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**Improving Rural Connectivity and its Impact on SDGs –Case of Nepal
(Background Paper for EST Plenary Session-3)**

Final

This background paper has been prepared by Mr. Kamal Pande, for the Tenth Regional EST Forum in Asia. The views expressed herein are those of the author only and do not necessarily reflect the views of the United Nations.

Improving Rural Connectivity and its Impact on Sustainable Development Goals (SDGs) – Case of Nepal

FINAL REPORT

Background paper for the Intergovernmental Tenth Regional Environmentally Sustainable Transport (EST) Forum in Asia

14-16 March, 2017, Vientiane, Lao PDR

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My background paper is based on the findings of the various studies published and documented. I have indicated the source of the materials in my text wherever it applies. I would like to thank them for their valuable research and indirect help in drafting this report.

Abbreviations

ADB	Asian Development Bank
DRCN	District Road Core Network
DDCs	District Development Committees
DoLIDAR	Department of Local Infrastructure Development and Agricultural Roads
DoR	Department of Roads, under MoPIT
DoTM	Department of Transport Management, under MoPIT
EIRR/IRR	Economic / Internal Rate of Return
FY	Financial or Fiscal Year, which runs from 16 th July to 15 th July
HDM4	World Bank's Highway Design & Management model (4 th edition)
HDI	Human Development Index
HPI	Human Poverty Index
HMIS	Highway Management Information System (under the DoR)
LRN	Local Road Network
M&E	Monitoring and Evaluation
MoF	Ministry of Finance
MoFALD	Ministry of Federal Affairs & Local Development
MoPIT	Ministry of Physical Infrastructure & Transport
N.A.	Not Applicable or Not Available
NPV	Net Present Value (used in economic evaluations)
NRs	Nepali Rupees
PA	Performance Agreement
PBMCs	Performance Based Maintenance Contracts
RBN	Roads Board Nepal
SRN	Strategic Road Network
TA	Technical Assistance
UNCRD	United Nations Center for Regional Development
VPD	Vehicles per day.

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Executive Summary

Nepal, a landlocked country, is sandwiched between two emerging giants: People's Republic of China (hereafter China) in the north and India in the south. The terrain of Nepal is such that within only a short distance of 145 km to 241 km, the ground altitude increases, from the Terai to the Peak of Mount Everest, by around 169 times. This is one of the major physical constraints in constructing transport infrastructure in the country.

More than 80% of the population of Nepal in 2014 resided in the rural areas with majority depending on agriculture as a source of income. Average of 25% of the population, mostly living in the rural areas, are below the national poverty line, of which almost 46% reside in the West and Far-West Regions. This poverty situation is eminent when households located in remote areas barely have access to basic transport services, which consequently limits access to markets, employment and income generating opportunities.

Road connectivity in the rural areas, establishing rural-urban linkages, has become a priority in enhancing the socio-economic conditions of the rural populations in Nepal. Understanding the importance of rural road connectivity, the Government of Nepal has taken several initiatives, such as the Postal highway along the southern border, East-West Mid-Hill highway, Kathmandu-Terai Fast Track, North-South road corridors, Kathmandu – Terai highway, etc., that are either in the planning or construction phase. In addition, Nepal's annual budget is mostly allocated towards reducing poverty, increasing employment opportunities and achieving an overall economic growth.

The activities of providing access through motor able roads first began in 1901. However, the linkage between Kathmandu and the Indian border was established only in 1956, after which efforts were channelled towards constructing the primary road network. Rural road connectivity, during the 1990s, gained momentum with the introduction of the "Build Your Own Village Campaign" in 1994. The Department of Local Infrastructure Development and Agricultural Roads (DoLIDAR) was established by the government in 1998 to build capacity of local authorities in carrying out infrastructure development in accordance to the decentralization policies of the country. In addition, different policies and projects such as the Rural Access Programme (RAP), Strengthening National Rural Transport Programme (SNRTP), Model Village Programme, Decentralized Rural Infrastructure and Livelihood Program (DRILP), have been introduced by the government of Nepal to enhance road infrastructure and rural urban-connectivity in the country.

Due to several road construction initiatives, the length of road networks has increased by almost 253 times in the period 1956-2015. However, much attention is still required in rural road construction as only 3% of it is paved with bituminous materials and almost 80% is earthen. The 13% of rural road is gravelled. These earthen roads provide limited access during the rainy season due to flooding, landslides, rock-fall and lack of river

crossing facilities.

Along with the landslides and road blockages during monsoon, there are several other critical factors that constrain the construction of rural road transport infrastructure in Nepal. Political influences in infrastructure development projects, shortfall in providing adequate guidelines in the Public Roads Act and other legal documents, cumbersome budgetary processes are some of the other factors that are making road construction more challenging.

Although there are many challenges, projects that have achieved milestones in rural road constructions include the District Roads Support Programme (DRSP), Rural Access Programme (RAP) supported by DFID along with transport infrastructure projects supported by ADB and the World Bank. Poverty reduction by almost 21% has been observed in Ramechhap, Rasuwa and Taplejung after introduction of access roads through ADB funded projects. In addition, the per capita income of the population in the project areas increased by more than 100% with the advent of the access roads. Local employment opportunities were provided to beneficiaries that were residing in the DRSP project areas in Okhaldhunga, Ramechhap and Khotang districts. Ambulance, competitive markets, increase in access to finance and other services became readily available in remote areas of the district due to connection with the district headquarters. Due to this, substantial improvement in education as well as health sectors have been observed in all the 12 districts of the ADB funded road infrastructure development projects.

These rural access projects have been targeted directly or indirectly in achieving the 16 out of 17 sustainable development goals that is applicable to Nepal¹. Poverty reduction the main target of the SDGs, has been primarily the thrust of the rural road program. By establishing basic mobility through road connectivity, it has helped to bring down incidences of death by facilitating people reaching to the basic health services on time. Increased access to education services will increase and the population residing in the rural areas will also get an opportunity to get quality education. The economy will grow with the increase in the access to markets and income generating opportunities.

There are many projects, donor funded and public, that are working to provide access roads to rural areas and rural-urban linkages. The approaches to these road construction projects used in government projects are completely different from the ones used in donor funded projects. Thus, there is a tremendous need for a “National Rural Road Program”, in addition to updating the District Transport Master Plan, which consolidates best practices and creates a baseline for all projects being implemented in the road transport sector. In addition, a Sustainable Maintenance Strategy is crucial in decisions related to funding maintenance activities to sustain serviceability of roads. It is equally important that, in order to avoid the damage caused by extreme rain and drought, the earthen roads should be upgraded to sealed all-weather roads that ensure reliability and affordability.

¹ Nepal is a land locked country and SDG number 12 “life below water” is not applicable.

Chapter-1

1. Background

Rural transport plays a major role not only in the distribution of goods and services, but also in improving the rural economy, rural productivity, rural resilience and rural empowerment. It further helps to enhance the livelihood security of the farmers and rural poor, which have a significant impact on socio-economic transformation. The provision of rural transport infrastructure and services bring multiple socio-economic benefits to the communities. The improved rural transport and infrastructure connects the rural community with education, health, markets, access to drinking water, energy, administrative and welfare facilities including provision for employment opportunities. It has significant implications to poverty eradication, hunger elimination, social integration and for achieving the 2030 Agenda for Sustainable Development Goals (SDGs). Therefore, there is a pressing need for improvement of rural transport and enhanced rural access in developing countries like Nepal so that no one will be “left behind”.

Realizing the importance of the improved rural connectivity and rural-urban linkage, the Government of Nepal has taken several initiatives in the extension of road network to support and facilitate the socio-economic development of the country. Construction of 1,141 km Postal Highway running east to west along the side of Indian border in south plain; building of about 1776 km East-West Mid-Hill Highway and development of 10 modern cities along the road corridor; 67 km Kathmandu – Terai Fast Track, four-lane highway to link Kathmandu Valley with the Terai plain; development of nine North-South road corridors which will link India in the south and P.R. China in the north, and the feasibility study for the East-West Railways, are among few examples that have initiated by the Government for improvement of the rural-urban connectivity in recent years.

The main objective of this paper is to provide an overview of improving rural transport infrastructure and services and its impact on socio-economic transformation in the rural communities. The paper is based on an extensive review of several research findings, recent reports published by the Government of Nepal and its supporting and partner organizations, and policy studies in the rural transport. The major focus of the paper is to illustrate the importance of the rural transport connectivity and rural-urban linkage for achieving the SDGs by 2030.

The first chapter provides a brief introduction on current status of rural transport connectivity and rural-urban linkage in rural areas of Nepal, both motorized and non-

motorized. It further describes why Nepal should consider improving rural connectivity and rural-urban linkage.

The second chapter describes the scope of the improved rural transport connectivity and rural-urban linkage in Nepal. This part of the paper further highlights the mobility options and their contribution for improving rural economy and rural development. In addition, this chapter describes the potential scope to improve the transport connectivity and rural-urban linkage in different geographic (Terai, Mid-Hill, Mountains and Himalayan regions) and political (Eastern, Central, Western, Mid-Western and Far- Western Development) regions.

The third chapter evaluates the efforts of the Government of Nepal to bridge the connectivity gap between rural districts, national road network, and major tourist destinations. It also discusses the different policies, programmes and development projects that have been launched by Government of Nepal and its partners, such as DoLIDAR rural roads programme, Strengthening National Rural Transport Programme (SNRTP), Model Villages Programme, the Rural Access Programme (RAP), the Decentralized Rural Infrastructure and Livelihood Programme, among others. This chapter further evaluates their impact on socio-economic development of the rural communities in different geographic regions in Nepal.

Chapter four focuses on the major issues and challenges particularly issues related with policy, planning, financial, technical and institutional that Nepal is currently facing for the development of rural transport connectivity and rural-urban linkage; issues and challenges related with access to basic utilities and services such as education, health care, market and employment opportunities, and energy, drinking water and public services and administrative facilities. This section also discusses issues (social, economic and environmental) and challenges related to rural transport connectivity in Terai, Mid-Hill, Mountains and Himalayan regions.

Chapter five discusses the impact of improved rural transport connectivity and urban-rural linkage on SDGs. The major focus would be given on how the improved rural transport infrastructures, services and all weather-road connection in Nepal could contribute to achieving towards different goals and targets of the SDGs such as poverty eradication, food security, access to quality education, better health care and wellbeing, drinking water, energy, market, administrative and welfare facilities, and obtain finance and employment opportunities, rural productivity (agricultural production), rural resilience (climate change and disaster resilience), rural empowerment, gender equality, rural economic growth, and overall sustainable development.

Finally, chapter six provides a set of concrete recommendations to improve rural transport connectivity and rural-urban linkage and how they link to the Sustainable Development Goals (SDG's). It also provides the suggestion to overcome the policy, planning, financial, technical and institutional challenges that Nepal is facing for improving rural connectivity and rural-urban linkage. In Chapter 6 the possible funding and financing opportunities to strengthen the rural transport connectivity will be also discussed.

1.1. Introduction

Geographic Location

Nepal is located in central part of the Himalayan belt between the latitudes of 26' 22" to 30' 27" N and the longitudes of 80'04" to 88'0012" E. As a landlocked country, it covers an area of 147,181 square km, with a population size of approximately 28.1 million. The northern part of the country, bordering China, is a rugged terrain with the Himalayas and the southern part is a plain land bordering with India.

