7. Bhardeo's Development Priorities

In fact, no real development efforts have been carried out in Bhardeo. The distribution of drinking water pipes to households; the community health programme; construction of small wooden bridges and afforestation activities; and road construction under the food-for-work programme, carried out in more recent years, have been indicative of social service programmes that have depleted the natural resources, such as forests, needed for survival. Ironically, they have been seen as signs of development.

The community has realised the fact that the traditional way of farming cannot maintained. Any improvement in farmland productivity requires changes in the land use system, and this will take time. Development cannot take place without key modern tools and services such as electri-city (for cottage and light industries), education, and health and marketing facilities. In short, without job opportunities and manufacturing industries, development will not take place.

A small income-generating programme launched at the end of the study was beginning to show signs of the community's will and resilience to improve its economic situation on a self-reliant basis. The community still lacks fiscal resources and a responsive market to complement its efforts. The majority want livestock and apicultural development. However, any increase in livestock population, by even one-seventh of their total LSU stock per annum, as was the case in 1987/88 without the prior requisite of an improved fodder base, would cause severe pressure on the fodder supply and subsequently harm the vegetation and the environment.

Economic Development with Responsive Market Links

The role of the existing market in the sale and purchase of milk and animal products is not thought to be satisfactory. Firstly, the traditional market is of negligible importance because of the low volume of transactions involved. Secondly, the merchants from Lele and Chapagaon have traditionally played an exploitative role. For the farmers selling milk, especially, there are no markets apart from a few selected client-merchants, and, in most cases, they are selling under compulsion owing to loan/credit problems.

The trend in the Bhardeo community is moving towards producing high value products like honey, special vegetables for which the area has **comparative environmental advantages** over other low-lying areas close to the Kathmandu Valley, and temperate horticultural products of good quality.

Low inputs are invested in low risk, animal husbandry (goats, specialised poultry, and/or even angora breeding). Small animals that require low inputs are preferred while the market demand for meat is rising. It is obvious that most farmers have also understood the link between fodder shortage and deforestation.

Both types of activity could help create employment opportunities within the area and enhance incomes. A crucial element is better marketing facilities that could increase production without being an additional burden on the environment. These facilities could be provided through measures familiar to the farmers, i.e., reduction in the number of unproductive animals, intensive feeding, improvement of fodder resources on the farmlands, and better management of private woodlots *(kharbari)*.

Basic Issues of Economic Development

The demand for capital is relatively small. A poor community is less likely to take steps to manage natural resources in a sustainable way, despite biomass deficits, as long as subsistence needs are met. In most cases, attempts to enhance biomass resources are made only when the household economy needs higher biomass inputs. Hardly one per cent of the households (two) wanted a development project in their area. The rest only favoured a development project if it guaranteed them employment and enhanced income.

Self-reliant Development

At national level, time bound and specific goals can be set to achieve self-sufficiency. But is self-sufficiency at the local level necessary? And does it tally with the imperatives of

optimum land use practices and development potential in a given mountain area with environmental conditions such as those prevailing in Bhardeo? Are there alternatives to local self-sufficiency?

The Bhardeo community at present has no choice but to realise development priorities through their own efforts. Although the pace is slow, their efforts have chances of success.

The selected path would have to be self-reliant development. It should be "*based on the premises that the poor in Nepal want and can have a better life, materially, physically, and spiritually*" (IDS 1989). Whatever the underlying principle, self-reliance should primarily raise the dignity of individuals in their development efforts. The concept of self-reliance should not be mixed up with the concept of self-sufficiency.

Of course, the issue of self-reliance is relatively sensitive. The development plans in the area have not been able to integrate the concept of self-reliant development of individual households, particularly that of the poorest households, because poverty degrades human dignity and suppresses motivation and initiative. Development plans are imposed on individual households, and this means a loss of individual liberty and human dignity.

New planning excercises and schemes need to be tried out in both on-farm and off-farm areas with consideration being given to micro-level feasibility. The feasibility of new programmes must be viewed from different perspectives.

New Planning Excercises and Institutional Arrangements

The major indicator of Bhardeo's unsustainability is the biophysical aspect of its economic base. Any efforts to improve Bhardeo's environment must consider income-generating activities, primarily in the off-farm area, in order to alleviate poverty and introduce nature management (rehabilitation of damaged farmlands, stabilisation of steeper slopes, and skill improvement for better marketing of the products of forest and farm-based small-scale cottage industries and trades). Some nature management activities could be used for land reclamation and the generation of direct incomes in the form of wages as a short-term plan. Other activities, such as plantation, are a long-term investment.

While some of the nature management programmes could be carried out as individual sector programmes, especially activities for the rehabilitation of common properties such as forest lands, stream beds, etc, others, such as soil improvement and plantation on farmlands, need to be accompanied by employment and income-generating activites.

