibly. In advance of the 2009 tourist season, the Alpine Club of Pakistan prepared a list of recommendations for environmentally friendly actions in the area of the glacier, with particular emphasis on treatment of organic and inorganic wastes (Explorers-web, 2009).

Assessment of the vulnerability of the Baltoro Glacier area

An overall **assessment of the vulnerability** of the environment and its landscape-forming components is based on the functional valuation of environmental components in individual LEUs, for which the carrying capacity was estimated from the aspects of relief (slopes and elevations) and water conditions. Based on existing data obtained from work in the field, the environmental burden of the LEU was estimated, and in the continuation concluded with an overall assessment using four classes.

Table 10: Assessment of vulnerability according to LEU.

LEU	class	explanation
Baltoro Glacier	3	Environmental vulnerability of the LEU is high, since the burden is great and already exceeds the regeneration capability of particular natural geographic elements. Given existing trends in visits and in the absence of sanctions, the state of the environment will rapidly worsen.
side glaciers	2	In this LEU the environmental vulnerability is moderate, since the natural geographic conditions can withstand the current level of visits, although some negative impacts of tourism can already be seen.
slopes	2/3	Considering the highly sensitive environment, with its extreme elevations and associated severe mountain climate, there is visible degradation of the environment in this LEU, hence vulnerability was assessed as moderate to high.

Perceptions of visitors to the Baltoro Glacier

In order to gain additional insights regarding the impacts of tourism and associated **perceptions** of the state of the environment on the Baltoro Glacier, in-depth interviews with porters, guides, tour operators, mountaineers, Pakistani International Airlines, various NGOs and representatives of the Alpine Club of Pakistan were conducted in 2007 and 2011. Within the interviews the following questions were discussed: overall mountain tourism development in the Karakoram, the importance of mountain tourism for the local population, the role of the Baltoro Glacier in mountain tourism as well as the perception of its environmental state.

They described their perceptions of the environmental state of the Baltoro Glacier area and the behavior and habits of visitors. All agreed that the state of the environment in the past was not “good” and that for future visitors better sanitation should be provided in camps on the glacier itself. The situation improved from 2009 with the annual cleaning campaigns led by the EvK2CN and financed by the Italian government, but a systematic solution to clean up the camps is still needed.

Regarding the state of the environment on the Baltoro Glacier one of the interviewees explained:

“It is much better now than it was few years ago. The NGO from Italy is doing a great job with establishment of toilets and with the cleaning system to take down the trash. As a porter sirdar I also try to educate porters in environmental protection – I survey them and explain about the trash and other pollution which is no good for the area and the tourism in the future.”

Not surprisingly, porters are less critical of the situation, since working for expeditions and trekkers is an important supplement to their income, and hence they favor growth in the numbers of visitors.

“Tourism is an important source of income for us and we like tourists to come to our region. If there are no tourists we find another way to get the additional money – either we stay on the budget from agriculture or we try to find a job in other provinces.”

The Alpine Club of Pakistan is also aware of the poor state of the environment on the glacier, and thus organizes periodic cleanup campaigns in base camps every few years, for which they receive sponsored funding from abroad (Europe, the USA, Japan). The role of the club is very important also in guides' education –regular training sessions are offered in order to improve the skills and knowledge of the individuals in the field of mountaineering as well as in environmental protection. Regarding tourism development in Gilgit-Baltistan, the representatives of the club see the biggest constraints in the difficult access to the area (irregular flights to/from the area - Skardu- Islamabad), regular road blocks in the tourist season due to weather), political instability in Pakistan as well as in the poor education among the tour operators, guides, cooks and porters. They gathered information on mountaineering expeditions and trekking groups and through briefing and debriefing meetings they were able to gain information from the field as well as influence visitors in protecting the environment in the high mountain areas they went to.

If the base camps and trekking camps are to some extent controlled and more and more cleaned up as well, the higher camps remain a problem. Due to their difficult access (elevation, technically challenging approach) and of course the negligence of expeditions, most are not cleaned up. Some campaigns in the past were also undertaken by nongovernmental environmental organizations, and the higher camps on the mountain of K2 for example, were cleaned up, but only up to an elevation of 7000 m. Higher camps for the most part remain in the exclusive domain of expedition members, and this is where the level of their ecological consciousness is on display. Based on the author's own familiarity with conditions on the eight-thousanders in the Karakoram, this consciousness is at a very low level, as evidenced by the huge quantities of different kinds of waste (remnants of climbing gear, tents, sleeping bags, food, bodies, oxygen cylinders, gas canisters, etc.) left behind especially in the “slopes” LEU, and to some extent also in base camps.

Perceptions of visitors to the Baltoro Glacier.



Figure 84:

Interviews with high-altitude porters at the base camp below Broad Peak in 2007 indicated degradation of the area, but their first priority was the income that this work generates for them.



Figure 85:

The environmental consciousness of visitors has an important influence on the state of the environment of the Baltoro area, although for various reasons, such as finding themselves in critical and life-threatening situations, the desire to succeed, etc., the environment is often the lowest priority.



Figure 86:

Cleanup campaign in base camps after the tourist season in September 2006. According to data from the Alpine club of Pakistan, three tons of wastes of various sorts were collected.

In past years the Alpine Club of Pakistan in Islamabad has been holding meetings with all expeditions and trekking groups before and after their operations on the Baltoro Glacier (as well as in other high mountain areas in Gilgit-Baltistan), emphasizing first and foremost concern for the environment. Upon returning from the area, the leaders of expeditions and trekking groups were asked to provide a brief description of the state of the environment there, as well as their personal observations and recommendations. We reviewed 54 such reports, every one of which noted the extremely poor environmental state of the Concordia (at the confluence of the Baltoro and Godwin Austin glaciers) and Goro II camps.

The majority of visitors are aware of how exceptional this environment is, and are also cognizant of the threats it faces, but they usually come to the area only once in their lifetimes, and hence tend not to participate actively in cleaning it up and improving its state. On the other hand, the porters (low and high altitude) are also aware of the importance of preserving the environment, but in this matter they like to point at tour operators as mostly responsible for the pollution on the glacier. They are also aware of their own responsibility for the clean environment from which they can benefit in the long run:

“The tour operators are mostly responsible for the pollution on the glacier and they should be taking more care about the trash as well as about the human waste. More than trekking groups the expeditions are problematic because they stay longer and they not only pollute the glacier but also the slopes of mountains.

We, the local population should clean the glacier because it is like our home and we should take proper care for it. One of the possibilities is to divide stages on the glacier among the tour operators and they would be responsible for their cleaning. Besides, each tourist should contribute a certain amount of money just for cleaning.”

From 2010 on, the briefing and debriefing of mountaineering expeditions and trekking groups can also be done in major towns of Gilgit-Baltistan (Gilgit, Skardu, Chilas) at the offices of the Ministry of Tourism. On the one hand this has eased the overall organization of expeditions or trekking, but on the other there are no data on expedition results or information on the environmental state at various locations within the mountain ranges.

Planning and achievement of the sustainable development of tourism in the Baltoro Glacier area and in Gilgit-Baltistan as a whole

Based on the assessment of vulnerability, planning for sustainable development must be done with a great deal of caution and supervision. The area is part of the Central Karakoram National Park, which for many years remained a “park on paper”. It had no management, or even a management plan, that could guide the sustainable development of the area. In recent years the international nature conservation organizations (IUCN, WWF) and EvK2CN have been working to improve the situation and regulate development in the area around the world’s second highest mountain. The EvK2CN and Alpine Club of Pakistan representatives as well as the visitors to the Baltoro Glacier, in addition to noting tourism as one of the most environmentally

problematic activities, also point to the military posts along the glacier. They are the ones staying at the glacier year-round and their environmental consciousness is evidently very low. In future, besides tourism also the presence of the army should be more regulated, and its members educated so as to protect this highly valuable high mountain environment.

The trend in visits shows steady growth after 2001, which means that the state of the environment, in the absence of specific measures, will only get worse. The first **measure** must be the activation of the protected area and the establishment of appropriate management institutions to begin realizing the goals of the protected area, using hard as well as soft measures. Considering that this is a high mountain area of international importance, a large share of the responsibility belongs to the international mountaineering public to be involved as actively as possible in maintaining a dynamic equilibrium between the natural environment and human pressures.

Among hard measures, the first to be introduced should be an annual quota of visitors, both in the number of climbing expeditions to eight-thousanders as well as in the number of trekkers. The maximum annual quota for expeditions to eight-thousanders is 7, with a maximum number of members of 7, and the maximum number of trekkers should not exceed 1200. In the first instance this means 49 climbers/mountain, or 196 climbers altogether, about half the annual number in a "normal" year (i.e. 2006). For trekkers the number is also half the figure from 2006, which represents a "normal" tourist season. Once the quota is reached, a waiting list for the following years is created. We estimated the annual quota based on an assessment of the vulnerability of the area, which is high for the "Baltoro Glacier" LEU (class 3), meaning that the current burden already exceeds the regeneration capability of particular natural geographic elements. In the other two LEUs – "slopes" and "side glaciers" – the assessment of vulnerability is "moderate", which means that some negative impacts of tourism are already evident, but the current burden can still be borne by natural geographic components.

In any case the assessment of vulnerability can only get worse, given the trends in visits. Thus based on a projection of visits in the future we also determined an annual quota which the environment could still withstand while providing participants in activities with a potentially high quality and complete experience in the Baltoro Glacier area – in particular, being able to experience a preserved natural environment.

For the other mountains in the region the current visitor load is not yet problematic and hence restrictions are not yet indicated. Exceptions to any quota can be made for research expeditions – these make a crucial contribution to the understanding of natural processes through the essential data they gather on natural geographic conditions, not only in the area of the glacier but more widely in high mountain areas. Their number in principle would not be restricted, but nevertheless it would be necessary to clearly define the goals and assess whether the expected results can justify the number of members and duration of the expedition in advance.

Permit fees for summits should be retained, but these should be returned in part to the area, to cover the costs of transporting organic wastes out of the area, setting up sanitation facilities, and above all for the training of all local residents involved in tourism (porters, cooks, guides) in the area of the glacier.

Among the methodologically more challenging hard measures, we outline below the economic valuation of a measure for improving the state of the environment and future management of wastes – we performed a cost-benefit analysis of the measure **“setting up a cleaning service”** in the Baltoro Glacier area consisting of a financial analysis and an economic analysis.

We have already been able to conclude that the Baltoro Glacier area is subject to a heavy environmental burden as a result of tourism in the area. Large numbers of trekkers and mountaineering expeditions are causing negative environmental impacts which can be generally seen in the whole area, but are most pronounced in camps (“hot spots” of pollution), as well as in the increasingly frequently used routes to summits above 8000 m (Gasherbrum I and II, Broad Peak and K2). The most pressing problem is pollution from organic waste (feces and urine), but there is also significant pollution from inorganic wastes (plastics, cans, remnants of climbing and camping equipment, etc.).

Therefore the Baltoro Glacier area requires a systematically organized cleanup. At present the occasional cleanup campaigns are dependent on the interest and financial assistance of various organizations, mainly foreign NGOs, and individuals who have already organized and financed such campaigns in the past. For the most part they cleaned up base camps beneath the Gasherbrum group, Broad Peak, and K2, while cleanups of the remaining camps along the glacier (Concordia, Goro I and II, Urdukass, Koburtse, Payu) are unorganized and dependent entirely on their caretakers. Caretaking of camps is provided at the beginning of trekking routes from the village of Askole to camp Urdukass, or six locations in total, with organized tent sites, three of which also have sanitary facilities. However, there is no disposal of organic wastes, and inorganic wastes are burned.

The assessment of the vulnerability of the Baltoro Glacier area indicates that the vulnerability of the “Baltoro Glacier” landscape ecological unit is high, moderate to high for the “side glaciers” unit, and moderate for the “slopes” unit. Considering the environmental conditions of the “Baltoro Glacier” landscape ecological unit, appropriate measures should be taken in order to improve the state of the environment and keep things from getting worse in the future.

The measure proposed is **setting up a permanent system for cleaning up camps on the glacier (referred to in the ensuing text as “cleanup system”)**, which will have a positive impact on the environmental state of the glacier over the long run and enable additional income for families in the wider region of the Northern Areas of Pakistan, thereby positively impacting the social and economic conditions in the region.

The proposed measure is based on existing data on:

- the number of visitors to the glacier and the duration of their stays,
- the number of porters,
- an estimate of the quantities of organic and inorganic wastes remaining in the area of the glacier, which is derived from my own work in the field (determining the state of the environment) and perceptions of visitors, who regard the current state as highly disturbing and propose solving the problems which have arisen by organizing the transport of wastes out of the area by helicopter and installing portable chemical toilets.

The organization of a cleanup system would employ additional porters, require new infrastructure (purchase of toilets, water filters, and barrels for transporting wastes) and the introduction of new ecological taxes for visitors to the glacier, according to the principle "the polluter pays."

"The polluter pays" principle is one of the principles of European Union environmental policy (Article 174 of the EU Contract), in which the goal is to encourage a system of billing which requires those who cause the pollution to pay for the environmental costs incurred and preventive measures required (Priročnik za analizo stroškov in koristi investicijskih projektov, 2004). In the case of the Baltoro Glacier the introduction of a new ecological tax is entirely justified according to this principle, since the main sources of pollution are visitors.

We expect the state of the environment to improve already in the first year of the cleanup system and that it will have long-term positive impacts environmentally, economically, and socially in the broader area of Gilgit-Baltistan, which lags behind the rest of the country based on certain key indicators.

