

V. Recommendations

The Government and donors interested in assisting to alleviate the serious soil fertility problems in Nepal must accept that direct intervention in technical soil fertility matters is unlikely to play a significant role in improving the overall situation. Most of the soil fertility problems recognised on the cultivated lands of Nepal are symptoms of a more serious decline in the net profitability of traditional farming systems. As populations rise, diminishing returns to agriculture make it a less attractive occupation. The following suggestions are considered to be basic requirements to reverse the dangerous trend of the increasing marginalisation of agriculture, particularly in the mountainous regions of Nepal.

Support Family Planning Programmes

More than any other single issue, the ever-increasing population is crippling the country in its attempts to advance. Any gains made by increased agricultural productivity or improved infrastructure in the past 30 years have been more than offset by the increased needs of the ever greater population (Sharma & Banskota 1992). The disequilibrium resulting in degradation of the natural resources, is a direct consequence of too many people, too few resources, and not enough flexibility in management. While there are a number of promising ways in which soil fertility and sustainability can be improved, even the total success of such programmes will mean nothing if population growth is not halted.

This said, it is also apparent that family planning follows, rather than precedes, basic improvements in household welfare. Once the basic needs of the family are met, and there is a sense of permanence in the improvements, most Nepalese families automatically actively seek to practise some form of birth control. Consequently, as in other areas of development, a definite pattern emerges in which, by choosing the appropriate entry point into village development, many seemingly unrelated aspects of development are eventually addressed. Family planning is rarely, if ever, a successful entry point to rural development but, with success in other programmes, its ultimate acceptance by the villager becomes a possibility.

Assist in Every Way to Make Markets More Accessible to Farmers

A portion of most hill farmer's income is derived from the sale of agricultural produce. Growth of commercial trade has been severely constricted by a myriad of obstacles that have hampered the farmer from taking a more active interest in cash crop production (Banskota 1989). While farmers are capable of producing a wide range of potentially suitable crops, they are unsure of preferred varieties; quality expectations; timings of planting and harvest to optimise prices, packaging, and transport requirements; advantages of bulk sales; or the role and requirements of the trader and agro-processor. Improper attention to any of these issues acts as a further constriction on the flow of produce. In fact, if the Nepalese agricultural marketing system was a heart patient, by-pass surgery would be indicated. While in many cases, Nepalese markets are in their infancy and, as such, are depressingly shallow, Indian markets are well developed and, from Nepal's perspective at least, are limitless. If a product can be grown and marketed competitively because of some comparative advantage, then radical surgery is in order to facilitate opening agriculture produce flow within the obstructed channels. The Government has a crucial role to play in this exercise. The current barriers to free trade and movement of goods could easily be removed by a Government committed to stimulating the economy. Encouragement of private enterprise, particularly for fertilizer distribution and sales, transport, storage, and agro-processing would help the farmers to improve their market scope. Market-led and producer-driven activities should be the bottom line for evaluating a programme's worth.

The Government Must Learn to Carry Out its New Role as a Facilitator

There is a deeply ingrained feeling in Nepalese culture that one's relationship to the Government or "*sarkar*" is the same as that of a son to a strongly authoritarian father. It is the duty of the son to do as instructed and the duty of the father to chart his son's course. In the case of Nepal, to create the changes required, the father will have to become less

authoritarian, the son more willing to step out on his own. Neither are simply done, but there is ample evidence that Nepalese society is ready to move in that direction. Just as the Government must move towards increasing facilitation of the motivated individual or group, it must move away from its heavy-handed regulatory nature. Many of the regulations that are in place stifle initiative and create inefficient and ineffective resource management. Significant changes in legislation are currently being considered by the new Government and it is assumed that significant change is in the offing. Privatisation of fertilizer distribution, decentralisation of government responsibility and authority, and giving villagers more power are all required to promote sustained village development (Plate 14).