Off-farm opportunities, whether in nature management or in the production and manufacturing sectors, should be flexible as far as its demand on local labour is concerned. As the timing of farmland operations is more or less rigid, off-farm opportunities, especially part-time ones, must be available during the monsoon period. Even stabilisation works on feeder roads (such as construction of drainage channels to minimise the damage to farmlands, plantations, etc), which are usually undertaken during the rainy season, offer respite to the poorest people.

However, urban pressure, i.e., relatively cheap labour, lack of development services, and heavy pressure on the resources within Bhardeo, have added to the complexities of nature management. Nevertheless, these complexities are manageable. The longer term effects of environmental conservation could bring back positive trends that once sustained a subsistence economy and a cultured lifestyle in Bhardeo.

The new schemes should take into consideration the importance of employment opportunities and enhanced income through a market-oriented production system, adding components that have a positive impact on the overall resource base. The schemes under discussion here are regarded by the Bhardeo community as ones aimed at sustained income generation which could, at long last, be the start of economically and environmentally sustainable development in Bhardeo. Sustainability is a question related to the environment, consumption patterns, and diversity in farming. In all aspects, the Bhardeo community is experiencing the stress of deficit. The overall objective of development planning in Bhardeo should be to restore a measure of sustainability. Of course, whether Bhardeo possesses potential is a pertinent issue that needs to be examined.

Development of a self-help institution, organised and managed by the local people, is vital to the community. The community has been marginalised politically, economically, and socially, and this has led to the fatalistic view that the local people could not and would not be able to establish such institutions. Hence, efforts to motivate them and restore

their self esteem and confidence must receive the highest priority. That will not be possible unless they participate in decision-making and carry out the programmes meant for them. There is a certain scepticism regarding the political and nationally organised government institutions. Real achievement can only be possible through the community's own efforts. The Bhardeo community has the resilience to organise itself and take the necessary steps. With minimum outside support, at the time of the study, there were six self-help groups engaged in income-generating activities. Within one and a half years they had been able to increase the incomes of 30 per cent of the poorest households by over 30 per cent. Any political institution that needs to be developed will operate better, as far as resource mobilisation and development programmes are concerned, through local self-help groups. This would ultimately strengthen the local institutions.

Resource Potential

The lifestyle in Bhardeo might not be different from any other village in the Nepalese Himalayas in terms of environmental changes related to natural resources. We have noted the changes in the resource base that have profoundly affected the local economy and environment, and the local community itself tried to solve these problems by taking a number of measures. But the condition of the resource base, as well as the morale of the people, indicated that a positive change was possible. The community had yet to discover its comparative advantages and development potential, compared to other areas close to the markets of the Kathmandu Valley.

Although culturally rich, the Bhardeo community is underdeveloped. The community is diligent, but it has become increasingly unable to cope with new problems. Lack of education, social problems, and lack of new skills, as well as the absence of health, credit, and transport services, have hindered progress. With skill improvement and provision of credit, inputs, and transport services the community could rapidly cast off its economic backwardness and break the vicious cycle of poverty-resource depletion-poverty.

We can assume that most of the area's natural resources, including its human resources, can be developed through demonstration and implementation of improved practices, controlled use of natural resources, and changes in the land use system. Table 22, based on interaction with the local community and observation of technical expertise, illustrates that there are sufficient possibilities of improvement in the system. Even though land-based resources are in an advanced state of degradation, the possibility of improvement exists.

It can be assumed that sustainability of resources would change in Bhardeo under different policy guidelines, access to responsive markets, resource enhancement practices, and provision of needed services and inputs. As far as the effectiveness of policy guidelines in resource enhancement and production increase is concerned, Table 22 illustrates that this is limited to forest and animal resources. But changes in resource use practices, such as changes of species and from seasonal to perennial cropping, can make a difference. What effects will they have on the environment and on the basic requirements of the Bhardeo community?

Table 22: Potential of Resource Enhancement Efforts in Bhardeo

Resources	Production Increase			Impact of Changes in		
	Food	Fwd	Fodder	Policy	Mkt	Services
Human Resources	h	h	h	ns	h	h
Land Resources						
Farmland	h	l	m	ns	h	h
Forests	m	h	h	h	h	m
Kharbari	ns	m	h	ns	ns	h
Stream beds	ns	m	m	h	ns	ns
Animal Resources						
Cattle	ns			h	ns	ns
Buffaloes	h			h	h	h
Goats	h			ns	h	h
Poultry	h			ns	h	h

(h = high, m = medium, l = low, and ns = no significant change is expected)

With improvement in inputs, credit, and transport services, as well as changes in land use practices, farmland resources still have potential for development. Policy guidelines, however, will not significantly affect farmlands and *kharbari* which are privately owned.