Topography

Nepal has a diverse topography consisting of Terai (plains), mountainous hilly and Himalaya regions. Within a short horizontal distance of 145 to 241 km, the ground altitude changes from 50m (Terai) to 8488m at the peak of Mount Everest (Himalaya). Such a sharp vertical landscape is one of the major challenges for the transport infrastructure development in the country.

Geology and Physiographic Regions

As a result of drastic change in elevation within a short distance, Nepal has tremendous geographic diversity which can be divided into five physiographic regions: Terai, Siwaliks, Middle Himalaya, Higher Himalaya and Trans-Himalaya extended from the south to the north, respectively. The Himalayan region covers 15%, Mountain Hills 68% and the Plain Terai 17% of the total area. Trans-Himalaya is mainly situated in the north of the Higher Himalayan which includes 4 districts: Dolpa, Mugu, Mustang and Manang.

The Middle and Higher Mountain belt comprises of the parts of the country above 4,887 metres, in average elevation. Its harsh terrain makes communication and transportation difficult, and only 7% of the population live there. This part of Nepal comprises of only 2% of the country's cultivable land. The 12 districts in this belt are food-deficit and mostly inhabited with low-income and vulnerable populations. The Hill belt,

ranging in altitude from 610 to 4887 metres, runs through the central part of the country, which is much more densely populated. The region has several agriculturally suitable valleys, including Kathmandu and Pokhara. There are 39 districts in the Hill belt, with socio-economically diverse population.

The Terai, is an extension of the Indo-Gangeatic flatlands that run across the southern part of the country bordering India. With an altitude from 50 meters up to 610 meters, this belt is mostly flat and includes dense forest and constitutes of the country’s most fertile land. The 20 districts of Terai make up the main agricultural belt of the country, with general surplus food production. With around 17% of total land area, Terai has the most extensive road network in comparison to Mountain, Hill and Himalaya.

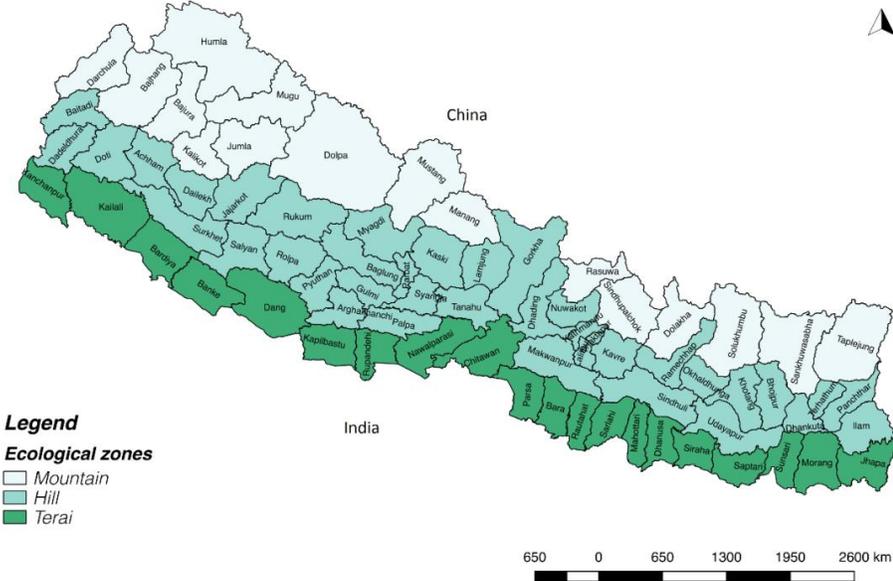


Figure 1. Physiographic regions of Nepal

Geologically, the Middle Mountains and High Mountains are relatively stable zones whereas Siwaliks is most unstable and unpredictable in the sense that it is very fragile in nature. Due to the rugged terrain, steep topography, fragile geological condition, and instant rainfall during monsoon season, Hill and Mountain area of Nepal poses formidable natural obstacles for transport connectivity. Most of the rural areas in Nepal are physically isolated, and lack basic transport infrastructure and services. As a result, rural communities in Nepal face several socio-economic challenges. Poverty, hunger and access to basic utilities and services such as primary health care, education, safe drinking water, energy, sanitation, market and employment, remain formidable challenges for rural Nepal.

1.2. Socio-economic conditions

About 80% of Nepalese live in rural areas and most of them depend on subsistence farming for their livelihoods. Poverty in rural Nepal is a massive problem. On average, around 25.2% of the population lives below the national poverty line, however this figure increases up to 46% in western and far-western regions. According to the national living standards survey (2010/2011), over 30% of Nepalese live on less than US\$14 per month, and the majority of them live in rural areas. About 23.8% of the Nepali population lives on less than US\$ 1.25 per day.

The current per capita income of Nepal stands at US\$ 762 (as of 2015). Despite a decade-long armed insurgency and protracted political transition, Nepal has made good progress in terms of poverty reduction and human development. The current annual rate of poverty reduction is 2.5%. Nepal has been able to reduce extreme poverty significantly in the last seven years from 53% in 2003/2004 to 23.8% in 2010/2011, and thus attained the first Millennium Development Goal ahead of time². However, as per the post-disaster needs assessment preliminary report, the poverty rate is estimated to rise between 2.5 and 3.5 percentage points due to devastating earthquake of 25 April, 2015.

Though population living below poverty line has declined in last decade, the disparity between rich and poor remain high. The Gini Coefficient based on consumption expenditure reached 0.353 in urban area, 0.311 in local area, and 0.328 in Nepal overall³. The gap between geographical regions and among the different ethnic groups is even much wider. In addition to the poverty reduction, Nepal has achieved gender parity in education and reductions in infant and maternal mortality. According to WHO⁴ report, the maternal mortality rate of 548 deaths per 100,000 population in 2000 has been considerably reduced to 258 deaths per 100,000 population in 2015.

² As this Nepal MDGs Progress Report 2013 points out, the Government of Nepal's commitment to achieving the MDGs, coupled with required policy reforms has borne fruit. Nepal is on track and is likely to achieve most of its MDG targets, despite the prolonged political instability. The targets for poverty reduction, maternal mortality, and boys and girls enrolment in primary education are either achieved or likely to be achieved. Even in areas where Nepal is lagging, particularly in sanitation, it has already internalized an acceleration framework in the form of the MDG.

³ National Population Census 2011, CBS, 2014

⁴ www.who.int/gho/maternal_health/countries/npl.pdf

1.3. Fiscal Budget Allocation and Expenditures on Rural Transport

The annual budget of Nepal is targeted towards achieving economic growth, poverty reduction, employment generation and creating foundations for overall socio-economic development. The budget focuses on prioritizing programs which directly benefit the people and at the same time deliver results through optimum utilization of available resources within the country. Over the last four years, the average annual fiscal budget⁵

Box 1. Nepal's Economy (2010-2014)

Remarkably, Nepal's economy grew steadily even during the height of conflict and economic management remained prudent. The average growth during 2010–14 was 4.22% with lowest 3.4% recorded in 2012. The economic growth for the Fiscal Year 2014 was 5.5%. Owing to the factor contributed by the earthquake of April 25, 2015, the growth for that year plunged to 3.0 percent. The following year 2015/16, the growth further plunged to 0.8 percent due to various factors including southern border blockade and its effect on low capital expenditures.

increase is in the tune of around 20.4%. However, due to various constraints⁶, only around 80% of the allocation is spent annually. Table 1.1 gives annual budget allocation and expenditures between 2012 and 2016 period.

Two implementing agencies: Department of Roads (DoR) and Department of Local Infrastructure Development and Agricultural Roads (DoLIDAR) are involved in implementing rural roads. Despite of DoR's mandate to restrict its programs implementation to Strategic Road Network, it has also been involved in rural road construction. For the fiscal year 2016/17 the total combined budget for these two agencies for improving rural connectivity is estimated to be USD 0.356 billion⁷ which is 3.4% of the national budget and 37% of the total transport sector budget. In FY 2015/16, the total budgeted spending⁸ on rural transport infrastructure was approximately USD 0.196 billion which is 91.5% of the fiscal allocation.

About 62% of expenditure came primarily from Ministry of Federal Affairs and Local Development while rest 38% budget expenditure was contributed through DoR. DoR's engagement in rural road is largely focused on the construction and rehabilitation of rural roads supportive to poverty reduction and promoting tourism, while DOLIDAR budget is allocated for agricultural rural-roads.

The following Table 1 provides the details of the fiscal allocation and expenditures for the last four years on transport sector and the rural transport.

5 Annual Budget Speech, 2016, MoF

6 Low spent allocation is contributed

7 Budget allocation, Annual Development Program, Part I, 2073-74, National Planning Commission

8 Annual development Plan, NPC, 2016

Table 1. Budget Allocation and Expenditures (in USD billion)				
	Fiscal Year			
	2013/14	2014/15	2015/16	2016/17
Annual Budget Allocation	5.17	6.18	7.01	10.48
Annual Expenditure	4.1	5.31	5.85	
% Expenditures against Fiscal Allocation (Total Budget)	79.30	85.92	83.45	
Annual Allocation of Transport Sector		0.476	0.615	0.953
Annual Expenditures Transport sector	0.368	0.438	0.580	
% Expenditures against Fiscal Allocation (Transport Sector)		92.0	94.3	
Annual Allocation for Rural Transport		0.158	0.214	0.356
Annual Expenditures for Rural Transport	0.152	0.116	0.196	
% Expenditures against Fiscal Allocation (Rural Transport)		73.4	91.5	

1.4. Transport Situation of Nepal

Although motorization in Nepal started around 1901, however the first motorable access from Kathmandu to the Indian border started only in 1956 after opening of Tribhuvan Rajpath which connects Terai (Indian border) with the Kathmandu valley. After 1956, it took three decades of extensive efforts to create and establish a primary road network to enable vehicle mobility from north to south and the east to west of the country without relying on foreign transport network. In terms of transport sector development, early 1990s marks an important milestone for rural road connectivity. With the “Build Your Own Village” campaign initiated by the Government in 1994, providing a lump-sum grant of USD 3,000 to each Village Development Committees was instrumental in raising people’s aspiration towards building rural access. To pursue the Agricultural Prospective Plan and stimulate the rural growth, the government established Department of Local Infrastructure Development and Agricultural Roads (DoLIDAR). The objective of DoLIDAR was to undertake infrastructure development programmes in accordance with decentralization policies for attaining the development goals by making the local authorities technically capable and competent by ensuring their accountability. Prior to the establishment of DoLIDAR, the rural road construction and extension went in such rampage that it was difficult to keep control over the adverse environmental impact created due to rural road building activities, undertaken without proper design and planning.

Green Road concept was introduced in 1990 in rural road construction. Two significant pilot projects “Rampur – Aryabhanjhyang Road” in Western Region and “Kathmandu – Sitapaila - Bhimdhunga Road” in Central Region were launched with Green Road concept.

The results obtained from these pilot projects were later used to develop specification and design standards for rural roads.

1.5. Road Network

Road infrastructure has dominated Nepal’s development endeavor over the last seven decades. In terms of road development, Nepal has achieved a substantial growth from merely 256 km in 1956 to around 65,000 km in 2015.

