



1. Magar woman harvesting millet, Dhading. Upland cereal grain production forms a critical part of the traditional hill agricultural system in Nepal. Unfortunately, soil fertilizing materials are becoming increasingly scarce and, within the subsistence production system, there is little opportunity to make the changes that might improve the system. Cash crop production appears to be one way to improve the soil and the farming system.



2. Putting up rice straw for winter feeding of buffalo, Chitwan. From this vantage point we see a cross-section of the country: the Siwalik Dun, the Mahabharat *Lekh* in the Middle Mountains, and the Annapurna Massive in the High Himal all within 100 km. This great diversity in landscapes and climate is reflected in the diversity of peoples and farming systems. Soil fertility management throughout the whole of the country depends to some degree on the forest; the greatest dependence is in the High Mountain Region, the least in the *Terai*.



3. Puddling rice land (*Khet*) in preparation for transplanting, Makawanpur. Rice is the preferred crop in Nepal and, wherever irrigation water is available, rice is grown. The anaerobic conditions afforded by flooded irrigation create a favourable set of chemical circumstances that permit stable, albeit low, yields of rice on a sustained basis without fertilizer addition. However, in the last 30 years, tremendous increases in the intensity of management have resulted in much higher yields and 3 crops instead of 1 crop per year. Compost and fertilizer demands are now very high, resulting in an overall scarcity of compost on the adjacent rainfed lands.



4. Abandoned rainfed land (*bari*), Nuwakot. According to local farmers, this land had previously supported good crops of maize/millet during the time of their grandfathers. Lack of fertilizing resources (compost) had forced farmers to abandon the land. The widespread occurrence of abandoned *bari* land is testimony that scarce fertilizer resources, rather than land per se, is the major constraint facing hill farmers. There are good opportunities, however, to substantially increase production, particularly of high quality fodder trees on such sites.



5. Homestead, Kavre. The most valued livestock and the compost pile are found adjacent to most farm houses in Nepal. Tied goats and a small vegetable garden are seen in the foreground. Because of the presence of kitchen wastes, easy access to compost, the possible availability of water, and the possibility of closer supervision, the home garden is often the focus for promoting innovation. Those innovations that are deemed successful by the farmer can then be moved out on to the farmer's lands, according to his own schedule and conditions. To be acceptable to the small hill farmer, horticultural development should be focused initially within the home garden area.



6. Sheep and goats grazing, Accham. Devastation such as that seen here is relatively uncommon, although such sites are often used in photo essays to elicit sympathetic donor response. In this case, the combination of proximity to the village, high livestock populations, lack of private tenure, highly erosive red soils, and low elevation where rainfall is most intense has led to the damage viewed here. Such sites have been given the label "hot spots" and selected for extra project attention. Unfortunately, it is the processes that are important, not these small areas of devastation. Under the philosophy of the triage when treating war wounded, this land should be written off, temporarily at least. There is much more rewarding work with much greater impact on local villagers on less devastated sites.



7. Sherpa girls carrying loads of forest litter back to their homes, Solokhumbu. Nepalese farmers make tremendous use of the forest. Fertility management of their agricultural land depends on the forest. Fodder (processed through livestock), litter, and ash from firewood are all used in compost to maintain the fertility of cultivated fields. Increasing pressure on forest areas for fodder and litter, without commensurate improvement in the management of the forests, is resulting in severe environmental degradation and creating severe hardship for the farmer. The net result is less compost, leading to less productive agricultural land and, finally, an increasingly strong incentive to quit the farm altogether. Because of the bureaucratic difficulties in assuring individual tenure on public or even community-managed land, privately owned *bari* appear to be a more promising target, at least initially, for enhancing high quality fodder production.



8. An extensive bench terrace system, Doti. Terrace systems are the best indicator of the health and productivity of the Nepalese farming system. Contrary to public perception, farmers are not actively clearing forest land and creating new terrace systems throughout the country. In fact, the reverse is occurring, with abandonment of large areas of terraced land. This author estimates that for every hectare of new terraced land being constructed, 1,000 hectares have been abandoned. The most common reason for abandonment is lack of fertilizing material. An anomaly occurs around the Kathmandu Valley where cash cropping opportunities have permitted the farmers to use chemical fertilizers and, thus, temporarily at least, maintain fertility. Unfortunately, most horticultural crops require more compost than grain crops, so, in the end, organic matter management is the most critical soil fertility issue for both subsistence and commercial crop production.