A comparison of selected socio-economic characteristics of the population of Pakistan as a whole and of Gilgit-Baltistan shows more rapid population growth and a lower literacy rate in the latter. The literacy rate there for women is especially low (25 %). Income per capita is also lower, and the population is oriented more towards agriculture, which represents 60 % of the total family income. Of the remaining 40 %, most heavily represented are activities which are directly or indirectly connected with tourism.

The data gathered were used in a cost-benefit analysis in the conclusions section, based on the potential wider economic impacts of introducing the measure of cleanup of the Baltoro Glacier.

On an international scale tourism in Pakistan represents a negligible share (in 1999 only 0.65 % of all international tourist trips) (Bakhtiar, 2003). At the national level, too, tourism is a less important economic activity, but it is nevertheless rapidly developing in some parts of the country, most of all in Gilgit-Baltistan, a region known for its exceptional mountain landscape and cultural heritage.

According to estimates 50 % of all tourists who come to Pakistan visit Gilgit-Baltistan (the former Northern Areas (Bakhtiar, 2003). There was a significant drop in the number of tourists after 2001, a consequence of the events of 11 September 2001. The period after 2003 is characterized by rapid growth in visits until 2007. In the last few years the unstable political situation in Pakistan has strongly affected the annual number of visitors. Nevertheless, our projection of visits for a 30-year period anticipates a 2 % annual growth in the number of climbing expeditions and a 5 % annual growth in the numbers of trekkers, based on actual data for the 2000 - 2007 period. In parallel with the growth in visits, there is an increase in the number of porters and total environmental impacts (amount of excrement and trash).

It is a fact that life expectancy in more developed countries is increasing, even as people are retiring earlier. According to some estimates half the population of these countries will be older than 50 by the year 2040; they are expected to enjoy good health, have extensive knowledge and in particular a lot of information about possible ways of

spending their leisure time. Consequently, this also means increasing numbers of visitors to mountain regions (Beedie, Hudson, 2003), hence also to the Baltoro Glacier area.

Table 11: A comparison of selected socio-economic characteristics for the population of Pakistan and for the population of Gilgit-Baltistan.

2006	Pakistan	Gilgit-Baltistan (former Northern Areas)
population	165,803,560	1,058,347
gender structure	51 % male 49 % female	52 % male 48 % female
age structure		
0-14 years	36.3 %	50 %
15-64 years	59.4 %	48.2 %
65 years and over	4.3 %	1.8 %
annual population growth	1.8 %	2.7 %
infant mortality /1000	81.5	70
life expectancy	64.13 years	56.5 years
women	65.24 years	56.5 years
men	63.07 years	56.5 years
number of members/family	N/A	8.8
literacy	49.9 %	40 %
women	36 %	25 %
men	63 %	75 %
GDP per capita	2,600 USD	2,000 USD
share of population employed in agriculture	42 %	86 %
net annual family income from agriculture	N/A	4,458 USD (60 % of the total annual income of the family)
other sources of family income	N/A	3,665 USD
access to drinking water	60 %	40 %

Source: Iftikhar, 2003; Federal Bureau of Statistics, 2008.

In the cost-benefit analysis we included all elements of the proposed cleanup system, which requires an initial investment – installation of sanitary facilities in camps which still lack them, purchase of water filters for the needs of visitors (the water is not of drinking quality and must be boiled or filtered) and of plastic barrels for transporting excrement out by helicopter. These barrels would need to be replaced every five years, and are not represented as a cost in the intervening years. We estimated an annual growth in visits based on current data and the average length of stay on the glacier, in which there are differences between trekkers and alpinists. The latter stay on the glacier on average for 35 days, whereas trekkers stay on average for 12 days. Their impact on the environment was also assessed based on daily rates of waste production (feces and urine) and an estimate of the amounts of waste which remain on the glacier.

Table 12: Projection of visits (according to the actual data in the period 2000–2007).

		Actual data				
		2000	2003	2004	2006	2007
No. of mountaineering expeditions		67	35	37	48	67
No. of climbers		407	315	400	420	632
No. of trekkers		889	377	1,721	2,445	3,260
No. of porters		1,200	768	1,845	2,384	3,293
ALL VISITORS		1,296	692	2,121	2,865	3,892
ENVIRONMENTAL IMPACTS						
excrement	0.2	33,783	21,539	51,203	66,012	91,285
urine	1.15	194,250	123,852	294,418	379,569	524,888
trash	10	12,960	6,920	21,210	28,650	38,920
		2014	2015	2016	2017	2018
No. of mountaineering expeditions	68	69	70	72	73	75
No. of climbers	608	620	633	645	658	671
No. of trekkers	4,587	4,817	5,057	5,310	5,576	5,854
No. of porters	4,184	4,364	4,552	4,750	4,956	5,172
ALL VISITORS	5,195	5,437	5,690	5,956	6,234	6,526
ENVIRONMENTAL IMPACTS						
excrement	115,682	120,638	125,825	131,255	136,938	142,889
urine	665,173	693,669	723,495	754,714	787,396	821,611
trash	51,953	54,368	56,900	59,555	62,340	65,259
		2026	2027	2028	2029	2030
No. of mountaineering expeditions	86	87	89	91	93	95
No. of climbers	771	787	802	818	835	852
No. of trekkers	8,238	8,650	9,082	9,536	10,013	10,514
No. of porters	7,001	7,314	7,641	7,985	8,345	8,722
ALL VISITORS	9,009	9,436	9,885	10,355	10,848	11,365
ENVIRONMENTAL IMPACTS						
excrement	256,393	284,362	314,367	346,542	381,030	417,980
urine	1,47,260	1,635,081	1,807,611	1,992,619	2,190,922	2,490,388
trash	90,091	94,364	98,846	103,548	108,480	113,654

	2008	2009	2010	2011	2012	2013
No. of mountaineering exped.:	60	61	62	64	65	66
No. of climbers	540	551	562	573	585	596
No. of trekkers	3,423	3,594	3,774	3,963	4,161	4,369
No. of porters	3,260	3,397	3,541	3,691	3,848	4,012
ALL VISITORS	3,963	4,145	4,336	4,536	4,745	4,965
ENVIRONMENTAL IMPACTS						
excrement	90,238	94,014	97,965	102,098	106,422	110,947
urine	518,866	540,581	563,296	587,061	611,926	637,945
trash	39,630	41,450	43,357	45,356	47,452	49,649
	2020	2021	2022	2023	2024	2025
No. of mountaineering exped.:	76	78	79	81	82	84
No. of climbers	685	699	713	727	741	756
No. of trekkers	6,147	6,455	6,777	7,116	7,472	7,846
No. of porters	5,399	5,636	5,884	6,144	6,416	6,702
ALL VISITORS	6,832	7,153	7,490	7,843	8,213	8,602
ENVIRONMENTAL IMPACTS						
excrement	149,119	155,642	162,473	183,483	206,068	230,335
urine	857,433	894,941	934,218	1,055,025	1,184,893	1,324,425
trash	68,321	71,531	74,898	78,429	82,133	86,017
	2032	2033	2034	2035	2036	2037
No. of mountaineering exped.:	97	98	100	102	104	107
No. of climbers	869	886	904	922	940	959
No. of trekkers	11,040	11,591	12,171	12,780	13,419	14,090
No. of porters	9,117	9,532	9,966	10,420	10,897	11,397
ALL VISITORS	11,908	12,477	13,075	13,701	14,359	15,048
ENVIRONMENTAL IMPACTS						
excrement	457,554	499,922	545,263	593,771	645,648	701,111
urine	2,630,983	2,874,550	3,135,264	3,414,182	3,712,476	4,031,389
trash	119,081	124,774	130,747	137,013	143,588	150,485

Source: data from Alpine Club of Pakistan; Islamabad, 2006; estimates and calculations I. Mrak.

Table 13: Overview of parameter and assumptions included in the financial and economic analysis.

parameter	assumption
investment	<ul style="list-style-type: none"> ▪ Installation of sanitary facilities in camps (20 toilets in each camp, cost of one toilet: \$1,500). ▪ Purchase of filters for water (cost of one filter: \$300). ▪ Purchase of barrels for excrement (cost of one barrel: \$7).
discount rate	7 %
basic assumptions	The number of mountaineering expeditions is 60 (in the initial year), with a predicted annual growth rate of 2 %
	Number of alpinists: on average 9 alpinists/expedition
	Number of trekkers: 3,423 in the initial year, 5 % annual growth
	Average length of stay: alpinists 35 days, trekkers 12 days
environmental impact	Average quantities: <ul style="list-style-type: none"> ▪ feces/visitor per day: 0.2 kg ▪ urine/visitor per day: 1.15 kg ▪ trash/visitor: 10 kg
INCOME	
newly introduced tax	\$85.37/person in the initial year, growth in accordance with the projected number of visitors
EXPENSES	
excrement	Helicopter transport: \$3/kg
labor costs	Porter: \$110 Additionally: upon returning also carries out trash: \$55

Source: Own field work in 2006, 2007.

The costs of cleanup include transport of excrement by helicopter and the costs of porters carrying trash out from the glacier. Some of the porters used will be those who are returning from camps on the glacier without a load and who will be paid additionally for their work (half the usual rate), while others depending on needs will be newly employed.

Currently there is an ecological tax (\$200/group of visitors) and an additional fee of \$1000, payable in the event of major damage to the environment. The ecological tax goes into the national budget and is not returned in any form back to the area of the glacier. The income which we anticipate through our measure is a new ecological tax (based on the "polluter pays" principle) which should be allocated exclusively for the cleanup of camps. The value in the initial year is calculated based on actual costs and data on visits to the glacier; based on the expected annual growth in the number of visitors, the annual growth of the tax will be 10 %. All calculated values are based on a discount rate of 7 %, by means of which the predicted costs and income in the reference period are comparable to current values.

Financial analysis

The purpose of the financial analysis is a calculation of the indicators of the financial results of setting up a cleanup system in the area of the Baltoro Glacier and organized care for the environment from the standpoint of the elements defined. It is prepared as a consolidated projection of financial flows at the local level.

Table 14: Indicators of the financial analysis.

net present value (NPV)	839,574
relative NPV	1.35
internal rate of return	19.67 %

Net present value shows the net cash flow in the reference period taking into account the discount rate. The net cash flow is the outcome of benefits and costs, and the net benefit as the difference between cash inflows and outflows during the time of the useful period of a particular project. The **relative net present value** is the ratio between the net present value of cash flow during the entire period of the investment and the present value of investment costs. The relative net present value shows the cumulative net return generated by a unit of investment capital.

In the **internal rate of return** we look for the discount rate at which the net present value is 0. The internal rate of return shows the actual financial justification for setting up the cleanup system; if it is higher than the discount rate this means that the proposed measure is financially justified. In our case the internal rate of return is significantly higher than the **discount rate** (using this rate we discount the future earnings and investment expenditures at the initial period in which there are investment expenditures). This means that the investment as defined is justified in a business sense. The new ecological tax in its entirety remains in the local environment for the designated purposes. Local businesses (existing tourist agencies) could potentially be interested in carrying out this kind of activity based just on the financial aspect.

Existing tourist agencies originate from Gilgit-Baltistan. Their services are used by all visitors, since visits to the Baltoro Glacier are not possible without prior arrangement (including getting a permit from the Ministry of Tourism), given that it is located in a border area which is the site of occasional conflicts with the Indian military due to the unresolved Kashmir question. Moreover, there are no permanent settlements in the area of the glacier, and it is thus necessary to arrange in advance for the provision of all food and equipment, with the loads carried in by porters who come from Gilgit-Baltistan. All services of this kind are provided by agencies, which in principle are also responsible for managing the wastes produced by their groups of visitors. However, in order to maximize profits, this responsibility is usually evaded.

The financial analysis showed that if one agency decided to organize the cleanup system, the initial investment in equipment (barrels for helicopter transport of excrement, water filters, toilets) would be recovered in 6.5 years, and during this time it would also already have a 10 % profit.

Table 15: Projection of income and costs (in \$) in the reference period.