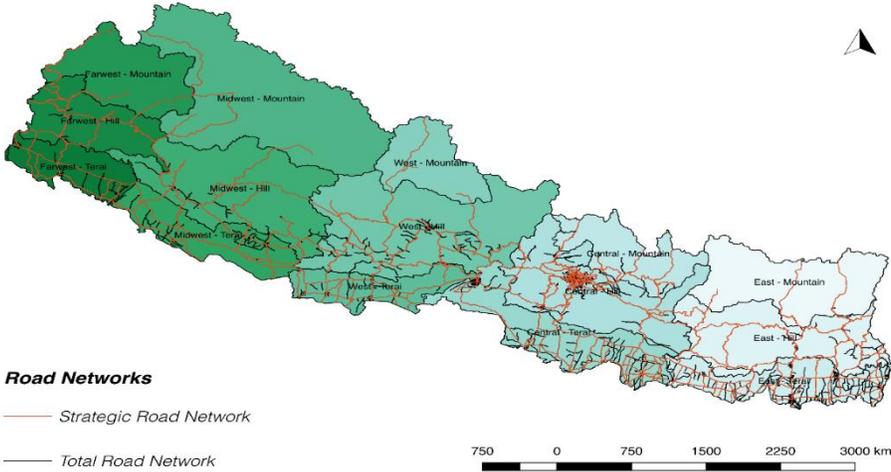


Figure 2. Road networks of Nepal

In early years of planned development, the strategy of road development was targeted towards building self-reliance in making trips within the country. In absence of this, our earlier movement from one part of the country to another was greatly relied on the transport network of the neighboring country, India. According to the Statistics of the Strategic Road Network, there is a total of 11, 636 km for the SRN as of 2013. However, half of the SRN is still unpaved and 35% of it is still earthen road.

1.6. Road Classification

Road development in Nepal is based on political classifications rather than functional classifications. Partly because of that, roads built with significant investment are found to be underutilized. Underutilization and unserviceability of roads combined with disruptions of local movement during rainy season calls into question the efficacy of Nepal’s road system planning, and threatens return on investment made to date on local roads.

Roads are classified mainly into two networks: Strategic Road Network (SRN) comprising National Highways and Feeder Roads and Local Road Network comprising District, Village and Urban Road Networks. Department of Roads (DoR) is responsible for managing and developing SRN. Local Institutions including District Development Committees (DDC), Village Development Committees (VDC) and respective Municipalities are responsible for managing and developing respective networks within LRN.

Table 2: Types of road infrastructure in Nepal			
	Strategic Road Network as of 2013	Local Road Network as of 2013	
		District Road Core Network	Other Local Roads
Total Identified Length	14,900	30,761 (approx.)	31,903
Road under Construction	2,092	5,033	945
Existing Road Track Open	12,898	25,728	30,000
% of Paved Length (Bituminous and Gravelled)	64 % (Bituminous - 51% Gravel – 13%)	31.7% (Bituminous– 3.18% Gravel – 27.62%)	-
Accessible to All Seasons Road	97% within 2 hrs. in Terai & 77% within 4 hrs. in Hills/Mountains (as of 2011)	Additional 2.5 million people will have access to motorable road head within 1 hr. in Terai and 2 hrs. in Hills/Mountains (Thirteenth Plan Target)	
Road Density Paved/Total	0.16 km/sq. km / 0.44 km/sq.km		
Bridges nos.	1,854	822	200
Bridge under Construction	352	296 DoLIDAR & 450 DoR	100
Bridge under planning	751	844	NA
Source: Department of Roads, Statistics of Strategic Road Network, 2015/16 Department of Local Infrastructure Development and Agriculture Roads, Statistics of Local Road Network (SLRN) 2016			

1.7. Nepal Road System

The present road system, description and the respective responsibility is illustrated in Table 3. National Highways are the main arterial route connecting regional headquarters, north-south roads and east-west corridor linking China in North and India in the South. Feeder roads are the important roads linking district headquarters and places of strategic importance. DRCN are the rural roads providing connection to Village Economic Centers.

Table 3: Nepal Road System			
Road Class	Km (2012)	Description	Respective Network
National Highways (NH)	12,894	The Main Arterial Route	DOR
Feeder Roads (FR)		Important Roads with a more Localized Nature	

District Road Core Network (DRCN)	25,728	Roads Connecting Village HQ (economic centers)	DDC
Urban Roads	3,000	Roads Within a Municipal Boundary	Municipality
Villages Roads	>31,903	Non-through roads linking single villages to roads of a higher class.	VDC

MoFALD provides policy guideline and technical backstopping for LRN through DoLIDAR. Within the District Roads Network, the roads are further divided into District Road Core Network and Village Roads.

Nepal's road system has been developed in stages. The first stage begins with track opening, which is followed by upgrading activities such as gravelling, construction of drainage structures along with, river crossing structures and finally bituminous pavement. Substantial part of SRN and LRN (36% of SRN and 68% of LRN) are unpaved (earthen condition) and are not passable during monsoon period when country receives more than 80% of annual rains during these periods (June – August). Although 28% of rural roads are paved with gravel, effective maintenance of gravel surface pavement has remained a challenge⁹ in this country due to extreme weather events: excessive rain during monsoon and complete dry spells afterwards. Generally, after three to four years of the operation, the gravel surface is found to have reverted back to the earthen stage owing to the excessive loss of gravel. The present road system consists of 64% of SRN and 31.7% of LRN in a paved condition (bituminous and graveled) and rest in earthen condition.

1.8. Rural Road System

In order to get an overall view of the rural road system in the country, the country has been divided into five administrative zones under three ecological system- Mountain, Hills and Terai (flat land). For each zone, the total land area, population, existing road length (paved and unpaved) has been calculated and presented in Table 4. These figures have been taken from the District Transport Master Plan (DTMP), which was developed and prepared for each individual district with the support from bilateral and multilateral development partners involved in this sector (Figure 3).

⁹ The gravel loss (estimated to 22 – 25 mm/year) of the graveled paved road is also substantially high due to 9 months' complete dryness of the surface, which causes a loss in the gravel moisture, and 3 months' excessive rains during monsoon.

It is evident from Table 4 that the paved road (bituminous) in Mountains and Hills is almost non-existent. In Mountains and Hills, only 65% and 85% of the rural road, respectively, has been constructed, of which 90% in Mountains and 70% in Hills are in a motorable condition. In Terai, 78% of the identified

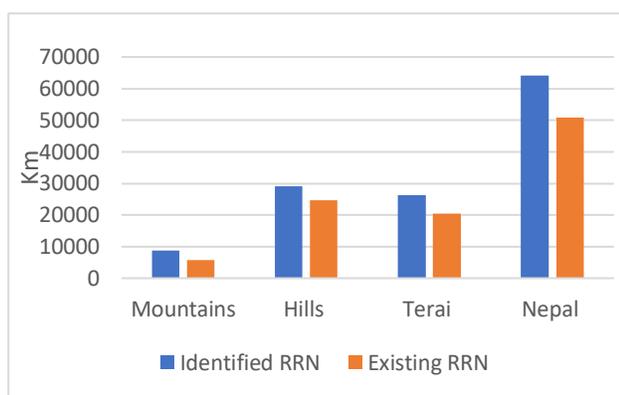


Figure 3. Rural Road Status

road network has been constructed and out of this 78% are motorable. Due to low utilization of the transport services especially in Mountains and Hills, some of the roads which have been built over the period of times have never been subjected to vehicle run. DoLIDAR has identified that out of the existing rural network; only around 50% of the rural roads are motorable and are in a condition for travel. The current DoLIDAR programs are mostly targeted to bringing the road into an effective motorable condition by rehabilitating or upgrading the road. The challenge lies not only in building and maintaining roads but equally support for generating traffic through increased economic activities in the project influence area.

Table 4. Status of Rural Road in the five Administrative Zones								
Administrative Zone	Ecological Region	Identified Road Length	Rural Road Status, km (2012)				Population (2011) in million	Land Area Sq. km
			Paved with Bituminous	Paved (Gravel)	Earthen	Total		
Eastern Region	Mountain	2235.99	0.0	15.6	783.7	799.3	0.39	10438
	Hills	6106.62	30.5	275.5	3907.6	4213.5	1.62	10749
	Terai	11672.72	142.0	2724.1	1556.8	4423.0	3.81	20760
Central Region	Mountain	5097.13	36.5	176.7	3918.3	4131.5	0.85	8203
	Hills	7935.69	388.1	1431.2	4983.3	6802.6	4.10	9879
	Terai	5874.55	254.9	3368.8	4193.5	7817.2	4.74	9328
Western Region	Mountain	560.05	0.0	0.0	301.0	301.0	0.20	5819
	Hills	8441.96	181.6	327.7	8975.4	9484.7	2.63	17126
	Terai	4658.64	464.8	2049.7	1981.9	4496.4	2.29	6453
Mid-Western Region	Mountain	435.70	0.0	0.0	303.5	303.5	0.25	19610
	Hills	5303.42	29.4	664.7	2698.8	3392.9	2.41	18406
	Terai	1897.40	47.6	1713.3	136.4	1897.4	0.91	4362
Far-Western Region	Mountain	396.62	0.0	0.0	209.6	209.6	0.46	7932
	Hills	1402.94	0.0	10.0	803.7	813.7	0.86	6762
	Terai	2124.34	0.0	1844.5	13.0	1857.5	1.21	4845
		64143.77	1575.4	14601.9	34766.3	50943.6	26.62	147181

Source: District Transport Master Plan; DoLIDAR

1.9. Road Accessibility and Density

The road density of the paved roads, which is normally an all-weather road, has currently reached 16 km per 100 sq. km of land area. If the current network of estimated 65,000 km is made fully operational with all-weather status. Nepal's road density (44km/100km²) is higher than other mountainous countries such as Bhutan (20km/100km²) and Pakistan (32km/100km²). This is a manifestation of Government Nepal's major focus on constructing new roads in the rural areas. The terrain-wise road density is given in Table 5. The road density in mountains is low compared to the other physiographic regions. Because of varied topography and settlement patterns, the distribution of roads in all the Development Regions and physiographic zones of the country is not even. The Central Development Region (CDR) has the highest road network, followed by Eastern (EDR), Western (WDR), Midwestern (MWDR) and Far Western Development Regions (FWDR). Similarly, the Terai has the highest road network followed by hills and mountains.

	Road density Km/100 sq.km Km/sq. km	Road length (km)
Mountains	0.03	4,293
Hills	0.12	33,630
Terai	0.13	27,077
Kathmandu Valley	2.61	2345
Kathmandu District	2.78	1,099
Nepal	0.44	65,000

Chapter-2

2. Scope of the improved rural transport connectivity and rural-urban linkage

2.1. Scope of the Rural Transportation in Nepal

According to World Bank, 81.76% Nepalese live in rural areas in 2014, and most of them depend on farming. Although rural population has slightly decreased in 2015, a significant portion of the population i.e. 23,206,000 (81.39%) still live in rural areas. Nepal is an agricultural country and two-thirds of its population depend on agriculture for livelihood. Agriculture also plays a vital role for the economy of Nepal. Recent studies show that about 31.6% of the National GDP comes from the Agriculture sector.

