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LOCAL ROADS IN HILLS OF NEPAL AND THEIR USE IN AGRICULTURE AND FORESTRY

В публикации отражены существующие трудности в развитии дорожной сети, их взаимосвязь с экономической и социально-политической ситуацией в стране Непал, которая имеет горный ландшафт и сложные климатические условия, что обуславливает выбор поэтапного строительства дорог.

The publication reflects the current difficulties in the development of the road network in the country, their interaction with economic and socio-political situation in the country of Nepal. The country has a mountainous terrain and harsh climate conditions, which determines the choice of the stage construction of roads.

Introduction. Nepal is a small land-locked country situated between two gigantic countries China and India in Asia. The average East-West length of the country is 885 km and the North-South width ranges from 133 km to 255 km. The territory covers an area of 147,181sq. km. Population is about 27 million. About 83% of the country's landscape is covered with multiple young fold mountains ranging from the low Churiya hills in the south to the Himalayas in the north. Only 17% of the territory at the southern belt, called Terai, is plain area. Middle hill range is called Mahabharat and that contains a few large valleys with relatively plain terrain like Kathmandu, Pokhara, Dang and others. As the landscape changes, so the entire environment changes, starting from tropic and sub-tropic in the south to Tundra in the north. Depending on locations, the annual precipitation ranges from 2500 mm to 5000 mm, about 90% of which falls within 3 months (Mid June – Mid September) [1–7].

Land Use. According to the Master Plan for the Forestry Sector (1988/89), the land use of the country represents as shown in the following table 1.

Agriculture. The territory is covered with young fold mountains and no significant natural mineral resources are available. The country's key resources are water resources, agriculture,

tourism, and cottage industry. The country's agricultural land in 2001/02 has reduced to 2,497,700. Ha from 3052 in 1989 as shown in the Table 1 above. This must have been an effect of rapid urbanization, and other activities, data of which is not available at this stage.

According to the statistics in 2009/10, the country's 35% of the gross domestic product is covered by agriculture. Total area of land holding is 2654 Ha. owned by 79% of house hold which is equivalent to 82% of the population. An average land holding is 0.8 Ha in year 2001/02. Only 54% of the agricultural land has irrigation facility. The 88% of the agricultural land is worked by the owners and 12% are rented.

Production share of the major crops as in the statistics of 2008/09 were as follows (table 2).

Forest. The Master Plan for the Forestry Sector, 1989, has prepared panining and policy framework in forestry in Nepal (table 3). The long term objective was set:

- to meet peopl'e basic needs for forest products on a sustainable basis;
- conserve ecosystems and genetic resources;
- protect land against degradation and other effects of ecological imbalance;
- contribute to local and national economic growth.

Table 1

Land use of Nepal ('000 Ha)

Description	Cultivated land	No cultivated inclusions	Grassland	Forest land	Shrub lands/degraded forest	Other land	Total
High Himal	8	1	885	155	67	2234	3350
High mountains	244	148	508	1639	176	245	2960
Mid mountains	1223	667	278	1811	404	59	4442
Churiya	269	59	16	1438	29	75	1886
Terai	1309	123	58	475	30	116	2110
Total	3052	998	1745	5518	706	2729	14748
Percentage, %	21	7	12	37	5	18%	100

Source. Master Plan for the Forestry Sector, 1989.

Table 2
Production share of the major crops

Crop	Area ('000 Ha)	Percentage, %
Paddy	1556	56
Wheat	695	16
Maize	846	24
Millet	266	4
Barley	26	< 1

Source. Ministry of Agriculture and Cooperatives, Agri-Business promotion and Statistics Division.

The Forestry Act 1993 has classified national forest into six categories:

- Government managed forests;
- Protected forests;
- Community forests;
- Religious forests;
- Leasehold forests;
- Private forests.

In southern belt of Nepal, nearly 12 km wide strip of tropical forest exist where hard wood of commercial value exist. From this area hard wood and its products were exported to neighboring countries like India and Bangladesh. However, uncontrolled deforestation has adversely affected on the quality of forest as well ecology, So the timber export does not come to any significant value these days.

Mid hills called, Mahabharat range contain soft wood forest. and high mountains contain more soft coniferous forest. Further north at the foot of Himalaya the area is covered with grassland and shrubs. This area also contains various medicinal herbs, some of which are exported.

In 1960 a semi-autonomous body The Timber Corporation of Nepal (TCN) was established under the Ministry of Forests and Soil Conservation(MFSC), with the purpose of collecting selling forest products.

In hills many people depend on the forest products in one hand. On the other, fragile hill slopes are protected by the forest from the weathering effect, especially heavy monsoon rains. However, the rampant deforestation has caused adverse impact on both livelihood of the local people and the ecology. Obviously not all forest could be managed by the government.

This is how the idea of Community forests were born. Local communities, under the government forest officer's supervision have come together to preserve the forests. The products required for livelihood, livestock, firewood etc are managed by the community themselves. This program has become very successful and in many areas the forest have grown enough that wild life have started living there.