YEAR	0	1	2	3	4	5	6	7	8	9
BENEFITS	338,326	352,649	367,637	383,321	399,736	416,916	434,899	453,724	473,432	494,066
Additional ecological tax	338,326	352,649	367,637	383,321	399,736	416,916	434,899	453,724	473,432	494,066
COSTS	654,191	298,297	311,227	397,890	338,241	354,096	367,825	383,661	400,237	417,590
Trash collecting (porters)	13,078	13,678	14,308	14,967	15,659	16,384	17,144	17,941	18,777	19,653
Excrement transport (helicopter)	270,713	282,042	293,894	306,293	319,266	332,841	347,047	361,914	377,475	393,764
Investment costs - toilets installed	300,000									
Investment costs - water filters	69,000	2,576	3,026	76,630	3,316	3,471	3,634	3,805	3,985	4,173
Investment costs - barrels	1,400				0	1,400		0	0	0
Net financial flow	-315,865	54,352	56,409	-14,569	61,495	62,820	67,074	70,063	73,195	76,476
YEAR	10	11	12	13	14	15	16	17	18	19
BENEFITS	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Additional ecological tax	515,670	538,293	561,984	586,795	612,781	685,726	764,048	848,100	938,260	1,034,929
COSTS	515,670	538,293	561,984	586,795	612,781	685,726	764,048	848,100	938,260	1,034,929
Trash collecting (porters)	435,757	456,179	474,696	495,552	517,394	581,840	652,482	725,439	805,247	890,867
Excrement transport (helicopter)	20,572	21,536	22,546	23,605	24,716	25,882	27,104	28,386	29,730	31,140
Investment costs - toilets installed	410,815	428,666	447,356	466,926	487,418	550,448	618,205	691,004	769,179	853,086
Investment costs - water filters	4,370	4,577	4,794	5,021	5,260	5,510	5,773	6,049	6,338	6,641
Investment costs - barrels	0	1,400			0	0	1,400		0	0
Net financial flow	79,913	82,114	87,288	91,242	95,386	103,886	111,565	122,661	133,013	144,062
YEAR	20	21	22	23	24	25	26	27	28	29
BENEFITS	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Additional ecological tax	1,138,532	1,249,520	1,368,374	1,495,603	1,631,749	1,777,386	1,933,123	2,099,608	2,277,529	2,467,613
COSTS	1,138,532	1,249,520	1,368,374	1,495,603	1,631,749	1,777,386	1,933,123	2,099,608	2,277,529	2,467,613
Trash collecting (porters)	982,680	1,081,091	1,187,932	1,299,458	1,420,356	1,549,741	1,688,162	1,837,597	1,994,466	2,163,622
Excrement transport (helicopter)	32,619	34,171	35,798	37,506	39,297	41,175	43,147	45,214	47,384	49,660
Investment costs - toilets installed	943,101	1,039,627	1,143,090	1,253,941	1,372,663	1,499,765	1,635,790	1,781,313	1,936,944	2,103,333
Investment costs - water filters	6,959	7,293	7,643	8,011	8,396	8,801	9,225	9,670	10,138	10,628
Investment costs - barrels	0	0	1,400	1,400	0	0	0	1,400	0	0
Net financial flow	155,851	168,428	180,442	196,145	211,393	227,644	244,962	262,011	283,063	303,991

Projection of income and costs for cleanup of camps on the Baltoro Glacier after installation of the system for the reference periods

For the level of study in the framework of the financial analysis we took into account a segment of the local tourism economy which will organize (in parallel with the organization of other activities required for the organized accompaniment of mountaineering expeditions and organized groups of trekkers) also the transport of excrement and other wastes from the Baltoro Glacier. The cleanup system can be set up by existing tourist agencies or by a new company which would be engaged only in cleanup.

Economic analysis

The purpose of the economic analysis is an assessment of the impacts that the implementation of the project will have on the broader socio-economic environment. In the framework of the economic analysis we determine whether the society is in a better position if the project is carried out, i.e. whether its benefits outweigh its costs. The basis for the calculation of indicators of economic efficiency is represented by parameters considered in the financial analysis, with the addition of parameters from a study of the impact of the project on the wider environment and assigned a monetary value. The additional parameters used represent the possible impacts of the execution of the project on the wider environment.

The parameters used are the following:

- Increased income (increase in added value – 10 % and along with this the GDP of the area studied).
- The activity will enable additional opportunities for employment and earnings which will contribute to an increase in the family budgets of those carrying out the services (between \$550 and \$1100), which means an increase of between 6.7 and 13.5 % (calculated based on data on the structure of the family budget).

Table 16: Indicators of the economic analysis.

economic net present value (NPV)	2,049,510
economic relative NPV	3.29
economic rate of return	40.09 %

The economic net present value shows the net economic flow during the reference period, in consideration of social benefits. The economic relative present value is the ratio between the net present value and the value of the investment. The economic rate of return shows the actual economic justification for setting up the cleanup system and the potential impact on the economic state of the region. In our case the economic rate of return is high. This means that the socio-economic benefits of carrying out the project are greater than its costs. For this reason (especially from the wider social aspect) carrying out the project and introducing this kind of tax is justified.

Table 17: Overview of economic flows during the economic period of the project.

YEAR	0	1	2	3	4	5	6	7	8	9
BENEFITS	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Additional ecological tax	386,849	403,279	420,473	438,467	457,300	477,012	497,648	519,251	541,868	565,549
SOCIAL BENEFITS	338,326	352,649	367,637	383,321	399,736	416,916	434,899	453,724	473,432	494,066
Added value in services	33,833	35,265	36,764	38,332	39,974	41,692	43,490	45,372	47,343	49,407
Additional family income (new porters)	11,770	12,311	12,877	13,471	14,093	14,746	15,430	16,147	16,899	17,688
Additional family income (existing porters)	2,921	3,055	3,195	3,343	3,497	3,659	3,829	4,007	4,194	4,389
COSTS	654,191	298,297	311,227	397,890	338,241	354,096	367,825	383,661	400,237	417,590
Trash collecting (porters)	13,078	13,678	14,308	14,967	15,659	16,384	17,144	17,941	18,777	19,653
Excrement transport (helicopter)	270,713	282,042	293,894	306,293	319,266	332,841	347,047	361,914	377,475	393,764
Investment costs - toilets installed	300,000									
Investment costs - water filters	69,000	2,576	3,026	76,630	3,316	3,471	3,634	3,805	3,985	4,173
Investment costs - barrels	1,400					1,400				
Net financial flow	-267,342	104,983	109,246	40,577	119,059	122,916	129,822	135,590	141,631	147,959
YEAR	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
BENEFITS	590,347	616,314	643,509	671,991	701,823	783,373	870,899	964,797	1,065,483	1,173,403
Additional ecological tax	515,670	538,293	561,984	586,795	612,781	685,726	764,048	848,100	938,260	1,034,929
SOCIAL BENEFITS										
Added value in services	51,567	53,829	56,198	58,679	61,278	68,573	76,405	84,810	93,826	103,493
Additional family income (new porters)	18,515	19,382	20,291	21,245	22,245	23,294	24,393	25,547	26,757	28,026
Additional family income (existing porters)	4,594	4,810	5,035	5,272	5,520	5,780	6,053	6,339	6,640	6,955
COSTS	435,757	456,179	474,696	495,552	517,394	581,840	652,482	725,439	805,247	890,867

Trash collecting (porters)	20,572	21,536	22,546	23,605	24,716	25,882	27,104	28,386	29,730	31,140
Excrement transport (helicopter)	410,815	428,666	447,356	466,926	487,418	550,448	618,205	691,004	769,179	853,086
Investment costs - toilets installed										
Investment costs - water filters	4,370	4,577	4,794	5,021	5,260	5,510	5,773	6,049	6,338	6,641
Investment costs - barrels		1,400					1,400			
Net financial flow	154,589	160,135	168,813	176,439	184,429	201,532	218,417	239,358	260,236	282,536
	20	21	22	23	24	25	26	27	28	29
YEAR	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
BENEFITS	1,289,027	1,412,857	1,545,425	1,687,295	1,839,067	2,001,378	2,174,903	2,360,360	2,558,510	2,770,159
Additional ecological tax	1,138,532	1,249,520	1,368,374	1,495,603	1,631,749	1,777,386	1,933,123	2,099,608	2,277,529	2,467,613
SOCIAL BENEFITS										
Added value in services	113,853	124,952	136,837	149,560	163,175	177,739	193,312	209,961	227,753	246,761
Additional family income (new porters)	29,357	30,754	32,219	33,755	35,367	37,058	38,832	40,693	42,646	44,694
Additional family income (existing porters)	7,285	7,631	7,995	8,376	8,776	9,196	9,636	10,098	10,582	11,091
COSTS	982,680	1,081,091	1,187,932	1,299,458	1,420,356	1,549,741	1,688,162	1,837,597	1,994,466	2,163,622
Trash collecting (porters)	32,619	34,171	35,798	37,506	39,297	41,175	43,147	45,214	47,384	49,660
Excrement transport (helicopter)	943,101	1,039,627	1,143,090	1,253,941	1,372,663	1,499,765	1,635,790	1,781,313	1,936,944	2,103,333
Investment costs - toilets installed										
Investment costs - water filters	6,959	7,293	7,643	8,011	8,396	8,801	9,225	9,670	10,138	10,628
Investment costs - barrels			1,400					1,400		
Net financial flow	306,347	331,766	357,493	387,837	418,711	451,637	486,742	522,763	564,044	606,537

Impacts which are not financially measurable

Introduction of a cleanup system for base camps and other camps along the Baltoro Glacier as a new activity would have a positive impact on the environment as well as on the wider social conditions in Gilgit-Baltistan. From an environmental aspect the introduction of such a system is urgent, since the landscape ecological unit of the Baltoro Glacier is environmentally heavily burdened and shows great vulnerability. A cleanup system would significantly improve the state of the environment over a short time period and would also maintain it as such over the long run. This will be urgently needed considering the trends in visits to the area, in which it is possible to foresee slow but steady growth in visitors, which means an increase in the burden on the glacier if the problem of cleaning up the camps is not resolved.

Field research on water quality in 2006 and 2007 indicated increased quantities of nitrates in the main subglacial streams, which we attribute primarily to tourist activities. These take place mainly on the glacier, where surface glacial streams are used for the daily supply of water. Although these streams are less contaminated than the main glacial stream, they are nevertheless no longer directly usable: water must be boiled or filtered before use. The cleanup system is expected to first of all have a positive impact on surface water flows, which wash out nutrients from the surface of the glacier through its interior all the way to the subglacial stream.

Over the long term this means reducing the vulnerability of this landscape ecological unit. Arranging for the cleanup of base camps and camps along the glacier would have a positive impact on the attractiveness of the region for visitors. Groups of trekkers and mountaineers in their recommendations to the Pakistan Ministry of Tourism (each group meets with a representative of the state before and after their trip to the glacier, to pass on their observations regarding the route across the glacier) most often cite the need to improve sanitary conditions on the glacier.

The current state is disturbing and has a negative impact on visitors' experience of the landscape. It is also a threat to their health. A cleanup system would thus make an important contribution to both the attractiveness of the area as well as improving hygiene, thereby enhancing the experience of trekkers and climbers. Improving the state of the environment is directly related to the broader social state of Gilgit-Baltistan. Tourism represents an increasingly important share of the income for the families of porters, cooks, guides, and everyone who is included in the operations of tourist agencies. Setting up a cleanup system on the Baltoro Glacier would have a positive impact on Gilgit-Baltistan, in particular on the province of Baltistan, which is where the majority of porters, cooks, guides, and agency staff come from. A cleanup system would enable additional income for existing porters who would carry out wastes from the glacier (at present most usually return without loads), while also enabling employment for new porters as a result of the greater demand related to the transport of wastes.

Thus the family income would increase directly, which would also make it possible to send more children to school as well as educate them to higher levels. Schooling would also be possible for greater numbers of girls (thereby increasing literacy among women in future), who at present are often excluded from the process and who at best receive just a few years of primary education. Women are not included in tourism since for religious reasons they are not allowed to have contact with visitors (especially men). Their significance, however, in families is exceptional, and for this reason their education is also very important.

A general rise in the level of education would have a positive impact on the general development of Gilgit-Baltistan, in the economic, social and environmental fields, i.e. in all three pillars of sustainable development. The concept of the cleanup system is also transferable to other areas where mass mountain tourism is developing, not only in the Karakoram but also in comparable regions throughout the world.

The established cleanup system can have wider positive impacts in the region.

Figure 87:

The number of porters can be potentially higher.



Figure 88:

Working in tourism can add importantly to the family budget which is now mainly dependent on agriculture.





Figure 89:

More income also means more opportunities to educate all children in these remote mountain valleys.

The resilience to tourism development in Gilgit-Baltistan and the importance of protected areas in the high mountains

Along with traditional agriculture, tourism represents one of the main sources of income in Gilgit-Baltistan. Due to the political instability in the country as well as for numerous other reasons (i.e. the global economic crisis) it remains highly vulnerable and from the economic point of view uncertain.

Kreutzmann (2007) i.e. suggests that “over-reliance on tourism (in Gilgit-Baltistan) is not advisable, as too many parameters are beyond the control of local entrepreneurs”. In terms of sustainable tourism development the author emphasizes the development of mountaineering, trekking and individual tourism with particular emphasis on ecological and cultural interests as “safe tourism sectors”.

As we have seen, tourism in Gilgit-Baltistan is already oriented mostly towards the sectors listed, but they require careful planning in order to keep them on a “sustainable track”. The field survey showed that the area is to a certain extent resilient to the high mountain tourism phenomenon but is unique in comparison to other world high mountain areas. There is one important difference from other high mountain areas, religion. In Gilgit-Baltistan jobs in tourism are reserved exclusively for males while women only indirectly benefit from it, as shown in the economic part of the cost-benefit analysis.

The resilience in the case of mountain tourism in the area is predominantly shown on a local, even individual level. Interviews revealed the significant role of tourism for individuals and their families but on the other hand also the lack of actual responses to tourism on a regional and even more on the national level. Tourism stakeholders in particular also sense the importance of future tourism development, i.e.

“I really like to work in tourism; not only in the area of Baltoro Glacier but throughout Gilgit-Baltistan. Recently also we, the tour operators, started to cooperate

because we are well aware that times in tourism are not brilliant and we need to adapt to global as well as local conditions. The unstable situation in Pakistan annually impacts the number of expeditions and trekking groups but for now I am well off. First I pay my employees but there is always some money left and I invest it to the school in my village. I believe that education is basic also for the work in tourism."

"Tourism is the main development potential for Gilgit-Baltistan. Prior to 1996 the area was more opened (politically), so also many backpackers arrived. Now, there are mostly expeditions and trekking groups. We desperately need better tourism infrastructure (hotels, roads etc.), better educated employees (especially guides) and more marketing in Western countries in order to attract more tourists."

The regional and national resilience seem to be quite weak and slow. Nevertheless it is shown on a national level in summit fees reduction after 2001 and on the regional level in the past few years with the establishment of offices of the Ministry of Tourism in major towns of Gilgit-Baltistan, which significantly facilitates the implementation of expeditions and trekking. Yet tourism stakeholders expect more help from the region and country:

"We need an international airport in Skardu in order to avoid the long transport of groups from Islamabad. Our clients also have too many problems in their home countries with applying for the visas. I think these procedures should be released or even erased."