Table 6: National Living Standards¹⁰
(Poverty head count rate in percentage)

Area	1995/96	2003/04	2010/11
Nepal	41.8	30.9	25.2
Urban	21.6	9.6	15.5
Rural	43.3	34.6	27.4

Poverty is pervasive in rural Nepal due to insufficient infrastructure for transportation and communication. On average, around 25.2% of the population lives below the national poverty line, this figure increases up to 46% in western and far-western regions. There are approximately 1.3 million households (4.8%) who do not have their own land. The poverty incidence for people living in rural areas is almost double to that of urban. The absence of essential transport infrastructure is one of the major causes of poverty in the rural areas.

Inadequate infrastructure and poor quality of road networks in rural areas lead to high cost of transportation for consumer goods and services. It further limits the use of local markets for the rural communities to sell their agricultural products. It is a widely-known fact that rural roads play a catalytic role in poverty reduction. Improving transport mobility and rural-urban connectivity can considerably reduce rural poverty by providing economic opportunities and basic services for all sectors of society (men, women, youth, children, farmers, elderly and physically disables). The freedom of mobility further provides more opportunities for social, political, and administrative activities.

The direct benefits of labor-based road construction and maintenance could provide the good opportunity of employment to the rural poor. Studies show that given a sufficiently long period of employment on the road, the poor can accumulate capital to invest in

¹⁰ Source: Nepal Living Standards Survey

alternative livelihood opportunities and thus move away from poverty (ADB, 2002). As many remote villages are yet to be linked with the district roads and national transport networks, building rural transport infrastructures particularly rural roads and bridges are the major priority of the Government of Nepal. Therefore, there is huge scope for the improvement of rural-urban connectivity and public transport system in Nepal.

2.2. Rural Transport Accessibility and Connectivity in Nepal

Over the last decade, Nepal has made significant effort for developing rural road expansion network. Since 2006, 58% of population in Hills has motorable access within a reach of 4 hours, whereas 94% of population has a motorable access within a reach of 2 hours in Terai. A study carried out by DoR has estimated that there has been an improvement in accessibility in Hills from 58 % in 2006 to 77.5% in 2011 and in Terai from 94% in 2006 to 98 % in 2011 with an overall accessibility of 88 % of the population in the country.

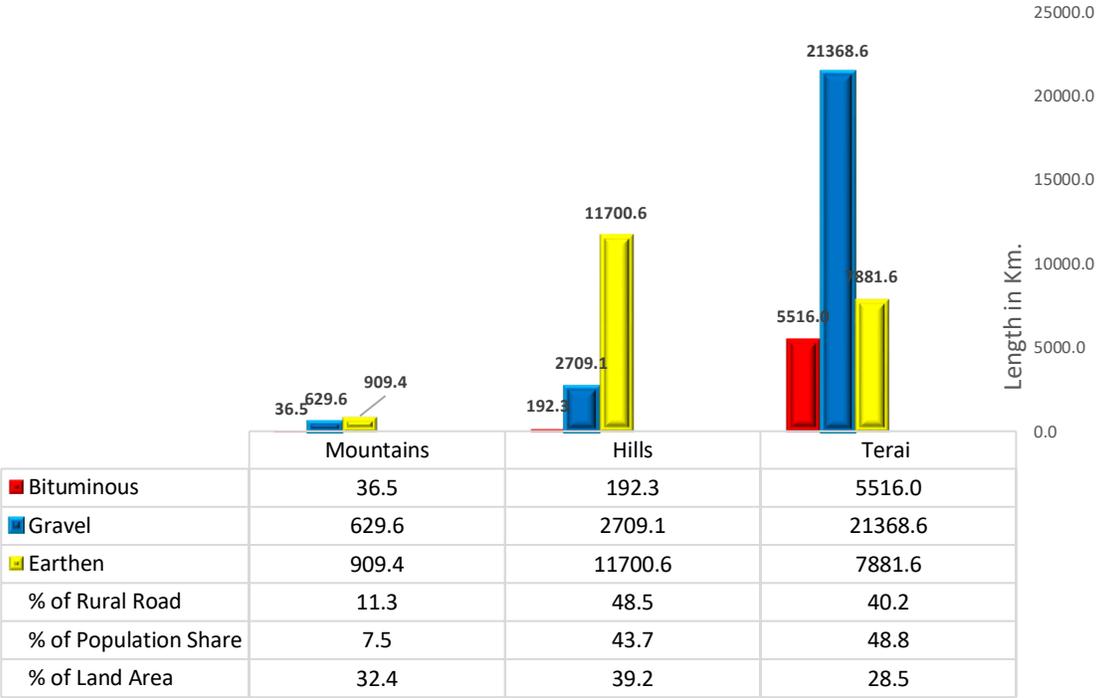


Figure 3. Rural road network: Ecological zone

It has been recorded that 79% of rural road networks in Nepal are categorized as “earthen”. Only around 3% is paved with bituminous materials. These earthen roads are seasonal and provide limited access during the rainy season because of the lack of river

crossing facilities. Figure 4 shows a geographical distribution of rural network in the country. The share of rural roads in 32.4% of the country (i.e., the mountainous region) is 11.2%. The Hills and Terai occupy 39.2% and 28.5% of the total land area in which the share of rural roads is 48.5% and 40.22% respectively.

Before the establishment of DoLIDAR in 1998, all roads were looked after by the Department of Roads (DoR) except some roads that were built by local institutions including District Development Committees (DDCs) and some key Municipalities. The design and implementation of the roads were carried out very meticulously and in a more controlled environment. During the Eighth Periodic Plan (1993-1997), the responsibility of the district roads shifted from DoR to DDCs.

Rural Road Program, introduced in 1993, was the first official program targeting rural road development in Nepal. Under this program, block grant ranging from one million to 4.5 million Nepalese rupees was provided to the district and were asked to implement rural road program through users' group. A guideline issued by the Ministry of Local Development provides details on the formation of the user's group and implementation modalities. The detail of the guideline issued is given in the following box.

The "Build Your Own Village" program was an initiation to accelerate rural roads program. This, however, lacked strong institutional support. Roads built by DDCs did not survive more than two monsoon seasons because it lacked proper alignment selection, maintenance strategy, received inadequate technical support and was constructed using inappropriate construction technique. This led to degradation of the environment, triggering landslides and slope failures causing large degree of social and economic loss to the society. Nepal has been experimenting with labor-based construction technology for the construction of roads since 1975. This technology was first started for Lamusanghu – Jiri Road with the support from Swiss Government. It is a first of its kind and an exemplary attempt in Nepal. The construction was based on environmentally friendly road construction concept with balancing earthworks by keeping cutting of the hill side slopes to a minimum. Another example of an effective and sustainable use of labor-based methods for poverty reduction is the Nepal Rural Access Program (RAP) design, where poverty groups are targeted for employment (including poor female household heads, and women employed traditionally as long-distance porters whose livelihood will be affected by road construction) during agricultural off-peak times without compromising other livelihood activities. This programme was very successful.

Box 2: Guideline Issued by the Ministry of Local Development in 1993 for the implementation of Rural Road under Rural Road Program

Project Planning

- A rural road project should normally be for less than 10km of road.
- In view of the limited availability of technical manpower and construction equipment and tools at the district level, not more than six projects should be selected per year.
- Only projects that can be implemented within a year should be selected.
- The planning of rural road should follow the District Road Network Plan (as soon as it is completed by the Department of Roads (DoR)).
- A rural road project should support the rural development process by linking rural areas with good roads o market centers.
- Priority should be given to projects having the least negative environmental impacts and which can be maintained through toll tax collection and mobilization of local resources.
- In districts road projects, the User's Committees should ensure provision on a free cost basis of 10 meters of land (on both sides) from the center of the road as Right of Way. The DDC should make necessary arrangements for transferring ownership.
- In districts, inaccessible motor transport, the money should be used in the construction of suspension bridges. For improvement of mule trails and tracks, prior approval of the MLD must be secured.
- User's Committee
- The User's Committee should be elected from among the people of the VDCs connected by the road and laborers from the village used for road construction.
- No elected officials shall be ex-officio chairperson or members of a User's Committee. However, the beneficiaries can elect such officials, if he/she is also among the project beneficiaries.
- The DDC should be represented at the meeting of the project beneficiaries in which the User's Committee is elected.

Implementation

- Rural road projects should be implemented through the User's Committee.
- A Monitoring and Supervision Committee should be constituted to supervise, monitor, evaluate rural road projects.
- The functions of the Monitoring and Supervision Committee are to help the User's Committee implement the project, monitor progress, provide technical backstopping, and, in the case of any problems in functioning bring it to the notice of the DDC.
- Rural road projects should be based on labor-intensive technology. Labors should be employed from the VDC to which the connecting road is being built. Twenty-five percent of the wages should be deducted at as a source free labor contribution.
- For special case, The Department of Road may provide heavy equipment, such as bulldozers and compressors on the request of the DDC. The DDC may use up to five percent of the budget for use of the heavy equipment to be used for maintenance of the equipment.
- If the allocated budget remains unspent, the amount, along with the service charge, should be used for road maintenance.
- The DDC should plant trees on both side of roads.
- The expenditure of the User's Committee must be audited according to government rules.

Road Completion

- The road completion certificate committee should certify a road project within three months of its completion

Nepal's topography offers a unique pattern for food grain movement from Terai to Mountains and Hills. The dependency on monsoon rains for carrying out farming activities in substantial part of Hills and entire Mountains necessitates the presence of rural

connectivity for timely supplies of essential goods, that too at a reasonable price. Some of the Hills and Mountain districts still face shortage of food grains. The rural road extension over the last five years, especially in Hills and Mountains, have reduced the dependency¹¹ on costly air transport in transporting essential goods and supplies to some extent.

2.3. Urbanization in Nepal

Nepal's urban sector is one of the fast-growing sectors. Urban Growth and Spatial Transition in Nepal, an initial assessment¹² made by World Bank states that Nepal is undergoing two momentous transformations – from a rural to an urbanizing economy and from a unitary to a federal state. The country's urban population growth rate is up to 7%. Current urbanization in the country is around 17% which is expected to grow at the rate of 4-5% annually and Nepal's journey is destined towards becoming a predominantly urban economy. The Government of Nepal is allocating significant amount of budget for sustainable rural-urban connectivity and urban development. For instance, 28.61% of the annual development budget has been dedicated towards implementing programs targeted to SDG 11. Industry, Innovation and Infrastructure (SDG 9) receives 27.59% of the allocated resources targeted to support 94 development programs. Around 50% of this resource is targeted to rural transport for an overall improvement of rural connectivity.

Box 3: Rural Access Program Review

In working in the Mid and Far West and the more mountainous parts of Nepal the Core districts of RAP3 have targeted some of the poorest and most remote districts in Nepal. By September 2015, 1.88 million person-days of employment have been generated. The poorest are selected for working in the Road Building Groups (RBGs) and Road Maintenance Groups (RMGs). A forthcoming DFID sponsored Systematic Review of research on the impact of rural road investment (Hine et. al. 2015) suggests that rural road investment, particularly in areas of low road density, will strongly promote economic growth and reduce poverty. It is also widely recognized that rural isolation is a key characteristic of poverty hence the programme should, overall, help to reduce poverty in both the short term (through employment) and in the long term. Approximately 40% of the RBG members are women. Dalits and ethnic groups make up 26%. For RMGs, approximately 41% are women; and 26% are Dalits and ethnic groups.

