

Landscape Elements and Agricultural Issues in the Border Villages of Eastern Nepal

Punya Prasad Regmi, Department of Agricultural Economics, Institute of Agriculture and Animal Science, Tribhuvan University, Rampur, Chitwan, Nepal, dailekh@wlink.com.np

Eco-restructuring of the landscape with conservation-friendly interventions is the best compromise between ecological and economic needs and should be emphasised to strengthen ecosystem functioning and improve the economy.



Introduction

The eastern Himalayan regions of Nepal are bordered by India to the east and south and China to the north. This is an important transboundary area which needs immediate attention in terms of effective conservation measures (Pei and Sharma 1998; HMGN/MFSC 2002). Due to the extremely rugged and remote terrain on the northern border, there is less interaction with local people in China compared to the interaction with India. The balanced geographic and topographic conditions in eastern Nepal have led to the formation of extensive vegetation (WWF and ICIMOD 2001). Commercial exploitation of forest and agricultural land, however, has put pressure on the natural resources in the area. The major objective of this work was to collect and analyse field-based data about landscape elements, focusing mainly on land-use

patterns, agroforestry, and livestock management practices and the associated transboundary conservation and management issues.

The study was carried out in 12 village development committee areas (VDCs) in Ilam and Panchthar districts representing border corridors between India and Nepal. Seven of the 12 VDCs were selected from Ilam districts: Maipokhari, Maimajuwa, Maabu, Jamuna, Pyang, Gorkhe, and Sri Antu. Five VDCs were chosen from Panchthar district: Memeng, Siding, Prangbung, Changthapu, and Falaicha. Extensive field and household level surveys, focus group discussions, and a literature review were carried out for the data collection.

Landscape Elements

The landscape elements described here broadly include vegetation types, population characteristics, land-use patterns, and agricultural and livestock productivity in the two districts.

Vegetation

Ilam and Panchthar are similar in altitude and the following categories of vegetation apply to both districts (DFO/Ilam 2001 and DFO/Panchthar 2003).

The tropical zone extends up to 1,000 masl with mixed tropical forest dominated by sal (*Shorea robusta*). The subtropical zone extends from 1,000 to 2,000m with mixed forest mainly dominated by *Machilus*, *Castanopsis*, and *Michelia*. The temperate zone extends from 2,000 to 3,000m and includes forest with *Machilus*, *Quercus*, *Pinus*, and *Rhododendron*. The subalpine zone extends from 3,000 to 3,700m. Forest vegetation in this zone includes *Rhododendron*, *Betula*, *Pinus*, and *Juniper*.

Demography and land-use pattern

The two districts are home to about 58 ethnic groups with diverse and rich cultures and traditions. The cultural integrity amongst these diverse communities and their vast knowledge about natural resources are indicative of rich indigenous knowledge and technologies. Functionally, traditional institutions such as 'kiduk' (among the Sherpas) and 'kipat' (among the Limbus) are most notable. The 'kipat' system is a form of communal land ownership through which families hold land titles. This system is still prevalent in terms of regulating pastures and the use of forest products (Kollmair et al. 2003).

The pattern of land use shows a greater proportion of land under forest use (about 47%) in Ilam district and of arable lands (51.83%) in Panchthar district. The lower farmlands (1000-2000m) in Ilam were observed in relation to the conversion of arable land into community forest. The area is rich in natural water resources with plenty of lakes, streams, and freshwater river systems. The land-use pattern has been gradually changing in both districts. In Ilam, the area of 'khet' (irrigated arable land) land is decreasing giving way to unirrigated arable land under cash crops such as large cardamom, broomgrass, and tea. The area under 'kharbari' or private forest has nearly doubled. The local practice of converting maize fields into rice fields

wherever water is available has helped increase land fertility by limiting sheet and rill erosion. With the emergence of community forestry, alder and pine trees have been planted on barren land. Land cultivated with bamboo is also increasing due to its religious association and multiple uses.

Cropping system

As these are agrarian districts, the agricultural system forms an integral part of local livelihoods. Agricultural and horticultural crops in this region include rice, wheat, maize, legumes, oilseed, jackfruit, pineapples, and mangoes. Commonly-cultivated crops and fruits and their corresponding productivity in the two districts (DADO/Ilam 2002 and DDC/Panchthar 2002) are shown in Table 1.

There is a clear indication that the cropping areas and productivity of cereals and potatoes are higher in Ilam than in Panchthar, whereas Panchthar district shows a better potential for fruit cultivation. Farmers are gradually avoiding exhaustible and labour-intensive crops like wheat and finger millet and are more inclined towards growing cash crops, such as large cardamom, alongside the irrigated rice fields. The border villages have also begun growing vegetables and flowers on a commercial scale.

