

FutureGenerations

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DRAFT

**COMMUNITY-LED RURAL ROAD
CONSTRUCTION IN NEPAL**

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Occasional Papers of the Future Generations Graduate School explore community-based approaches to social development, health, nature conservation, peace building, and governance. Faculty, alumni, and partner organizations present their field studies and applied research.

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I. Background

Nepal is a land-locked country between India and China. Its rivers generally run north to south and divide Nepal into many deep valleys. The Terai, a rich alluvial plain 20 to 30 miles wide, lies on the southern border of Nepal. Although this terrain is suitable for agricultural production and contains very heavy forest growth, lack of roads, communication, and electricity in Nepal separate the people who live in this country's isolated rural communities.

The lack of communication handicaps all prospects of development. All isolated districts tend to follow a pattern of subsistence economy of the most primitive and basic type. In some localities, the soil and climate is suitable for raising cash crops of comparatively high value, and some places are fitting for the development of cheap hydroelectric power. **The problem is market and transportation. The lack of a transportation system is the greatest barrier to putting these natural resources to use for the benefit of all.** Without transport, administration is costly and the government cannot effectively fulfill its role of uplifting economic and communities' welfare. The forest in Nepal is approximately four times larger than State of Uttar Pradesh in India, but due partly to the lack of transport Nepal's income is much less even though the natural quality of the forest is better. In these circumstances not only do trade and production languish but also there prevails a general lack of economic security.

Development of Nepal's main roads has depended upon substantial foreign assistance, INGOs support, government-funded seed money for rural road construction, and major labor contributed by the local community. Typically, 50-70% of the road budget has come from foreign loans and INGOs grants. About 30% of the total foreign assistance goes to the road sector. Most of the main roads, particularly those made with foreign assistance, are built to a high standard. Two examples are the West Highway by India and China and the East Nepal road constructed by British and Swiss Development Cooperation.

Rural roads in Nepal are often erected with poor alignment and the onset of environmental degradation at the beginning of construction. Local district government units and the local community typically use simple construction methods to build these rural roads. **Therefore, greater focus on use of local contractors and the packaging of contracts into forms suitable for this in the later ADB and other INGOs-funded projects contributed to the availability of work to support growth of the local contracting industry, and parallels similar increasing use of domestic contractors by other foreign funding agencies in the road sector.**

"ADB evaluation report of 2000", the key part of Nepal's road system was the 4,740-kilometer (km) strategic network² linking major towns, district headquarters, and other key commercial and economic centers. The strategic network was formed by the East West Highway (EWH), which acts as a backbone running the length of the country in the Terai, and north-south highways and feeder roads³ running from the EWH to Kathmandu and Pokhara, into the hills, and to border points. Summary of roads construction in Nepal by 2004:

1. 14,000 km motor able rural road that serves 58 districts
2. 6,600 km highway and urban road
3. 20, 600 km total roads in Nepal. National Highway comprises 23%, urban roads 9%, and rural roads 68%. The rural roads are mostly earthen roads and tracks. The urban roads are a mixture of sealed and non-sealed roads. About 1/3 of all urban roads are within Kathmandu Valley.

In Nepal, the indigenous population is popularly known as Janajatis, which is also recognized by the government and constitutes about 37.2% (8.4 million) of Nepal's total population. Government has declared 61 (later reduced to 59) groups as Janajatis. These groups live mostly in rural areas. ADB and other INGOs focused road construction in 18 districts about 500 km in Nepal. The objective was to reduce poverty and deprivation of relatively isolated people in the mountainous regions of Nepal, and support economic growth of rural communities by providing enhanced access to various produce, markets, trade, employment opportunities, and social service centers, including health and education for the poor. Road construction covered the districts that have a high concentration of indigenous population. As compared to 37% of the population belonging to indigenous groups in the country, about 50% of the population in the road projects districts was from indigenous groups.

II. The Initiation of and Participants in Rural Road Construction

In 1976, the ADB was the first organization to work in road development in Nepal. During this year, Nepal's road status was relatively undeveloped. Before the 1980's in most of the rural districts, the trail routes provided the main means of transportation for the largest area of the district. Consequently, transportation of goods and services from the market centers to the rural areas and vice-versa has been difficult, insufficient and costly. ADB and other agencies assisted the Government of Nepal to expand, upgrade and maintain the road system. Advisory and operational technical assistance provided focus on institutional strengthening within the road sector. Many of the road projects are multi-component, addressing different road development needs in several places at the same time. The majority of the components are: 1) East West Highway (EWH) upgrading, 2) hilly roads, and 3) periodic maintenance. Gradually other INGOs and organizations involved in road construction focused on rural road construction such as Rural Road Forum, Rural Access Program, Rural program funded by GTZ, Nepal forum for Rural Transport Development, District Roads support program funded by SDC, Decentralized Rural Infrastructure and livelihood project (DRILP) etc.