¹¹ Example: Karnali Highway: after completion of Karnali Highway, it has not only facilitated the movement of food grains to the food deficit areas but also supported the local economy by minimizing the transport cost to exporting local produced goods (herbal products and apple fruits) to the bigger markets.

¹² Managing Nepal's Urban Transition, News Feature, April 2013, World Bank, (<http://www.worldbank.org/en/news/feature/2013/04/01/managing-nepals-urban-transition>)

The link between the rural and urban areas has always remained a driver of rapid urbanization. Urban demand of services, supply for urban consumption such as agricultural products and construction materials are generally supplied by the rural area surrounding the urban centers. To facilitate these services and supplies to the urban centers, rural-urban links are coordinated mainly by rural roads. Therefore, improved rural connectivity is essential to tackle with the rapid urbanization, which not only brings effectiveness efficiency in carrying out social and economic activities, but also helps to minimize the missed opportunities.

2.4. Motorization in Nepal

Nepal's recent growth of motorized vehicle population is quite impressive. There has been a steep increase in registered vehicles in the last 8-10 years. The current composition of vehicle fleet comprises of around 80% motorcycle. The details of the vehicle composition are given in Figure 5. In rural roads, the transport is dominated by non-motorized transport. Bullock Cart and Rickshaw are the common means of transport for goods and passenger especially in Terai plain. With the introduction of electric vehicles, it is now getting popular among rural dwellers and is gradually substituting the non-motorized transport in rural areas. In Hills and Mountains, the non-motorized means of transport particularly Bullock Cart, Rickshaws and bicycles are almost non-existent because of the road profile having higher gradient generally exceeding 7 percent.

Chapter-3

3. Government's Effort to Improve the Rural Transport Connectivity in Nepal

3.1. Budget Allocation for Transport Connectivity

Nepal is one of the few countries which achieved substantial progress on aligning annual budget with the Sustainable Development Goals (SDGs). Considering the activities and the programs targeted to each SDG, the resource allocation ranges from 0.18% (Partnerships for the Goals: Goal 17) to 28.61% (Sustainable Cities and Communities: Goal 9). In terms of the budget allocation, Goal 9 and Goal 11 receive highest percentage resources. A massive program has been launched to address the growing urbanization in the country. About 29% of the annual development budget has been dedicated towards implementing programs targeted to SDG 11. Industry, Innovation and Infrastructure (SDG 9) receives 27.59% of the allocated resources targeted to support 94 development programs. Around 50% of these resources are targeted to rural transport for an overall improvement of rural connectivity. The Figure 6 provides the details of the current fiscal year budget allocation aligned to SDGs.

Two agencies- Department of Roads (DoR) and Department of Local Infrastructure Development and Agricultural Roads (DoLIDAR) are involved in implementing rural roads. Despite of DoR's mandate to restrict its programs implementation to Strategic Road Network, its involvement in rural road continues. For the fiscal year 2016/17 the total combined budget for these two agencies for improving rural connectivity is estimated to be USD 0.89 billion¹³. Figure 6 provides the details of the current fiscal year budget allocation aligned to SDGs.

The major aim of improving rural transport connectivity is to support poverty reduction program by focusing on creating additional employment opportunities and supporting the rural environment for generating additional income to raise the living standards of the common people. The Government of Nepal is putting significant effort to bridge the connectivity gap between rural districts, national road network, and major tourist destinations. Different policies, programmes and development projects have been launched by the government with the help of international organizations and development banks such as RAP, Strengthening National Rural Transport Programme (SNRTP), Model Villages

¹³ Budget allocation, Annual Development Program, Part I, 2073-74, National Planning Commission

Programme, Decentralized Rural Infrastructure and Livelihood Programme (DRILP), among others.

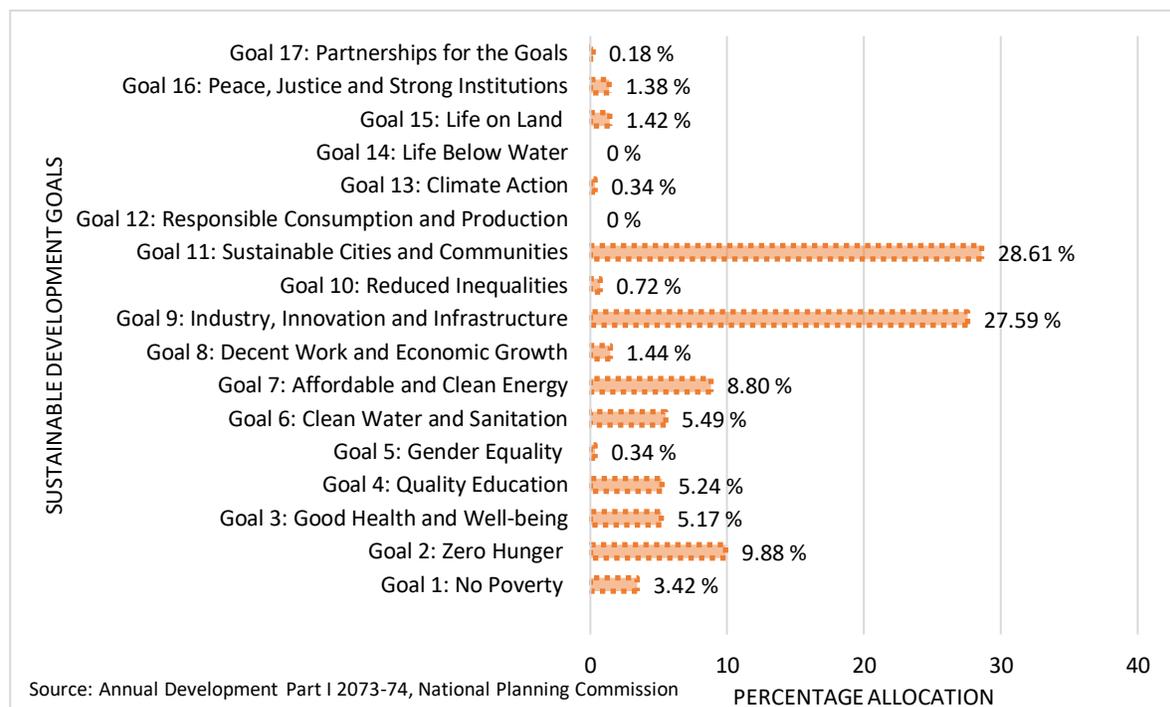


Figure 4. Budget allocation (development)

3.2. District Transport Master Plan

A district plan, which provides direction as well as resource projection for transforming district into socially and economically capable to facilitate the well-being of its people, was lacking in rural road planning.

District Transport Master Plan (DTMP) is a basic tool that identifies area of investment in maintaining, improving and constructing local roads within a district.

Box 4. District Road Core Network

The concept of District Road Core Network (DRCN) introduced by DoLIDAR in 2012 as a policy guideline for preparing DTMP is a major policy decision towards managing and developing LRN. The overall target of the government is to link all VDC HQs by all-weather connectivity through DRCN. The DRCN strategy focuses on:

- Developing all-weather road network with bridges to provide access to all VDC HQs;
- Selecting (for up gradation) only one shortest road link to serve a VDC HQs under DCRN, if multiple routes exist; and
- Planning for the construction of new roads for those VDC HQs which are not yet connected by earthen roads (number around 413 out of 3.660 VDCs).

The concept of District Road Core Network (DRCN), introduced by DoLIDAR in 2012 as a policy guideline for preparing DTMP, is a major policy decision towards managing and

developing LRN. The overall target for the government is to link all VDC HQs with all-weather infrastructure.

The DTMP, which is prepared for every five-year period, provides a prioritized list of interventions for local road network particularly to the DRCN that can be carried out with the estimated budget for the 5-year DTMP period. Each year the planned interventions are further detailed in the Annual Work Programme of the DDC, adjusting the plan as per the actual budget and requirements. The conservation works are further detailed in the Annual Road Maintenance Plan (ARMP) that defines the maintenance interventions to be carried out in the DRCN and provides further detail to the general proposal included in the DTMP.

As per the DTMP Guideline, in the allocation of the DTMP budget, priority is given to conservation works, followed by improvement works and finally new construction. DTMP funding will first be allocated to conservation, and remaining funds will be allocated to improvement of the existing DRCN roads, and if there is still funding available this will be allocated to new construction of DRCN roads.

Following the National Strategy for Rural Infrastructure Development, DoLIDAR has been a central institution for implementing rural road program in the country. DoLIDAR is assisted by several bilateral and multilateral development partners to implement rural road programme with a focus on a) building local capacity to manage local infrastructure; b) developing accountability of the local institution by ensuring their participation; c) increasing their competency to ensure quality; d) generating additional employment opportunities; e) supporting poverty alleviation program with substantial focus on uplifting the marginalized communities; f) focusing on gender equality; g) creating awareness for HIV/AIDS effected diseases. The review of the current rural road initiatives are given in the following paragraph.

3.3. Local Roads Bridge Programme (LRBP)

Isolation and lack of access (aggravated by absence of adequately maintained local roads and bridges connecting them) are some of the primary reasons for high incidence of rural poverty in Nepal. It is evident from the poverty disparity that there are strong connections between poverty and access to economic and social services. Lack of access (in absence of motorable bridges) is a serious constraint for economic and social development, incurring huge economic costs (cost of travel, health cost and inflated prices of commodities) for people. During monsoon, the significant part of the rural road network

virtually gets closed due to risk encountered in crossing the river system in absence of motorable bridge.

The LRBP is supported with the technical assistance of Swiss Government. Currently the program is running in an expansion phase. The details are given in the following Table 7.

Table 7. Local Roads Bridge Programme		
Physical Target/Progress	Methodology	Impact (assessed/expected)
<p>1. Component 1: Construction and piloting of new bridges and approaches</p> <p>2. Component 2: General Knowledge and Technology transfer</p> <p>3. Component 3: Formulate policies, strategies, norms, standards.</p> <p>4. Component 4: Capacity building (GoN, Local Bodies, Private Sectors and Communities)</p>	<p>Build-up Phase I (4years):</p> <p>5. Formulating policy, strategy, norms and standards</p> <p>6. Constructing/ piloting around 80 bridges + Additional support for 60 Bridges</p> <p>7. Technology transfer and capacity building</p> <p>8. Preparation for the integration of “Local Roads Bridge” as a part of RTI SWAp</p> <p>Expansion Phase II (3-4 years):</p> <p>9. Replicating the pilots nationwide</p> <p>10. Continue with the capacity building</p> <p>Consolidation and scaling up</p> <p>Phase III (3-4 years):</p> <p>11. Consolidate the learning from above phases</p> <p>12. Scaling up the motorable bridges nationally with exponential growth</p> <p>13. Prepare a gradual phase out-plan and prepare long term business plan for motorable bridges building to be handed over to the GoN</p>	<p>Outcome 1:</p> <ul style="list-style-type: none"> • People have improved access to services and opportunities. • This outcome is measured against the indicators/target of 1400 kms of roads accessible/operable all year round, • increase in the number of people having access to all weather roads within 2/4 hours of walk, • increased utilization of health services by number of people visiting, • increase in numbers of public utilities in the ZOI, • decreased costs of freights and increase in traffic and freight volumes. <p>Outcome 2:</p> <ul style="list-style-type: none"> • National and local institutions adopt appropriate local road bridge strategy. • Both the GoN and the private sector including local community based institutions can regulating/facilitate and building/maintaining motorable bridges respectively.