The development of forest resources is influenced by policy changes, particularly for timber and fodder resources, while the market can play a key role in promoting minor forest products. The farmers would indirectly benefit if marketing of cattle outside the country was legalised, or even if they culled the unproductive animals. Because of the lack of

grazing grounds in the immediate area, even veterinary services would fail to provide the needed impetus to cattle productivity. Government intervention could help those rearing buffaloes by fixing the price of milk and providing services. It could render help to the farmers and motivate them to produce fodder.

In the following pages, activities to enhance the resource potential of Bhardeo and increase incomes have been considered. Realistic suggestions have been given, taking into account the resource potential of the community.

Income-generating Nature Management Activities

Clearing Debris

Approximately 22ha of farmlands were damaged by a cover of approximately one to two metres' thick debris (330,000 cubic metres). Fifty per cent of the area is under loose debris cover with boulders of all sizes and aggregates.

The large amount of debris lying on the farmlands and in the gullies can be regarded as a resource with potential economic use. Clearing debris from farmlands is one of the priorities of the community, primarily because of the necessity of reclaiming farmlands and, secondarily, the debris can be marketed.

Reclaiming Damaged Farmlands

It is necessary to consider a few important points before taking measures to reclaim the farmlands with government support. There have already been some efforts on the part of the farmers to reclaim the farmlands which were damaged extensively in 1981. Since then only 30 per cent of the lands have been reclaimed by the farmers who invested substantial amounts of personal savings.

Attempts have been made to reclaim land right up to the stream banks for the production of food. Almost all the households were affected in one way or the other by the floods of 1981. The primary objectives and rationale behind the government-supported reclamation of the 1981 flood-damaged lands are given below.

1) To give partial compensation to the affected farmers for the loss of crops.
2) To help generate cash income to help individual households save some cash for economic recovery.

To reduce pressure on the forests and to increase animal productivity, there is a need to produce more fodder and forage within the farmlands. The best areas are those near the streams in the valley. The reclamation efforts would bring more areas under cultivation, thus producing more fodder and forage as agricultural by-products and crop residues or terrace border vegetation.

The boulders and stones should be removed from the fields so that cultivation can take place. This can be done by engaging landowners on a daily wage basis or under the proper supervision of development agencies.

- The collected debris materials should be purchased and used/deposited to protect stream banks or to stabilise roads.
- Protection of stream banks and road stabilisation works should be carried out by employing local labourers after clearing the debris. This would compensate the farmers in two ways and maintain a certain level of off-farm income generation activity for a considerable length of time. The income generated could be used for improving the farming system (specialisation of production, etc). The people of Bhardeo are ready to cooperate with development agencies.

It is estimated that even if only 50 per cent of the debris was mined, it would yield 15,000 truck loads of stone for export, bringing in over Rs 1.5 million net income to the local economy (at Rs 20 per cubic metre and a load of five cubic metres per truck load), provided that the load-bearing capacity of the road to the area is maintained for loads of up to 10MT.

The amount of money earned by the people through wage labour would be around rupees three million. If the rehabilitation work is carried out over a period of 10 years, expected income from wages would be, on an average, over Rs 1,000 per household/year whereas the households who have stones on their fields would earn much more. If only 10 per cent of this income could be taxed to create a fund for local development in areas such as trade, higher schooling, and creation of local jobs, almost half a million rupees would be available to the community for investment by the year 2000. This project has to be handled with caution. The possibility of making profit from debris may attract clever land grabbers and the poor households deprived of their past incomes may lose future benefits also.

Long-term and Indirect Income-generating Nature Management

Tree Plantation

The suffering of man is linked with the suffering of trees and vice versa. This has become a universal truth. A properly managed slope with a forest containing appropriate species of trees and other plants, valued now and in future by the people, is crucial for Bhardeo's future development. As the farming and livestock management system cannot be totally cast aside, the needs of both man and animals must be met and, if not entirely from the incomes within Bhardeo, a substantial portion must come from these slopes which must be conserved for the sake of the environment.

Programmes need to be devised to plant species that are appropriate as a source of fodder and other useful species. In order to cope with the problems of reforestation, priority should be given to private plots. Increased fodder production cannot be attained unless wide ranging rehabilitation of the farmlands *kharbari*, and the forest lands within Bhardeo is undertaken on a priority basis.

To achieve this end, several means can be considered. Firstly, farmlands could be used to produce larger quantities of fodder, provided the farmland use system changes to accomodate diverse and multiple cropping. There is a local demand to plant suitable species as fodder grasses on terraced benches and there is no previous experience of grass planting, apart from local species such as *babiyo (Pollinodium angustifolia)*, etc. Secondly, the depleted forest lands of Bhardeo could also be used. Both areas could be used to plant fodder trees and other multipurpose tree species. The community wishes to use forest lands for activities such as cultivating mushroom species *(Quercus semecarpifolia, Q. languinosa, Q. glauca)*, species suitable for charcoal-making *(Rhododendron* sp. and *Lyonia* sp.), and fodder tree species (*Ficus nemoralis*).

