Risks and Mountain Hazards in the Muktinath Valley, Nepal
Risikofaktoren und Gebirgsgefahren im Muktinath Tal, Nepal

Robert Kostka, Austria/Österreich

Die Hochgebirgsregion und die mit ihr verbundenen Nutzungsinteressen sind in letzter Zeit verstärkt in das Blickfeld öffentlichen Interesses getreten. Weitgehend handelt es sich bei Gebirgsgefahren um natürliche Prozesse, die für und durch die Aktivitäten des Menschen zum Risiko werden und nicht nur in den Alpen sondern auch im Himalaya zu Gefahrensituationen und Schadensfällen führen können. Ein besonderes Beispiel in dieser Hinsicht stellt das Muktinath Tal nördlich der Annapurnagruppe in Nepal dar. Es handelt sich um ein Tal mit speziellen Nutzungsinteressen wie einem Naturheiligtum für Hindus und Buddhisten und um einen Bereich mit extremer Morphodynamik. In der Fotoserie des Beitrages ist hierfür eine Reihe unterschiedlicher Beispiele angeführt.
Menschen leben seit Jahrtausenden in dieser Region und sind immer wieder mit diesen Problemen konfrontiert worden. Heute gibt es zahlreiche „high-tech" Möglichkeiten, um in diese natürlichen Prozesse einzugreifen. Die Frage ist, wie weit der Mensch eingreifen soll, um zukünftige Entwicklungen zu steuern, denn viele technische, ökologische, finanzielle und soziale Maßnahmen führen zu Folgen, deren Nachhaltigkeit und Auswirkungen z.Z. oft nicht beurteilbar sind.

Introduction — Mountain Hazards

Comparative studies of high mountain regions belong to the most interesting and manifold tasks of geographical research (UHLIG, HAFFNER 1984). Reports on mountain areas (STONE 1992) are available at an international level, with the focus increasingly shifting to effects caused by growing human land use (ICIMOD 2001a). Some of these research studies deal with mountain risks and hazards not only in the Alps but also in the Hindu-Kush Himalayas (ICIMOD 2001b). Most of these phenomena are natural processes, which can, however, be aggravated by human activities and risky behaviour, resulting in dangerous situations or severe damage. A special example in this context is the Muktinath Valley in Nepal. It is an area characterised by strong morphodynamic processes and different human land use interests, ranging from yak pastures at high altitudes of more than 4,000 m to a natural holy site with a sacred spring and eternal flame.

The Muktinath Valley — location and special land use interests

The Muktinath Valley is one of the valleys on the orographic left side of the Kali Gandaki River north of the Annapurna massif in Nepal. It is situated in the dry region of the Inner Himalayas north of the main ridge of this mountain system. The valley rises from 2,810 m at the confluence of the Dzong Chu near Kagbeni to

5,416 m at the Thorong Pass leading from the Mustang district to Manang, resulting in a height difference of 2,600 m. Due to its large height differences and geological nature, the fossil rich dark Jurassic strata (formerly also called 'Saligram series'), it is subject to strong morphodynamic processes. This was evident in the past but is also proving true for the present.
The valley is densely settled compared to the Mustang district as a whole. The irrigated oasis of Kagbeni is situated at the confluence of the Dzong Chu with the Kali Gandaki River. In the upper Muktinath Valley we find numerous settled and abandoned villages, monasteries, ruined fortresses and cave settlements. A special place in the valley is the natural holy site of Muktinath at an altitude of 3,750 m: a karst spring next to a jet of natural gas, producing the blue flame of the 'eternal fire'. Pilgrimage tourism has existed there for thousands of years. More comfort has become necessary in the last few decades due to the increase in trekking tourism round Annapurna. Land use is mainly agriculture and pasture farming, there is no industrial production.

