

Pasture, Livestock, and Conservation: Challenges in the Transborder Areas of Eastern Nepal

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The challenge lies in improving the livelihoods of mountain people without increasing pressure on pastures.



Introduction

Kangchenjunga landscape has a vast extent of open meadows, traditionally used by both wild and domestic herbivores. It is an important transboundary area in terms of conservation (LRMP 1986; Pei and Sharma 1998; HMGN/MFSC 2002). This study looks into biodiversity in the context of grazing and livelihood issues (Box 1) and their impact on pastureland in Ilam, Panchthar, and Taplejung districts, especially in the transborder areas within 10km of the international eastern border of Nepal. These transborder areas include 10 village development committee areas or VDCs in Ilam (Maimajhuwa, Mabu, Jamuna, Pyang, Jogmai, Ghorkje, Pashupatinagar, Shree Antu, Samalbung, and Jirmale), nine VDCs in Taplejung (Lelep, Olanchungola, Papung, Mamanhake, Khawang, Yamphudin, Susrungkhim, Kalikhola, and Sadawa), and five VDCs in Panchthar (Parangbung, Memeng, Chyangthapu, Phalicha, and Siding). The total area of approximately 2,975 sq.km covered by the transborder VDCs account for 44% of the total land area in the three districts.

Box 1: Transhumance migration

The annual cycle of transhumance migration of grazing animals begins from mid March, moving from sub-tropical grazing areas to temperate pasture or 'lekhali kharka' by mid May. The cattle and 'pahadi' (temperate) goats remain at the higher altitudes until September, while sheep, 'lekhali' (subalpine) goats, and yaks are moved further up to 'himali' (subalpine and alpine pastures). During the colder months, yak and sheep are wintered in the temperate pastures and the other species are brought back to subtropical areas.

The crop and livestock system includes several ruminants (cattle, buffaloes, sheep, and goats) and other monogastric animals (poultry and pigs). Almost all the farms in the three districts and adjoining transborder areas are small family-run private farms that raise both crops and livestock. Livestock in the areas are extremely mobile and follow a transhumance pattern of movement between the villages of origin and the northern and eastern borders. With the development of a livestock extension service system, many exotic animal breeds, such as Hill Zebu cross and Taurine cattle breeds, and Pahadi Bakhro and cross Jamuna Pari Sindal goat breeds, have been reared along with a large population of native species.

The livestock are fed on crop residues, native forage, tree fodder, and pasture grasses. Pastures in the area can be divided into alpine and subalpine pastures or 'himali kharka' (at 3,500-5,000m), temperate pastures or 'lekhali kharka' (at 2,000-3,500m), and subtropical rangelands (at 1,500-2,000m). The highest proportion of pasture is in Taplejung (13%) and the lowest in Ilam (3%). The proportion of agricultural land varies from 1.5% in Taplejung to 42% in Ilam (Table 1).

Table 1: Major land uses in the transborder area (%)

Land-use category	Ilam	Panchthar	Taplejung
Agriculture	42	26	1.5
Forest	36	54	19
Shrub	18	11	10
Pasture	3	8	13
Permanent snow	0	0	20
Other	1	1	37

Source: Calculated from LRMP1979 data, ICIMOD

The agricultural system is complex and labour intensive as it integrates irrigated and rainfed farmland, livestock rearing, use of forest products, and household labour. The cropping system depends on three growing seasons: pre-monsoon (February-March), monsoon (June-September), and winter (October-January). About 60% of farmers grow local crop cultivars of rice, maize, barley, buckwheat, and other minor crops and legumes; but improved cultivars have been slowly replacing economically less promising crops.

The process of land ownership and tenancy rights followed the 'kipat' system (Box 2) until the Birta Unmulan Act of 1965 and the Pastureland Nationalisation Act of 1975. The 'de jure' right of 'kipatiyas' or other locals to pastures were then vested in the government. In some remote mountain areas, a 'de facto' kiptat system is still prevalent.

Box 2: Land ownership in east Nepal

There was a practice among the early settlers to claim rights to the land they cleared for cultivation and regeneration known as 'kipat'. Ownership of most of the land resources was given to the 'kipatiyas' commonly designated as 'jimmawal' among higher castes such as the Chhetris and Brahmins, 'subba' among the Limbus, and 'goba' among the Sherpas. They were also commonly known as 'mukhias'. The transfer of land ownership from 'kipatiyas' to new settlers was complex and needed a final signature from the 'subba' and other locally-established functionaries.