The importance of as well as resilience to tourism in Gilgit-Baltistan is mostly seen on the individual level where tourism is incorporated into entire families. Almost all those who work in tourism have their background in the traditional agricultural communities which assures them a solid base to which they can always return, even in unfavorable tourism seasons. At the same time, work in tourism represents additional income for families and a higher quality of life.

"In a good year I go 6-7- times over Baltoro and on average 4-5 times. This year (2011) was not a good year and I went only 2 times. I mostly carry load for expeditions and I like them more than trekking groups. In a good year I can earn up to 70,000 Rs (cca. 700 EUR) and this money goes to my family budget – for everything; for education of my children, for home expenses. Without this money it is very hard to survive." (porter)

"In a good year I go up to 11 times over Baltoro. This year (2011) I went 4 times with the trekking groups but usually I work for expeditions. I earn between 150 – 200,000 Rs a season. I have 5 children, so this money goes for clothing, food and education but a certain percentage goes to a wider family or community." (porter sirdar)

The strongest resilience is in the field of environmental preservation but this is present on a national level and significantly more on the international level. Among the responses are also protected areas as one of the instruments for assuring sustainable development.

Responses to the environmental state in the area of Baltoro Glacier.



Figure 90:

Representative of the Kurpha care project for porters' education.



Figure 91:

Toilets set up for porters and mountaineers are one of the first responses to the environmental degradation in the area.



Figure 92:

The role of EvK2CN is important not only in cleanup campaigns in the area of the glacier but also in activation of Central Karakoram National Park management institution in Skardu.

The World Commission on Protected Areas (WCPA) of the International Union for the Conservation of Nature (IUCN) defines **protected areas** as “areas on land or in the sea which due to their biotic diversity and natural and cultural values are protected and maintained through legal or other effective means” (Hamilton, McMillian, 2004). The management of protected areas is crucially important for achieving the objectives of protection, and hence the preparation of an appropriate management plan is essential for every protected area. Protected areas typically bring together all the fundamental values of a space: environmental, economic, cultural, and social. Their exceptional and representative nature, and in some cases their threatened status, have led to the designation and protection of certain areas or particular natural or cultural elements as special conservation areas. These are especially precious and valuable areas which in addition to intrinsic value also have economic, environmental and social potential of crucial significance for the sustainable development of regions as well as entire countries (Lampič, Mrak, 2008).

If we want to examine values as development potential, in the first phase we must evaluate them as having applied values or no applied value. Applied values can have an entirely direct economic value, such as for example environmental potential (timber, crops, and so on), the direct value of plants in medicine, or the direct marketing of environmental and cultural potential (e.g. the marketing of biodiversity and cultural heritage in tourism). The applied values can also be indirect. Of exceptional importance is the indirect value of ecosystem services (nutrient cycling, buffering of climate change, etc.); the value of cultural heritage, and cultural as well as natural values, also have exceptional educational, aesthetic, and recreational value. The functioning of society as a whole and of the economy is heavily dependent on all the indirect applied values mentioned (Lampič, Mrak, 2008).

The values of non-use are intangible but they hold great significance for the human psyche and culture. These are optional and existential values which are of great importance in protected areas. The mere fact that a particular area is protected indicates the presence of environmental or cultural goods with a high value of non-use and which play an important role in the consciousness, culture and identity of people. The activation of this awareness in people and the qualitative appreciation of exceptional natural and cultural goods and space are crucial for cultivating a different approach to the treatment of such spaces, especially protected areas. Of course, these areas also have applied value and it is reasonable for them to be used sustainably, but these are of lesser importance in protected areas (Lampič, Mrak, 2008).

Another characteristic of protected areas is their high **experiential potential**, which could also be counted as a value of non-use; this experiential potential can vary depending on the system of social values (what is recognized as of value) as well as especially the environmental state of a particular landscape.

The experiential potential of a landscape implies the ability of a particular landscape, or of a part of it, to arouse certain sensory experiences or responses in people. In addition to the information that sensory organs receive about a particular landscape, personal and social factors also have an influence on the experience of it. The main factor in experiencing a landscape is its composition, the existence of perceived landscape differences which influence the experiencing of it. Since the

main organ for visual experience is the eye, the dimensions and colors of a space are among the most important transmitters of visual experiential attractiveness (e.g. the shape of the surface, the color of vegetation). Less important is aural attractiveness, which can be negative (e.g. the noise of motor vehicles) or positive (e.g. the sound of running water, the singing of birds). The smell of the air is often negative (due to emissions), and if there is no smell in the air, we evaluate it as something positive (Jeršič, 1985).

The high mountain landscape already has high experiential potential in and of itself. The government of Pakistan established the Central Karakoram National Park in 1993. The central part of the park is represented by the second highest mountain on Earth, K2 (8611 m), and the entire area of the park encompasses 10,000 km², containing the greatest concentration of high mountains in the world – 60 peaks over 7000 m. Administratively, the park lies in the provinces of Gilgit, Skardu and Ghanche, and there are about 230 villages, 98,000 residents, and 13,200 households in the protected area. The park is administered by the Forestry Department of the national Directorate of Parks and Wildlife, and the legal foundation is provided by the 1975 Northern Areas Wildlife Preservation Act. Although the park was declared in 1993, there is very little evidence of protection in the area, nor is the park recognized by the public. For this reason various nongovernmental organizations are becoming increasingly active in drawing attention to the importance of the park's areas and the threats to them (among the major ones are the Aga Khan Rural Support Program, IUCN and the World Wildlife Fund, EvK2CNR) (CKNP, 2009).

"We started the Baltoro Glacier cleanup expeditions in 2007 and we organize them now every year. In 2011 we collected 1300 kg of trash – plastic was burnt in Askole, but the glass and tin were brought to Skardu and sold there. The money is used for our work and actions. In 2010 we started to work out the problem of human waste, so we set up eight toilets at Concordia but we still need to organize the entire management for the human waste in the area. Until now all the activities were paid by the Italian government..."

We are also actively involved in the capacity building within the Central Karakoram National Park as well as in the formation of the management plan where tourism represents one of the most important park development segments. The main constraint is the difficult access to the area- regular flights to Skardu should become a common practice." (EvK2CNR representative)

By all indications, protected areas were a kind of response on the part of tourism and recreation to the massive changes inflicted on the natural environment by other activities. Protected areas were created primarily due to anthropocentric motives – the protection of an area "from" humans as well as "for" humans. Based on our work as well, the protection of high mountain areas turns out to be the most appropriate form of preservation and protection of high mountain areas, since the general level of ecological consciousness is unfortunately not sufficiently high as to obviate rules and their enforcement regarding human activity in the high mountain landscape.

In 2002 mountain protected areas made up 33 % of all protected areas on the list of world heritage, and the majority of these at least partially include high mountain

areas as well. The primary criteria for being listed as world heritage were geological features, ecological processes, the appearance of the landscape, and biotic diversity (Thorsell, Hamilton, 2002); many authors also highlight the great importance of the spiritual value of mountain protected areas.

The selection of an area for protection in the mountains must be based on the recognized values of a particular area – natural geographic features, spiritual and cultural values, and appearance of the landscape, while at the same time it must take into account the anticipated use of the future protected area – for research, education and various recreational and tourist activities. The last, i.e. the use of some landscape, is usually the only one which convinces key stakeholders in the protection of the area – authorities and the general public – that protection is in the national and public interest (Hamilton, McMillian, 2004).

The protection of a high mountain landscape can take quite different forms, although in protected areas to date the predominant category is “national park” according to the criteria of the IUCN.

The greatest achievement of every manager of a protected mountain area is balancing the protection of the mountain landscape with managing the needs of tourists and recreationalists. With respect to the exceptional heterogeneity of activities and the perception of “mountain experience” of visitors, managers must make constant adjustments to policy measures within protected areas.

Recreationalists are recognized as “environmental” allies, since they usually have a different attitude to the mountain environment and consider themselves its protectors. As such, managers also include them in the protection of the mountain environment in protected areas, in an effort to find ways of working “with” visitors and not “against” them in protecting the mountain environment. This kind of approach reduces the negative impacts of visitors, since it indirectly raises their environmental awareness and creates broader political and financial support for mountain protected areas (Hamilton, McMillian, 2004).

“The Baltoro Glacier is polluted but the situation is lately improving. Especially normal routes on the most popular mountains (K2, Broad Peak, Gasherbrum I and II) should have restrictions on the number of climbers because the environmental state there is really problematic and commercial expeditions usually care less for the environment than the real climbers.” (Broad Peak expedition leader)

Appropriate management of a protected mountain area also includes an educational role, which in general can have very favorable effects in preserving the high mountain environment. However, areas in which either the protected area is not established, or exists but does not have any management and hence also no management plan, are problematic. In the case of the Central Karakoram National Park things have been rapidly changing in the past few years and the park can become an important instrument on the path to sustainable tourism development in the area.

■ Concluding remarks

High mountain areas share a set of geographic characteristics, primarily natural geographic features - steep, glacially sculpted relief and severe mountain climate, and human activities which are traditionally present in such regions – livestock grazing, hunting, exploration and research, trekking, alpinism, ski touring and downhill skiing. Elements which distinguish one high mountain area from another are latitude, altitude, climatic tree line, and upper limit of settlement. These variable elements enable the identification of high mountain areas in all the world's mountain ranges in which a definition based only on, for example, elevation or mountain climate would not suffice. Humans do not usually have a permanent presence in high mountain areas, and hence the upper limit of permanent settlement is one of the variable components of the general geographic definition of high mountain areas. With the development of tourism and recreation, the human presence in high mountain areas is becoming more common and less time-limited. Mass visits are increasing but the limit of permanent settlement nevertheless does not change; it is, however, quite different in particular mountain ranges of the world. It depends mainly on the climatic conditions, and these in turn are influenced by latitude and elevation. We thus cannot set a uniform elevation at which the high mountain zone begins for all world mountain regions; this varies depending on the variable elements cited, not just from one range to another, but even within the same range.

World high mountain areas are faced with large and growing numbers of visitors as well as a diverse range of human activities, most of which are no longer as seasonal in nature as they have been traditionally: tourism and recreation, in contrast to grazing and hunting, are increasingly present throughout the whole year.

The rapid and often uncontrolled development of different forms of tourism and recreation in high mountain areas is difficult for development planners to follow, and they generally lag a step or two behind, since the actual impacts of some activity on the environment can be difficult to predict. A good knowledge of the natural geographic features of different high mountain areas is crucial, since this helps in predicting their response to already existing tourism and recreation activities.

An assessment of the carrying capacities of high mountain areas based on a functional evaluation of natural geographic elements and an analysis of anthropogenic influences and impacts provide the basis for an overall assessment of vulnerability which serves as a foundation for planning and achieving sustainable development of tourism in high mountain areas. A second foundation, in the absence of which sustainable development of mountain tourism is not possible, is a good knowledge

of the characteristics of participants in the activity, which contributes to understanding the type and extent of environmental impacts and in designing measures to reduce and spatially restrict such impacts. Measures are the most difficult part of any planned development, since they are also largely dependent on the perception or awareness of the state of the environment in the high mountains, which are of crucial importance for the reaction of society in the broadest sense – both in the sense of the attitude towards improving the state of the environment as well as towards future sustainable development. However, development must be regulated and have as its priority the preservation of the high mountain environment as a whole.

Most common in the high mountain environment are adventure tourism and recreation, which already due to the very nature of their activities require a special kind of geographic environment (mountain areas, rivers, lakes, sea, etc.). This environment, due to its natural geographic features, is highly sensitive and there is thus a correspondingly greater chance of its degradation if development is inappropriate and unregulated.

In addition to mountaineering, downhill skiing on groomed ski trails is also present in high mountain areas, along with a range of more modern forms of activity reflecting the development of sports and technical equipment, new knowledge, and the desire for physical activity that is increasingly lacking in the everyday lives of most people. Most often these activities are paragliding, mountain biking, driving all terrain vehicles and snowmobiles (where roads extend above the tree line) and heli-skiing. Although taken together all these activities represent a relatively small share, they are becoming increasingly popular and the construction of infrastructure makes it possible for such activities to increasingly impact high mountain areas.

The destination high mountain areas are also adapting to the needs of tourists. The last permanent settlements are increasingly better equipped with the necessary and expected tourism infrastructure (hotels, restaurants, telephones, internet, etc.). At the same time, tourists preserve a “romantic” longing for discovery, exploration and travel through authentic, remote, and unspoiled mountain regions. Yet even so participants frequently “forget” their environmental awareness and ethical principles more generally, as reflected especially in the large quantities of different kinds of waste which they leave behind in the environment. Mountaineers are usually aware of their responsibilities in protecting the mountain environment, but the conditions in base camps and high altitude camps indicate just the opposite. Despite the fact that ecological awareness today is at a much higher level compared to a few decades ago, it seems that time has stood still in this respect in the high mountains. The actual state reveals the ignoring of one of the fundamental rules in mountaineering – “leave no trace behind”. This is partly a function of the not infrequent occurrence of critical, life-threatening situations, and in such cases it is physically impossible to act in accordance with this rule. The state of the environment in high mountain areas is also affected by the large numbers of visitors and the still prevailing opinion in the world’s highest ranges that “the goal – the summit -- justifies the means.”