As far as the nature of land and the choice of species are concerned, the current practice of plantation programmes needs to be reappraised. The Bhardeo *Khola* watershed was linked with the people's farming practices. Multipurpose trees, such as *Quercus* sp. and *Schima wallichii*, are an economically justifiable choice. Construction of many costly checkdams could be avoided in favour of planting specific tree species which have better and far-reaching effects.

- Tree plantation on the mountain slopes should be in line with the people's choice of certain species, their uses, and the local management system. The planting of pine species should be discouraged.
- Tree and shrub species preferred by the people should be planted on common land slopes with the cooperation of the people.
- The major focus of tree and grass plantation should be on *kharbari* lands. One hundred and fifty households have private *kharbari* grasslots of about 24ha that should be placed under priority programmes for planting fodder trees, fodder grass, nut trees, and other useful species.
- In addition, the rehabilitation programme for the common land of the Bhardeo watershed should consider planting fodder trees during the new afforestation programme.

The number of fodder trees to be planted on common lands as part of the massive afforestation programme, especially the species *Quercus semecarpifolia, Q. glauca,* and *Ficus nemoralis,* should total about 30,000. These eventually could yield leaves amounting to approximately 100MT from about 20,000 surviving trees by the year 1995 and 300MT by the year 2000. Over 10,000 fodder trees are needed to carry out plantation on farmlands. These could yield over 300MT of tree fodder in 10 years.

The quantity of fodder from trees harvested from farmlands (and from forests outside Bhardeo) could be increased from around 1,100MT of fresh leaves-cum-twigs (in the year 1987/88) to 1,300MT by the year 2000, given appropriate and timely action. The scenario presented in Table 23, however, does not guarantee complete self-sufficiency in fodder production within Bhardeo if the level of plantation is not maintained and the number of animals remains unchanged or decreases. This shows that the problem can be solved, provided serious efforts are made without delay and not on a piecemeal basis.

As a result of labour costs and time loss, Bhardeo could face problems in the future if it continues to use resources located at a distance. It will not be necessary to collect fodder from the major pressure areas of Gairi, Gupteswor, and Phulchokipakha by the year 2000, if the number of fodder trees planted has exceeded 40,000 to 50,000 by 1990/91. This will have far-reaching effects on the management of the forests and on the stability of the slopes in and outside Bhardeo.

Table 23: Scenario of Fodder Base Improvement within Bhardeo

Time Dimension and Quantity of Fodder Available			
Fodder Base	Year 1990 (MT)	Year 1995 (MT)	Year 2000 (MT)
Farmland/*Kharbari*			
. Existing trees	120*	180 (37kg/tree)	240
. 1989/90 plantation (11,200 trees) **	-	112 (10kg/tree)	336 (30kg/tree)
Forests +			
. Existing source	972	798 (-18%)++	439 (-55%)++
. 1989/90 plantation (20'000 trees) **	-	100 (5kg/tree)	300 (15kg/tree)
Total	1092	1190	1315

* at the present yield estimation of 50 kg/tree

** productive trees

\+ existing forest sources are located outside the former Bhardeo *Panchayat*

++ reduction of dependency on existing forests outside Bhardeo

Nature management activities that are feasible in the ensuing years, such as tree plantation and reclamation of flood-damaged farmlands, will be undertaken to bring relief to the farmers.

Terrace Improvement

The gradient of the slopes in question, water, temperature, and soil conditions; price of inputs; and the quantity and quality of products should be considered in order to convert the low lying maize lands into better rice terraces.

The people of Bhardeo now require more than this to carry out terrace improvements. Many flat paddy terraces and semi-terraced maize fields were destroyed in 1981 during the catastrophic floods. What the people have tried and are still trying to do is to reclaim their lands to the extent that they are as close as possible to the original condition. But the farmers have made harder efforts on steeper slopes. The loss of potential nutrients, topsoil, and the loss of productivity from such slopes are too high for sustainable production.

Terrace improvement programmes need to consider the overall gradient of the slopes involved as well as the productivity of the terraces in question. Terraces on steeper slopes tend to become narrow if terrace walls are low, which may prove to be effective depending upon the purpose of land use and the terrace foundation.

The construction of wider terraces on steeper slopes for grain production is a pointless excercise because of high velocity runoff. The wider terraces affect terrace stability because of high terrace walls. Relatively flat valley slopes are suitable for terrace improvements. Unless there is a change in the land use system on such slopes, terrace improvements may not lead to sustainable development. The terrace improvement programme could cause more damage than it remedies.

- Steeper slopes should be used for tree plantation: fruit trees, fodder trees, or any other good cash crop tree (nuts, etc) should be planted on narrow and low-walled terraces with good ground covers of fodder quality grasses.
- The question of providing food subsidies until the land becomes commercially productive should be considered.

Serious thought should be given to the chronic food shortage in Bhardeo. It could be tackled by making available soft and long-term interest free loans from the Agricultural Development Bank Collateral could be offered by development agencies.

