RESEARCH REPORTS

Geomorphological Studies in the Bagmati Valley, South of Kathmandu

Robert Kostka

As a result of the rapid population growth in the mountain regions of High Asia, the limited space for land use must be exploited to a maximum. Since even the border zones of the living space are cultivated and used for house construction, the areas used by man are increasingly threatened by natural hazards. Soil erosion, and abrasion of terraces and river banks due to changing runoff conditions in a monsoon climate pose severe problems to the mountain dwellers, and have for many years been particularly well known in Nepal.

The objective of this study using remote sensing data was (a) to document recent relief formation processes, and (b) to show how useful this method could be for the mapping of hazard areas, which in turn might provide important information for planning and other measures for the protection of such areas.

The application of different remote sensing methods was demonstrated by our investigation into a selected area along the Bagmati river in the southern part of the Kathmandu Valley (Buchroithner *et al.* 1991). Various maps and series of space- and airborne remote sensing data were available for this area.

These investigations concentrated on geology, geomorphology, as well as aspects regarding the climate or soil and natural vegetation. The influence of natural changes on human activities (above all cultivation on terraced field) in the agricultural areas constituted the most important part of the study.

Extensive investigations in the Kathmandu Valley as a whole and in an adjacent part of the Mahabharat Lekh were carried out with the help of the existing topographical 1:50 000 scale maps (enlargements from the original 1:63 360 scale), satellite image maps, and LANDSAT image data.

The detailed studies near Katuwal Daha in the Bagmati Valley would not have been possible without the large-scale Kathmandu Valley Maps 1:10 000 and 1:25 000 (Arbeitsgemeinschaft für Vergleichende Hochgebirgsforschung 1977) and the corresponding aerial photographs produced within the framework of the Nepal Himalaya Research Scheme (cf. Höfer & Höfer 1982). Two different sets of aerial photographs were used: 23 x 23 cm size vertical, photogrammetric black & white images taken by Erwin Schneider on December 13, 1971 (cf. Kostka 1993); and 6 x 6 cm size vertical, stereoscopic colour slides taken by Erwin Schneider and Robert Kostka on December 10, 1986 (cf. Schneider & Kostka 1987).

The evaluation of these stereo-images provided graphic representations of the erosion- and abrasion-prone areas in this intensively used agricultural region of the Kathmandu Valley (s. figure below).

The area of this detail study comprised a rather flat section of the Bagmati river in the southernmost part of the Kathmandu Valley, lying just before the v-shaped gorge where the river breaks through the Mahabharat Lekh. As comparison shows, changes through erosion and abrasion, that have occurred in a period of 15 years, are rather insignificant in proportion to the total area. Larger changes can be found only near the banks of the Bagmati.

Nowadays, new and different types of spaceborne remote sensing data provide an excellent basis for such extensive investigations and overview studies. Still, as already mentioned, large-scale aerial photographs remain fundamental to detailed investigations of this kind. These aerial photographs, we should add, are the fruit of the late Erwin Schneider's initiative and tireless efforts under the difficult conditions of this mountain area. Even during the last years of his