Conservation and Development Issues

Livestock management

In the three districts, livestock constitute a formidable part of the rural economy, helping people cope with inflation, crop failure, and expenses related to children's education, health, and marriage. The communities depend on local breeds of animals for their subsistence (Table 2). Intensive animal husbandry involves various feeding practices that are ultimately related to the availability of pastures and open meadows. Among the three districts, stall feeding is more prevalent in Ilam, partial stall feeding in Panchthar, and partial stall and migratory feeding in Taplejung (Table 3).

The traditional transhumance grazing method is practised throughout much of the high-altitude grazing lands. The grazing lands are constantly subjected to changes affecting their succession processes. The aggressive growth of weeds resulting from heavy grazing of palatable species has caused loss of pasture biodiversity and livestock productivity.

Table 2: Species of livestock in the three districts (%)

Animal species	Ilam	Panchthar	Taplejung
Local cattle	64	97	96
Improved cattle	36	3	4
Local buffalo	79	96	96.4
Improved buffalo	21	4	3.6
Local goats	76	97	97
Improved goats	24	3	3
Local sheep	94	100	99
Improved sheep	6	-	<1
Local pigs	77	94	40
Improved pigs	23	6	60
Local poultry	85	99	70
Improved poultry	15	1	30

Sources: Anonymous 2001a,b; Anonymous 2002

Table 3: Animal rearing system in the study area (%)

Rearing system	Ilam	Panchthar	Taplejung
Stall feeding	62	27	20
Partial stall feeding	24	57	44
Scavenging	5	7	9
Migratory	9	9	27

Source: Field survey 2003

Landslides in some areas have caused loss of the original pasture giving way to vegetation with less forage value. In addition, grazing results in continuous defoliation of palatable species rendering the habitat open to invasive weed species.

Land Tenure and Pasture Management

Alpine and subalpine pastures are important common property resources for grazing, mainly transhumance grazing. Warm temperate rangelands, however, are used extensively by both transhumance and stall feeders without resting periods or regeneration of pasture species. Similarly, subtropical rangelands are used extensively in the winter months. Implementation of the community forestry policy has brought about conversion of open pastures at lower elevations to forests, suppressing the growth of desirable pasture species under the forest canopy. The community forestry policy and the new legislation on land administration have dismantled traditional pasture management practices.

In some areas, community forestry user groups (CFUGs) forbid the use of traditional migratory routes by animal herders. With the abolition of kipat and customary arrangements, the sense of ownership and affection of the traditional community for their inherited pastoral resources weakened, leading to haphazard grazing and mismanagement of pastures.

Protected areas and transborder grazing system

The ban of transborder use of pastureland by the Chinese and Nepalese governments in 1978 had the greatest impact on Taplejung and parts of Chyangthapu and Phalaincha VDCs in Panchthar districts. It forced the opening of inaccessible and fragile high-altitude areas for animal grazing. Further, with the increase in conservation areas in India (Box 3), options for yak

Box 3: Transborder issues and the national parks

The notification of Singhalila National Park in Darjeeling (India), adjacent to Panchthar and Ilam districts, imposed intensive grazing pressure on the pasturelands of Nepal. In addition, community forest management is failing in transborder areas due to growing market incentives on the other side of the border and willingness of user groups to support illegal harvesting and transport of forest products across the border. With every incentive for using pasture and other forest resources on the weaker non-vigilant side of the Nepalese border, the traditional transboundary resource sharing system is weakening. The landscape demands appropriate government guidelines and awareness at local, regional, national, and international levels.

grazing became limited, and yaks were brought to 'lekali kharka' in Nepal, where grazing sites were already overstocked, for wintering. Traditionally, herders from the transborder area have enjoyed the privilege of an open border that allowed local herders to graze their animals on pastures within 10 km of the border in either country. Sociocultural integrity among the communities living in border areas has provided opportunities for sharing resources on both sides of the border. The system is breaking down because of dual citizenship and property rights. This issue is becoming more conspicuous among the communities living on either side. Departure from the traditional sharing of transborder resources took place when the increasing problem of dual citizenship and property rights led to improper and unequal management of forest and grazing resources.