Charcoal Plantation on Kharbari

Charcoal-making could provide an additional source of income to the people of the area and help in the conservation of forests. It is a fact that charcoal-making has had negative effects on the forests. But the problem does not lie exactly therein. Charcoal-making is concentrated on forest lands. It could have a completely different effect if charcoal-making was carried out outside the forests. The traditional dilemma of integrating conservation with economic development is applicable to this trade. Planners should consider integrating charcoal-making and afforestation objectives.

From the study, it cannot be assumed that the weakest of the Bhardeo households, such as landless or semi-landless villagers (with very little land) with access to forests and poor quality land, tend to engage in the charcoal business. It cannot, however, be denied that poverty induces people to enter the charcoal trade.

The policy of forbidding practices that have continued throughout several generations is wrong and will have no effect. The question is linked to the future of the area which has a long history of poverty. The issue of suitable alternative energy for artisans is also relevant. When it is absolutely necessary to stop the practice of charcoal-making,

priority should be given to providing alternatives to charcoal and not to preventing its manufacture. This is a very difficult process. **The problems created by charcoal-makers do not stem from the fact that they use trees, but from the fact that they have not been able to raise trees on their private plots of land to make charcoal.**

The economics and causes of charcoal-making in the area and its effects and implications, particularly on the environment in the case of forest fires and loss of trees, are known facts. Although forest fires caused by charcoal-makers are mostly incidental and unintended, these fires do cause damage when they get out of control. Better use of the available charcoal-making skills by selecting different species for use should be considered.

From a short-term perspective, charcoal-making is the most lucrative use of forests from the users' point of view. It is also a source of high income, bringing quick profits to a hard-pressed community.

Updating Charcoal-making Techniques. Charcoal-making, which is essential for gold, silver, and copper smiths, is a very intensive process and a technically difficult and risky undertaking. Various techniques are applied at different stages.

The community is interested in making minor adjustments to their practices. In addition to other gains, the motivation to check forest fires would also be there. There are some issues that have to be addressed. The administration's view that this trade is illicit has to be reversed. Returns from the business of charcoal plantation take a long time, e.g., 10 to 20 years depending upon the species of tree used. This activity could be one of the "side-businesses" while others with quicker returns could be the backbone of the household economy, relieving the economic imperatives of the charcoal-makers and bringing positive development trends to market mechanisms.

The use of the currently degraded forests and parts of the private *kharbari* lands for the production of charcoal species, such as *Rhododendron, Lyonia*, and *Quercus*, could motivate the people to manage private local woodlots. It would be a good idea to plant up to 800 trees of the charcoal-making species (or 50% of the total trees normally planted per ha of land) per hectare on *kharbari*, with fodder and fuelwood species making up 50 per cent of the trees.

The area of available *kharbari* is around 24 ha, of which around 50 per cent could be used for planting charcoal species at the rate of 1,600 trees/ha. With a 10 year harvesting cycle only 10 per cent of the standing trees, a yield of 2,000 trees (200MT of fuelwood or 80MT of charcoal) worth a net income of Rs 600,000 would be available after 10 years of production management. Thereafter, annual replacement planting could be carried out. Approximately 150 *kharbari* "holder" households would benefit from this activity, providing an additional income of Rs 4,000 per user household per year.

Reduction of Pressure on Forest-based Resources

It may not be possible to avoid extensive use of forests, considering the current conditions and the dependence of the local economy on biomass. Farmers should normally avoid forests during the major growth period of the forest floor vegetation. This could perhaps be made possible by improving the *kharbari* and farmlands.

It is recognised that forestry resources, especially for traditional uses such as leaf litter, leaf fodder, fuelwood, and timber, within the former Bhardeo *Panchayat*, were depleted years ago. Until forest use and forest management systems are diversified, the local forest lands need to be protected from further depletion. The production of fodder within accessible areas is of utmost urgency, if the productivity of the ruminant animals directly and that of the farmlands indirectly, even at the present level of animal productivity, are to be sustained. There are two issues which need to be considered. Firstly, reduction of pressure on the most frequented forests such as Phulchokipakha and Gairi. This is not possible with the efforts of the Bhardeo people alone, but, at least, the Bhardeo people could start by reducing the pressure on the forests. Secondly, rehabilitating the Bhardeo slopes and raising productivity to meet the fodder and firewood requirements of Bhardeo could play a vital role in reducing pressure on the forests of Phulchoki. Alternative solutions are required to achieve this.

Management of Neighbourhood Forests

There are households that are eager to protect nearby forest areas, provided the households managing the woodlots derive benefits. For example, an inhabitant of Ward No. One wants to protect and develop a currently degraded woodlot so that she can protect her farmland which is located immediately below the forest and use the available grass, dry twigs, and branches for her household.