III. Cause of Rural Road Construction Mushrooming

INGOs, NGOs and government conducted a number of studies and impact evaluations about the rural road construction, including a survey administered by the decentralized Rural Infrastructure and Livelihood project. *The study and impact evaluation identified that road access in rural areas is the lifeline for rural communities and entry point for other development activities.* The study noted that the majority of rural road constructions are implemented through three-way partnerships between government, INGOs and the local community with three types of road construction organizations in Nepal including:

1. Community Based Decentralized Road Construction (CBDRC)
2. Labor Based Rural Road Construction (LBRRC)
3. Government Controlled Road Construction (GCRC)

All of the above three types of road construction focused on the GREEN ROAD (GR) concept. The organizations' objective is to establish community-based sustainable development via rural road construction with a vision that the roads will directly benefit the overall community including business people and farmers, as well as indirectly benefit landless people. The available roads save considerable travel time, improve income generation, enhance commercial opportunities and improve market access. The road has provided short-term employment opportunities by engaging the poor rural people in the road construction and rehabilitation. Such community-based development efforts have boosted economic activities in the area by creating long-term employment and other opportunities.

The organizations believe this system shares, supports and consolidates the ideas of government, funders and community members. All organizations come to a consensus on such issues, which have helped facilitate government to produce guidelines or policy documents relating to the issues. The INGO program has advised the partners/stakeholder, (ex: government/ DDC/VDC/Funding Agencies) on the specific issues and consolidated views back to government and the funding agencies via the donors. It has shared all ideas through **practice** and demonstrations. Most of the study reports mention that labor-based, environmentally friendly, and participatory approaches have ensured that the investment in road construction and rehabilitation of infrastructure has resulted in sustainability.

The concept of community-based decentralized rural road construction in Nepal seems to be the most effective method of road construction in mountainous areas using a labor-based approach. This approach is recognized by government departments and is strongly reflected in their policy and strategy, as well as in other government documents such as the 9th and 10th plan, the Local Self Governance Act and the DDC/VDC work Directives. This concept relates to Aphno Goun Aphai Banou in 1994 and it improved ownership and participation of the local community. Problems arose in the beginning, but the community improved in management and leadership, which strengthened sustainability. This concept is not only for road construction; it also covers overall development activities.

The Labor Based Rural Road Construction's concept is also very famous to integrated development activities with its benefits to social, economic, environment, agriculture and sustainability. This concept originated in 1999 from the Rural Roads Forum, an informal group of implementing program and projects working primarily on rural roads in Nepal. The concept does not represent government or the funding agencies' opinions. Instead, it serves to improve and coordinate the technical and institutional services that are provided to such bodies. The programs involved in supporting the districts in Nepal, through district authorities and central government, local committees and civil society. The programs tried to avoid duplication, ensure working toward a common goal in a coordinated and effective manner, and come to a consensus on issues that they can pass along to the Government of Nepal and other funding agencies.

The government-controlled road construction is suitable for highways but not in rural areas because 1) There is no ownership, community participation, or sustainable maintenance, 2) This type of construction uses heavy machinery

that is harmful to the environment and considerably more expensive than community-based road construction, 3) Government use contractors who care only about profits and not for environment and future of the village.

All of the organizations focused on the Green Road concept and tried for best practices. The Green Road concept is a conservation-oriented rural mountain road construction approach that mainly focuses on participatory, labor-based and environment friendly technology that has been gradually developing in Nepal since the mid 1970's and 1980's. The Green Road concept comprises a "phased construction" approach meaning construction of road in different phases. This directive includes the simple methods of environmental management in the different phases of the project cycle. More emphasis is given to prevention rather than cure.

IV. How Roads are Constructed

Most road projects use an alternative road construction approach. Projects use two types of road design and construction methods: conventional and green road approach. In the conventional method, heavy machinery and equipment, explosives, heavy concrete structures with the application of bituminous surfacing, side drains, bridges and culverts, etc., are extensively involved. This is also known as government-based road construction.

Most of the rural road projects are environmentally friendly and use community participation to protect vegetation cover as a means of soil conservation. Under this approach, construction work is done manually from the local labor without using heavy machinery and explosives. Important features of this approach involve using local people as the laborers (*community-led or labor-based road construction*), providing them tools and small equipment for construction. This approach recycles excavated materials as construction materials, thus not generating excess spoils, as far as possible. Phase widening and low-cut slope: a track of about 1.5m to 2m width has opened in the first year of construction. This progressively increased to the full road width of about 5m over a three-year construction period by maintaining low-cut slope. This procedure reduces the risk of erosion during construction and facilitates compaction of soil through natural rain.

a. Why is labor-based construction better than mechanization?

Labor-based road construction brings locals employment and subsequent economic benefits. With labor-based construction there is a chance to have a direct impact upon poverty by ensuring that the benefits go directly to the local community. If the local community is involved in the construction, it contributes to high community ownership and people take more responsibility for the maintenance of the road. Labor-based construction also increases income-generating opportunities with the support of small business and technical training for locals.

b. Are Labor-Based Roads really slower to build?

In terms of opening the alignment, with a crudely cut trail of 5m with no camber, spoil disposal, drainage, etc., bulldozer roads are quick to construct. A 5m trail can be opened for between approximately 50m and 250m per day. A similar result could be achieved using labor, which can be arranged in several gangs at intervals along the alignment. If you consider the time it takes to make a road fully drivable, then the time is comparable to labor-based methods.

In terms of quality, which roads are built to a higher standard? A number of earlier arguments have already been presented to attest that labor-based methods are environmentally and technically better than using a bulldozer, for rural, non-surfaced roads. Using labor is a much more flexible and quality-oriented way to build rural roads, for example; material can be managed, cambers can be made accurately, slopes can be cut to the appropriate angle, drainage can be made as the road progresses, etc.