3.4. Rural Access Program (RAP)

This program is designed a) to improve the lives of the poorest and most marginalized people in remote areas by generating economic activities through the construction of transport infrastructure; b) to provide access particularly in remote areas; and c) to improve planning and the delivery of road maintenance and construction. The project is funded by Department For International Development (DFID), UK. The project commenced in 1999 and is currently in its third phase of operation. The target group for mobilizing workforce for rural road construction and maintenance is the communities that have limited access to

goods and social services. The physical target, progress, methodology and expected impact of the project is detailed below in the Table 8.

Table 8. Rural Access Programme		
Physical Target/Progress	Methodology	Impact (assessed/expected)
<p>Phase III (2014 –2017)</p> <ul style="list-style-type: none"> • Construction activities: Bajura, Humla, Kalikot and Mugu. (Constructing 97.5km of new fair-weather earthen rural roads. • Maintenance: Achham, Dailekh, Doti and Jumla (maintaining approximately 2,000km of fair-weather roads with some emergency repairs (usually annually after the monsoon) and minor upgrades. • Implements maintenance activities in six other districts across Nepal: Pilot districts are Parbat, Sindhupalchok, Morang, Jhapa and Sankhuwasawa, Dadeldhura <p>Progress</p> <ul style="list-style-type: none"> • total track opened has been, 6.6km at 2.5m width, 17.5km at 3.5m width and 18.8km at the full 4.5m width. • 2000km of rural roads regularly maintained using RAP approach. 	<ul style="list-style-type: none"> • Roads are constructed in ‘stages’ of track-opening to 2.5m width, then widening to 3.5m width, and finally widening to 4.5m width with full supporting structures in place. As of June 2016. • Road Building Group (RBG) formed with specific guideline involved in road construction. • Road maintenance carried out by Road Maintenance Group formed with specific guideline. • Approximately 40% of the RBG members are women. Dalits and ethnic groups make up 26%. • For RMGs, approximately 41% are women; and 26% are Dalits and ethnic groups. • Implementation has involved construction of tracks, trails and roads using labour-intensive, environmentally sound and climate resilient methods; alongside complementary socio-economic interventions. 	<ul style="list-style-type: none"> • By September 2015, the project has created 1.88 million person-days of employment. • Study suggests that rural road investment, particularly in areas of low road density, strongly promote economic growth and reduce poverty. • With effective asset management plan (maintenance), the cost of annual maintenance has significantly reduced. • The living standards of RBG and RMG group significantly enhanced: a) their spending on children’s education increased; b) maintaining bank balance; c) formed their own cooperative to carry out economic activities; sector; d) increased participation in activities generating additional income (cash crops, fruits etc.)

3.5. Strengthening National Rural Transport Programme (SNRTP)

SNRTP is a World Bank funded project and it is targeted at the 35 districts, covering almost half of the population of Nepal. About 25 percent of the people living in these districts have been identified are poor and 2 percent are considered extremely poor. SNRTP has also been a successor programme for Rural Access Improvement and Decentralization Project (RAIDP) funded by WB for 30 districts in Nepal. The objective of the inclusion of these 30 districts is to strengthen the effective maintenance system to the rural roads built with RAIDP investments. The project summary is give in Table 9.

Table 9. Strengthening the National Rural Transport Program (SNRTP) 2014-2019			
Physical Progress	Target/	Methodology	Impact (assessed/expected)
<p><u>Component A</u></p> <ul style="list-style-type: none"> • Updating of DTMP and Multi-Year Maintenance Plans (MYRMP) • Consultancy support to manage safeguards related preparation and implementation tasks. • Consultancy support to assist technical implementation tasks • Staff training on specific technical, fiduciary, or safeguards related subjects. <p><u>Component B</u></p> <ul style="list-style-type: none"> • Support to routine and periodic maintenance of roads and crossing structures • Support road upgrading (or rehabilitation) and new crossing structures construction <p><u>Component C</u></p> <p>Funding investments in market related infrastructure along roads that offer all season connectivity to project districts.</p>		<ul style="list-style-type: none"> • Maintenance support (routine and periodic) using a simplified out-based disbursement approach that ties a portion of payments to the as needed (Government providing upfront 75% of the implementation cost and WB providing rest equivalent to 25% of implementation costs. • Road upgrading and rehabilitation to provide all-weather connectivity. completion of works; • For necessary new bridge construction, project to liaise with DoLIDAR's Local Roads Bridge Program (LRBP) 	<p>The project expected outcomes are:</p> <ul style="list-style-type: none"> • Increased access to all weather transport connectivity: Percentage of population within 2 and 4 hours walking distance in the participating Hills and Terai districts respectively from an all-weather condition, • Improved reliability of rural transport infrastructure: Percentage of core road networks in target districts rated in “good” or “fair” condition.
Source: Project document: Strengthening National Rural Transport Program, the World Bank, 2013			

3.6. Local Road Improvement Project (LRIP)

LRIP was one of the pioneer project undertaken by DoLIDAR with the support from the Swiss Government. The approach taken by LRIP is to improve accessibility (in terms of upgrading to all-weather roads) and support and improve livelihoods of the people and support the economic development of the target districts, Ramechhap, Sindhuli, Okhaldhunga, and Khotang. The details of the project are given in the following Table 10.

Table 10. Local Road improvement Project (LRIP) October 2014 – July 2018		
Physical Target/Progress	Methodology	Impact (Assessed/expected)
<ul style="list-style-type: none"> • Updating District Transport Master Plan (DTMP) and establishing core district roads network inventory including condition statements; 	<ul style="list-style-type: none"> • Road construction using target groups. The target groups include disadvantaged groups living along the zone of influence of the roads. 	<ul style="list-style-type: none"> • 750 km of existing road made all weather and well maintained. • 200 km of road upgraded to all weather standard. • 100 km of new road constructed to all weather standard.

<ul style="list-style-type: none"> • Implementation of priority upgrading and rehabilitation works; • Institutionalizing Annual Road Maintenance Plans within Districts • Setting up routine and periodic maintenance systems, and • Budgeting and channelling funds through a one-window approach. 	<ul style="list-style-type: none"> • Target groups will benefit directly from cash incomes/injections through work in road maintenance, rehabilitation, upgrading and construction works. • Communities who, at present, have difficult access to roads also fall in the category of target groups. • Other target groups include District Development Committees (DDCs) and local road user's committees. 	<ul style="list-style-type: none"> • 2.4 million person-days of employment, generated of which at least 60% will be targeted to disadvantaged groups, while 35% of the employment will be provided to women. • The users and coordination committees are established and inclusive and have the capacity to coordinate, implement and monitor road works. • DDC / District Technical Offices (DTOs) establish viable Local Roads Maintenance Systems. • DoLIDAR strengthens its capacity to adopt appropriate Local Road Maintenance Strategies.
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3.7. Decentralized Rural Infrastructure and Livelihood Project (DRILP-AF)

DRILP-AF is one of the flagship projects of DoLIDAR.

Table 11. Decentralized Rural Infrastructure and Livelihood Project (DRILP-AF)		
Physical Target/ Progress	Methodology	Impact (Assessed/Expected)
<ul style="list-style-type: none"> • poverty reduction and livelihood restoration in conflict-affected districts • active community involvement in planning supplementary investments to enhance rural livelihoods and restore incomes in connection with access improvements provided by road and trail infrastructure. • Support to high level of integration with similar projects supported by other funding agencies, to ensure that DTOs can administer their responsibilities. • Support to Government's emerging strategy for rural road maintenance, including establishment of district road maintenance funds, required to provide matching funds to access money from the central road fund. Linked to DTO capacity building, the road funds will for the first time allow a reasonable level of structured maintenance management on rural roads, thereby making the investment fully sustainable. 	<p>Labour-based, environmentally friendly, and participatory (LEP) approaches to ensure that the investment in construction and rehabilitation of infrastructure results in sustainable, improved access to economic and social services, and enhanced social and financial capital.</p>	<p>The Project will improve the livelihoods of people in the project areas, particularly the poor, who constitute about 70% of the population by Constructing and rehabilitating of existing, district roads and village roads, including provision of small cross-drainage structures and all protection structures; and Rehabilitation and upgrading of existing main trails; and Construction of new trail bridges on existing main trails.</p>

The project is supported by Asian Development Bank. The main objective of the project is to address the development needs of the poor and conflict affected communities by promoting inclusive processes that seek to restore incomes and connect the rural poor and those that have traditionally been excluded from the development process to markets and economic opportunities through investments in rural infrastructure and livelihood restoration facilities. The Project is located in 18 districts, including 4 districts in the

Western (Baglung, Gorkha, Lamjung and Myagdi), 6 districts in Midwestern (Dolpa, Humla, Jajarkot, Jumla, Kalikot, and Mugu), and 4 districts in Far Western (Baitadi, Bajhang, Bajura, and Darchula), and remaining 4 districts in the Central and Eastern region districts (Okhaldhunga, Ramechhap, Solukhumbu, and Taplejung) that are among the poorest in the country and most affected by the conflict. The districts have been selected on the basis of their high incidence and intensity of poverty, intensity of the armed conflict, need for improved access and enhanced livelihoods, and implementation manageability considerations. The details are given in the following Table 11.

3.8. Other Rural Infrastructure Projects

The other projects which are currently involved in the improvement of rural connectivity are briefly summarized in the following Table 12.