Hunting as an Off-farm Activity

There are still some traditional hunters and some have permanent jobs in Kathmandu. Since the general degradation of the forest has resulted in the loss of wildlife, the hunters find it hard to make a living. Of the 163 persons belonging to the official hunting brigade, which supplies birds, deer, and wildboars, one is from Bhardeo. All of them face the same problem. The problem is twofold, i.e., loss of wildlife pastures and loss of forest vegetation leading to general degradation and the loss of wildlife. They are under pressure to find wildlife regularly in order to retain their jobs. Their beat covers a large area as far as 10 to 15km away from their traditional areas. Hunting should be regulated to preserve the ecosystem.

In other parts of the country, where forests and wildlife have been revived, the people have to face a different kind of problem. The existing wildlife is posing a threat to life and farming property. It may become necessary to gradually set up an organised hunting area, permitting the local people to hunt only in their own allotted area as a control measure to protect the economic activities of the people in the area.

Management of Forest Products of Economic Importance

There are a few important forest-based activities that could enhance household incomes, either in a cooperative or individual manner, such as the collection and marketing of medicinal plants (*Thulo Okhati* = *Astilbe rivularis* and *Sano Okhati*), mushrooms (see Table 19), *niuro* (fern), and *bantarul (Diascorea* sp.)

The local price of mushrooms in Bhardeo is Rs 15 per kilogramme for buyers who are able to pay in advance to the collectors. The price is higher for traders who are unable to pay in advance. By the time the mushrooms reach Lele market, the price increases by Rs 10 and, in Kathmandu, they can fetch Rs 45 which is three times the producers' price. The difference of Rs 20 to 30 per kilogramme, after deducting transportation costs, benefits the traders. The price of mushrooms from May/June to July/August is higher than in later months and fresh mushrooms from Bhardeo are very popular in Kathmandu.

Income enhancement during the initial period of self-reliant development is reflected in the savings made from wages and the price rise that is necessary for collection of the products which have been marketed locally. The strategy would be to help local collectors market the materials. This could help them to more than double their incomes to Rs 150,000 per annum without harvesting more forest-based products. The price rise would hardly affect the local community as collection for home consumption is carried out free of cost. The trader/moneylenders can be bypassed by giving small amounts of credit whenever the collectors are in difficulties, which is normally during the early part of the dry season when they are in need of cash to purchase food.

Maximising On-farm Opportunities

The objectives of farm-based activities related to nature management are, firstly, to enrich soil and, secondly, to stabilise the lands for sustainable production and income generation.

Comparative Advantage

Ecologically, Bhardeo, being a temperate mountain area close to the large markets of Kathmandu, has two important advantages, i.e., as a production 'niche' and as a place where tourism could be developed. The temperate areas around or close to Kathmandu markets have the natural advantage of marketing products in summer which the valley otherwise would only have during the winter, for example, mountain potatoes, cauliflowers, and peas. There is a potential for growing temperate vegetables and fruits. In fact, a few farmers have tried to produce marketable peas. Income and job opportunities from these activities need to be properly assessed in the future.

The markets of Kathmandu Valley are easily accessible to Bhardeo and, in due time, this fact could serve to reduce reliance on cereal or foodgrain production. There is a high demand for fruit and nut trees in at least four wards (1,3,4, and 8). Fruit species such as apples, *naspati (Pyrus* sp., *Persemum*, apricots, peaches, walnuts (*Juglans regia*), bitter limes (*jyamir*), plums, oranges, limes, and *lapsi* (*Choerospondias axillaris*) could be planted. People are willing to try new species of fruit and vegetables. Even the newly cultivated forest lands (about 3 ha) used by landless villagers could be turned into fruit orchards.

- Horticultural extension works should be started by establishing a horticultural nursery (vegetables, fruit, and nut trees) to make sure good quality plants are available on time. Adequate work should be undertaken in the very beginning to create marketing facilities (collection, storage, transport, payment, and sales).

Special consideration should be given to products that earn higher profits and environmental protection should be supported by increasing fodder production and horticultural production. In the case of cereals, the trend will be one of lowered production while not necessarily leading to a decrease of productivity in terms of value. The farmlands will be used for better production management. The rising trend will be in horticutural and high-value animal products.

Considering the economic potential of other opportunities, the households could be motivated to opt for smaller animals or other income-enhancing activities. It would not be advisable to replace the present stock of large cattle because of the fact that the disposal of unproductive animals may be difficult.

Specialised Economic Programmes

A crucial issue is the establishment of an organised system for production and marketing of local goods. The experience of other villages in Nepal is that the farmers lose the clout they need to market their goods if they are produced and marketed individually in an unorganised manner. In addition, protection of marketable products is beyond the economic reach of individual households.

Strategic focus should be placed on producing and marketing the kind of goods that have comparative advantages in quality and on scheduling the market requirements of other areas. Different and flexible approaches are needed in production and marketing which involve a whole range of specialised organisational and monetary complexities. The system should not be so rigid as to limit the access of individual households to certain commercial or manufacturing enterprises.