High mountain areas are characterized by natural processes in which humans have a limited and brief impact with their activities. This raises the question of where the actual limits of use of landscape-forming components are: when is a particular activity

still “sustainable” and when do its impacts cause degradation? Although this study cannot give a complete answer to this question, we take as our foundation a good familiarity with the laws of natural geographic processes in a particular landscape and the best possible knowledge, assessment, and prediction of the impacts and effects of different human activities. These are constantly and rapidly changing, and so it is not in fact possible to anticipate all environmental impacts and effects. We also face this dilemma in the case of tourism and recreation in high mountain areas, in which a brief historical overview of the development of both activities in a specific landscape shows the exceptional heterogeneity of activities in recent decades, which has caused varied environmental impacts and consequences. In parallel with this, the perception of visitors and participants in tourism and recreation activities is also changing. Thus the increase in general environmental awareness is being reflected in high mountain areas as well (for example, the quantities of solid wastes along trekking routes are incomparably smaller than what they were twenty and more years ago; mountain huts are equipped with solar cells; in climbing the principle of using a minimum of technical aids (e.g. pitons) which remain in rock crevices or damage them is applied, and so on).

A priority task in the development of tourism and recreation in high mountain areas is the preservation of the environment and environmental sustainability. Social and economic sustainability are not directly tied to high mountain areas due to the absence of permanent settlement. Appropriate and sustainable development of tourism and recreation in these areas can have indirect positive impacts on the social and economic sustainability of other regions outside the high mountain area (for example, the favorable economic position of businesses and individuals whose livelihood is based on the organization of various activities in high mountain areas is positive for the regions in which they are headquartered; participants in tourism and recreation activities in high mountain areas gain certain positive experiences in the course of doing them, which favorably influences the development of their personalities which in turn can be reflected in their everyday work, and so on).

The defined model of sustainable development of tourism and recreation in high mountain areas is based on a landscape ecological regionalization, an assessment of carrying capacities, and an assessment of the environmental burden, built up using all elements of the DPSIR framework. The consideration of both assessments results in an assessment of the vulnerability of the high mountain environment, which represents the basis for planning sustainable development of tourism and recreation in high mountain areas. The achievement of sustainable development of both activities can be enabled to a great extent by means of protected areas and the planning of development in frameworks with a legislative basis, on which an appropriate management plan is adopted involving the participation of all stakeholders. This plan has a regulatory part and a development part, both of which give rise to measures for the solution of specific problems in the environment itself. The form of protection of a high mountain area can differ from case to case, although in the majority of cases these are already existing protected high mountain areas for national parks (IUCN category II), enabling integrated management – protection as well as the development of some activities, with priority given to tourism and recreation.

Despite the ever higher level of ecological awareness and recognition of the negative impacts of human activities in general, the high mountain environment can be one in which anything goes: it is “far from the eyes” or in other words far from areas of permanent residence, and in the consciousness of the individual it is an environment in which the usual rules for “environmentally friendly” behavior no longer apply. This tendency is further aggravated in areas which are very far away from the individual’s place of permanent residence. For this reason we see the possibilities of sustainable development of tourism and recreation in the framework of one of the forms of legally based protection, on the basis of which an appropriate management structure can be set up to supervise the area and guide its sustainable development. Since extensive high mountain areas are located in less developed countries, the provision of appropriate management structures is a difficult task, but in today’s globalized world, with the rapid flows of information and knowledge as well as qualified labor force, it is not impossible.

The management plan is a crucial document which defines all fields of the management of a protected area; in the field of tourism and recreation it is important that it defines activities which can be developed in some area and provides for the cleanup of possible hot spots in which the current level of environmental degradation (as a consequence of tourism and recreation) is the greatest. The development part of the management plan must foresee visitor trends and associated environmental pressures as well as ways of managing them. It is very important to have constant monitoring of the development of new activities in adventure tourism and recreation, which are becoming increasingly diversified in the high mountains. The development part must be explicitly oriented towards sustainable development, with priority given to the field of the environment; social and economic impacts should also be foreseen, but these in any case are directed outside the high mountain areas.

The last segment of the model of sustainable development of tourism and recreation in high mountain areas consists of measures. These result from the state of the environment and the perception or some sort of final result of natural geographic conditions, human activities, and their environmental impacts, and consequently with appropriate planning also the sustainable development of tourism and recreation in high mountain areas. We have defined them as hard and soft measures. Among the first is a complete ban on visits and activities in areas which are degraded to such an extent that they need time to regenerate, or the sensitivity of environmental components is so high that they cannot withstand visits in any form; this is followed by restricting visits or certain types of activities for which it has been found that they have a negative impact on a specific environmental component. Among hard measures we also include the introduction of entrance fees and fees for the summits of mountains, with the funds thereby generated being used for the needs of the operation of the protected high mountain area. The last hard measure is enforcement of rules and penalties for violators; the latter must be consistent and the funds obtained likewise returned to the protected area. Among soft measures we foresee the education of all stakeholders – providers as well as users of services, the local population living closest to the protected area, local, regional and national institutions – and raising awareness of environmental problems in high mountain areas using a variety of media.

Pollution of the **Baltoro Glacier area** occurs primarily at points and is most intensive in trekking camps and base camps, which represent “hot spots” of pollution. In these places all the negative impacts of tourism are most evident – for example, large quantities of organic and inorganic wastes, destruction of vegetation, trail erosion, noise, and so on. Along the route across the glacier the negative impacts of tourism are minimal and confined to a narrow zone along the trail where one occasionally sees animal carcasses and inorganic wastes.

The overall assessment of the vulnerability of the area indicates the high vulnerability of the Baltoro Glacier, where the environmental burden is high and already exceeds the regeneration capabilities of particular natural geographic elements. Based on the state of the environment, cleanup activities have been conducted by the Alpine Club of Pakistan and various NGOs, but a systematic cleanup effort is strongly needed in order to reduce environmental degradation. Although the area of the Baltoro Glacier lies within the Central Karakoram National Park, this park is still little known to the public and needs an appropriate management institution and management plan. Tourism activities in the area are carried out in an unorganized fashion and without any supervision or control. Summit fees and ecological taxes go into the national treasury and are not returned to the area, although with the establishment of the Gilgit-Baltistan regional government this is about to change. The trend in visits over the last few decades indicates rapid growth, which means that the state of the environment will worsen further in the absence of specific measures, and just cleanup campaigns will not be sufficient.

We therefore propose measures restricting visits and introducing a cleanup system for base camps and other camps along the Baltoro Glacier, which would have a positive impact on the environment as well as more broadly on socioeconomic conditions in Gilgit-Baltistan. The cleanup system would significantly improve the state of the environment over a short time period and maintain this improved state over the long run. The proposed measure would positively impact the quality of surface streams which flush nutrients from the surface of the glacier into its interior all the way to the subglacial stream. Over a certain time period the state of the main subglacial stream would also improve. The already organized cleanups of base camps and other camps along the glacier have a positive impact on the attractiveness of the area for visitors but they need to become a common practice. Most groups of trekkers and climbers recommend improving the sanitary conditions on the glacier in their reports to the Pakistan Ministry of Tourism. The current state is still disturbing and has a negative impact on visitors’ experience of the landscape. It is also a threat to their health. The cleanup system would thus make an essential contribution to the greater attractiveness of the area and improved sanitary conditions would enhance the experience of trekkers and climbers.

Improvement of the state of the environment is directly connected with the broader social state of Gilgit-Baltistan. Tourism represents an increasingly important share of the family income for porters, cooks, guides, and everyone included in the operations of tourist agencies. Setting up a cleanup system for the Baltoro Glacier would have wider positive impacts in Gilgit-Baltistan and especially in Baltistan, where most of the porters, cooks, guides, and agency staff come from. The concept of the cleanup system would be transferable in future to other comparable high mountain areas.

Planning the sustainable development of tourism and recreation in high mountain areas needs to be placed in the specific frameworks presented by the proposed model. The weakest link in the model is determining the perceptions and understanding of the state of the environment among all the stakeholders in tourism and recreation in high mountain areas, and communicating to them the importance of preserving natural values in the high mountains. In this respect we very often remain at the level of principle; the reactions of individuals in the high mountain environment can be entirely dependent on circumstances at the time (e.g. critical situations!) and as such are entirely “atypical” with respect to an otherwise high level of ecological consciousness.

We initially counted on a wider selection of measures, but after careful consideration and familiarity with the conditions, and of course also based on the results of this work, we narrowed them considerably and decided in favor of a predominance of “hard” measures supporting the development of sustainable forms of tourism and recreation.

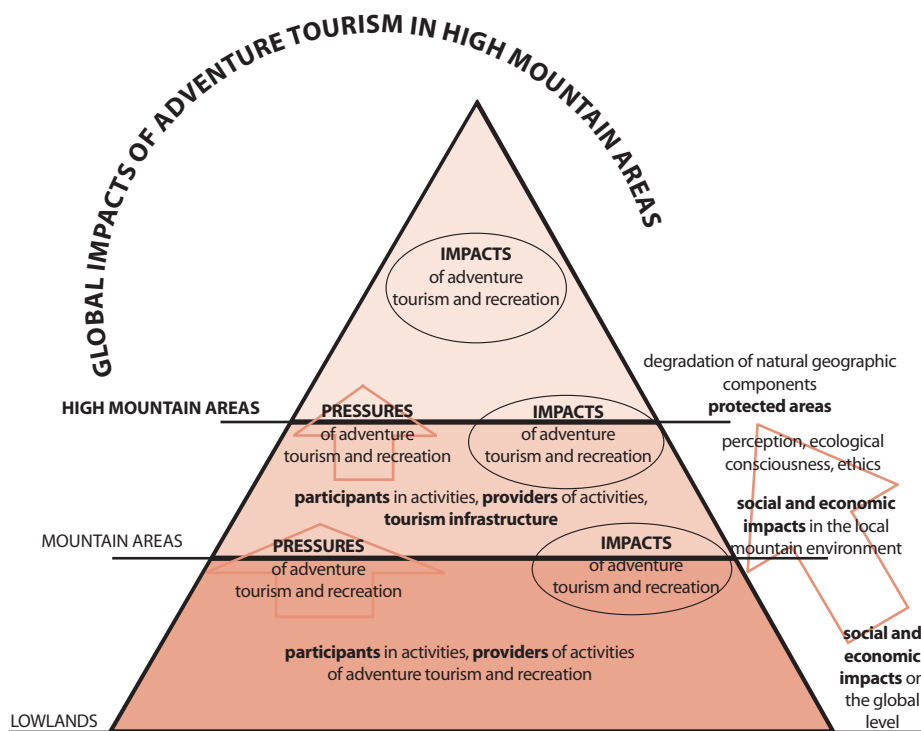
The tested model of sustainable development of tourism and recreation in high mountain areas provides a comprehensive insight into the state of the natural geographic elements of a given high mountain landscape in response to burdens from human activities, with an emphasis on the importance of perception, which partially already influences the state of the environment itself, while at the same time it is embedded in the planning and achievement of sustainable development. The model is general enough for use in different high mountain areas yet at the same time allows for the consideration of their specific features both from the standpoint of natural geographic conditions as well as the nature of tourism and recreation activities.

In the course of the work the dilemma often arose as to whether it is even possible in the case of tourism and recreation activities to make reference to a dynamic equilibrium, since for the most part it is one way – the high mountain environment in fact represents a site for the performance of activities causing only degradation, which in a sensitive environment can be mitigated only to a certain extent. The dynamic equilibrium in some high mountain areas (e.g. the LEU of the Baltoro Glacier) has been destroyed due to excessive pressure, and we have not yet had an opportunity to monitor its regeneration capability since in the past there was never this sort of environmental state in high mountain areas.

One of the possible scenarios in the future is for some of the most heavily visited high mountain areas to be “sacrificed” and subjected to mass visits and in this way preserve others which are less well known and rarely visited. Even so it will be necessary in the first type of areas to at least maintain a suitable environmental state. Another possibility is the promotion of the development of tourism and recreation in more locations. In this way areas which are currently overcrowded with visitors would be relieved, but the negative environmental impacts, though reduced, would be spatially spread more widely. In both cases additional measures are urgent, so that mass visits will not increase and the accessibility to high mountains will be limited (e.g. halting plans and banning the construction of roads and cableways, maintaining more simply equipped mountain huts, with modest catering capabilities).

An area that we have not especially highlighted but which is certainly deserving of attention in future is the global impact of tourism in high mountain areas, due to the increased carbon footprint of participants in tourism in the world's high mountain areas. The regions of origin of the participants are usually quite distant, which means that air travel is unavoidable.

Figure 93: High mountains in the function of a site for adventure tourism and recreation activities.



Finally we need to emphasize that high mountains represent a barrier to carrying out certain activities of adventure tourism and recreation, and here there are different forms and levels of intensity of the degradation of natural geographic components. This means that with the presence of humans and especially through their activities, the high mountain environment is coming under threat, and its self-cleaning and regeneration capabilities in some areas are already exceeded, as evidenced by the state of particular natural geographic components. Pressures in the high mountains come from nearby mountain areas, where the main providers of adventure activities are, along with the corresponding tourist infrastructure, which enable the carrying out of activities in the high mountain area itself. At the same time mountain regions are already permanently settled to a smaller extent, which means that it is from these types of regions that a certain portion of participants in the activities come and most of the providers of services and their employees (guides, cooks, etc.). Pressures are more intensive (as measured in the numbers of visitors) from all the other, i.e. lowland

regions, from which the majority of participants come as well as some smaller portion of the providers of adventure tourism and recreation. Some of the participants remain in the broader mountain regions, others take part in activities in the high mountains. As revealed in the case of Baltoro Glacier, mass visits threaten above all two natural geographic components – relief and water, and partially also soil and vegetation where these are present.