The primary test is how long a road lasts. In the experience of most rural roads programs in the districts of Nepal, labor-based roads are much more likely to withstand the rigors of monsoon and still be drivable, due to both the construction standards applied and the ownership of the local community, who are more likely to maintain the road if they have been integrally involved in building it. There are several instances of bulldozer roads being washed out or sustaining serious damage when subjected to even average rainfall.

c. How Labor-based Road Construction benefits the Environment

Labor-based road construction has proven to be environmentally friendly. In Nepal especially, much effort has been put into ensuring the protection of the environment (for example, the development of the Green Roads' approach). When labor-based construction is used, it gives the road a chance to integrate into the landscape gradually over three to four years, allowing water management to be progressively developed. This minimizes the environmental impact of the road in terms of slope instability, drainage and agricultural effects.

If the environmental impact is found to be too severe after the first or second years, it is relatively cheap and easy to realign. Using labor-based methods the cut material can be utilized most efficiently. Cut spoil can be used to fill areas, whereas useful materials such as boulders and topsoil can be separated, stored and used for the future. Bulldozers cannot effectively cut and fill material, so slopes are not cut to the correct angle, leading to higher and less stable slopes, with the consequent increase in costs of retaining structures for these slopes. Also, bulldozers cannot separate useful and non-useful materials, even boulders and topsoil that could be used later on in the construction process are pushed over the side of the excavation.

Drainage and structures are not often planned nor implemented with bulldozer roads, at least initially, leading to washouts and subsequent road failure during the monsoon months. This is due to a lack of proper planning and unrealistic expectations from the communities, politicians and civil servants. Unless the drainage is properly planned and installed at an appropriate time, then the road is vulnerable to suffer serious damage during the monsoon. Environmental problems can arise through soil erosion.

Whereas the labor-based method allows for appropriate management of cut material, with a bulldozer road the cut material cannot be relocated and has to be pushed over the side of the excavation. The consequence of this is often that it washes out and can block irrigation or drainage systems, as well as cause a serious safety hazard to any settlements in the immediate area. The International Centre for Integrated Mountain Development (ICIMOD) research on siltation of waterways, seems to indicate that unpaved roads that are not constructed appropriately can have a serious affect hydrologically. Landslides tend to be more frequent on bulldozer roads and have been known to block adjacent roads.

d. Conflicts for Implementation

It is recognized that the problem in Nepal developed through extremely high levels of poverty within the country. Labor-based road construction was much more able to address those issues of poverty orientation and inequitable distribution of wealth than building a road by bulldozer, as demonstrated in practice. It seems that both local government policy and the Maoist forces in Nepal support labor-based road construction, as the benefits go directly to the poorest sectors of society. In this context labor-based construction has been able to proceed even through the worst times of conflict.

e. Best Approach for Maintenance

When a labor-based road is constructed to the appropriate standards, the routine maintenance was manageable by user groups, the local people from within the road corridor who are trained to maintain the road. This has been proven on a number of labor-based roads in the central region of Nepal such as Kathmandu to Makwanpur and Lalitpur to rural VDC. The maintenance costs of a bulldozer road are likely to be higher than those of a labor-based road, because of the steeper cut slopes and lack of appropriate camber on the road surface, leading to longitudinal scouring. Also because the structures on a bulldozer road are invariably larger, they will require proportionately more maintenance resources.

With the present rules and regulations for local government, it is simpler and easier to organize and supervise bulldozer work, plus the administration is less. Labor-based roads involve a lot of organization at the community level

to set up groups, supervise groups, etc. Increasing access to remote areas can be done quickly (but not sustainably) by bulldozer, which can ease the pressures of the conflict in the short term. However, the Maoists, who favor labor-based methods of road construction, oppose the bulldozer approach.

V. What is Beneficial for the Rural Community?

The rural road facility provided multiple benefits in socio-economic, environmental conservation, behavior change and integrated development activities. The surveys indicated substantial production of cash crops—potato, tea, broom-bristle, cardamom, and ginger—throughout the area served by the roads. In addition, basic subsistence crops consisted of maize, millet, and wheat, with rice in limited areas. In 1983, the export of fresh milk began with one daily truck from India, in response to the newly sealed road. This activity has expanded dramatically in recent years following the upgrade of the road to further north. Daily production is now in the range of 18,000 to 35,000 liters per day and 3-5 tankers per day collect milk from chilling centers along the road (within 18 districts).

The extent of cash crop production was lower, and cereal cropping correspondingly higher, in the non-road-influenced areas. Road construction brought short-term employment and an increase in trade and NGO activity. In areas where there are roads, there is greater availability of electricity and telephones. As result of the rural road construction projects, transport costs were reduced and national integration has been improved. Most of the economic cost is related to transportation services. Bus fares and shipment rates are lower for sealed roads than for earth and gravel roads, and traffic on the sealed roads has grown faster than the normal rate for Nepal.