Table 1: Commonly cultivated crops and fruit and their productivity in the two districts

Crops	Ilam		Panchthar	
	Area (ha)	Productivity (t/ ha)	Area (ha)	Productivity (t/ ha)
Rice	1,090	2.62	505	1.5
Irrigated rice	19,365	1.89	5,400	1.6
Non-irrigated rice	12,875	183	831	1.5
Maize	31,330	181	17,282	1.57
Wheat	4,592	1.69	4,094	1.4
Millet	3,290	1.04	5,959	1.03
Barley	71	1.0	525	1.03
Pulses	1,238	0.93	2,060	0.59
Oil crops	718	0.92	849	0.62
Sugarcane	13	35.5	65	33
Fruit	565	8	1,540	10.8
Orange	235	10.25	296	12
Vegetables	2,005	10.56	619	12
Potato	6,595	12.85	85	12
Cardamom	2,750	0.5	2,150	0.6
Ginger	1,976	14.25	132	12
Tea	1,951	2.87	403	1.2

Livestock production systems

Livestock form an integral part of the farming system in these two districts. Common locally-bred livestock breeds include cattle, buffalo, goats, sheep, pigs, fowl, horses, and yaks. Among the livestock-based products, cow's milk brings the highest income. Other favoured products are live animals, eggs, butter, and cheese. Grazing is reported on lands above 2,500m. These pastures are deteriorating in terms of area and pastoral species due to the increase in land used for private and community forestry practices and overgrazing by animals.

Agroforestry system

The communities living in the study area are extremely dependent on forest resources for their subsistence (Box 1). Many communities living in and around the protected areas are fully or partially dependent on such resources. In many cases, however, they are practising agroforestry on their own farmland, private forestland, and community forests. Many species are recorded from these agroforestry systems in which fodder (*Ficus nemoralis*, *Saurauria nepalensis*, *Dendrocalamus species*, and *Arundanaria species*); timber (species of *Michelia*, *Castanopsis*, and *Alnus nepalensis*); and fuelwood (*Alnus nepalensis*, *Schima wallichii*, and *Macaranga pustulata*) are all found in the same system. Apart from these, many medicinal plants, large cardamom, broom grass, and tea are planted as cash crops.

Box 1: Forests under pressure

According to the Ilam District Development Committee (DDC) in 2001, the heavy pressure on forests is due to illegal cutting and export of timber as well as dependency on firewood for rural energy, and extensive collection of fodder, green manure, and non-timber forest products (NTFP). The encroachment by people converting these forest areas to agricultural land is also significant.

Agricultural and agroforestry products and their marketing channel

The major agricultural products are cereals, vegetables, cash crops (large cardamom, ginger, potatoes, local chillies, and brooms), and fruit. In addition, livestock and livestock products, herbal products, and timber also are in demand in the market. The trade in cereals is negligible due to their meagre, subsistence-level production. Farmers make efforts to sell their goods to local market centres as far as possible, thereafter reaching outside markets in urban centres and across the border in Darjeeling and Siliguri in India where they earn more profit (Figure 1).

Governance and management needs

The communities are asking for training in both agroforestry and livestock management. For agroforestry, the training required is on seed production and collection, nursery management, harvesting, and pruning of fodder vegetation. Regarding livestock development, the felt need is for training in feeding requirements, disease control, breed improvement, housing, forage production, fodder enrichment, and training for women in livestock management and time-saving technologies. The prevailing government management practices also give very little incentive for harnessing local potential.