In parallel with the pressures, there are also direct and indirect impacts of activities in the high mountains on other areas (mountain and lowlands). Impacts in the high mountains are reflected directly in the state of individual natural geographic elements (environmental impacts), and are negative. Indirect impacts are economic and social in mountain regions and lowlands. With respect to proximity and characteristics, positive economic impacts are reflected in mountain regions, and social impacts which to some extent can be negative (influence on the tradition of the local population), but to some extent can also have a positive influence on both participants in as well as providers of activities who come from these regions. The intensity of economic impacts in lowland regions is small and dispersed. The high mountain area can have a very positive impact on participants in the activities in the sense of rest and relaxation, etc., which is consequently reflected in the environment in which they live and work. Here it is not necessarily the case that the high mountain area is only subjected to degradation of natural geographic components – the protection of particular high mountain areas and preservation of an exceptional environment, which also has a high spiritual value, is dependent to a large extent on the perception, level of ecological awareness, and ethical values of providers and participants in activities.

■ Povzetek

Gorska območja so zaradi specifičnih geografskih razmer vseskozi predstavljala človeku na eni strani območja številnih naravnih virov, po drugi strani pa območja, kjer je bila njegova stalna poselitev in preživetje zelo otežena. Pri tem je zlasti visokogorje ostajalo nenaseljeno. Ljudje si ga večinoma le občasno obiskovali, predvsem v želji odkrivati še neraziskana območja in iskati prehode, ki bi omogočili gospodarske in kulturne povezave z nižje ležečimi gorskimi in nižinskimi območij. Tako je bila gospodarska raba naravnih virov visokogorskih območij v prvi vrsti vezana na rudarjenje ter planinsko pašništvo, obe dejavnosti pa nista posegali v najvišja območja na Zemlji. Ta so čakala na prve obiskovalce dolga tisočletja, dokler niso želje, vedno boljša tehnična oprema ter psihofizične sposobnosti posameznikov pripeljale do pristopov na najvišje točke našega planeta. Šele povečevanje obsega prostega časa, vse večja prometna dostopnost gorskih območij nasploh, oglaševanje in promocija aktivnega in zdravega načina življenja, obsežna strokovna in poljudna literatura ter želja po ohranjanju stika z naravnim okoljem, so vplivali na izjemen porast in obseg različnih oblik turizma in rekreacije v visokogorju. Med njimi v zadnjih letih vedno bolj prevladujejo aktivnosti, ki po svojih značilnostih spadajo v okvir pustolovskega turizma in rekreacije, za katerega je pregovorno naravno gorsko okolje, čist in svež gorski zrak, privlačna pokrajina in zanimivo življenje domačinov bistvenega pomena. Ob tem pa ne gre zanemariti niti pomena gorskih območij kot območij s posebnimi zdravilnimi in duhovnimi vrednostmi in vrednotami.

Poseben pomen svetovnih gorskih območij je prvič opredelil trinajsti člen Agende 21 - »Upravljanje občutljivih ekosistemov: Trajnostni razvoj gorskih območij« in bistveno pripomogel k splošnemu zavedanju o potrebi po varovanju in skrbnem načrtovanju razvoja v gorah. V omenjenem členu je med drugim jasno zapisano, da dogajanje v gorah posredno lahko vpliva na polovico svetovnega prebivalstva, zato je nujno posvečati veliko pozornost naravnim virom v gorskih območjih, posebej vodnim virom in biotski raznovrstnosti (Mountain Agenda, 1999).

Turizem je postal ena najbolj hitro razvijajočih se gospodarskih dejavnosti povsod po svetu in je tudi primarni vir zaslužka za prebivalstvo številnih gorskih območij. Letna rast dobička v turizmu je bila v devetdesetih letih 4,7 % in v različnih napovedih ostaja nad 4 % vse do leta 2020. Velik delež turistične industrije (15 - 20 %) je povezan z gorskimi območji, ki sicer sama po sebi bistveno ne prispevajo k gospodarstvu posameznih držav, njihov pomen v turizmu pa je toliko bolj pomemben in izjemen (Mountain Agenda, 1999). Heterogenost aktivnosti, ki spadajo v okvir turizma je v gorskih območjih zelo velika, njihov nabor pa se precej skrči v visokogorju, kjer so naravnogeografske razmere z vidika

posameznih aktivnosti bolj omejujoče, z vidika lastnosti posameznih okoljskih sestavin pa hkrati tudi občutljivejše.

Povečana množičnost in raznolikost turističnih in rekreacijskih aktivnosti v gorskih območjih se odraža v naboru in intenziteti njihovih okoljskih ter tudi socialnih, kulturnih in ekonomskih učinkov. V visokogorju so se okoljski vplivi turističnih in rekreativnih aktivnosti okrepili in predvsem prostorsko razširili do te mere, da so postali opazni, moteči in se na nekaterih območjih odražajo v degradaciji posameznih okoljskih sestavin.

Dosedanje raziskave ugotavljajo negativne okoljske vplive turizma in rekreacije v najširšem smislu, pri čemer izpostavljajo zmanjševanje obsega in kakovosti naravnih virov, negativne vplive na vode, predvsem na pitno vodo, zmanjševanje virov energije in drugih surovin ter degradacijo površja. Negativni okoljski vplivi se kažejo še v onesnaževanju zraka z izpušnimi plini in hrupom, onesnaževanju s trdnimi odpadki in eroziji pohodniških poti, ki ogroža prst ter posledično matično osnovo, vodo pa ogrožajo odpadne vode, olja in različne kemične snovi. Posebej izpostavljajo vizualno onesnaženje kot posledico gradnje turistične in rekreacijske infrastrukture, ki je v konfliktu z okoljem (UNEP, 2006). Turizem in rekreacija v gorah povzročata predvsem motenje živali, vplivata na odstranjevanje vegetacije, povzročata erozijo pohodniških poti, negativno vplivata na vodo, na zrak pa zlasti s hrupnim onesnaženjem. Med pozitivnimi učinki so največkrat izpostavljena zavarovana območja, ki nastanejo kot posledica izjemnih geografskih lastnosti gorske pokrajine, izboljšana infrastruktura in pa večje ekonomske priložnosti za ljudi, ki živijo v gorskih območjih (Newsome in drugi, 2002).

Hitremu in največkrat nenadzorovanemu razvoju različnih oblik turizma in rekreacije v gorskih območjih načrtovalci razvoja težko sledijo in so običajno korak ali dva zadaj, saj je dejanske učinke neke aktivnosti v okolju vnaprej težko predvideti. Bistvenega pomena je poznavanje naravnogeografskih razmer različnih visokogorskih območij ter njihov odziv na že obstoječe turistične in rekreativne aktivnosti, kar je podlaga za skupno oceno ranljivosti, na kateri lahko gradimo sonaravni razvoj turizma in rekreacije. Prav tako je izjemnega pomena dobro poznavanje značilnosti udeležencev aktivnosti, kar posledično pomaga pri naboru in obsegu okoljskih vplivov ter pri oblikovanju ukrepov, ki okoljske učinke zmanjšujejo in prostorsko omejujejo. Ukrepi so odvisni tudi od percepcije ali zavedanja o stanju okolja v visokogorju, kar je ključnega pomena pri reakciji družbe v najširšem smislu v smislu in se posledično odraža v njenem odnosu do izboljševanja okoljskega stanja kot tudi do bodočega sonaravnega razvoja.

Sonaravni razvoj turizma in rekreacije v gorah mora upoštevati ključna vprašanja o dejanskem doprinosu turizma k sonaravnemu razvoju nekega gorskega območja; o tem kdo ima ekonomske koristi od turizma; ali turizem povzroča degradacijo posameznih okoljskih sestavin in kako turizem vpliva na lokalne skupnosti – pozitivno ali negativno (Mountain Agenda, 1999)? V visokogorju je nujno v ospredju vprašanje kako turizem že in bo vplival na okolje. Glede na to, da visokogorje ni stalno naseljeno, je toliko večja možnost, da tovrstna območja postanejo območja nepremišljenega izkoriščanja in degradacije okoljskih sestavin, saj so še vedno pogosto prepoznana kot »človeku nekoristna območja«, ki pa ravno z razvojem turizma in rekreacije postajajo vedno bolj privlačna.

V delu so predstavljena značilnosti in razvojni vidiki pustolovskega turizma in rekreacije v gorskih območjih in visokogorju po svetu, kot študija primera pa je izpostavljen ledenik Baltoro v pogorju Karakorum v Pakistanu. Gorska območja se v zadnjih desetletjih soočajo s heterogenimi oblikami turizma in rekreacije ter z množičnim obiskom, kar jim predstavlja osnovno stično točko, medtem ko so naravnogeografske razmere in družbenogeografske razmere specifične in ključno vplivajo na odzivanje gorskih območij na dejavnike in učinke, ki jih v tovrstna območja prinašajo aktivnosti turizma in rekreacije.

Geografska opredelitev gorskih in visokogorskih območij

Opredelitev pojma gorskih in visokogorskih območij v geografski literaturi ni poenotena. Večina avtorjev opredeljuje zgolj gorska območja in posebej ne izpostavlja visokogorja. Tako je npr. v Geografskem riječniku (Cvitanović, 2002) podrobni opis gorskega območja, in sicer so to »izstopajoča in prostrana reliefno vzpeta območja, kjer so absolutne višine višje od 1000 m; so masivna in razdrapana, obkrožena s širokim nižjim območjem. Po višini se običajno delijo na nižja (1000 – 1500 m), srednja (1500 m – 2000 m) in visoka (nad 2000 m). Vrhovi so običajno goli in izpostavljeni preperevanju, pobočja so strma in erozijsko preoblikovana, doline so globoke, s strmimi pobočji. V višjih gorah pod ločnico večnega snega in ledu prevladuje gozd, doline in uravnave služijo za pašništvo, značilno je še gozdarstvo; promet je otežen, zato se gradijo predori in ceste preko prelazov, doline se premoščajo z viadukti; v novejšem času se gradijo žičnice, vedno bolj pa je pomemben zimski turizem« (Cvitanović, 2002). Geografski terminološki slovar opredeljuje visokogorje kot »gorski svet, ki s svojimi vrhovi sega nad zgornjo gozdno mejo« (Kladnik in drugi, 2005).

Glede na geografske značilnosti in hkrati razlike svetovnih visokogorskih območij je težko postaviti enotne kriterije za opredelitev visokogorja, lahko pa opredelimo ključne sestavne dele. Geografsko opredelitev visokogorja sestavljajo stalni in spremenljivi elementi pri čemer med stalne sodijo naravnogeografske razmere, ki so tipične za vsa visokogorska območja (strm, ledeniško preoblikovan relief in ostro gorsko podnebje) ter človekove dejavnosti, ki so prisotne v teh območjih (pašništvo, lov, raziskovanje, pohodništvo, alpinizem, turno in alpsko smučanje). Spremenljivi elementi, ki razlikujejo posamezna visokogorska območja med seboj, vključujejo geografsko širino, nadmorsko višino, klimatsko gozdno mejo ter zgornjo višino stalne poselitve. Spremenljivi elementi omogočajo omejitev visokogorskih območij v vseh pogorjih, kjer opredelitev zgolj na podlagi npr. nadmorske višine ali gorskega podnebja ne bi zadostovala. Človek praviloma v visokogorju ni stalno prisoten, zato je zgornja meja stalne poselitve prav tako ena od spremenljivih komponent splošne opredelitve. Predvsem z razvojem turizma in rekreacije se prisotnost človeka v teh območjih časovno podaljšuje, povečuje se množičnost obiska, vendar pa se meja stalne naselitve kljub temu ne spreminja; je pa zelo različna v posameznih pogorjih po svetu. Odvisna je predvsem od klimatskih razmer, te pa pretežno od geografske širine in nadmorske višine. Tako ne moremo poenotiti nadmorskih višin pri katerih se začneja visokogorski pas v vseh pogorjih. Ta se torej spreminja v odvisnosti od naštetih spremenljivih elementov ne le med posameznimi pogorji, ampak tudi znotraj njih.

Preglednica 18: Geografska opredelitev visokogorja.

V I S O K O G O R J E	
stalni elementi	spremenljivi elementi
<ul style="list-style-type: none"> ▪ relief <ul style="list-style-type: none"> ◦ reliefna energija, ◦ naklon (veliki nakloni: nad 13°; pretežno 32° in več) ◦ ledeniška preoblikovanost (pretekla, recentna) ▪ gorsko podnebje ▪ človekova dejavnost (pašništvo, lov, raziskovanje, pohodništvo, alpinizem, turno in alpsko smučanje) 	<ul style="list-style-type: none"> ▪ geografska širina ▪ nadmorska višina ▪ klimatska gozdna meja ▪ zgornja višina stalne poselitve

Visokogorska območja označujejo skupne geografske značilnosti, predvsem naravnogeografske razmere - strm, ledeniško preoblikovan relief in ostro gorsko podnebje, ter človekove dejavnosti, ki so že tradicionalno prisotne v teh območjih - pašništvo, lov, raziskovanje, pohodništvo, alpinizem, turno in alpsko smučanje. Elementi, ki razlikujejo posamezna visokogorska območja med seboj pa so geografska širina, nadmorska višina, klimatska gozdna meja ter zgornja višina stalne poselitve. Ti t.i. spremenljivi elementi omogočajo določitev visokogorskih območij v vseh svetovnih gorstvih, kjer opredelitev zgolj na podlagi npr. nadmorske višine ali gorskega podnebja ne bi zadostovala. Človek praviloma v visokogorju ni stalno prisoten, zato je zgornja meja stalne poselitve prav tako ena od spremenljivih komponent splošne geografske opredelitve visokogorskih območij. Predvsem z razvojem turizma in rekreacije je prisotnost človeka v visokogorju pogostejša in časovno vedno manj omejena. Povečuje se množičnost obiska, vendar pa se meja stalne naselitve kljub temu ne spreminja; je pa zelo različna v posameznih pogorjih po svetu. Odvisna je predvsem od klimatskih razmer, te pa pretežno od geografske širine in nadmorske višine. Tako ne moremo poenotiti nadmorskih višin pri katerih se začne visokogorski pas v vseh svetovnih pogorjih. Ta se spreminja v odvisnosti od naštetih spremenljivih elementov ne le med posameznimi pogorji, ampak tudi znotraj njih.