The road upgrading also stimulated a noticeable increase in the movement of food and consumer goods into the project areas by encouraging the growth of market centers at strategic points along the roads. The expansion in cash cropping and dairy production also has paralleled road development. The greater availability of consumer goods, greater mobility through faster and more frequent bus services, and enhanced employment has improved living conditions. This is to be expected because the roads aid the installation and servicing of these facilities. School construction and the availability of schools were also similar in road served areas and areas poorly served by roads, as was house construction and housing. While schools in road-served areas achieved slightly better overall performance, attendance in schools in all areas was reported as high and increasing. Health services were better in the road-served areas than in poorly served areas, primarily because of the better access to hospitals and health centers, including through ambulance services. According to the impact evaluation, the average income level in the Eastern Region (NRs7,429 per capita) is close to the national average—NRs7,673—although the three road-influenced hill districts have a lower average of NRs5,880. The relatively affluent and productive areas in the Terai raise the average for the region.

a. Specific Findings from ADB and DRILP impact evaluation and Case Study

- **Local community involvement:** Local labor and contractors were extensively involved in the road works, in some cases after the failure of an initially selected international contractor. Local contractors performed well, and the projects have contributed to the growth of this local industry. Local consultants also performed satisfactorily. Domestic road construction contractors performed adequately. Except for a limited number of tasks, such as the laying of blacktop

or concrete surfaces, the use of domestic contractors on future road works would be appropriate. Domestic contractors would benefit from actions, such as the issuing of maintenance contracts to expand the volume of work and smooth surface. Overall, local road construction contractors have performed better than international contractors, which has led to greater use of local contractors and efforts to build local capabilities in future projects.

- **Women's Empowerment:** All of the people have benefited from the road construction. Women in particular have benefited more from improved access to the market centers and various services providing agencies like health centers, banks, training institutes, women's development offices, etc. Frequency of visit to such agencies has increased awareness levels and empowered the women. Female students are encouraged to go to school due to road accessibility.
- **Awareness:** The project has adopted bioengineering treatments. This activity has enhanced the local understanding on the importance of vegetation, particularly the trees and shrubs, including grasses for road slope stabilization. Also local people had the opportunity to be aware about the importance of plants and its contribution to the stability of the road.
- **Skills:** The road construction has not only provided employment opportunities but also supported the transfer of skills and technical know-how to the local laborers. Building group members have been given on-the-job training during road construction, which has enhanced their skills and capability in works like masonry, gabion wires, construction of dry and foundation walls, slope cutting and stabilization as well as bioengineering works. These skills have not only benefited the local workers by providing long-term employment opportunities but also contribute to local human resource development.
- **Strengthened Community Development Service:** Due to increased employment opportunities, trade, business and agricultural income, considerable amount of money has been channeled into the local economy in the area. This will increase the income level of the individual households and the local communities of the area. **It is possible that some money may be spent by the individual for the community development activities such as education, school, health and sanitation services.** Locals may spend more on health and sanitary facilities, education facilities and other community services due to reduced transportation cost. The operation of roads will also contribute to raise quality services in social sectors as more competent agencies and people will enter into the area to provide services. Road transportation has also encouraged students to enroll in campuses for higher studies. People can now more easily access health services due to the transportation facilities.
- **Increased Crop Productivity:** The road benefits the local communities in terms of increased productivity and diversification of crops including cereals and cash crops. Due to easy and cheaper availability of agricultural inputs and technologies, productivity has increased along the road. Sale of farm and livestock products has increased in the settlements along the road corridor.

- **Land Value:** Road construction leads to appreciation of land values particularly near the market and settlement areas. The land price has increased due to the availability of reliable transportation facilities. For example, before the road, land cost Rs 10000 per Ropani after the road Rs 400,000 per ropani. There will be rapid increase in the commercial production of agricultural crops due to road accessibility which is also a major factor to raise the land value. This activity would likely uplift the economic condition of the local people.
- **Market:** Towns have grown larger due to new road facilities. Gradually it will increase economic opportunities and significant growth and extension of the minor local markets along the road alignment and in the VDCs.
- **Business Promotion:** During construction period, different types of commercial activities came into operation in order to meet the demand of workers. Since they had good purchasing power, they regularly demanded different types of food, beverage and other daily necessary items. To meet these demands, many local and outside people have operated a number of small shops and restaurants around the vicinity of the construction sites. Various farm-based enterprises including wide range of agricultural and livestock products have gained momentum as a result of increased demand by labors during construction period. This will increase local trade and business in the area.
- **Tourism:** The most rural areas of the Nepal have great potential for tourism development. Tourists can visit these areas to see the scenic beauty of Himalayan range including forest, wildlife etc. Local communities can benefit by establishing eco-tourism income generation. Examples are found already in the Mount Everest region of Tibet, China. Flow of tourists and other visitors may influence the changes in the social behavior. People may leave their family in their villages to dwell near the new spots for economic incentives. This will ultimately affect the traditional bonds, norms and functions of the family. This will also cause impact on social and cultural transition.
- **Land acquisition:** With the present practices in Nepal, labor-based construction tends to provide more time and opportunity to consider sensitive issues such as land acquisition and compensation. With bulldozer construction, such issues tend to be ignored because of the lack of planning, lack of time available once the work has started and high unit costs once the machinery is on site. This puts pressure on the district to complete the road as soon as possible. All of these factors lead to rapid acquirement of land with little or no participation by the local community and no safeguards to prevent people from becoming landless. Labor-based roads also give the opportunity to realign the road at an early stage when difficult areas or land issues are encountered. If the local communities are involved in the planning process from an early stage, such problems or disputes can often be overcome harmoniously and equitably. In contrast, bulldozer roads are often unplanned and hastily designed, leading to more vulnerable and less durable roads. The bulldozer driver is sometimes left to determine the alignment if difficult areas are encountered, often leading to steep gradients and tight corners.