Some of the early migrants from Tibet, who managed to acquire citizenship in both Nepal and India, brought along Tibetan culture and knowledge about rearing yaks and hunting for high-altitude wildlife, herbs, and medicinal plants. Over time, these settlers migrated to urban centres of Nepal and India, but still invested in settlement of newcomers along the transborder areas, leading to continuing pressure on pastures. To ensure the continued flow of yak products for their businesses, wealthy people from urban centres hired middlemen who were in charge of rearing herds across transborder areas. Similarly, rich people from either side provided incentives to traditional mobile hunters to capture and hunt barking deer, wild boar, and red panda in such areas: these fetched high prices in the urban markets of India. The illegal harvest of fresh small bamboo shoots, other non-timber forest products, and medicinal plants by mobile hunters has also been rising.

Recommendations: Ensuring Environmental and Livelihood Sustainability

Pastureland management

Pastures are managed as common property resources and ownership is mainly in the hands of government agencies. This should be reverted in favour of local communities. This means revamping existing policies and the legal apparatus in favour of the people. For the conservation of pastoral biodiversity in these areas, transboundary areas within Nepal need to be brought under an appropriate legislative framework of conservation area management in conformity with the traditional knowledge and customary laws of local institutions.

Discussions about transborder cooperation have already started between PR China, India, and Nepal to frame a common policy towards bringing potential border areas into the transboundary conservation landscape (WWF and ICIMOD 2001). Rehabilitation of degraded pasturelands needs to be carried out with modern techniques of pasture management such as rotational grazing, differed grazing, mechanical weed control, turf planting, reseeding with palatable native plant species, and co-management and multiple-use concepts.

Livelihood options

In the three districts, where earnings from livestock are crucial, ensuring livelihood sustainability without deterioration in pastoral resources is a challenge to both the local community and

development agencies. Well-planned co-management and multiple-use initiatives involving local communities could open up new livelihood options and, at the same time, reduce pressure on pastoral resources. One example is farming under forest canopies. Cardamom plantation under alder trees is an ecologically-stable farming system that has greatly improved the local economy. Similarly, broom grass, Napier, and molasses planted along terrace risers have provided fodder for livestock in the mid-hills. Conservation of native animal species and their genetic resources by rearing the threatened local black hill pigs, local goats such as 'sindhal' and the cross-bred mid-hill 'phadi' has potential for significant economic gains. Lastly, the three districts in eastern Nepal, despite many shortfalls in the planning and management of land, still receive tourists because of their panoramic mountain views and pristine culture. Organising the tourism industry in line with environmental conservation will bring about improvements in living standards.

Conclusion

The fundamental problem associated with growth in the livestock industry in Ilam, Panchthar, and Taplejung districts in eastern Nepal is poor animal nutrition caused by high-stocking density and poor management of pastoral biodiversity. Extensive and illegal harvesting of pastoral resources from fragile mountain pastures are grave issues that need prompt attention. Regarding the management of natural resources through protected areas, Taplejung, Panchthar, and Ilam districts present strong evidence about how PAs situated along the border of a neighbouring country, if not extended to areas in the other country, can exert tremendous pressure on pasture and fodder biodiversity in non-protected landscapes. These PAs in themselves are not enough to ensure sustainable management of environmental resources and an integrated approach is needed in which environment, wildlife, livestock, and local human communities co-exist in harmony.

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Vegetable Production as a Potential Enterprise for Sustainable Livelihoods in the Border Villages of Eastern Nepal

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There is a great potential for vegetable production as an enterprise in the study area but improved technology in micro-irrigation and off-season vegetable seed production, along with development of marketing channels and infrastructure, are needed.



Introduction

The livelihoods of a majority of the people in Nepal revolve around agriculture. The agricultural sector accounts for about 39% of the gross domestic product and provides employment to more than 80% of the labour force. Agricultural production, however, is to a great extent subsistence oriented. The cultivable land area is estimated to be 26,533 sq.km, roughly 18% of the total land area of the country; the terai region accounts for the major share of agricultural land (HMGN/MFSC 2002). A variety of agroclimatic regions and fertile soils permits the production of a wide variety of vegetables of good quality in Nepal. At present 200 varieties of vegetables are grown, out of which only about 50 are cultivated on a commercial scale.