Svetovna visokogorska območja se soočajo z vedno bolj množičnim obiskom in raznolikostjo človekovih dejavnosti, ki večinoma niso več sezonske narave, kot so bile tradicionalne – pašništvo in lov; turizem in rekreacija sta vse bolj prisotna preko celega leta.

Hitremu in največkrat nenadzorovanemu razvoju različnih oblik turizma in rekreacije v visokogorju načrtovalci razvoja težko sledijo in so običajno korak ali dva zadaj, saj je dejanske učinke neke aktivnosti v okolju vnaprej težko predvideti. Študij literature in lastno raziskovalno delo je potrdilo, da je ključnega pomena dobro poznavanje naravnogeografskih razmer različnih visokogorskih območij, s pomočjo katerega lahko do določene mere predvidevamo njihov odziv na že obstoječe turistične in rekreativne aktivnosti.

Ocena nosilnih zmogljivosti visokogorja, ki je rezultat funkcijskega vrednotenja naravnogeografskih elementov in analiza antropogenih vplivov in učinkov sta podlaga za skupno oceno ranljivosti, ki je prvi temelj pri načrtovanju in doseganju sonaravnega razvoja turizma in rekreacije. Drugi temelj, brez katerega sonaravni razvoj turizma

in rekreacije v visokogorju ni mogoč, je dobro poznavanje značilnosti udeležencev aktivnosti, kar posledično pomaga pri naboru in obsegu okoljskih vplivov ter pri oblikovanju ukrepov, ki okoljske učinke zmanjšujejo in prostorsko omejujejo. Ukrepi so najbolj kočljiv del vsakega načrtovanega razvoja, saj so v veliki meri odvisni tudi od percepcije ali zavedanja o stanju okolja v visokogorju, kar je ključnega pomena pri reakciji družbe v najširšem smislu - tako v smislu odnosa do izboljševanja okoljskega stanja kot tudi do bodočega sonaravnega razvoja. Prav v visokogorju je zaradi odsotnosti stalne poselitve mogoče govoriti o možnostih pravega sonaravnega razvoja dejavnosti turizma in rekreacije.

Na primeru ledenika Baltoro v Karakorumu smo ugotovili degradiranost vseh naravnogeografskih sestavin, kar je vsekakor posledica v prvi vrsti izjemne občutljivosti visokogorskega okolja ter takoj za tem stihijski in povsem nekontroliran razvoj turizma kljub dejstvu, da je območje razglašeno za narodni park. Dejstvo je da obisk visokogorskih območij povsod po svetu narašča, kar je posledica vedno boljše prometne dostopnosti, informacij in tudi dejstva, da se vedno več ljudi odloča za aktivno preživljanje prostega časa, pri čemer je gorništvu in ostale aktivnosti v gorah med najbolj priljubljenimi. Prav zato je zelo pomembno skrbno načrtovanje razvoja teh aktivnosti, v izogib negativnim okoljskim učinkom, prav tako pa tudi negativnim družbenim in gospodarskim učinkom v gorskih območjih. Zgolj z vidika naravnogeografskih razmer (ekocentrični pogled) je raba termina »razvoj« vprašljiva. Dejansko gre bolj za »varovanje«, kar pomeni, da so za visokogorje prednostno primerne tiste aktivnosti, ki imajo za svoj ključni cilj raziskovanje (znanstveno in strokovno) in osveščanje o značilnostih, procesih in posledično o globalnem pomenu visokogorskih območij. Tudi načrtovanje in izvajanje tovrstnih aktivnosti mora slediti načelom sonaravnosti - kar pomeni raziskovanje brez uporabe tehničnih pripomočkov (npr. helikopter, motorna vozila ipd.), ki bi lahko ogrožala naravne sestavine. V primeru bolj antropocentričnega gledanja in ob upoštevanju vseh pozitivnih učinkov, ki jih imata turizem in rekreacija v visokogorju na posameznika in posledično tudi na ponudnike tovrstnih aktivnosti ter na območja iz katerih udeleženci prihajajo, pa je raba termina »razvoj« nujna. Le ta pa mora biti nadzorovan in mora prioritarno stremeti k ohranjanju visokogorskega okolja kot celote.

Dejstvo je, da sta v visokogorju večinoma zastopana pustolovski turizem in rekreacije, ki že po sami naravi aktivnosti tudi sicer zahtevata posebna geografska okolja (gorska območja, reke, jezera, morje ipd.), ki pa so glede na naravnogeografske značilnosti zelo občutljiva in obstaja toliko večja možnost njihove degradacije ob nepravilnem in zlasti nenadzorovanem razvoju. Poleg gorništvu je v visokogorju prisotno tudi alpsko smučanje na urejenih smučiščih in pa vrsta modernejših oblik aktivnosti, ki so odraz razvoja športne in tehnične opreme, novih znanj in želje po fizični aktivnosti, ki večini prebivalstva v vsakdanjem življenju vedno bolj »manjka«. Najpogosteje gre za jadralno padalstvo, gorsko kolesarjenje, vožnjo s terenskimi vozili in motornimi sanmi (kjer ceste segajo nad gozdno mejo) ter helikoptersko smučanje. Eden od pomembnih dejavnikov, ki vplivajo na množičnost predvsem gorništvu je tudi relativna cenovna dostopnost te dejavnosti, kar velja predvsem za gorništvu v domačem okolju, pri čemer imamo v mislih območja, kjer je dejavnost že zgodovinsko prisotna pri domačem prebivalstvu, in sicer kot priljubljena oblika preživljanja prostega časa. Prav tako postajajo cenovno vedno bolj dostopne ak-

tivnosti v različnih gorskih območjih po svetu, kjer gorništvu praviloma ni uveljavljeno kot pristočasna dejavnost domačinov ampak kot oblika gorskega pustolovskega turizma.

Potrebam turistov se prilagajajo tudi ciljna visokogorska območja. Zadnja stalna naselja so večinoma vedno boljše opremljena z vso potrebno in pričakovano turistično infrastrukturo (hoteli, gostilne, telefon, internet ...). Vzporedno s tem pa se pri turistih ohranjajo »romantične« želje po odkrivanju, iskanju in potovanju po pristnih, odmaknjenih in »neokrnjenih« gorskih območjih. Ob tem se pogosto dogaja, da udeleženci svojo okoljsko osveščenost ali nasploh etična načela »pozabijo«, kar se zlasti v okolju odraža v velikih količinah najrazličnejših odpadkov. Za gornike sicer velja, da se zavedajo svoje odgovornosti pri varovanju gorskega okolja, vendar pa razmere v baznih taborih kot tudi na višinskih taborih kažejo povsem nasprotno. Kljub dejstvu, da je ekološka zavest danes na splošno na precej višji ravni kot pred nekaj desetletji, se zdi, da je v visokogorju čas obstal. Dejansko stanje kaže na splošno zanemarjanje enega osnovnih pravil v gorništvu - »za seboj ne puščaj sledi«. Deloma gre za posledico nemalokrat prisotnih kritičnih situacij, kjer so ogrožena življenja in v takih primerih fizično ni mogoče delovati v skladu z zgornjim pravilom, po drugi strani pa k okoljskemu stanju v visokogorju bistveno prispeva množičen obisk ter v najvišjih svetovnih gorstvih še vedno prevladujoče mnenje, da »cilj opravičuje vsa sredstva«.

V visokogorju izrazito prevladujejo naravni procesi, v katere človek s svojimi dejavnostmi posega kratkotrajno in omejeno. Ob tem se zastavlja predvsem vprašanje, kje so dejanske meje rabe posameznih pokrajnotvornih sestavin; kdaj je neka aktivnost v pokrajini še »sonaravna« in kdaj so njeni učinki degradacijski? Pravega odgovora dosedanje raziskave na to temo ne dajejo. Vsekakor zaenkrat večinoma temeljimo na dobrem poznavanju zakonitosti naravnogeografskih procesov v neki pokrajini in čim boljšem poznavanju, oceni in napovedi vplivov in učinkov različnih človekovih dejavnosti. Prav te pa se stalno in hitro spreminjajo, zato je pravzaprav nemogoče predvideti vse možne okoljske vplive in učinke. S tovrstno dilemo se srečamo tudi na primeru turizma in rekreacije v visokogorju, kjer že kratek zgodovinski pregled razvoja dejavnosti v tej specifični pokrajinski enoti kaže na izjemno heterogenost različnih aktivnosti v zadnjih desetletjih, kar je povzročilo tudi heterogene okoljske vplive in učinke. Vzporedno se spreminja tudi percepcija obiskovalcev/udeležencev turističnih in rekreacijskih aktivnosti. Tako se povečevanje splošne okoljske zavesti posledično odraža tudi v visokogorju (npr. količina trdnih odpadkov ob pohodniških poteh je danes neprimerljivo manjša kot pred dvajset in več leti; planinske kočice so opremljene s sončnimi celicami; pri plezanju velja načelo čim manjše uporabe tehničnih pripomočkov (npr. klini...), ki ostanejo v skalnih razpokah ali le te poškodujejo, ipd.).

Pri razvoju turizma in rekreacije v visokogorju je prednostno ohranjanje okolja in posledično okoljska trajnost. Socialna in ekonomska trajnost nista neposredno vezani na visokogorska območja, zlasti zaradi odsotnosti stalne poselitve. Ustrezen, torej sonaravni razvoj turizma in rekreacije v visokogorju ima lahko posredno ugodne učinke na socialno in ekonomsko trajnost drugih območij, izven visokogorja (npr. ugoden ekonomski položaj podjetij in posameznikov, ki

se preživljajo z organiziranjem različnih aktivnosti v visokogorju, je pozitiven za območja, kjer imajo tovrstna podjetja svoj sedež; udeleženci turizma in rekreacije v visokogorju v aktivnostih pridobijo določene pozitivne izkušnje, ki ugodno vplivajo na razvoj njihove osebnosti, kar se posledično lahko odraža tudi v njihovem vsakdanjem delu ipd.).

Model sonaravnega razvoja turizma in rekreacije v visokogorju temelji na pokrajinsko ekološki regionalizaciji, oceni nosilnih zmogljivosti in oceni obremenjenosti, ki jo nadgrajuje z vsemi elementi DPSIR okvirja. Rezultat upoštevanja obeh ocen je ocena ranljivosti visokogorskega okolja, ki predstavlja osnovo na kateri načrtujemo sonaravni razvoj turizma in rekreacije v visokogorju. Doseganje sonaravnega razvoja obeh dejavnosti je v veliki meri mogoče s pomočjo zavarovanja območij ter načrtovanja razvoja v okvirih, ki jih določa zakonska podlaga, na kateri je osnovan ustrezen in s sodelovanjem vseh deležnikov sprejet upravljavski načrt, ki ga sestavlja t.i. ureditveni del in razvojni del, iz obeh pa izhajajo ukrepi, s katerimi se konkretno rešujejo problemi v samem okolju. Oblika zavarovanja visokogorskega območja se lahko od primera do primera razlikuje, čeprav gre pri večini dosedaj zavarovanih visokogorskih območij za narodne parke (kategorija II po IUCN), ki omogočajo celostno upravljanje – varovanje in hkrati tudi razvoj nekaterih dejavnosti, prioritetno turizem in rekreacijo.

Pri tem je ključnega pomena ustrezen upravljavski načrt, ki opredeljuje vsa področja upravljanja nekega zavarovanega območja, na področju turizma in rekreacije pa je pomembno, da opredeljuje aktivnosti, ki se na nekem območju lahko razvijajo in predvideva sanacijo morebitnih vročih točk, kjer je sedanja degradiranost (kot posledica aktivnosti turizma in rekreacije) okolja največja. Razvojni del upravljavskega načrta pa mora predvideti trende obiska in posledično okoljske pritiske ter načine kako jih obvladovati. Izjemnega pomena je stalno spremljanje razvoja vedno novih aktivnosti pustolovskega turizma in rekreacije, ki so v visokogorju vedno bolj raznolike. Pomembno je, da je razvojni del izrazito sonaravno usmerjen, s prioriteto na okoljskem področju; socialni in ekonomski učinki sicer morajo biti predvideni, vendar so v vsakem primeru usmerjeni izven visokogorskih območij.

Pomemben element modela sonaravnega razvoja turizma in rekreacije v visokogorju predstavljajo ukrepi. Ti so posledica stanja okolja ter percepcije oz. končni rezultat tako naravnogeografskih razmer, človekovih dejavnosti, njihovih okoljskih učinkov in predstavljajo aktivnosti za izboljšanje okoljskega stanja ter posledično ob pravilnem načrtovanju tudi možnost tako sonaravnega načrtovanja kot tudi posledično sonaravnega razvoja turizma in rekreacije v visokogorju. Opredelili smo jih kot trde in mehke ukrepe. Med prve uvrščamo popolno prepoved obiska in izvajanja aktivnosti v območjih, ki so do te mere degradirana, da potrebujejo čas za regeneracijo ali pa je občutljivost okoljskih sestavin tako velika, da obiska ne prenese v nobeni obliki; sledi omejitve obiska in/ali omejitve določenih vrst aktivnosti, za katere je ugotovljeno, da imajo negativen vpliv na določeno okoljsko sestavino. Med trdimi ukrepi smo predvideli tudi uvedbo vstopnin in pristojbin npr. za vrhove gora, pridobljena sredstva pa se morajo obvezno uporabiti za potrebe delovanja zavarovanega visokogorskega območja. Zadnji trdi ukrep je nadzor in izvajanje kaznovanja morebitnih kršiteljev; slednje mora biti dosledno, sredstva pa bi se prav tako morala vračati

v zavarovano območje. Med mehкими ukrepi predvidevamo izobraževanje vseh deležnikov - ponudniki in povpraševalci, najbližje zavarovanemu območju živeče lokalno prebivalstvo, lokalne, regionalne in državne ustanove – ter osveščanje o problematiki stanja okolja v visokogorskih območjih skozi različne medije.