Table 12: Rural Road Projects				
Name of the Project	Funding Agency	Main Objectives	Target Districts	Expected outcome
UNNATI	Danish Government	Promotion of sustainable inclusive growth that reduces poverty and raises living standards” and the intermediate objective of the Infrastructure component is “A sustainable improvement in the rural infrastructure that supports local economic development”.	Koshi Zone: Dhankuta, Terathum, Bhojpur and Sankhuwasabha Mechi Zone: Ilam, Panchthar and Taplejung	<ul style="list-style-type: none"> • Improved rural transport infrastructure (RTI) including motorable roads, motorable bridges, foot trails, trail bridges and gravity ropeways. • Enhanced local capacity to identify, plan, develop and maintain RTI. • Established system, procedures and resources for maintenance of RTI. • Provision of a better public market – related infrastructure, e.g. collection centers, storage facilities, market place facilities and small irrigation schemes for the value chain products • Enhanced local capacity to identify, plan, develop and maintain public market – related infrastructure. • Established system, procedures and resources for maintenance of the public market – related infrastructure.
Earthquake Emergency Assistance Project (EEAP)	ADB	<ul style="list-style-type: none"> • Construction of Earthquake Resilient rural road • Benefit to underprivileged and backward people by providing improved services 	11 Districts badly affected due to earthquake Kathmandu, Bhaktapur, Chitwan,	472 km of road damaged: restored and upgraded

		<ul style="list-style-type: none"> • Rehabilitation, reconstruction and upgrading of 472 km of rural road. • Training to 100person of the target districts. 	Lalitpur, Kavre, Dolakha, Ramechhap, Okhaldhunga, Solukhumbu, Okhaldhunga, Gorkha and Lamjung	
Rural Reconstruction and Rehabilitation Sector Development Program (RRRSDP)	ADB	<p>(i) Reduction in proportion of population in project districts that have to walk 4 hours in hill and 2 hours in Terai to reach the road head from about 36% to less than 25%,</p> <p>(ii) average household travel time to market cents in road- influence area reduced by 50%,</p> <p>(iii) traffic counts and/or passenger movements increased by at least 30%,</p> <p>(iv) improved access to assured supply of drinking water for about 30,000 households,</p> <p>(v)employment of 15.8 million person-days in civil works provided, and</p> <p>(vi) increased social capital at village level.</p>	<p>The Project covers 20 districts including Panchthar, Ilam, Jhapa, Morang, Sunsari, and Dhankuta, Sindhuli, Dolakha, Sindhupalchowk, Kabhrepalanchok, Lalitpur, Bhaktapur, Kathmandu, and Chitawan, Manang, Mustang, and Parbat Rolpa and Rukum and Dadeldhura.</p> <p>addition, the Project will provide complementary support to the existing 18 Decentralized Rural Infrastructure and Livelihood Project (DRILP) districts,</p>	<p>The project outcome will be improved connectivity, enhanced economic and employment opportunities, and increased access to market and social services of rural communities.</p> <p>The Project outputs include:</p> <p>(i) improved rural roads;</p> <p>(ii) developed and improved community-based supplementary rural infrastructure;</p> <p>(iii) enhanced equity, employment, and income opportunities for the poor and disadvantaged;</p> <p>(iv) strengthened institutional capacity of Ministry of Local Development (MLD), Department of Local Infrastructure Development and Agricultural Roads (DOLIDAR), district development committees (DDCs), and communities; and</p> <p>(v) improved project management.</p>

Chapter-4

4. Major issues, challenges and opportunities for improving rural transport connectivity and its impact on socio-economic transformation of Nepal

4.1. Major Issues and Challenges for Rural Transport Connectivity

The major challenge for the sustainable development of the rural Nepal is lack of transport infrastructure and poor access to transport facilities. Improving rural people's access to essential utilities and services requires improving mobility through better transport infrastructure and services. However, lack of basic infrastructure and public transport system makes it more difficult for poor people to access basic utilities and services. Most of the rural areas of Nepal are isolated by distance, mountain terrain and extreme poverty due to lack of education, healthcare, markets, job facilities and economic opportunities.

Agriculture is the largest economic sector in Nepal. Many Nepalese depend on subsistence farming. There is clear evidence that rural isolation is associated with low agricultural productivity due to poor market access and low use of fertilizers and modern agricultural technologies. It is also linked with poor health and low school enrolment. Rural isolation also hampers mobility for the elderly and people with disabilities. In addition, rural transport connectivity is a significant generator of employment and contributing to the poverty reduction and the food security.

There are several challenges for rural transport development in Nepal. The first category includes natural challenges such as steep topography, rugged mountain terrains, fragile geology, active tectonics, intense monsoon rainfall, strong and high flow of Himalayan rivers. Natural disasters such as earthquakes, severe thunderstorms, flooding, landslides, and glacial melting, are other challenges. Erosion in the uplands causes flooding in the lowlands, which can devastate crop yields.

Second category involves geographic, socio-economic and environmental problems, which include the remoteness of habitations, sparsely populated rural villages, poor quality of transport infrastructure and services, haphazard construction of rural roads/trails and lack of road maintenance, among others. The increasing population in Terai region is another challenge and this creates significant pressure on the sustainable use of natural resources,

including overgrazing and deforestation. Moreover, in recent years human safety/road safety has been a very critical problem and the issue is of major concern in the transport sector of Nepal. Other challenges include, the weak cooperation, coordination, and collaboration among the government ministries, departments, agencies, universities and research institutions; the weak capacity and resources of construction industry and private sectors leading to lower quality of works and higher costs.

There are many elements that need to be considered while planning for and constructing rural transport connections. Involvement of different stakeholders in this process, which is outlined in a figure by Starkey et al. (2002)¹⁴, is an integral part of road infrastructure development.

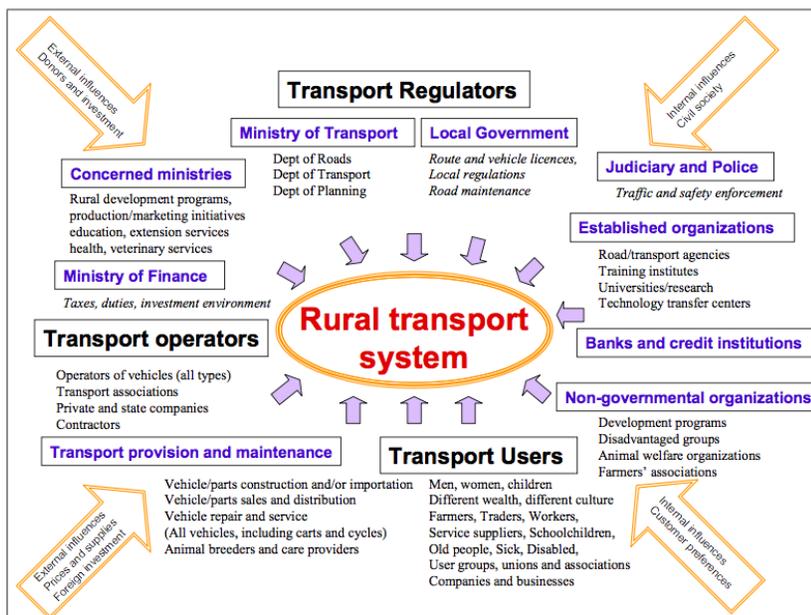


Figure 5. Different elements in rural road construction

Source: Starkey et al. (2002)

Incorporating the concerns of each of these stakeholders poses problems during planning and implementation. Starkey in his paper further elaborates that stakeholders, for example “transport users”, come from different backgrounds. It is a challenge to incorporate the needs of the population with different occupation, age, gender, socio-cultural characteristics, etc. into the planning process.

Addressing rural connectivity in a low-density area is a challenge. In Mountains, the average household per district is very low compare to Hills and Terai. The average rural road per household for Terai is the lowest with only 0.16 km per household. Table 13 provides a detailed comparison between the three-physiographic regions: Mountains, Hills and Terai.

¹⁴ Starkey, P. 2002. Complementing infrastructure: enhancing rural mobility through motorised and non-motorised transport. Animal Traction Development, Oxgate, 64 Northcourt Avenue, Reading RG2 7HQ, UK.

Table 13. Household and Road Length in Three-physiographic Zones

Physiographic zone	Nos. of Dist.	Average Household/District	Average Pop./Dist	Average Area/Dist. Sq.km	Avg. Rural Road km/Area Sq.km	Avg. Rural Road km/household
Mountain	16	22,758	111,362	3250.12	359	0.25
Hills	39	64,985	292,154	1613.38	633	0.38
Terai	20	126,438	665,935	2287.4	1024	0.16

In the Mountains, greater transport demand can be stimulated through schemes to promote employment, economic activity and agricultural production. Such initiatives require a coordinated, integrated, participatory approach with complementary investments involving the government (different ministries and department levels), the private sector, local financial institutions and NGOs. A virtuous circle of improved transport and marketing, leading to greater production and more transport may be stimulated in a number of ways. Promoting market depots as transport hubs, which can be made accessible by intermediate means of transport can prove successful in raising agricultural production. The use of labour-based methods on rural roads can stimulate local economic activity, transport and productivity. Agriculture departments should promote appropriate multipurpose power sources that can be used for farm work and transport (animal traction, power tillers, tractors, etc).

Increasing rural credit and purchasing power should stimulate demand for, and supply of, transport services. Credit can be very important in expanding the use of intermediate means of transport. Credit provision can assist production (or importation), distribution, rural supply and purchase of transport technologies. Existing credit programmes for agriculture and small industries can be expanded to cover the supply and purchase of transport devices. Credit programmes should consider the specific needs of women and physically disables.

Subsidies distort markets, but they may help establish transport services in poor, low-density areas. Authorities may use subsidies to stimulate services where transport provision is below what they (and the local population) consider to be minimum standards for that area. In such cases, operators may bid competitively for the market. Subsidies to the formal sector or imported products may cause unfair competition to the informal sector or indigenous products. Reducing taxes and duties can increase demand for both motorized and non-motorized transport (including bicycles), but it is difficult to target benefits specifically for rural areas.

The gradual buildup of local connectivity within districts in Nepal was possible only after District Headquarters got connected to the National Road System. In 2001, only 60

Districts Headquarters were linked to the National Road System through motorable access roads. Even after seven decades of planned development commencement, two districts, Humla and Dolpa, out of 75 districts in the country are yet to be connected to the national road system.

In a rural transport system, critical factors that affect the efficiency of the road network include economic demand in the area, the cost of technologies, availability of technologies and socio-cultural influences along with policies that create an enabling environment. A vehicle's operating costs are considerably lower if competitive markets are prevalent along with optimum vehicle utilization, cost, maintenance and fuels¹⁵.

The difficult terrain of Nepal adds to the challenge of constructing rural roads/access points in the country. The World Bank states that access to all-weather roads becomes more constrained as we move from the hilly regions to the mountainous regions of the country; one-third of the population in the hilly region must walk on an average of four hours to reach an all-weather road. In addition, areas which are already connected are barely accessible in rainy seasons due to landslides that block connecting roads. Rampant landslides in the Narayangadh-Mungling road, for example, disrupted access to Chitwan from Kathmandu and Pokhara multiple times during the June-September 2016.

The Nepal Road Sector Assessment Study carried out in 2012, discusses an extensive list of challenges that the road development sector in Nepal is facing. One of the main shortfalls is that the legal document in road development, i.e., the Public Roads Act, lacks adequate information on the scope of working modalities for road construction. A wider scope encompassing details¹⁶ in road construction is necessary for proper implementation. This must be supplemented by the development of Public Roads Regulation. Similarly, many policy documents pertaining to the roads sector either have contradicting information or are outdated and lead to loopholes in proper implementation. These documents must be amended and upgraded.

The study further points out that political influence is very strong in the road sector due to which funds that are meant for the projects are shared between the political parties and roads that have been identified to have the least priority are being constructed. Due to this, the rate of expenditure for SRN is high with very low efficacy and although the expenditure on the LRN is comparatively lower, there is room for increasing its efficiency. A

¹⁵ External review of District Roads Support Project: Final Report. Paul Starkey, Shuva Sharma and Ansu Tumbahangfe , May 2013

¹⁶ Environment, implementing modalities, institutional set up, interaction with immediate beneficiaries etc.

resounding challenge for construction of the LRN is that there is no concrete strategy document with approaches and targets for road construction.

In terms of planning documents, the Nepal Road Sector Assessment Study also stresses that the Environmental Protection Act (EPA-2007) and Regulations (EPR-2007) along with the Land Acquisition Act (LAA-1977) also need to be revised to incorporate current working modalities.

Lack of access to proper services is one of the principal reasons for high incidence of rural poverty in Nepal. There is a strong correlation between poverty and access to economic and social services. An estimated 30,000 kms of rural roads (over 50,000 kms exist, of which more than 55 % are non-operable) are needed to provide the connectivity required. About 22% of the population still has to walk more than 4 hours in the hills and 2 hours in the plains to reach the strategic road network.