Vegetables can, in fact, give a much higher return per unit of land than cereals and are worth growing even in small quantities. The difficulties arise over marketing. The transport of delicate, perishable goods grown in remote and hilly terrain is a difficult task. For individual growers cultivating vegetables on a small plot of land, the quantity ready for sale at any one time is limited and, if the trek to market is long and difficult, then it will not be worthwhile. Hence, access to roads and markets is most important if vegetable production is to be established on a commercial scale. There is also great potential for seed production; the pockets of microclimates separated by high mountains provide an ideal environment for this. In remote places without road access, vegetable seed production is a promising option for poverty reduction as the volume to be transported is much less than for fresh vegetables but of higher value. Good potential exists in Nepal for the establishment of vegetable seed farms catering to both domestic and foreign markets.

Most people in the Ilam and Panchthar districts of eastern Nepal earn their living from agriculture. To a great extent, agricultural production is for subsistence only. About 60% of the households in Jirmale, Samalbung, Srianu, and Swoyang VDCs are completely self-sufficient in terms of producing their own food. In the remaining VDCs, self-sufficiency in food ranged from rather insufficient to around 50%. The situation in other remote VDCs of Panchthar and Taplejung is very bad. Due to remoteness and inaccessibility there are limited opportunities for people to overcome acute poverty. To examine these issues, comprehensive research was undertaken covering 15 VDCs in Ilam and Panchthar districts in 2003.

The overall objective of the research was to assess the present status and future potentials of vegetable production as an enterprise in the study sites. Special emphasis was given to understanding a) land use and size of landholdings in the communities in the selected VDCs; b) current seasonal and off-seasonal vegetable cultivation and household incomes; c) present market linkages for farm produce (vegetables and other produce like cardamom and broom grass) and the challenges; d) potential for crop diversification with a focus on vegetable and vegetable seed production as an opportunity for enterprise development ; and e) identification of issues and challenges.

Land Use and Size of Land Holdings

Ilam has a total geographical area of 1,717 sq.km of which more than 50% is covered by forest. Only about 26% of the area is cultivated. In Panchthar district, out of 1,246 sq.km, forest cover is about 46% and about 33% of the area is cultivated. The details are given in Table 1. Out of the total cultivated land available in the two districts (860 sq.km), only 15% (132 sq.km) is used for cultivation of vegetables, the remainder is used for paddy rice or agroforestry (Table 2). The highest amount of cultivated land was recorded in Chyangthapu (17.5 sq.km), followed by Jamuna (16.6 sq.km) and Pashupati Nagar (14.1 sq.km). The size of holdings is high (>2ha) among farmers in Maipokhari, Jogmai, Jirmale, and Srianu VDCs whereas among other farmers the size was between one and two hectares per household. Irrigated land ('khet') was available only in limited places whereas unirrigated ('bari') was more predominant. The system of private land leasing amongst agricultural communities is not very common in this area.

Table 1: Land-use patterns of the study districts

Land type	Ilam	Panchthar
	Area (sq.km)	Area (sq.km)
Cultivated area	448 (26.1%)	412 (33.1%)
Non-cultivated area	228 (13.3%)	190 (15.3%)
Forest area	959 (55.9%)	577 (46.3%)
Grazing land	34 (2.0%)	53 (4.2%)
Other	49 (2.8%)	13 (1.1%)
Total geographical area	1717	1246

Table 2: Total cultivated area by land type classification

District	VDC	Total cultivated area in sq.km		
		Khet	Bari	Total
Ilam	Maipokhari	0.5	9.5	10.0
	Maimajhuwa	0.0	3.2	3.3
	Mabu	1.8	10.6	12.4
	Jamuna	0.2	16.5	16.7
	Gorkhe	1.0	4.3	5.3
	Jogmai	1.7	6.0	7.7
	Pashupatinagar	0.3	13.8	14.1
	Jirmale	0.6	9.9	10.5
	Sriantu	0.4	3.6	4.0
	Samalbung	0.9	11.6	12.6
	Swoyang	5.6	8.3	13.9
Panchthar	Chyangthapu	6.0	11.5	17.5
	Phalaicha	0.0	0.0	0.0
	Memeng	3.0	11.0	14.0
	Prangbung	1.9	6.0	7.9
	Sidin	1.9	6.1	8.0
Total		25.8	131.9	157.6

Source: Various VDC profiles and key informants

Cropping Practices and Household Income

Both districts have diverse, integrated subsistence cropping practices. The principal cereal crops in the area are maize, rice, wheat, and millet, with maize being cultivated by more than 80% of households (Anonymous 2002). The main vegetable crops are potatoes, radishes, peas, cabbages, cauliflowers, chillies (the akbari variety, a local landrace), leafy vegetables (mustard in particular), and beans. Potatoes are the main vegetable crop cultivated commercially.