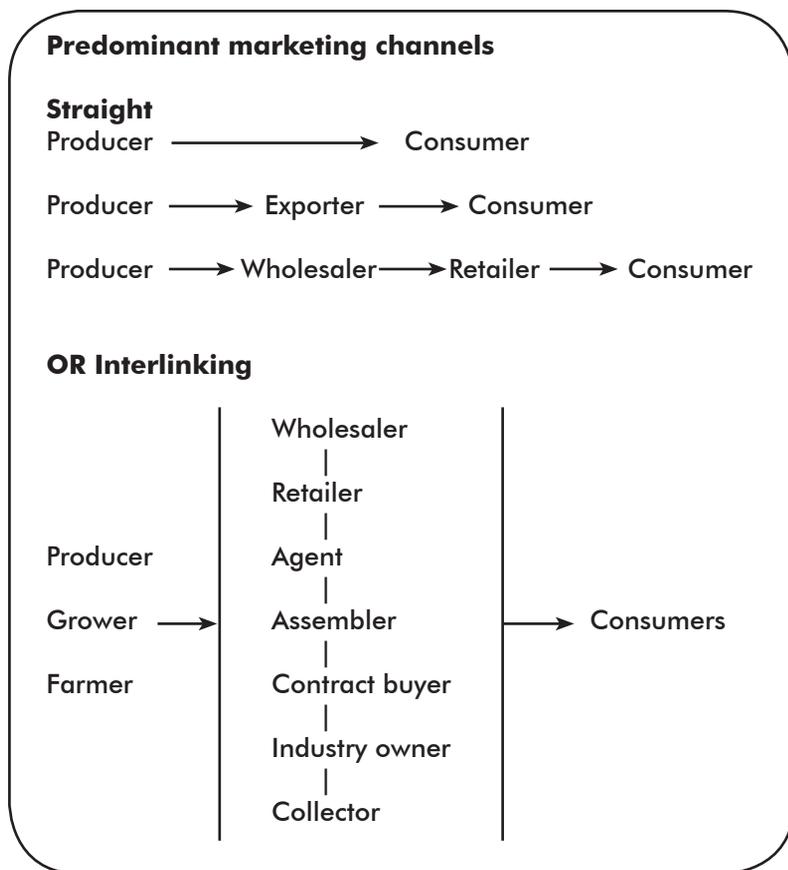


Figure 1: predominant market channels for goods in the study area

Ecosystem services

The whole study area is an important watershed for people downstream. It is the source of irrigation and clean drinking water. Assessing the potential of agroecosystems, it appears that small farmers are unable to meet their farm and household requirements due to limited access to resources and lack of other income-generating activities. As a result, the whole watershed is deteriorating at an unprecedented rate. The local communities are experiencing acute shortages in availability of natural resources. Hence, there is an urgent need for an integrated approach to resource management. This might improve ecosystem services in the study area.

Transboundary conservation and management issues

Rich vegetation of economic importance and the open border situation make these two districts a very important transboundary area for conservation and management of the landscape. Some of the major transboundary issues related to agroforestry, agriculture, and livestock activities include the excessive use of fertilizer and pesticides, declining agricultural production, poor management of cash crops, cultivation on marginal lands, biodiversity degradation, deforestation, declining livestock productivity, overgrazing in the upper belt, erosion due to

road construction, illegal trade in herbal plants and timber, poaching of animals, uncertain markets due to heavy reliance on the international market, and problems in the formation of local and regional cooperatives. Many local institutions are working in the area for conservation but with limited success (Box 2).

Box 2: Local institutions

There are 225 NGOs registered in Panchthar, among which only a few such as, Durdimba Jnachetana Samuha; Amapur Yuva Bikash Mancha; Hariyali Samaj Sewa Bikash Club; Chiya Krishak Samuha, and a few others have agricultural initiatives. In Ilam, important agriculture-based NGOs include Namsaling Samudaik Bikas Kendra; Nepal Resham Sangh; Mahila Jagaran Sangh; Ilam Sahayog Parishad; and Jun Tara Yuva Club.

Potential for Eco-restructuring the Landscape

Based on current land-use practices, it is essential to focus on agricultural development through improvements in irrigation, agricultural extension, timely input and credit supplies, and development of infrastructure to address the issues of poverty and the depletion of resources. The four important foci for eco-restructuring – entrepreneurship development, provision of reliable marketing, an integrated approach to conservation, and judicious use of natural resources – are essential. The following recommendations are made for eco-restructuring of the landscape in the two districts.

- Plant vegetation, such as broom grass and bamboo, to reduce soil erosion on sloping, marginal land
- Adopt mixed cropping to increase soil fertility and agricultural productivity
- Encourage integrated pest management
- Encourage organic farming
- Design an agroforestry policy to upgrade the economy and the environment
- Provide training on modern techniques to raise productivity in farming, agroforestry, forestry, and animal husbandry
- Establish rural development committees or organisations to facilitate credit systems and market flows.

Conclusion

The distinct features of these two districts, which are an important part of the proposed Kangchenjunga landscape, indicate the potential for high agricultural productivity in agroforestry and forest and livestock products. These areas have great scope for increasing farm and agroforestry productivity on individual farmers' land, provided issues related to land tenure and ownership, marketing mechanisms, and decision-making processes are improved. The conversion of degraded government forests into community forest plots is encouraging. Improvement in animal breeding and grazing systems will facilitate livestock management and increase productivity. The beautiful forest cover and scenic landscape also have prospects for ecotourism which can provide employment opportunities for local people and encourage local enterprises.

Most farmers, although illiterate and lacking in modern skills and knowledge, have been using their local knowledge since time immemorial. Special attention needs to be paid to harness such local potential and knowledge. A good mix of local potential and support from government, non-government and international organisations are needed for sustainable development of the local community, the two districts, and the eastern Himalayan corridors as a whole.

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