VI. Impact of rural road construction

The impacts generated are both beneficial as well as adverse but there are more benefits. The findings of impact evaluation study in relation to rural road upgrading mentioned that such a component is unlikely to be economically viable by itself. National planning commission and ADB's infrastructure department has investigated ways of integrating the hill road component with other rural development projects. As part of a general decentralized of power in Nepal, the responsibility for rural and urban roads has been passed to local government units, namely village committees, district committees, and municipal authorities.

The Department of Roads retains responsibility for the strategic network. The Department of Roads estimates the total length of the constructed road network to be 13,220 km and Five-Year Plan (1992-97), poverty reduction was introduced as a specific additional road development objective, and gender equality was introduced as an objective under the Ninth Five-Year Plan. The positive impacts on disadvantaged groups, particularly women and those of lower caste, have also been noted. The improvement in employment and living conditions was greater due to the changes in agriculture. The efforts, particularly the development of transportation network, had multifold beneficial impacts. Road projects are generally intended to improve the economic and social welfare of the people. One of the major direct beneficial impacts of the road during construction stage was the creation of employment opportunities for the local community. For example, road construction in 18 districts in Nepal created work for 232,85 unskilled and 7,673 skilled people.

Rehabilitation of those roads will generate employment for the local people, which will minimize seasonal migration to other parts of the country. The amount of money that is earned by the wages will directly enhance the operation of various economic activities and enterprise development. The land acquired for the implementation of the project can undergo a long-term permanent change in the land use. Changes of land use due to the construction of road are mainly conversion of agricultural land, forest, barren land and public spaces into built up area. The changes in land use will have impact on the loss of agricultural land, which directly reduces agricultural production.

a. Specific impacts:

- **Poverty reduction:** The ADB and other INGOs studies show, approximately 2.5 million people live in the road access districts, of whom 1.5 million are below the poverty line. Estimated in 18 districts show that 780,000 poor people have directly benefited from a wage income increase of around 25% over the subproject and supplementary investment construction period, and that 200,000 people have uplifted out of poverty. A total of 34,700 person-years of employment are created by the road projects and significantly contributed to income restoration in conflict-affected districts. The skills training received, particularly disadvantaged castes and ethnic minorities, and increased social capital, resulting in a decrease in social exclusion and vulnerability. But a recent study by UNDP result shows within the total population in Nepal 283000000, 65% under the poverty (183000000), 155000000 pop's income per day is less than Rs 94 (\$ 1.25), 218000000 pop survive within Rs 1.50 (\$ 2) per day.
- **Local Economy:** A significant movement of food and consumption goods into the project areas from supply centers in the Terai had existed prior to INGOs and ADB involvement. Upgrading the roads to all-weather bitumen standard under the projects expanded this trade by encouraging the growth of market centers at strategic points along the

roads. These market centers have extended the availability of outside goods a considerable distance from the roads as porters and pack animals move the goods from the market centers to more remote areas. Based on changes in traffic, the quantity of goods imported into the hill districts has estimated to have increased by around 10-12% per year over the past decade. Dairy production and farm gate milk values have also increased around Nepal due to the installation of milk chillers and the operation of milk tankers that have allowed liquid milk sales from the area. Direct effects of the road were evident for dairy produce as the dairy facilities would not have been installed without a sealed all-weather road. The domestic food supply has increased over the past decade due to increased fertilizer use and irrigation development, a comparison among road-served and remote areas indicates that the roads have not had any major direct impact on agricultural production in the beginning. Small-scale vegetable cropping has become established under an NGO program, and the road has facilitated a limited trade of fresh vegetables to neighboring settlements. After roads connected to rural villages, agriculture production was increased.

- **Socio-economic:** According to the study report, all respondents within the influence of the roads reported an increase in overall living standards over the past 25 years, whereas those in non-road or poorly served areas claimed there had been no change. The main reason for the change quoted by survey respondents was the income from the increased production of cash crops. The elimination of "middlemen" was seen as an additional benefit in the east, with individual farmers taking their produce directly to market. The poor and lower castes in the road-influenced areas reported increased job opportunities over the last 25 years—including work in road construction, laboring, and portering of cash crops, milk, and other goods brought in for sale within the area. Besides increasing income, it reduced the social exclusion of very poor households, particularly disadvantaged castes and ethnic minorities, through a social mobilization program of community meeting that focused on participation, gender, and integration of issues concerning women and disadvantaged castes within local communities. Community awareness has increased in participation and decision-making and raised social concerns. Increased community participation in all social groups has enabled representative decision-making and effective planning, and reduced elite control of rural life, thereby addressing one of the causes of the conflict.
- **Transportation charges:** Transportation fares show a clear relationship with road condition. If roads are allowed to deteriorate, it is likely that bus fares will increase, and conversely, if roads are maintained, fare increases are likely to be avoided. In practice, it seems that neither official nor actual fares are adjusted automatically when roads are improved. Changes in fares may occur only over the longer term or where strong competition exists. Analysis of shipment charges in the mountainous areas of Nepal indicates that shipment rates also reflect the road conditions and imply rates on the unpaved sections of NRs20-25 per ton km, compared with around NRs10-12 per ton km on the paved sections.
- **Environment:** The hilly areas are relatively unstable and, despite careful design and construction, landslides are common during the wet season. The project has developed a series of techniques appropriate for Nepal. Instances of

increased deforestation were not reported as a result of the road upgrading and new road construction in the hills. Most logging had occurred earlier. The Department of Forestry views the improved hill roads as beneficial by facilitating increased supervision and surveillance in the area. But the last 10 years and more recently, deforestation occurred along the road due to untellable government, misuse of the authority and policies. Substantial areas of the hill districts in Region remain under forest cover and the extent of forest cover is reported to be increasing through community forest initiatives. The most community-based road construction did not cause any significant negative environmental impacts since several safeguards were incorporated into the project design. The required initial environmental examinations (IEE) were done by most of the projects. The INGO and government provided technical and financial support to conduct IEE and per standard of government and ADB environmental regulations. The RC was independently monitored to ensure compliance with the environmental assessment and review procedures.