Nature versus agriculture? The oasis Kagbeni at the river Kali Gandaki the beginning of the Muktinath-Valley — Natur gegen Landwirtschaft? Die Oase Kagbeni am Beginn des Muktinath-Tales am Fluss Kali Gandaki.[1]

Mountain hazards and their effects can be observed in the entire valley. They were commonplace in the history of the settlements and still are now. Local farmers and pilgrims have always known about the consequences, but in former times their extent was limited and usually caused no great problems. Their influence on modern trekking tourism, however, is much more important, since in this case the natural setting and the mountain hazards connected with it strongly influence the economic situation of the valley.

[1] Photo: Robert Kostka

The Tibet-Himalayan research project of the German Research Council

Studies of settlement processes and the formation of states in the Tibetan Himalayas focusing on the Mustang district in Nepal were carried out within a multi-year research programme of the German Research Council. This interdisciplinary programme was coordinated by Prof. Willibald Haffner, University of Giessen, and Prof. Dieter Schuh, University of Bonn. Different projects were carried out, ranging from geography to Tibetology, and also including studies on settlement history (HAFFNER, POHLE 1993) or special types of land use (POHLE 2002). Geomorphologic studies (BAADE et al. 1998) were performed with the aim to map mountain risk factors and the damaging results of mountain hazards in the past and present. Some examples concerning this topic are shown in the following chapter.

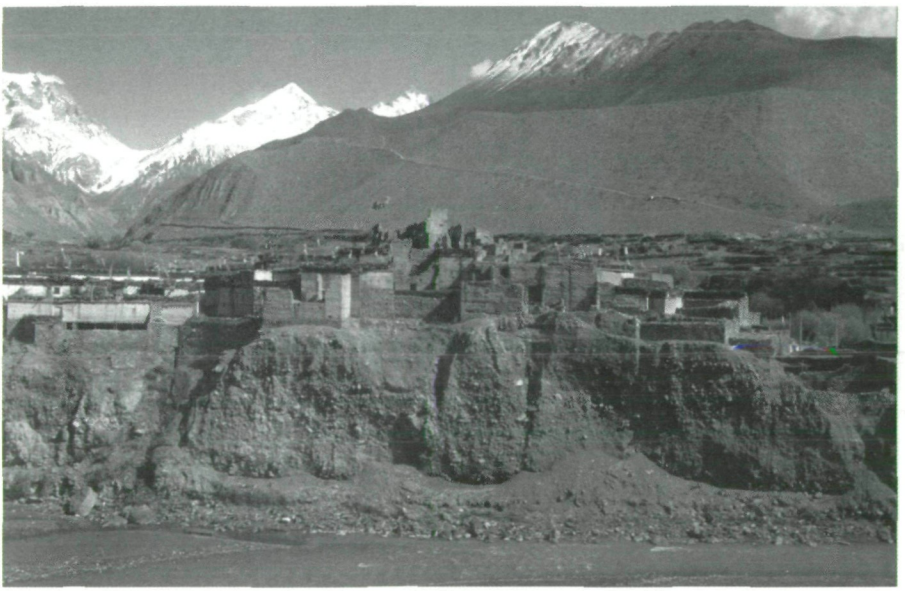
Investigations of hazardous places and sites in the Muktinath Valley — examples

As a result of the arid or semiarid character of this region, agriculture is only possible with artificial irrigation. Since there are no forests, morphological conditions can be investigated without disturbing vegetation cover. The effects of morphodynamic processes on settlements and settlement development can thus be studied extensively. It was thus possible to survey not only the present situation in the Muktinath Valley but also the consequences of mountain hazards in historical and prehistoric times.

The settlement of old Phudzeling was completly deserted by mountain hazards. — Die alte Siedlung Phudzeling wurde wegen Berggefahren aufgegeben.[2]

[2] Photo: Robert Kostka

In Kagbeni, north of the Nilgiri group in the Himalayas, the biggest hazards resulted from erosion of the Kali Gandaki River as a result of high waters and mudflows after heavy monsoon rains or floods caused by glacier lake outbursts. Severe damage was found in the historical centre of the settlement but also in the agricultural areas (fields and trees). One further ecological disadvantage of Kagbeni are the heavy storms blowing from south to north nearly every day after 11 – 12 a.m. (HAFFNER et al. 2001). This meteorological phenomenon has visibly affected the structure of the settlement and the formation of the fields, and also has the potential to destroy technical devices. Several abandoned slope and cave settlements, such as Phudseling or Mebrak, can be seen when walking up the Muktinath Valley. Local people mention evil spirits as a reason why these places are deserted but in our opinion it must have been the lack of water or interrupted access to them that led to their being given up for habitation.