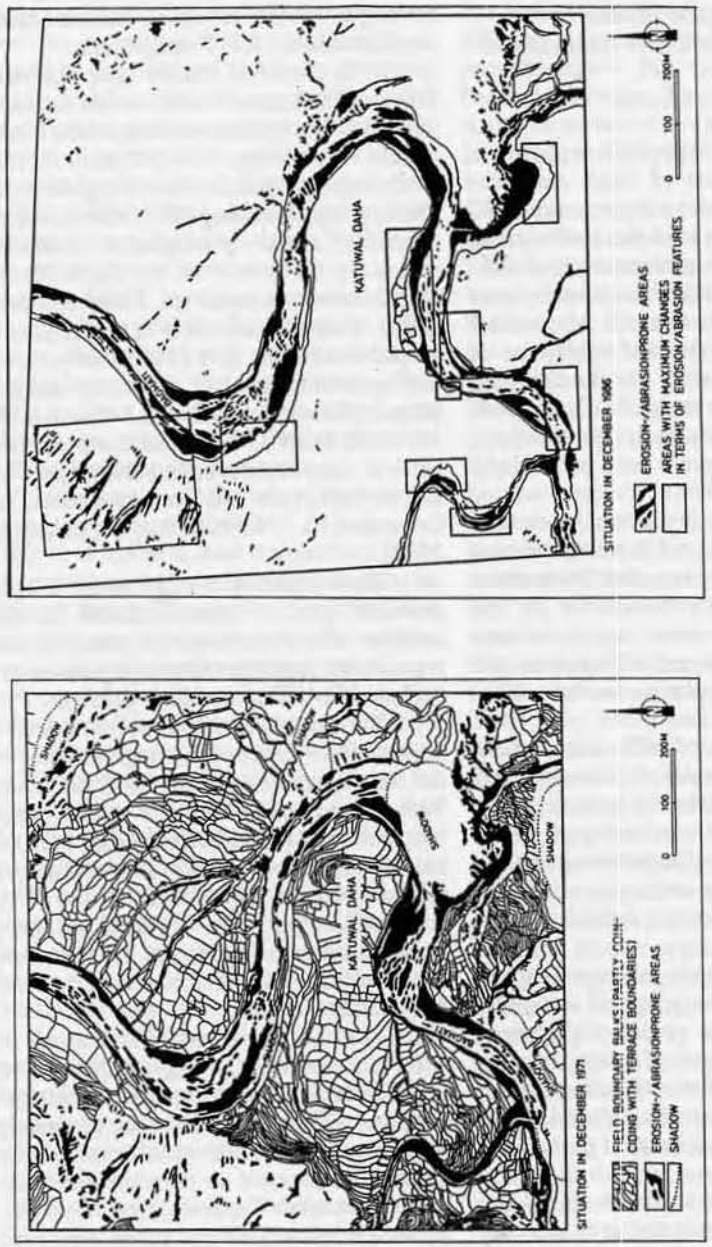

Fig.: Erosion-prone and abrasion-prone terrain in the area of the detail study at Katuwal Daha in the Bagmati Valley. Comparison of the situation in December 1971 with the situation in December 1986 indicates the areas of change in this time period.

life, when ill-health prevented him from carrying out terrestrial survey work, he went on taking, from a Pilatus Porter aircraft, the aerial photographs by himself.

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The Ruins of an Early Gurung Settlement

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A recent visit to the ruins of a Gurung village provided evidence that supports current views about their origins.

Khola Songbre is one of the names by which the local people know a ruined village which is considered to be amongst the oldest Gurung settlements. The author visited the site in April 1992. The suggestion to go looking for these ruins came from Dr. Alan Macfarlane, a social historian who first researched among the Gurungs 25 years ago (Macfarlane 1976). He has known of the ruins for many years but had not visited them.

The Oral tradition among the Gurungs of many of the villages to the North East of Pokhara, including Thak, Tangting, Khilang and Siklis, is that their villages were founded by forebears who moved down from Khola Songbre. Gurung legends and myths recall long wanderings over forested mountain ridges (Gurung & Macfarlane 1990). The origins of the Gurungs are thought to lie to the North of the current homelands of West-Central Nepal. Their language is a variant of Chinese and Tibetan. Many thousands of years ago their ancestors may have lived in the high mountains of western China. So the tradition that their villages were founded by people from Khola Songbre can only represent the last chapter of a long story of migration. The ruins were reported to be high on the hillsides above Tangting

Dr. Macfarlane suggested that if the ruined village was visited, the party should note the shape and number of the houses and photograph the ruins. The original shape of Gurung houses, oval or square, has been a question of some controversy amongst those interested in Gurung culture.

At Tangting the help of Damarsingh Gurung was enlisted to act as guide. His earlier interest in hunting had lead him to know the jungle paths well. It took two days of not very hurried walking to arrive at the ruins. They are on the South facing slope of the ridge to the North of the Ganch Khola at a height of about 3300 metres. The area is the highlands to the South of Lamjung Himal but the accurate position is 28 degrees 22.7 minutes North and 84 degrees 11.7 East. To reach the site requires a one day detour from the main trekking routes from Tangting or Siklis to the Namun Pass. The site would