

LAND USE AND GEOECOLOGICAL DAMAGES THE CASE OF GORKHA

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The observations concerning land use and geoecological damages in the study area of Gorkha were carried out as part of an ecological and geographical project sponsored by DEUTSCHE FORSCHUNGSGEMEINSCHAFT (DFG). Field work took place in July, October and December 1983. The research area was fixed by the topographic map "Gorkha — Sirdi Khola 1:5000" by R. Kostka and E. Schneider. In particular, the studies were centered on investigations into the relationship between natural potential and ecologically as well as economically sensible exploitation of the natural resources.

In the research area surfaces of intensive and at the same time ecologically adapted land use may be found immediately adjoining to others which are extremely over-used and degraded. To find out about the back ground of these different modes of land use and to arrive at conclusion on how to use degraded surfaces profitably and at the same time adapted to the demands of ecology, the following investigations were carried out:

- taking-down and analysis of physical-geographical parameters (soil, vegetation, climatic data of two local meteorological stations),
- mapping of land use (see Gorkha-Sirdi Khola: land Use Map) and geomorphic damages,
- interviews on the socio-economic structure of the population and analysis of the land register.

Comparing Gorkha region to other parts of the Nepalese midlands, a considerable number of common characteristics may be emphasized. An increasing population and correspondingly a higher demand for food, fodder, fuel and timber lead to the clearfelling of the natural forests and the extension of arable land. Due to the natural features of the area such as the monsoonal climate, heavily weathered metamorphic rocks, steep slopes etc., the deforested and today more or less intensively cultivated land is highly susceptible to erosive processes.

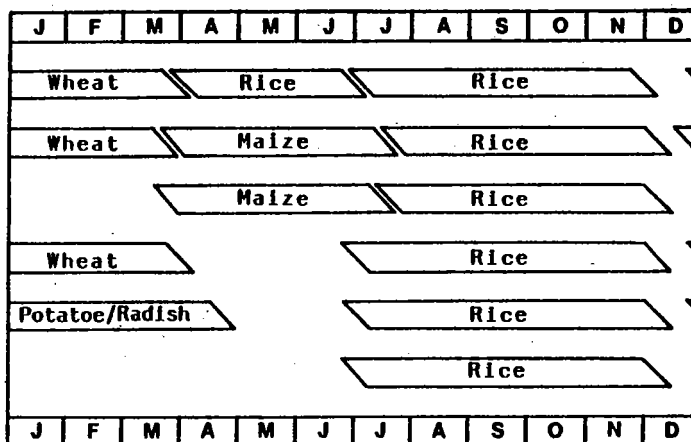
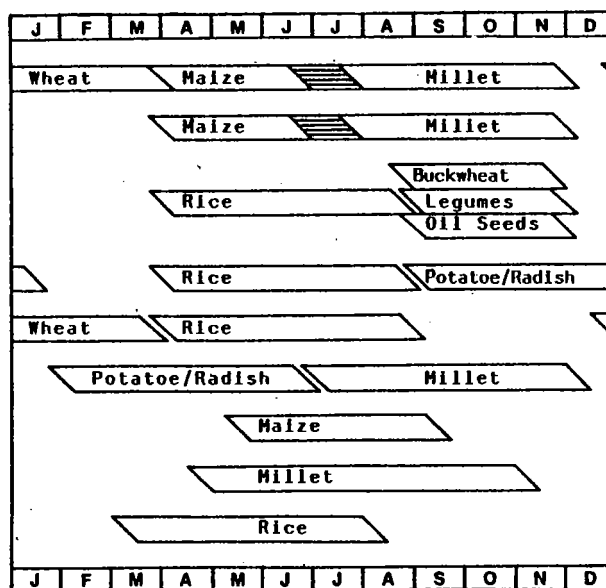


Fig. 1: Cropping calendar on irrigated levelled terraces (khet), annual rotations.



Vegetation period in the main field



Mixed cropping

Fig. 2 Cropping calendar on dry inlined terraces (bari), annual rotations.



Photo 1: The preparation of khet-terraces for rice cultivation.