One area where the Government can make a major contribution to Nepalese agriculture, in general, and overall soil fertility management, in particular, is in the area of research and extension. No private agency has the resources to nurture appropriate research properly and to provide for its effective extension to the widely dispersed, highly diverse Nepalese farmers. Donors should assist the Ministry of Agriculture in creating such a new system whenever possible.

It is strongly recommended that a National Agroecological Zone Classification System be developed for Nepal, in order to assist in the efficient management of human and financial resources associated with agricultural research and development and the effective communication of appropriate extension materials to the farmer. A framework for such a classification system is presented in Annex 3.

Encourage Local Initiatives

A great many of Nepal's resource utilisation problems would be resolved if local resource management could be based on local decision-making initiatives. In the village, there is a tendency to divide the world into two major spheres: that which is "mine" or "ours" and is managed to the best of one's ability given local constraints and that which is the Government's and is exploited with the aim of immediate gratification with no thought to sustained management. As a simple example of how this ownership works, villagers who have designed, worked, and paid for a water system themselves will also maintain it to the best of their ability. Drinking water systems "dropped" on them through some form of aid function only until the first minor thing goes wrong, at which time they never function again. When asked why someone does not fix the system, villagers will invariably say that it is not their system, it is the

Government's. The same holds true for roads, forest plantations, irrigation canals, and the results of most other centrally conceived development projects. If one is serious about fostering local development, it is certain that it can only succeed if it is based on local enthusiasm. Donors, then, should assist in implanting or nurturing that local enthusiasm, while at the same time helping the Government in their role of facilitating local requests initiated from local demands. There are a number of points that should be considered when encouraging local initiative and these are given below.

A Client-oriented Extension System

Extension materials should be developed to meet the specific needs of a wide range of diverse Nepalese hill farming systems. For a specific agroecological zone, relevant, tested technologies and varieties should be made available to the farmer for him to select which, if any, are of use to him. The farmer should feel it is his right to demand service from extension agents. In the same light, it should be the extension agent's responsibility to communicate the wishes of the farmer back up the line, so that the Government can develop more relevant programmes.

A Recognition that Women Should Be a Major Focus of Most Agricultural Development Programmes

Women in Development (WID) has come to be considered an essential part of many development programmes. Given the fact that men are increasingly leaving the farm in search of more remunerative labour, it is often the women who carry out the bulk of agricultural decision making. In many cases it would be more fitting to leave out men altogether from agriculture and forestry management groups, as women generally are much more concerned about a properly run household; including child health, sanitation, cash crop production, and livestock raising. Women are usually the initiators of farm household improvements and to focus on them would be more productive than the traditional focus on men (Bajracharya et al. 1990).

Accelerating the Process of Community Forest Handover

Local management of local forests is one of the key issues in the area of village resource management. The widespread environmental degradation found on common lands is a

direct result of uncertain tenure. Soil fertility decline is partially a result of the lack of management of these public lands and the poor yield of low quality fodder from these lands. If the Government is committed to promoting better forest management, it must back that commitment by an immediate and unconditional hand over of forests to the users. Any means that the donor has to assist in this process will have a strong positive effect on local development.

Assist in the Promotion of Local Political Power, Local Tax Collection, and Local Budget Preparation

Until political power both represents and is responsible to the local community, there is little real opportunity for the kind of changes that are required. Local revenue collection is also required to promote efficient local resource management. Any encouragement the donor can provide the Central Government in these areas would be important.

A Priority Entry Point for a Soil Fertility Management Strategy

Donors and government agencies appear to get lost in the seemingly insurmountable problems associated with village level development. They often respond by trying to attack too many fronts at once and rarely succeed on any. As aid agencies have found out, tangible, sustainable development is rarely nurtured by the convoluted programme action plans that traditionally go with integrated rural development programmes.