VII. Disadvantages during Road Construction

Government-based road construction resulted in some loss of forest vegetation, while community-based road construction resulted in less loss. In most rural areas, there was disturbance to wildlife and bird habitat during the road construction. There were some problems in cultural, religious and historical sites resulting from road construction. Some place people lost their occupation by Porters. Removal of vegetation and open cuts with exposed soil to rain will cause soil erosion as well as landslide. This can become a major source of silt that the monsoon runoff carries away. There is a passive landslide at along the road alignment which can be vulnerable to soil erosion during the road construction. The degree of sliding increases during the road excavation, and it may cause regular sliding during operational phase.

VIII. Cost effectiveness

Bulldozer roads can be cheaper to construct in terms of excavation-only on a cost per kilometer basis, by up to 50%, based on market hire rates for bulldozers. This is misleading, because a trail cut by bulldozer cannot be considered as a proper road. When additional activities such as structures and bioengineering are added to the equation and then compared to a comparable labor-based road, the difference in cost is minimal. In some cases the bulldozer road can even be more expensive. It should be realized that capital and running costs of a bulldozer generally result in a mass outflow of funds, not only from the district but also out of the country, with little or no benefit to the local or national economy.

With the present low level of awareness of the comparable merits of labor-based roads versus bulldozer roads, it is easy to persuade the local people that they need a bulldozer to build their roads. District Development Committees are also often able to persuade all Village Development Committees to contribute towards the procurement of a bulldozer for a particular district, making the purchase (but not the maintenance) affordable. When a bulldozer

breaks down it is often beyond the financial capacity of the district to repair it. Also skilled operators and mechanics are not available in the districts leading to premature and frequent breakdowns of the equipment. These factors combine to make repairs expensive and impractical, leading to lengthy down times and funds being redirected from other district sources. Ultimately some vehicles are even abandoned. If foreign exchange is scarce, the purchase of bulldozers will use scarce funds that could otherwise be used in local currency through labor-based technologies.

IX. Overall Success of Road Construction in Nepal

Overall, the involvement of the community, INGO, government, especially ADB's involvement in the road sector, has been significant, addressing a large proportion of the road upgrading and periodic maintenance needs of the nationally important East-West Highway as well as access routes into the rural areas. In addition, rural roads have improved. About one quarter of the road development expenditure in Nepal since the 1980s has been financed under INGOs and ADB projects.

The above argument provides a strong case for the use of labor-based technology in rural road construction in Nepal. Developments in rural road technology and management have been oriented towards this concept over the past 10-15 years in Nepal. It is important that this momentum is not lost. We can understand the urgency to connect remote areas. Doing this by bulldozer is not a sustainable solution, neither in the short or long term. The cost of procuring one bulldozer could provide the equivalent of over 120,000 person-days in labor-based road construction (including the cost of tools and materials). 10 labor gangs with 15 people each would excavate and move the same quantity of spoil in five months, that a bulldozer would move in one month. VDC are often willing to contribute to the purchase of bulldozers, but not to road maintenance costs. This shows, on one hand, a lack of awareness of the advantages of labor-based construction, as well as a lack of appreciation of the importance of road maintenance in general. If you have to use a mechanized approach, then use an excavator, it is much more appropriate than a bulldozer. If you have to use a bulldozer, then hire one, this is much more cost effective for local government than procurement of heavy machinery.

X. Future Plan and recommendations from INGOs and NPC

Green Roads are community-oriented, appropriately engineered, environmentally sound, locally maintainable, and they result in improved access to goods, markets and services for rural people.

1. It is suggested that to effectively tie together all the communities and areas of Nepal, a total of 9,000 km of road should be built in the next 20 years. A master plan for such construction has been divided into four tentative five-year projects. After this is accomplished, the standard of the roads will be raised to the highest level that the community can afford. Sources of funding include:
 - a. Foreign assistance in road construction

- b. Government
 - c. Local contributions
 - d. Road Taxation (A principle underlying such taxation is that the beneficiaries from the improved transportation should share equitably in meeting the burden.)
2. Process:
- a. In the first year the main emphasis on the collection of the technical staff for survey work, fixation of the alignments, preparation of the projects, completion of the reconnaissance's of the hill alignments, completion of the detailed survey of the alignments in the plain regions, the cutting of tracks in the hills, from two to six feet in width to make possible the carrying out of detailed surveys, and the training of personnel for construction work.
 - b. In the second year the work of survey and alignment will move forward and 12 foot roads will be constructed on those alignments whose survey has been completed in the first year.
 - c. From the third year on the work will be in full swing; Arrangements will be made for the recruitment of local labor as required, for whom campus will be set up with sanitary facilities to include: pure drinking water, consumer stores facilities for recreation and entertainment and social education programs.
 - d. The cost of this will not be large but the effect on the morale and the wellbeing of the labor will be important.
3. Major problems:
- a. Political insatiability in country
 - b. Shortages of technical and supervisory personnel for survey and construction work
 - c. In addition to highly trained engineers, we shall need in substantial numbers, assistant engineers, overseers, draughts men surveyors, computers accountants and clerical staffs.
 - d. Management of future maintenance, responsibility and localization
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XI. Example of community-based rural road construction stories:

1. Example of Community-Based Road Construction in South Lalitpur District.

Interview with Mr. Chandra Bdr. Dhulal (Pradanpanch during the Panchayat system and VDC Chairman), and also interviews with other village leaders who are involved village road construction.