Roads. Due to the difficult terrain and weather conditions, development of road network has been always a challenge both technically and economically. In addition to that, feudal Rana, who ruled for 104 years, kept the country closed until 1951 and did not show any interest on the development activities. The first motorable road in the country was constructed in 1924 in Kathmandu. Construction of the first 115 km long road Tribhuvan Rajpath, linking Kathmandu with Terai in the South was constructed only in 1953 after abolishing the Rana regime.

At present the road networks are divided into two categories for the administrative and management purpose – Strategic Road Network (SRN) and Local Road Network (LRN). The strategic roads are managed by the Department of Roads (DOR), and the local roads are managed by the Department of Local Infrastructure Development and Agricultural Roads (DOLIDAR). Old inventory of roads had included only strategic roads and local roads were not taken into account in the national statistics. Just before a few years DOLIDAR started taking the inventory of the roads under its purview and the statistics are being regularly updated. So far by the year 2012, total length of 50944 km of local road network have been inventoried, and it is believed this figure will grow more. On the other hand total length of strategic road network, as mentioned in the Business Plan of DOR was 19875 km in 2010. However, this figure as updated in the latest statistics of SRN 2011/12 11635.58 km. There is no clear cut explanation on this change of the length, however, it is understood that the two agencies keep exchanging the roads for administration and apparently some SRNs have been shifted to LRN category. The same way as the traffic intensity in LRNs grows, that gradually moves onto the SRN category.

Table 3

Forest and shrub distribution in Nepal ('000Ha)

Total Land	Total Forest Land	Forest % of total Land	Reachable forest area	Reachable forest area, %	Non-reachable forest area	Shrubland % of total land area
14748	4269	29	2179	51.5	2090	10.6

Source. Forestry Resources of Nepal (1987–1998) DOFR, MOFSC.

Economically the country is more based on the agriculture, however, due to hilly terrain the agriculture is not much mechanised except in Terai area. Land holding size is gradually reducing and that becomes an impediment to the mechanical farming. This all speaks about the fact that there are not much specific requirements towards road building for the use in agricultural and forestry purposes. Roads in plain area can afford horizontal and vertical curves with larger radii, where any machineries related to agriculture or forest can easily drive through. This is different in hill roads. Steeper vertical gradients (5–7%) and smaller radii of horizontal curves (20–10 m) are common phenomena. Roads in hills are basically meant to provide access between farm and market so that local agricultural products could be sold and basic needs of people could be supplied from the bigger markets in plain Terai. On this, local road network has got a significant meaning. Broadly speaking SRNs in the hills provide main access between market and road heads nearby. Then LRNs provide access between the road head at SRN and farms and villages. This way both type of road network has a direct connection with the agriculture.

Construction wise, SRNs are all weather roads and many of them are blacktopped with asphalt surfacing, the minimum road widths vary between 5.5 m to 7 m. LRNs can be all weather or seasonal. Many parts of the country were deprived of vehicular access and supplies and products were carried on shoulders or pack animals. To overcome this problem low cost LRNs were constructed, many of them can be used only in dry seasons, which is about 8–9 months in a year. For the villages where there was no vehicular access, having at least a seasonal road which can be used 8–9 months of the year is a significant progress. Many key LRNs have been black topped, or gravelled. But many interior areas have connection with earthen roads.

The local roads normally do not have much traffic and are generally constructed single lane of 4–4.5 m wide. By pass areas are frequently provided so that two way vehicles can cross each other. In many local road network there is tendency of driving farm tractors on the road. It is because the tractors are used for agricultural purpose and at the same time they are found suitable in rough road to pull a trailer with goods. However, experiences have shown that use of tractors

in the local roads significantly destroy the road surface and the maintenance cost of roads drastically increases. Generally local roads in hills are built for medium sized trucks and buses, however, due to inadequate control on the roads, people tend to run heavy trucks and buses. This obviously causes adverse impact on the life road and pavement. Similarly the unpaved LRNs are meant to be used only in dry season. but people tend to use it also on the wet season causing serious damage to the roads. Such erratic behaviours can be controlled by the local community who runs and manages the local road network.

Conclusion. As explained above agriculture is one of the key business in rural areas in Nepal. Those rural areas are connected by local road networks. So there is a direct relation between the agriculture and the roads. While analysing feasibility of a road link, the agricultural inputs and outputs have direct bearing on how feasible the investment on the road could be. Regardless of how big economic value the forestry might have in any locality, it also has got a direct link with the local roads.

Access roads provide an opportunity of improved farming and agricultural products would be enhanced, which will have a direct impact on the economic condition of the people and the area as a whole. This in turn will generate more traffic and becomes more feasible for larger investments on the road for its improvement.

The LRNs are managed and maintained locally through beneficiaries and local government. Compared to urban areas, people in villages are much more open and cooperative and that makes even easier to organise road maintenance and operation locally.

Literatures

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