The strategy components mentioned above form the ground work for any soil fertility management strategy. Only if these are sanctioned by the Government will the Nepalese farmer become enthusiastic about participating in entrepreneurial activities. As has been repeatedly stated, only by creating this enthusiasm is there any hope of making the kind of revolutionary change required to reverse very serious land degradation. The role of the donor is to provide consistent and generous assistance to help the by-pass patient through surgery, including pre- and post-operative care. However, all of the above-mentioned strategies and actions take time. Programme officers cannot immediately produce the results that head office requires. Agricultural development needs a "kick start" by which some relatively easy and popular innovation can be successfully promoted by local institutions and enthusiastically received by a large number of small hill farmers.

To be effective, a priority entry point must be simple, clear, and able to capture the interest and imagination of natural resource planners. More importantly, it must accurately reflect the needs and aspirations of the small farmer. As far as possible, it should adopt the major technical innovations discussed in this paper and observe the major recommendations presented. It must also lead into readily implementable work plans that can conceivably be carried out by development agencies as they exist today.

The priority entry point presented here is based on a single front line of action and proper phasing. However, the potential spinoffs that may lead to solving other development problems are significant. The use of this priority entry point has already been adopted by a number of NGOs, with impressive results.

Increase the productivity of high quality fodder, which is green during the dry season, by planting nitrogen-fixing trees on marginal *bari*, and support the development of more productive and profitable livestock management systems for selected agricultural production pockets where identified markets exist.

It is recommended that this agricultural innovation be adopted as the highest priority for implementation of any agricultural development programme in the Middle and High Mountain Regions.

Rationale for Choosing a Fodder/Livestock Entry Point

The strategy is simple, but not simplistic. As a critical first entry point, it addresses the most immediate problems facing the farmer by exploiting production where Nepal has an obvious comparative advantage. No other country in the world has such a high livestock population density per hectare of cultivated land. This entry point has been tested across the country and when all of the elements were accounted for, the programme was successful. The fact that it is developing spontaneously is the best indicator that it is indeed appropriate.

Declining soil fertility is a major factor influencing the decline in the production of rainfed lands. Compost, of which animal manure is the critical component, is in increasingly short supply and any increase in horticultural cash crop production requires even greater compost resources. More, better quality compost can only be made available if livestock are stall fed with greater amounts of

higher quality fodder. The major constraint to livestock production is the lack of high protein content feed, most critical during the dry season in March, April, and May. High quality animals do not thrive in this famine period. Farmers are only interested in implementing labour-intensive feeding schedules of high quality fodder for livestock that provide a significant cash return for their labours. Local breeds of milch buffaloes, goats, and pigs are presently being used in income generation. Where feed is sufficient and farmers recognise a good market, there is tremendous opportunity to increase the genetic potential of local breeds by providing a stud service and basic veterinary care for higher quality animals. However, in most village areas, fodder resources are not sufficient and, before a livestock improvement programme can be instigated, farmers must produce much greater quantities of high value fodder for the pre-monsoon period when other fodder is not available. No concern need be given to the low quality scrub cattle that are now a part of most village systems. With alternative, high quality livestock that provide significant cash returns, farmers will manage those animals in an economically rational manner. At present, there are many under-utilised, poorly-managed rainfed croplands associated with most agricultural production pockets. Privately-owned, marginalised rainfed lands provide the primary target lands for the introduction of a range of agroecologically-suited fodder species. Local nurseries would supply appropriate fodder trees, shrubs, legumes, and grasses to the farmer. Community forest lands, while they have an even greater potential, should not be the primary focus for the planting of fodder trees, shrubs, and grasses, because in most cases the individual tenurial harvesting rights are lacking and so is the motivation to manage at the level of intensity required to provide the quality and quantity of fodder needed. However, reducing pressure on forest areas, as alternative fodder sources become available, provides a positive first step to the regeneration of Nepal's forests.