Predlagani model smo preizkusili na primeru ledenika Baltoro (Karakorum), ki je eno najbolj privlačnih svetovnih visokogorskih območij. Onesnaževanje območja ledenika Baltoro, ki je posledica hitrega razvoja turizma, je pretežno točkovno in najbolj intenzivno v pohodniških kampih in baznih taborih, ki predstavljajo »vroče« točke onesnaževanja. Na teh mestih so najbolj očitni vsi negativni vplivi in učinki turizma – npr. velike količine organskih in anorganskih odpadkov, posekano grmičevje, erozija poti, hrup idr. Vzdolž poti preko ledenika so negativni učinki turizma minimalni, vezani zgolj na ozek pas ob poti, kjer se občasno pojavljajo živalska trupla in anorganski odpadki.

Skupna ocena ranljivosti območja kaže na veliko ranljivost glavnega ledenika Baltoro, kjer je obremenjevanje veliko in že presega regeneracijske zmogljivosti posameznih naravnogeografskih elementov. Ob sedanjih trendih obiska in brez morebitnih sanacijskih ukrepov, se bo stanje v okolju hitro slabšalo. Območje ledenika Baltoro je sicer del narodnega parka Central Karakorum National Park, ki pa je v javnosti še slabone prepoznan, upravljavske institucije se šele vzpostavljajo, prav tako je v izdelavi načrt upravljanja, aktivnosti turizma pa se na območju parka izvajajo stihijsko in nenadzorovano. Pristojbine za vrhove in ekološke takse so se do nedavnega stekale v državno blagajno in se na območje nazaj niso vračale, z večjimi pristojnostmi regionalne vlade Gilgit-Baltistan pa kaže, da se bo to v prihodnje spremenilo. Glede na trend obiska v zadnjih desetletjih se kaže hitro povečevanje, kar pomeni, da se bo stanje okolja brez konkretnih ukrepov slabšalo. Odzivi na stanje okolja se sicer že kažejo, in sicer v organizaciji čistilnih akcij, ki jih izvaja tako pakistanska planinska zveza kot tudi različne mednarodne nevladne organizacije. Kljub temu se bo potrebno izboljšanja stanja v okolju lotiti sistematično. Tako med svojimi ukrepi predlagamo omejitve obiska ter uvedbo sistema čiščenja baznih taborov in drugih taborov vzdolž ledenika Baltoro kot nove dejavnosti bi imela pozitiven vpliv na okolje kot tudi na širše družbene razmere v provincah severnega Pakistana. Sistem čiščenja bi okoljsko stanje bistveno izboljšal v kratkem časovnem obdobju in bi ga kot takega dolgoročno vzdrževal. Predlagani ukrep bi pozitivno vplival na kvaliteto površinskih vodnih tokov, ki sicer spirajo hranila s površja ledenika skozi njegovo notranjost vse do podledeniškega potoka. V določenem časovnem obdobju bi se izboljšalo tudi stanje glavnega podledeniškega potoka. Urejeno čiščenje baznih taborov in taborov vzdolž ledenika bi pozitivno vplivalo na privlačnost območja za obiskovalce. Večina skupin gornikov v svojih priporočilih pakistanskemu Ministrstvu za turizem priporoča prav ureditev higienskih razmer na ledeniku. Trenutno stanje je moteče in negativno vpliva na doživljanje pokrajine pri obiskovalcih. Prav tako je ogroženo njihovo zdravje. Sistem čiščenja bi torej bistveno pripomogel k večji privlačnosti območja, prav tako bi izboljšane higienske razmere vplivale na polnejšo izkušnjo obiskovalcev.

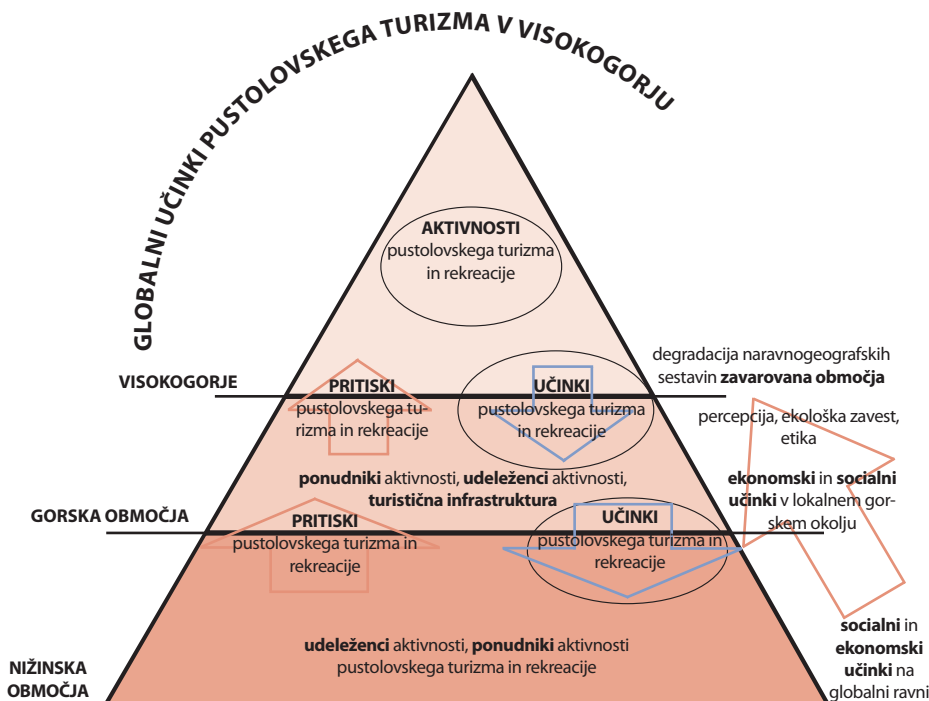
Izboljšanje okoljskega stanja je neposredno povezano s širšim družbenim stanjem severnega dela Pakistana (Gilgit-Baltistan). Turizem predstavlja vedno bolj

pomemben del dohodka družinam nosačev, kuharjev, vodnikov in vseh, ki so vključeni v delovanje turističnih agencij. Vzpostavitev sistema čiščenja na ledeniku Baltoro bi imela širše pozitivne učinke na predvsem na območje Baltistana, od koder izhaja večina nosačev, kuharjev, vodnikov in osebja agencij. Koncept sistema čiščenja bi bil prenosljiv v bodoče tudi na druga primerljiva visokogorska območja.

Preizkušen model sonaravnega razvoja turizma in rekreacije v visokogorju omogoča celovit vpogled v stanje naravnogeografskih sestavin neke visokogorske pokrajine z vidika človekovega obremenjevanja, poudarek daje pomenu percepcije, ki deloma že vpliva na samo stanje v okolju, hkrati pa je vpeta v načrtovanje in doseganje sonaravnega razvoja. Model je dovolj splošen, da ga lahko uporabimo v različnih visokogorskih območjih in hkrati dopušča upoštevanje njihovih specifičnosti tako z vidika naravnogeografskih razmer kot tudi narave aktivnosti turizma in rekreacije.

Med delom se je večkrat vzpostavila dilema o tem, ali v primeru aktivnosti turizma in rekreacije v visokogorju sploh lahko govorimo o dinamičnem ravnovesju, saj gre v večji meri za enosmernost – visokogorsko okolje pravzaprav predstavlja poligon za izvajanje aktivnosti, ob tem pa prihaja zgolj do degradacije, ki jo občutljivo okolje lahko sanira samo do določene mere. Dinamično ravnovesje je na nekaterih visokogorskih območjih porušeno na račun prevelikega obremenjevanja, kolikšna pa je sposobnost regeneracije pa dejansko še nismo imeli priložnosti spremljati, saj v preteklosti do takšnega okoljskega stanja v visokogorju še ni prišlo!

Slika 94: Visokogorje v funkciji poligona za aktivnosti pustolovskega turizma.



Eden možnih scenarijev v prihodnosti je, da bo nekatera najbolj obiskana visokogorska območja potrebno »žrtvovati« in prepustiti množičnemu obisku ter na ta način ohranjati druga, ki so manj poznana in redko obiskana. Kljub temu bo potrebno tudi v prvih območjih potrebno vsaj ohranjati ustrezno okoljsko stanje. Druga možnost je pospeševanje razvoja turizma in rekreacije na številčnejših lokacijah. Tako bi razbremenili preobljudena območja, vendar pa bi se negativni okoljski vplivi in učinki zmanjšali in prostorsko razpršili. V obeh primerih bodo nujni dodatni ukrepi, s katerimi se množični obisk ne bo še povečeval in bo dostopnost visokogorja omejena (npr. ustavitve načrtov in prepoved gradnje cest, žičnic; ohranjanje skromno urejenih planinskih koč, s skromno gostinsko ponudbo). Področje, ki ga posebej nismo izpostavili, vendar pa je vsekakor pomembno nanj opozoriti v prihodnje, so globalni okoljski učinki turizma v visokogorju. Ob tem gre predvsem za povečan ogljični odtis udeležencev turizma v svetovnih visokogorskih območjih. Izvorna območja udeležencev so namreč precej oddaljena, kar pomeni, da je za večino nujna uporaba letala.

Visokogorje torej predstavlja okvir za izvajanje hitro razvijajočih se in heterogenih aktivnosti pustolovskega turizma in rekreacije, ob tem pa prihaja do različnih oblik in intenzivnosti degradacije naravnogeografskih sestavin. To pomeni, da s prisotnostjo človeka in zlasti skozi njegove aktivnosti, visokogorsko okolje postaja ogroženo, njegove samočistilne in regeneracijske zmogljivosti pa so na nekaterih območjih že presežene, kar nam kaže stanje posameznih naravnogeografskih sestavin. Pritiski na visokogorje prihajajo iz najbližjih, gorskih območij, kjer so glavni ponudniki pustolovskih aktivnosti in kjer je največ ustrezne turistične infrastrukture, ki posledično omogoča izvajanje aktivnosti v samem visokogorju. Hkrati pa so gorska območja že v manjši meri stalno poseljena, kar pomeni, da iz tovrstnih območij izhaja tako določen delež udeležencev aktivnosti ter večina ponudnikov in zaposlenih (npr. vodniki, nosači, kuharji ipd.). Intenzivnejši (merjeno z množičnostjo obiska!) so pritiski iz vseh ostalih, t.i. nižinskih območij, od koder prihaja večina udeležencev, hkrati pa tudi sicer manjši delež ponudnikov aktivnosti pustolovskega turizma in rekreacije. Del udeležencev ostane na širših gorskih območjih, del pa se udeleži aktivnosti v visokogorju. Kot smo ugotovili s pomočjo obeh študij primerov, množičnost ogroža predvsem dve naravnogeografski sestavini – relief in vode, deloma pa tudi prst in rastlinstvo, če sta zastopana.

Vzporedno s pritiski, pa prihaja tudi do neposrednih in posrednih učinkov aktivnosti v visokogorju na ostala območja (gorska in nižinska). Učinki v visokogorju se odražajo neposredno v stanju posameznih naravnogeografskih sestavin (okoljski učinki), in so negativni. Posredni učinki pa so ekonomski in socialni v gorskih in nižinskih območjih. Glede na bližino in značilnosti, se v gorskih območjih odražajo pozitivni ekonomski učinki ter socialni učinki, ki so do neke mere lahko negativni (vpliv na tradicijo lokalnega prebivalstva), do določene mere pa tudi pozitivno vplivajo tako na udeležence kot ponudnike aktivnosti iz tovrstnih območij. Intenziteta ekonomskih učinkov v nižinskih območjih je majhna in razpršena. Visokogorje pa lahko zelo pozitivno vpliva na udeležence aktivnosti, v smislu oddiha, sprostitve ipd. kar se posledično lahko odraža v okolju v katerem sicer bivajo in delajo. Ob tem pa ni nujno, da je visokogorje prepuščeno zgolj degradaciji naravnogeografskih sestavin – od percepcije, stopnje ekološke zavesti ter etičnih vrednot ponudnikov in udeležencev aktivnosti je v veliki meri odvisno ali pride do zavarovanja določenih visokogorskih območij ter posledično do varovanja izjemnega okolja, ki ima tudi veliko duhovno vrednost.

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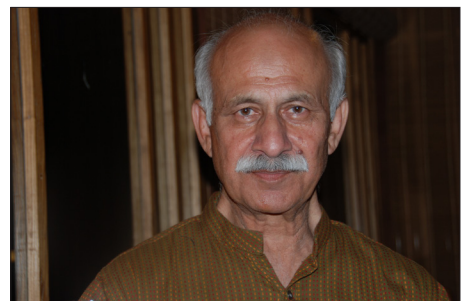
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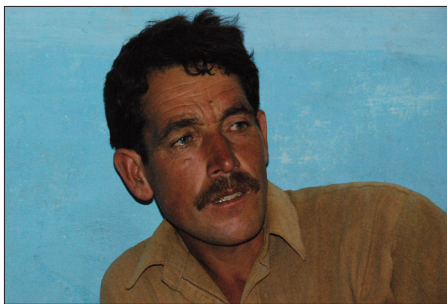
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