1. Do you know about Aphno Goun Aphai Banou (AGAB)?

Yes, this plan started in the middle of 2051 (1994) during UML government. The concept of the AGAB was advertised and announced all over the country through Gorkhapatra, national daily newspapers, radios and limit guideline. It was very famous in the community and every villager and community member knows about program, we know specific budget for this AGAB plan and we can use it for common needs of our community such as health, drinking water, road, agriculture, school, tree plantations, bridges or infrastructure. Sometime, all NGOs and INGOs helped to motivate and empower the community about the concept and support to DDC and how to implement it to include technical and management skills.

2. How much of the budget was allocated and how did you use it?

Budget was Rs 300,000 in the beginning. It was allocated for for VDC development activities but most VDC decided to use the budget for road construction because south Lalitpur 10 VDCs are isolated from all facilities due to lack of road/transportation. Finally some VDC used the budget for different activities but most of the VDC used budget for road construction for the following reasons:

- Most community expressed that transportation (road) facility is the most important and beneficial in terms of socio-economic, access to market for agriculture products and hospitals.
- Many people (especially mothers) died since we have no hospital facilities in the area and no transportation to take people to a city hospital.
- Road is a common need for all communities, and all agree on the proposal.
- Local people get the job (especially who are landless).
- It is easy to manage and implement project as compared to water systems, health centers and school buildings without technical and material resources.
- Porters is the only means of transportation in this area which makes transportation very expensive and once the road is in operation, we would have improved access to many inputs such as seeds, chemical fertilizer and technology leading to increased agricultural production and diversification.
- The cost is expected to come down by more than 100% percent for many of the inputs that are used by farmers in the farm and other goods.

United Mission to Nepal, Community Development & Health program (UMN/CDHP) started integrated program in south Lalitpur since 1978 to uplift Agriculture products, Preventive health, Animal health, Re-forestation, child education but they didn't included road construction because they said road, electricity, higher education and infrastructure are the government's responsibility. During the 15 years of the projects (CDHP), the agriculture products increased more than we needed during those years. So, we needed to take products to city (chapagoun and Lagankhel) and carrying two to three days is very expensive for transportation with no profit. CDHP established curative health centers and trained number of volunteers about preventive health care but when we have major health

problems, we need to take to city hospital but we don't have transportation facilities due to lack of roads. Also there are many problems due to lack of road facilities. Therefore, we used the budget for road construction according to the following plan:

- We divided budget into 9 wards (each ward get about Rs 30,000 *9=270,000 and rest Rs 30,000 is used for VDC admin cost. But it is increased year by year and now about Rs 20,00000 to 2500000 but due to political instability budget is not coming according actual plan but still our community has continued maintenance and building new roads because without transportation, community can't forward development. But some VDC didn't follow the plan.
- Ward committee decided how long and which direction of the road should start in first year as per priority then in second, 3rd year respectively and finally our plan was to connect the road to next ward and VDC. Following this strategy by 10 VDCs and 90 wards in south Lalitpur, the most of the wards can have access road within VDC and it connect to VDC to VDC and gradually connects to District headquarter.
- VDC Chairman supervises the overall VDC projects and ward Chairman supervises and monitors the ward road construction.
- In some wards, community worked as volunteer to built road and the money was used for school building materials and technician which they need money and community can't do as volunteer. In some wards, we paid for labor but 50% of the daily wages and 50% volunteer. Which means our community contribution on road construction is 50% to 100%.
- Also we collect road tax for maintain which can help us sustainability of the maintenance and also we are raising fund for village development.
- After completion of the all road construction, we can use the budget for other development activities.

3. What was the major problem?

The major problem during the road construction was:

- To convince participation from all communities
- There are many political groups and every group had different proposals. It was difficult to agree on common objectives.
- It was difficult to manage all communities time same time.
- Technical and material support form government and no local skill peoples available.
- Lack of design and clear project guidelines.
- Government released budget very late at the end of the fiscal year.

- Due to timing of construction and technical problem, constructed roads would wash out and landslides occurred during the monsoon. So, we have to work on it again and again. We lost a lot of money and our community contribution due to lack of technical problems.
- Gradually, we learned some technical skills and tried to find technical support from government and NGOs but still not enough technical support and supervision.
- We needed to maintain the road every year after monsoon due to landslides. This happens all over the roads in Nepal.
- At present, the political insatiability is the major problem for development projects and other village development activities because there is no political representative, government do not release the budget, and there is no government staff at village. But still our village user groups keep in working on our village development and road maintenance.