The prevailing marketing and credit policies and disbursement facilities have not benefitted the weak economy of the mountain communities. Movement and access to better and bigger markets are controlled by the traders at strategic points on the producers' route to the markets. For example, the markets in Lele and Chapagaon have exploited the people of Bhardeo. The profits derived by the middlemen are very high. The individual farmers as producers lack price protection and a farmers' association is needed for price enhancement, creation of a market 'niche', and collective sales. The same commodities could increase in value if they were hygienically processed (drying, packing, etc) locally and marketed at reasonable prices.

A new programme based on group efforts for production and marketing could be launched for those specialising in dairy products. Despite fodder deficits, some households continue to keep animals. Depending upon the type of livestock, rearing becomes profitable at a certain level while a large number of animals becomes a burden. The animals are needed not only for meat and milk products but also for the production of essential farmyard manure. An organised production and marketing system could operate at different levels depending upon the approach taken by individual households.

The individual households or clusters of households (a flexible cooperative) could participate in programmes of their choice. The households should be organised into groups of producers (raw materials and manufacturing), packers, and marketeers. A coordinated cooperative system is necessary to avoid hardships (exploitation by markets, middlemen, lack of cash, storage, and transportation facilities).

Specialised Household Level Activities

Production programmes could be launched at the household level by selecting low-risk and high-value marketable goods as well as goods for local consumption (inter-household exchanges) such as animals, honey, fodder, fruits, vegetables, raw materials for manufacturing bamboo goods, cream, cheese, husk mats, ropes, and brooms which would not negatively affect the environment.

Some of the activities especially linked to production depend upon favourable exchanges of goods among households. Some households would emerge as producers of raw materials and semi-finished goods, while others would be responsible for manufacturing goods, and some would be involved in marketing.

Livestock have been a vital source of cash income (although the total value of the sales is small), but they have the least potential within the traditional management system. The community is aware that they would need to upgrade their buffalo stock in order to set up dairies. The general shortage of fodder is another constraint. As an alternative, a selective kind of approach is required in the case of animal husbandry with households specialising in buffalo or goat cooperatives. Households should be encouraged to exchange larger animals with smaller ones and to market cream and ghee, instead of milk and *khuwa*.

Specialised Poultry-keeping with Sakini Fowls

A poultry industry with the *sakini* breed of local fowl is rarely found. The quality and taste of *sakini* fowl make it very popular and it fetches higher prices than hybrids. Entrepreneurs go from door to door to collect fowls from households willing to sell them.

At present, there are 33 households which are ready to start poultry farming. They have over a thousand fowls at 30 to 50 fowls per household. They have not specified the breed. Because of the constraints of inadequate feed supplies and unfavourable market conditions, it would not be advisable to keep hybrids or exotic fowls. Hence, people should rear *sakini* fowls. Interested households could maintain flocks of 12 to 24 *sakini* fowls selling one to two birds per month. This would bring 2,000 to 3,000 rupees per annum (more than 50% of the total income of the households during 1987/88).

Each household could collect at least an egg a day and market eggs in an organised way. It is difficult for them to sell a few eggs in a market that is four to five hours away. On an average, the participation of 200 households and 300 days of egg collection could bring an annual income of at least Rs 120,000.

Goat Rearing

Stall-fed goats are more energy efficient. Even a single household can minimise risks if they invest in several animals and the quicker cash returns realised will be relatively high. Therefore, reduction in the number of goats is not desirable. In fact, the population of goats in the former *panchayat* was not large. Goats are the most important animal resource for cash income and they can be raised with relatively little effort. People would acquire more productive goats provided veterinary services were more readily available.

The local demand for improved breeds is for as many as 461 animals. Approximately 128 households (48%) are interested. The total investment would be over half a million rupees. However, the local economy, as well as the environment, could hardly bear the burden. So positive but cautious steps need to be taken in this area.

In the initial stages, a production programme could be undertaken for the local breed of goats without raising the population, organising the households keeping goats (especially goats raised for their meat), by encouraging participation of about 20 per cent of the households involved in farming. The initial capital investment is minimal. It would come to around Rs 100 per animal. The number of animals should be determined by the households involved depending upon the fodder and the services available. Production of 100 animals for slaughter per annum at the rate of one per household is possible.

Rearing of Wild Boars for Marketing

There is a complete absence of pigs as a result of the food deficit. However, six households are interested in keeping 14 pigs, mainly for meat production. Wild boars can find a ready market in all seasons, fetching a price of up to 50 per cent more than goat meat. These could be reared instead of pigs.

Production of Honey

Bhardeo has an ecological advantage over other areas, particularly over the Kathmandu Valley. The climate is good, flowering plants are abundant round the year on farmlands and on forest slopes. The air is clean and the area is sunny most of the time. So the quality of honey should be far better in terms of taste, consistency, and viscosity.