Nature threatens settlements and therefore sites for habitation have to be selected with great care. — Natur gefährdet Siedlungen. Die Auswahl des Ortes für eine Niederlassung muss deshalb mit größter Sorgfalt getroffen werden.[3]

Two regions in the central Muktinath Valley are especially prone to landslides and mudflows: the slope near Old and New Puta north of the Dzong Chu and the sliding slope and terraces near the village of Khyinga south of the river. Old Puta (Buta) was destroyed completely by a huge landslide. We found a few remains of walls in the framework of the research programme mentioned above. This disaster was the reason for relocating the settlement to another place, but the new village is again situated in a risky area.

[3] Photo: Robert Kostka

The slides near the Dzong Chu River can move several meters a year, meaning that agricultural areas and buildings situated higher up are also affected. Slides were also responsible e.g. for the interruption of water supply to the terraced fields in historical but also in prehistoric times (HÜTTEL 1993). The lack of water did not allow the upper terraces near the village of Khyinga to be irrigated. This risky situation still prevails but this problem can be solved using modern technical devices.
Higher up the valley, to give another example, trekking tourism is also influenced by mountain hazards. People crossing the Thorong Pass (5,416 m) may experience problems with the high altitude of more than 5,000 m, with weather conditions and extreme cold, intensive sunshine, snow and ice and, last but not least, with avalanches and rock falls. All these facts challenge or threaten human interests. People are forced to react, but the question is how?

Conclusions — measures required

The Kali Gandaki Valley and its tributaries north of the Himalayan main ridge is a very old settlement area despite its high mountain character and unfavourable conditions. This was one of the results of the above-mentioned studies on settlement and cultural landscape history. Archaeological studies showed that human settlement there goes back thousands of years. The people living in this region have been confronted with problems of natural mountain hazards for a long time. Topographic conditions (HEINE, KOSTKA 1998), climatic change (SIMONIS 2002) and the increasing impact of human activities in the past few decades are responsible for the consequences we see today.
In this context it is important to decide whether, and if so, what measures and solutions should be taken in the future to minimise hazards and damage. Should people continue to live with all these risks and accept the resulting difficulties? Should they leave such hazardous areas and settle elsewhere? Should they actively take counter-measures? Today, a wide range of sophisticated technologies is available to influence natural processes but they may result in a host of technical, ecological, financial or social problems. The use of modern technologies should therefore be well considered and studied in advance to avoid unforeseeable ecological and social consequences. In any case close contact with the local population concerned is important — a requirement which is not so easy to satisfy today. Decisions are very often taken by commissions which meet for a short time, work in far-away offices and often lack local knowledge and local experience.

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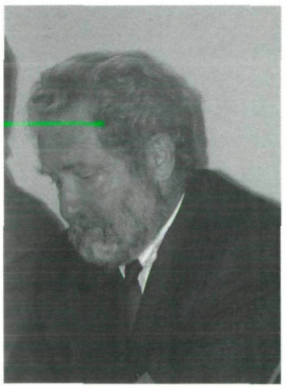
Univ. Prof. Univ.Doz. DI Dr. Robert Kostka
Technische Universität Graz
Felix-Dahn-Platz 1
A-8010 Graz
r.kostka@utanet.at



ROBERT KOSTKA was born 1935 in Graz, Austria. Studied at the Technical University of Graz, receiving there his doctorate (surveying and engineering), specializing in cartography. Teaching and research, including travels in Europe, Africa, America, and Asia. Principal reasearch in the cartography of high mountainous regions and documentation of cultural artifacts.