Most of the vegetables and cereals are seasonal and produced for subsistence. Other crops include high-value cash crops such as large cardamom, tea, broom grass, and ginger. Mixed cropping patterns are predominant in the hilly terrain. Most of the vegetables, usually legumes, are grown alongside maize and rice. On irrigated 'khet', the main crops are rice and wheat, whereas on 'bari', maize and potatoes are more popular. One major drawback according to vegetable traders, with regard to current cropping patterns and cultivation practices, is lack of diversity in the production and sale of vegetables.

Farm incomes accounted for a lion's share of family income in the sampled households. On an average the farm sector accounted for 78% of the total household income, and the off-farm sector only 22%. In Samalbung, the contribution of farm income to total household income was highest (89%) and in Maimajhuwa it was lowest (58%) (Table 3). Among the various components of farm income, income from cash crops was the most important component. Income from cash crops accounted on average for about 40% of the total farm income. Likewise vegetables, including potatoes, accounted for about 35%. This high contribution to farm income from vegetables was because of the inclusion of potatoes in the vegetable group. Most of the households cultivated potatoes on their land as a traditional staple food crop. The income from vegetables excluding potatoes, however, accounted for only 13.5%.

Table 3: Average household income of the sample population by VDC

VDCs	Household income (%)	
	Farm	Off-farm
Mockery	81	19
Maimajhuwa	58	42
Mabu	69	31
Jamuna	68	32
Gorkhe	72	28
Jogmai	77	23
Pashupatinagar	86	14
Jirmale	87	13
Samalbung	89	11
Sriantu	88	12
Swoyang	70	30
Average	78	22

Market Linkages and Challenges

In Ilam, local residents used 'haat bazaars' (local markets), town markets (markets around the major towns and cities), and border markets to sell their products. The main outlets for exporting vegetables to India (Siliguri, Sikkim, and Darjeeling) and other countries are Birtamod in Jhapa district and Manebhanjyang and Pashupatinagar in Ilam district. In Panchthar district, sale is restricted to the 'haat bazaar' and, to some extent, to local traders because there is no road access even to the district headquarters; as a result there are few vegetable traders in Panchthar district. From many VDCs, such as Siding, Memeng, and Prangbung, local farmers use porters to carry products to the nearest traders. Porters and horses are the major mode of transportation in Panchthar, whereas in Ilam people do use jeeps, trucks, and buses. Horses carry a minimum of 100 kg and cost the least. Using porters is the most costly and perhaps the only means in some remote areas of Panchthar districts. The main problems associated with vegetable marketing are unreliable and inadequate transportation, lack of storage facilities, and lack of

a price information system. Taxation and levies imposed at several levels on vegetable marketing in cross-border markets reduce farmers' incomes even more. Competing with other countries in the international market is difficult for Nepalese traders due to an extensive taxation system and complicated certifying mechanism. For instance, there is great demand for tomatoes in Bangladesh and Pakistan, but Bhutan's export tax is half the cost of Nepal's and hence the price of tomatoes from Nepal is not favourable in these markets.

In Ilam, despite these difficulties, the vegetable trade increased over the year, in terms of both the number of traders and quantity of produce handled. The growth in vegetable trade is attributed to increased awareness about nutritional values, changes in eating habits, rising population, better profits from vegetables than from cereals, and rapid expansion in road networks. Some traders, however, mostly in Panchthar, believe that vegetable trade has decreased over the years because of inadequate supplies, fierce competition, migration, poverty, lack of organised markets, and a rise in exports leading to lack of availability in the domestic market.