Some farmers had tried to produce honey earlier, but, as a result of poor management, the profit was minimal. Seventy-six households are willing to set up 132 hives and undergo training in this activity.

Elsewhere in Nepal, profits between Rs 2,000 to Rs 3,000 per hive per year can be made by marketing honey. This has become one of the most lucrative and environmentally favourable activities in the mountains. The local market price of good quality honey is anywhere between Rs 200 to 300 per kilogramme throughout the year. The income from honey alone would be able to double the current household income of about Rs 5,000. However, if technical expertise is available, efforts could be geared towards producing and marketing high value beehive products (such as royal jelly) with high nutritive and medicinal/cosmetic properties as royal jelly has a profitable international market (Verma 1990).

Production of Materials for Brooms

Approximately 25 per cent of the households own a few bushes of *amriso (Thysanolaena maxima)*. Each bush of

amriso can be used to produce four brooms. The current price of one *amriso* broom is five rupees in Patan.

Babiyo (Pollinodium angustifolia) is available on the farmlands but the number of bushes is limited, partly due to its low price in the market. *Babiyo* is a much more versatile material than *amriso*. *Babiyo* can be used to produce ropes, brooms, brushes, mats, etc. The area is climatically and altitudinally suitable for the production of *babiyo*, especially the lower areas. Production of *babiyo* could be increased by engaging farmers and planting more bushes.

Manufacturing and Marketing Household Clusters

Marketing Higher Value Milk Products

The dairy markets of Kathmandu Valley consider fat content the most important criterion for good quality milk. The lower milk fat content in the milk produced by livestock during the warm monsoon period (*Jestha-Srawan*) would normally bring less money to the farmers. Another problem is the transportation of milk which is especially difficult during the monsoons. Ghee is easier to sell but less profitable compared to *khuwa* (evaporated milk). It also needs firewood for its preparation which poses a problem. The marketing of milk is not beneficial to the people.

During the months from *Bhadra* to *Magh* (six months) the people could churn 25 to 50 per cent of the total milk available into cream, and this amounts to from five to 10,000 litres of milk. The milk (with a content of four to five per cent butter and whole protein) which is left over could be a source of nutrition. This could provide the area with an additional income of at least 30,000 to 40,000 rupees, in addition to employment opportunities for two persons. Should this prove less profitable, the people could still sell 25 per cent of 27MT of the available milk annually to dairies and earn about Rs 50,000. Delivery to dairies or sale of cream would provide immediate relief to the farmers. Arrangements should be made to operate a creamery for marketing fresh cream to markets in Kathmandu.

Manufacturing Households

Agencies dealing with local economic development are non-existent apart from some services. NGOs could encourage efforts to attain self-reliance in many ways whether through mobilising the concerned government departments or initiating direct action. The local small-scale cottage industries, based on locally available materials such as maize husks, bamboo, mushrooms, and potatoes, could be promoted. There are also skilled carpenters who could be encouraged to produce furniture.

Bamboo (Nigalo and Bamboo Goods)

The strands (*choya*) from *dhuti nigalo* for *perungo* (packing for mushroom baskets) can be produced for local consumption as well as for the markets. *Dhuti nigalo* could be planted in and around farmlands in higher and more marginal areas above 1,900m. At present, a single person can harvest 60 to 100 pieces of *nigalo* in one day, or raw material for four baskets (*doko*), from the forests located at cooler altitudes. Assuming that 10 per cent of the households enter this business and produce four baskets a day, it would imply a collection of 80 bushes of *nigalo* in 100 days and a production of 400 baskets worth Rs 10,000 per year. *Choya* utensils, such as large and small baskets, are in demand in the markets of Patan and Kathmandu. The price of a large basket is anywhere between Rs 15 to 25 in the markets depending upon the quality of work involved.

Brooms, Ropes, and Headbands (Namlo)

Pat (*Yucca* sp.), *allo* (*Gorardinia diversifolia*), *babiyo* (*Pollinidium angustifolia*), and *amriso* (*Thysanolaena maxima*), are used to manufacture ropes which have a permanent market. An estimated production of 400 brooms worth Rs 10,000 would be possible for Bhardeo households.

Maize Husk Mats

The demand for maize mats is high and the price offered is acceptable. They can cost anywhere around Rs 100 to 150 for a 1.2 by 1.5m mat. The Bhardeo area produces over 70MT of maize husks. At present most of it is used as roughage fodder for livestock. At least 50MT of husks could be used to manufacture over 1,500 mats (25kg/mat) at the market rate. This would mean an additional income of Rs 150,000 to 200,000 annually.

Development Scenario

Given the opportunity, the Bhardeo community could increase its income and also preserve its environment within a decade. If the multiple activities based on judicious use of local resources and efforts are encouraged, Bhardeo possesses the potential to be an example of sustainable development in a mountain community.