It is recognised that agriculture, livestock, and forestry, as well as the existing market-led and producer-driven forces, are all integral parts required to solve the soil fertility problems of Nepal. An interdisciplinary rather than multidisciplinary approach is required. A model after the Lumle "*Samuhik Bhraman*", or rapid rural appraisal approach, should be considered an essential element. It is not enough to collect information about each sector, but specialists must recognise the opportunities and limitations of other sectors. While non-government organisations have performed well using this type of methodology, there is considerable scope for adoption by government-sponsored

research and extension agents. The Rapid Rural Appraisal Team should not develop packages but should rather present a variety of technical options to the individual farmer through his user group.

Major research and extension domains should be defined to look at (among other things) high quality indigenous and exotic fodder trees, shrubs, and grasses. Fodder quality, as it relates to animal productivity research, must be heavily stressed. There has been a tremendous amount of good research on fodder in Nepal but communication of the findings has been poor. Preliminary domains must be developed to provide a vehicle for communication from areas of research to areas of extension. This will greatly ease the burden on small NGOs and even major donor-driven projects that apparently rarely communicate with each other on their successes or failures.

Staging of Interventions

Stage 1. Determine those production pockets where there are comparative advantages for the production of various livestock products for an identified market. The product will vary with distance from road heads and size and sophistication of markets identified. For instance, fresh milk collection points should be no further than four hours from a chilling plant. Commercial production of milk, therefore, must be restricted to areas adjacent to road heads at reasonable distances from commercial markets. More remote areas have other options, including higher value, less perishable items like ghee. Better processing methods can make unprofitable operations profitable. A system based on that developed by the Master Plan for Horticultural (ADB 1991) using Agroecological Zones and regional infrastructure is recommended. See Annex 3.

Stage 2. Encourage user group formation and initiate nurseries to produce desired species of fodder for livestock of preference for which markets are readily identifiable. Training programmes should be developed and possibly run by presently existing non-government agencies or the Lumle or Pakhribas Agricultural Centres. In the initial stages focus on:

- fodder tree production on private *bari*,
- fodder grass production on private terrace risers, and
- green manure-cum-fodder production on marginal *bari* or as relay crops.

Stage 3. Encourage livestock user group formation as fodder resources increase. High value crosses of desired buffalo, goat, and pig species are to be introduced into the farming system as fodder production picks up. The user group itself is to provide collateral for purchase and maintenance of breeding stock. Systems of local rotating credit can be resurrected or initiated to assist in capital accumulation.

Stage 4. Encourage the setting up of group initiatives for the improved production and marketability of their product. Cooperatives should be set up for extension and service during production, livestock disease control, product quality control, bulking, packaging, etc.

Stage 5. The direct positive spinoffs from successful initiation of the above programme are significant. These include self-imposed stall feeding, prohibition of free-grazing animals, increase in compost resources for use on cash crops, better ground cover and, hence, less erosion of marginal lands, less pressure on forest lands, increased cash resources, and, possibly the most important, a recognised channel through which other developments can proceed.

One of the most promising features of the fodder/livestock/market intervention is that by design it focuses on the small farmer and on degraded, marginalised land; two formerly elusive targets. The small farmer is poor and his actions are resulting in most of the environmental

degradation that is occurring in Nepal. Providing this farmer with a means to receive cash from on-farm employment is a key to starting the process of agricultural renewal in Nepal.

Longer Term Considerations

There are a number of mid- and long-term technical soil fertility issues that should be of concern to donors and the Government. These should be included within the mandate of Nepal's agricultural research programme.

- Soil organic matter management and the role of crop residues, green manures, composts, and chemical fertilizers for different farming systems.
- Potential for incorporation of night soil in agricultural systems and positive spinoffs in areas of sanitation and public health.
- Soil acidification and the role of chemical fertilizers and different composts in the acidification process.
- Economic liming requirements of acidic soils: sources, manufacture, and distribution.
- Enhancement of chemical fertilizer use.
- Future feasibility of Nepalese hydroelectric power for nitrogen fertilizer production.
- Use of local rock phosphate deposits.