There are various problems associated with the large-scale cultivation and production of vegetable crops. The major problems identified by the villagers are as follow:

- Limited support from government and non-government organisations in terms of providing technical knowledge about farming
- Natural calamities such as fog and hailstorms
- Limited organisational development; for example, there are only a few producers' groups (like Kishan Jagaran and Taja Tarkari Rara Samuha in Pashupatinagar and Segera Vegetable Growers' Group in Swoyang) established in the area although most of the landholdings are still small and scattered.
- Lack of irrigation, quality seeds, and other inputs such as storage and organised markets
- Limited road access

Technical assistance and training for farmers on adaptable and suitable modern farming and marketing methods with provision for storage facilities would increase the potential of vegetable production as a sustainable livelihood enterprise.

Potentials for Crop Diversification

Both Ilam and Panchthar have comparative advantages for growing vegetables because of their climate, location, and topography. Both districts have climatic conditions and soil types suitable for vegetable cultivation in the monsoon season. Altitudes ranging from 1,500 to 2,500m are suitable for producing rainy-season vegetables. Vegetables such as cauliflower, cabbage, peas, carrots, radishes, and beans grown here during the monsoon become off-season vegetables for the nearby terai belt as well as for Indian States like Bihar, West Bengal, and Uttar Pradesh. Due to the proximity of the districts to these areas, transportation costs are quite low and the percentage of loss in produce is also quite small. Places similar to Ilam and Panchthar in terms of climate and location, such as Dhankuta, have benefited from the comparative advantage that their locations have for vegetable cultivation. The average

household income from vegetables increased from NRs 2,480 to NRs19,150 within a period of three years because of vegetable cultivation during the monsoon. With increased road access, Ilam and Panchthar too can improve their income levels by taking up off-season vegetable cultivation, as off-season vegetables fetch much higher prices than seasonal vegetable crops.

Crop diversification is limited and farmers have been growing the same crops for generations, more so in Panchthar. The situation is changing slowly in Ilam due to its proximity to Darjeeling in India and farmers in Ilam are trying many new crops similar to those grown in Darjeeling.

Challenges and Recommendations

There is a climatic and economic potential for production of a wide variety of vegetables in Ilam and Panchthar districts of eastern Nepal. Farmers are quite slow in reaping the benefits and this is due to reasons ranging from lack of awareness to weak technical infrastructure. Farmers lack knowledge about off-season vegetable cultivation and are unaware of improved technologies for producing new vegetables and about how to combat pests and disease. Agricultural loans and inputs are not readily available in local markets and are restricted to the district headquarters in some districts. Some of the dry areas in Panchthar districts have no irrigation systems for the dry season.

Marketing channels are vital but least developed, and middlemen make most of the profit, leaving a meagre amount of the earnings for the farmers. Transportation is poor, unreliable, and costly because of the inappropriate and inadequate transport infrastructure. There are neither collection centres for vegetables nor information systems about market prices, this leads to high storage losses and biased pricing by traders. The study recommends the following actions to address these issues:

- Farmers should be given training on recent technology about different aspects of vegetable production, growth, and harvesting.
- The concept of cooperative marketing should be promoted among farmers in the two districts.
- There should be in-house investments in quality seeds and credit facilities in the villages of the two districts.
- Marketing channels and road networks should be developed.
- Collection centres at the production sites and market sheds at market entry points should be constructed.
- Local taxes should be levied.
- The potential for organic vegetable production should be explored.
- Micro-irrigation schemes should be facilitated in the drier areas of Panchthar district.

Conclusion

Most vegetable cultivation in Ilam and Panchthar districts is at the subsistence level, apart from vegetables such as potatoes, cabbage, peas, and chayote which are grown on a commercial scale. Most of the vegetables are highly productive due to intensive cultivation, however none of the farmers is involved in vegetable seed production on a commercial scale except for seed potatoes. Lack of availability of quality seed or an organised market in the two districts, inefficient storage facilities, and lack of knowledge about scientific methods for dealing with plant diseases are major problems hindering vegetable-based enterprise development.

Being a comparatively drier area, Panchthar is more suitable for extensive seed production and could easily provide sufficient vegetable seeds for production in Ilam.

Developing collection centres and proper outlets to collect vegetable produce and export it to nearby districts and across the border would benefit local farmers immensely and also help develop vegetable production as an income-generating enterprise for the area. The non-functional Jaubari Potato Development Centre could be developed into a Resource Centre for producing and testing vegetable seed samples and training farmers and technical staff.

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