9. Example of severe erosion, Bardiya. Surface soil erosion is one of the most serious threats to the integrity of the marginalised agricultural and forestry lands in Nepal. Lands that have been marginalised by serious decline in soil productivity reduce the interest of the farmer in husbanding the soil in a sustainable manner. Overgrazing and the burning that must accompany grazing are the two most degrading practices on public lands. Unfortunately, the technologies are "sound" - from the point of view of the farmer, given the lack of tenure and other uncertainties that stifle any form of more productive management on these lands. It is also important for the land manager to be able to recognise the difference between man-induced, accelerated erosion and geological, natural erosion. A good rule of thumb is that, if the layman can readily observe the erosion (landslides, gulleys, debris torrents), changes in management cannot greatly improve the situation. At the same time, most of the serious, controllable erosion is going on in an unspectacular way, unobserved.



10. Landscape, Kavre. Is this a forested slope or is it an agricultural slope? While this is what planners wanted to know and is information that the Land Resource Mapping Project attempted to provide, in the end it is of no relevance to the farmer. The farmer needs the forest as much as he needs the agricultural land. The artificial separation of agriculture and forest bureaucracies has caused serious problems with integrated land management. Antagonisms between bureaucracies and, indeed, between the forester and the farmer are deep rooted and serious. Until they can be resolved in the village, rapid improvement in forest management is unlikely.



11. A farmer's experimental plot on his own *bari*, Kavre. A major thrust of World Neighbours, an international NGO, is to substantially increase the production of high quality fodder on marginalised *bari*. In this trial, velvet bean is sown after the maize and both crops are able to grow together in a sort of symbiosis. The Government, with the assistance of donors, must increasingly look for innovative solutions to the management of rainfed upland, because this is the land owned by the poorer farmers and it is these farmers who are directly or indirectly responsible for much of the environmental degradation taking place in the country. The mistake of many projects in the past was to not tie innovations in with a marketable cash crop that would motivate the farmer to adopt innovative practices. Farmers do not cherish more work or even sustainable agriculture. What they need is more money and this should be the thrust of village development programmes. No direct intervention in soil fertility can hope to succeed without a well-conceived entry point into the indigenous farming system.



12. Farmer carrying fertilizer (urea) into the village, Ramechhap. About 12% of Nepal's present grain yield is the result of chemical fertilizer additions, of which over 95% of chemical fertilizer use is within a short distance of the existing road network. Chemical fertilizers can definitely increase yields of agricultural crops, as demonstrated by many trials and the farmer's own experience. It is not so clear, however, if it is in the best interest of the farmer to invest scarce capital in agriculture versus some other off-farm venture. There is a malaise in the present subsistence-based agriculture that has prevented greater interest in producing surplus agricultural crops. The lack of clear market signals appears to be the major constraint.



13. Woman with goat, Kavre. This high-value breeding buck is owned and managed by a users' group. In a short period, impressive increases in farm income can be realised by the small farmer. Research and extension have not been looking towards the needs of the small hill farmer. The emphasis on rice and irrigation has by default excluded many of the poorer farmers who must make a living from the relatively impoverished uplands and have maize and millet for staples. However, even for these farmers, a more profitable system is required. Cash crop production must be encouraged to break the farmer away from his present downward spiral of decreasing grain yields and further decreasing soil fertility. In most situations, improved livestock, both large and small, appear to have the production qualities required to increase cash incomes without further taxing the soil base.



14. Gurung women, Lamjung. Local empowerment involves giving those who use the resource the right to manage it without interference from outside. Because of the temporary movement of men in search of jobs outside the village, women are increasingly making the decisions on how the village resources are to be managed. It is the farmers who make all the resource-utilisation decisions, whether male or female. At best, the Government can influence those decisions in a positive way by carrying out a facilitating role.