4. What was successful?

- We achieved our objective to connect the road to District headquarters.
- Now we have access to District headquarters, and most of the wards using this facility to sell our agriculture products, do small business, take sick people to the city hospital, and children can pursue higher education and visit home easily.
- After the road construction, we established a farmer's cooperative at Bhatte Danda VDC (under the leadership of Mr. Dhulal), collects all vegetable and any products and cooperative truck takes to City (Lagankhel) every Saturday and sale by our cooperative members. Many city people like our products because they are fresh and organic. We have very good income for the community and cooperative. So, now there are many cooperatives establish learning from us and Maoist slogan was also Goun, Goun ma shahakari and Ghar Ghar ma Bhakari (cooperatives every village and food store every house)
- Our economic status in the South Lalitpur has uplifted about 60%.
- People are empowered after transportation access to city. Before 1980, very few people visited Kathmandu and Lagankhel((which is a part of Lalitpur). A local friend asked, "Where are you going?" The person replied, "I am going to Nepal!" Our communities think Kathmandu is the Nepal. Now our community challenges city people.
- There are many other benefits and achievement in terms of economic, social development, empowerment, awareness and education. It was not possible without transportation facilities.
- A key success in community-based road construction alignment has been to minimize the acquisition of valuable agricultural and forestland.

My observation on the interview with the local community (Mr. Dhulal and villagers): The greatest change brought by the rural road construction has been in social aspects, including income and material conditions. The roads have made the movement of people easier, which has led to more frequent trips to the city, resulted in saving travel time, cost, and have opened up the area to outside influences. Importantly, increased mobility and exposure to outside influences are making it possible for some people to ignore the more rigid aspects of caste and negative traditional practices. In addition, women reported that their conditions had improved as compared to the last 15 years. The road construction did not pass through any environmentally sensitive areas and had minimal detrimental effects associated with loss of forest and agricultural land. Most of the adverse impacts predicted are of low significance and short term as well as of reversible nature. The beneficial impacted with the facility of access to market centers, location of social services have been enhanced productivity in south Lalitpur has improved more and the quality of life of the people. In addition, local people got direct employment as small business, sale of agriculture products that has contributed significantly in improving their livelihoods.

3. Example of Community Based Road Constructio, Pharping to Makwanpur, which includes Kathmandu and Makwanpur districts.

Dr. Taylor's interview with X-minister Mr. Krishnaman Gopal UML and Mr. Guanjaman VDC chairman.

X-Minister Mr. Gopal and other officials said that even though we have a lot of problems in political instability and development overall, community and government focused on the road construction which is important for overall development and the community. Government implemented different development concept/slogans in Nepal such as:

1. Panchaya > “Goun pharka Aviyan” (GPA) 1979
2. UML Amahale > “Aphno Goun Aphai Banou” (AGAB) 1994
3. Maoist > “Goun Goun shahakari and Ghar Ghar Bagari” (GGS, GGB) in 2008

The major problem in Nepal was and is lack of transportation, communication and electricity. In order to uplift the livelihood of rural people, improve education status and agriculture development, the above concepts are implemented to address the major problems in Nepal. But most rural communities decided that roads are first priority in order to achieve other development activities.

During the Panchayat time in 1979, the concept of the Goun pharka was a good idea which means, “go back to own village, to develop the village.” Since there was no specific guidelines and supervision, this only improved specific people and not the whole village. He means, there was a lot of corruption and some people become very rich while the rural community and nation became poor and malnourished. Government provided budget for the Village Panchayat development through the Pradanpanch or ward Chairman but communities didn't know about the budget, how

much budget was given from government, how to use it etc. Only PradanPanch and some ward Chairman know about it and they decided where to use it. There was no monitoring system nor proper report system. Panchayat secretary visit once or twice a year and writes report and prepares documents according to Pradanpanch says and Pradanpanch sign his worksheet of years.

Who initiated Aphno Goun Aphai Banou?

In 2051 (1994) during the 9 months government of the UML, Mr. Manmohon Adhikari implemented two special concepts:

- a. Aphno Goun Aphai Banou (develop villages our self) Starting with Rs 500,000 (he said Rs 500,000 but actual amount was Rs 300,000) for each Village Development Committee (VDC) (total 495 VDCs in Nepal). Gradually increased the budget to 500,000, 10,00,000 and present Rs 25,00,000 per VDC.
- b. Allowance for old citizens starting Rs 75 per month and at present increased to Rs 200 per month.

Actually Aphno Goun Aphia Banou concept came from Dr. Kesharman Shakya the CO of National Planning Commission who worked and learned from SNV. Dr. Mangle Singh adopted the concept and proposed to implement the idea during UML government in 1994. But after Congress took over the government, they changed the name (slogan) and amount of the budget was increased for political credited. Maoist like the concept and continued using different slogan. However, this Rs 300,000 budget can be used for any development activities in the VDC according to proposal came from wards in the VDC. Many DDC and VDC started road construction as example (Mr. Gopal): During my time in government as minister, I have provided Rs 70,00000 for road construction from Pharping to Makwanour and community contributed equivalence Rs 150,00000. Also due to good performance of the community-based managed road construction, India government supported Rs 190,000,000 for 2010. Also, Share & Care has supported to mobilize the community participation for the road construction and development program. Each VDC has established road tax collected center for maintenance and community is taking responsible. Now more than 200 vehicles running this road and more than 200,000 households benefited in terms of business, employment and agriculture products sales. Also government and business people save transportation cost from India and time because 60% imports and exports comes and goes through this root.

XII. Document and information sources

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