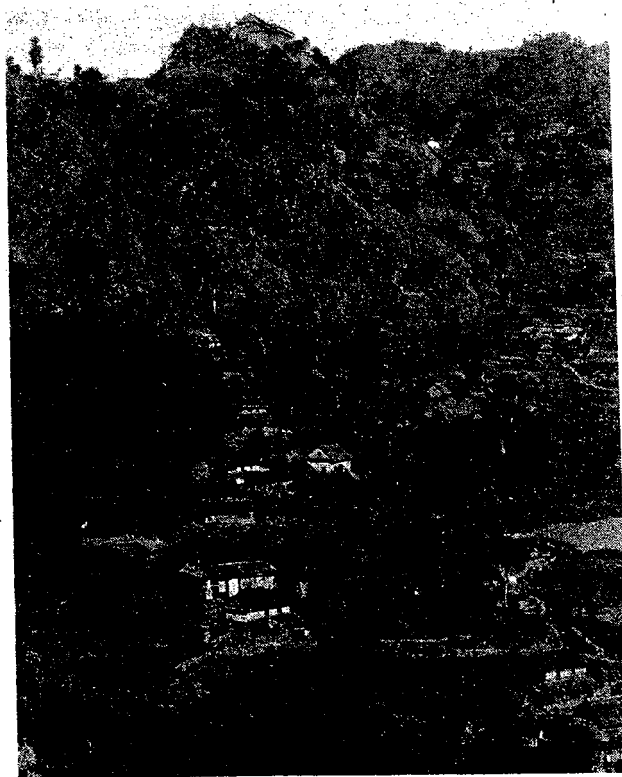


Photo 2: Bari-fields at Pokharathok with the Gorkha Darbar in the background.

The present situation of land use in Gorkha may be described as follows (see Land Use Map): Two thirds of the total mapped area are under agricultural cultivation now. Wet-rice is the staple crop on levelled and bunded irrigated terraces ("khet" Photo 1). The most commonly practiced rotation systems on khet-land are the cultivation of wheat or potatoes as winter-crops after wet-rice during the monsoon, or the cultivation of maize in spring followed by wet-rice (Fig. 1). Due to the introduction of an improved variety of wet-rice with a shorter vegetation period, nowadays three crops per year are possible. Yet the high labor input and the increasing demand of fertilizer implies that these fields are scattered.

On dry, mostly sloping terraces ("bari", Photo 2) maize, millet, and dry-rice are cultivated as well as numerous by-products (Fig. 2). The intensity of cultivation on bari-land may be considered higher than on khet-land. Applying the methods of relay and mixed cropping, the farmers commonly harvest two or three main crops per year. Additionally, fodder trees are planted along the terrace bunds, providing animal fodder and at the same time stabilizing the fields. The cultivation of bari-fields may be regarded as exemplary for ecologically adapted land use.

With exception of the protected forests of "Raniban" and "Kaliban" the original woodlands in Gorkha had either to make room for arable land or through over-use were degraded to shrubland. As long as these areas are not enclosed or supervised continually, over-use will go on leading susceptibility to erosion to rise. The grassland, occurring only in places, is subject to over-grazing as well resulting in a low productivity on the one hand and a rising susceptibility to erosion on the other.

The discrepancy between areas showing ecologically adapted land use (intensive dry field systems) and surfaces extremely degraded as a result of over - use and lacking care (woodland and pastures) are the most striking facts. Whereas the farmers are very well capable of applying intensive and ecologically adapted methods of land use to their own lands, communally owned land (woodland and pastures) is extremely over-used.

Comparing the susceptibility to erosion of khet and bari-land, the irrigated fields show numerous damages. Other than with woodland and grazing land in this case it is not the population pressure which leads to over-use and ensuing to the intensification of erosion processes but the extensification of land use resulting from socio-economic reasons. Maintenance of the terraces, supervision of the irrigation systems, and multiple cropping is often neglected as the land owner pursues a more profitable extra job.

The answer to the final question about the geoecological capacity of the region if the limit to reception has been reached or already been passed or if there are still possibilities to increase the agricultural production may be put as follows:

At present, the agricultural potential is not being exploited at its best, particularly with respect to the wood- and grazing lands which have definite possibilities to increase the agricultural production. Obeying the concepts of "Social Forestry" or "Agro-Forestry" the following proposals contribute to improve the exploitation of natural resources:

- introduction of rotational grazing systems,
- stables for livestock,
- more productive stock breeds,
- growing fodder plants during fallow period (e.g. leguminous plants supplying nitrogen to the soil),
- replanting of eroded surfaces and degraded grazing land (sowing of grass-varieties with high yield and fodder value or planting of fodder trees),
- transferring the responsibility for woodland and grazing land from state level to the communities,
- reduction of energy use, e.g. through the introduction of low-energy stoves.

Increasing the agricultural potential by means of extending the arable land is no longer possible in the area of Gorkha. Therefore it should intensify cultivation on the surfaces already in use by means of ecologically and economically adapted methods. The possibilities, however, are limited. Intensifications seeming sensible from the economic point of view easily turns out to be disadvantageous to the ecological conditions. That is why the following proposals are made subject to care ful analysis regarding both the ecologic and the economic local circumstances:

- optimal application of fertilizer,
- exploitation of the high genetic potential of local varieties to introduce high-yielding improved varieties.

Theoretically a new concept of land-ownership may lead to optimal land use - a demand which can hardly be put into practice. The following points seem to be more realistic:

- the improvement of irrigation and drainage system,
- the intensification of measures taken against erosion (replanting of eroded valley slopes, etc.)

These proposals for improvement may be considered feasible if they are decided upon with regard to the local particularities and above all by the local people themselves.

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