Another fundamental challenge in road construction in Nepal is that the budgetary processes, in addition to other bureaucratic procedures, are very cumbersome. Funds are released only at the last minute. This is less favorable when taking a labor-based approach for construction, which compels the implementing agency to adopt the equipment-based approach that is less environmentally friendly and costlier (UNDP, 2011). This adds to the difficulties as higher instances of corruption have been recorded with the use of the equipment-based approach.

The 2015 earthquakes and associated landslides caused widespread damaged to transportation infrastructures in Nepal. Surveys in earthquake impacted districts show that road and highway network across Nepal was heavily impacted, with more than 2,000 kilometers (13 percent of the network) damaged or destroyed. Many landslides blocked roads and disconnected remote villages with the district headquarters and infrastructural damage which cost about 2 per cent of total economic loss and 500 casualties (CEDIM, 2015). As a consequence of the earthquakes, an additional 3 percent of Nepal's population (approximately 1 million people) had been pushed into poverty, according to the World Bank.

Along with several issues at hand, yet another major issue is that a detailed assessment of Nepal's challenges in enhancing rural connectivity and its impact on the SDGs, is yet to be worked out. Between year 2008 and 2012, substantial rural road was constructed (i.e., from 22,000 to around 50,000 km) but 50% of the network still remains non-operable. During the monsoon, the situation gets worse due to unpredictability of the service condition of the rural road leading to the economic disruption of the significant rural area.

4.2. Opportunities for Improving Rural Transport Connectivity

There is an enormous opportunity to improve the rural transport connectivity in Nepal, and the GoN has given considerable importance for building rural transport infrastructures and services. There have been many bilateral and multilateral agencies that are willing to support rural road construction in Nepal. The World Bank has funded 12 projects since 1970 that have the objective of expanding the existing road networks to provide access to rural areas like Karnali in the Far West. Currently, there are 16 bilateral and multilateral agencies engaged in improving rural connectivity in Nepal. More details on the Governmental effort for improving rural connectivity can be found in Chapter 3.

4.3. Impact of Rural Transport Connectivity on Socio-economic Transformation

Access to markets and services through road connectivity is an important factor in boosting economic development in rural communities. An effective road transport service is an integral component for poverty reduction along with access to quality education, health and agriculture services (GIZ, 2013). With access to markets, road connectivity provides opportunities for conducting income generating activities and increases prospects of commuting for work in surrounding areas. As the predominant mode of transportation in Nepal is through roads, connecting rural communities to urban centers is a necessity. This will transform socio-economic dynamics of the country.

A recent survey has shown that roads save people time, with nearly two hours saved travelling to district headquarters. Roads have brought services closer to people, with more and better-stocked shops and more schools, clinics and agro-vets. Ambulances now operate on the surveyed roads. Traffic on some surveyed roads was low (20 vehicles a day including motorcycles). Buses operated on all roads. For instance, services ranged from one outgoing trip a day (Okhaldhunga) to eight travel opportunities a day (Dolakha). About two-thirds of the passengers were men and one third were women. Fares ranged from NPR 3-8 per km. Buses were important for small freight, and the cost for this is estimated to be NPR 25-90 per tonne-km, one tenth of the cost of transport by porters. Prices were higher on shorter journeys on isolated routes, notably in Okhaldhunga. Bus operators were very satisfied with the quality of District Roads Support Programme (DRSP) roads. Safety was not a major problem for operators, users or regulators. Passengers were relatively satisfied with bus fares but dissatisfied with low transport frequency.

ADB's support to construct 318 km rural road during 2006-2015 has resulted in the increase in-vehicle operating cost savings by around 19% and a reduction in travel time by around 58%, which was higher than ADB's initial estimates (ADB, 2016). ADB's project

to provide all-weather access to 12 districts in Nepal reduced poverty rate by around 21% in the project area; especially in Ramechhap, Rasuwa and Taplejung where high incidence of poverty had been recorded. In addition, the per capita income of the population in the project area increased by 102% with the introduction of access roads. Significant improvements in the education and health sectors have also been noted in the 12 districts because of increase in access through road connections.

An increase in access to finance has been observed with improved road connectivity. ADB's assessment of the 318 km roads shows that over 10 banks, along with other financial institutions, have opened branches in Rasuwa, Ramechhap and Taplejung. In addition, cooperatives and NGOs are more active in these areas due to the road connections (ADB, 2016). Similarly, in the District Roads Support Programme (DRSP), the funds provided to the community supported and sustained over 130 savings and credit companies.

A surge in employment was recorded in the areas as the locals participated in construction of the road networks. The DRSP was successful in providing 1.25 million person-days of employment to mainly the marginalized community in the project areas in its second phase of operations (Starkey et al., 2013). In its third phase, the DRSP focused entirely on empowering both the women and disadvantaged groups. In its four phases of road development, the DRSP continued to increase its efforts in providing employment opportunities to the poor and marginalized to enhance their livelihoods.

4.4. Costs

There are several costs associated with the absence of road connections in the rural areas. The study by UNDP (2011) emphasizes that the return on investment of any road is greater to a country than individual households. Further, it states that the labor-based roads have returns of about 30% or more than the equipment-based roads because of the access and income generating opportunities it provides right from construction. UNDP (2011) assesses that the existence of Mude-Deurali road in Dolakha reduces the cost of transporting goods by almost seven times.

Chapter-5

5. Improved Rural Transport Connectivity and Its Impact on SDGs

5.1. Rural Transport Connectivity and SDGs

Majority of the Nepalese population (81.39 % in 2015) live in rural areas, and most of these areas are isolated and lack transport connectivity. Sustainable transport infrastructure and services play a major role for the rural economic growth, rural productivity and rural resilience by providing access to basic utilities and services. Therefore, sustainable rural transport is prerequisite for the sustainable development. The provision of improved rural transport connectivity brings multiple socio-economic benefits to rural communities. It connects rural communities with education, health care, administrative and welfare facilities, and it opens new opportunities for markets and employment, both of which have significant implications to poverty eradication, hunger elimination, social integration and improved quality of life.

In 2015, 193 member countries of the United Nations adopted the post-2015 development agenda – *Transforming our world: the 2030 Agenda for Sustainable Development*. It comprises of 17 Sustainable Development Goals (SDGs) and 169 related targets, which represents a plan of action for people, planet and prosperity that reflects the commitment of the countries to shift the world onto a more sustainable and resilient path. Through adoption of the agenda, member states have acknowledged the importance of the transport infrastructure and services in achieving the SDGs. Sustainable transport particularly rural-urban connectivity and rural access closely linked in achieving the Sustainable Development Goals (SDGs). Some of the SDGs are related directly to the rural transport, while other contributes indirectly to the upliftment of rural transport. Therefore, there is a pressing need for improvement of rural transport and enhanced rural access in developing countries so that no one will be “left behind”.

Rural transport connectivity and rural-urban linkage can contribute directly/indirectly to the following SDGs and associated targets.

Box 5. Transport-related Sustainable Development Goals (SDGs) and Associated Targets

 <p>1 NO POVERTY</p>	<p>Goal 1: End poverty in all its forms everywhere (Poverty eradication)</p> <p><i>Target 1.4.: By 2030, ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology and financial services, including microfinance</i></p>
 <p>2 ZERO HUNGER</p>	<p>Goal 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture (Achieve food security)</p> <p><i>Target 2.1: By 2030 end hunger and ensure access by all people, in particular the poor and people in vulnerable situations including infants, to safe, nutritious and sufficient food all year round</i></p>
 <p>3 GOOD HEALTH AND WELL-BEING</p>	<p>Goal 3: Ensure healthy lives and promote well-being for all at all ages (Access to health)</p> <p><i>Target 3.6: By 2020, halve the number of global deaths and injuries from road traffic accidents</i></p>
 <p>4 QUALITY EDUCATION</p>	<p>Goal 4: Ensure inclusive and quality education for all and promote lifelong learning (Access to education)</p> <p><i>Target 4.3: By 2030, ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university</i></p>
 <p>5 GENDER EQUALITY</p>	<p>Goal 5: Achieve gender equality and empower all women and girls (Gender Equality)</p> <p><i>Target 5.1: End all forms of discrimination against all women and girls everywhere</i></p>
 <p>6 CLEAN WATER AND SANITATION</p>	<p>Goal 6: Ensure access to water and sanitation for all (Access to water and sanitation)</p> <p><i>Target 6.1: By 2030, achieve universal and equitable access to safe and affordable drinking water for all</i></p>
 <p>7 AFFORDABLE AND CLEAN ENERGY</p>	<p>Goal 7: Ensure access to affordable, reliable, sustainable and modern energy for all (Access to energy)</p> <p><i>Target 7.1: By 2030, ensure universal access to affordable, reliable and modern energy services</i></p>
 <p>8 DECENT WORK AND ECONOMIC GROWTH</p>	<p>Goal 8: Promote inclusive and sustainable economic growth, employment and decent work for all (Economic growth)</p> <p><i>Target 8.5: By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value</i></p>

	<p>Goal 9: Build resilient infrastructure, promote sustainable industrialization and foster innovation (Building resilient infrastructure)</p> <p><i>Target 9.1: Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all</i></p>
	<p>Goal 10: Reduce inequality within and among countries (Reduce Inequality)</p> <p><i>Target 10.1: By 2030, progressively achieve and sustain income growth of the bottom 40 per cent of the population at a rate higher than the national average</i></p>
	<p>Goal 11: Make cities inclusive, safe, resilient and sustainable (Sustainable Cities and Communities)</p> <p><i>Target 11.2: By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons</i></p>
	<p>Goal 12: Ensure sustainable consumption and production patterns (Sustainable consumption and production)</p> <p><i>Target 12.3: By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses</i></p>
	<p>Goal 13: Take urgent action to combat climate change and its impacts (Climate Change)</p> <p><i>Target 13.1: Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries</i></p>
	<p>Goal 17: Revitalize the global partnership for sustainable development</p> <p><i>Target 17.9 Enhance international support for implementing effective and targeted capacity-building in developing countries to support national plans to implement all the sustainable development goals, including through North-South, South-South and triangular cooperation</i></p>

Rural Transport Connectivity for Poverty Eradication

Although transport is not directly connected with the poverty reduction, many studies show that investment in urban and rural roads stimulated significant socio-economic growth. In the case of Nepal, improved rural transport connectivity is one of the biggest factors, which has improved the economic activities in rural areas. Improving transport mobility and rural-urban connectivity can reduce rural poverty by providing economic opportunities and basic services for all sectors of society (men, women, youth, children, farmers, elderly and physically disabled). Studies show that given a sufficiently long period of employment on the road, the poor can accumulate significant capital to invest in alternative livelihood opportunities and thus move away from poverty (ADB, 2002).

According to the national living standards survey conducted in 2010-2011, the overall poverty rate for Nepal is 25%, which increases to 46% in the Mid-Western and Far-Western regions. Over 30% of Nepalese live on less than US\$ 14 per person per month. Rural transport infrastructure has undergone substantial transformation from an early stage mule track to motorable road. As a result, based on the multidimensional poverty index, Nepal has made significant progress in reducing poverty with the rates of 4.1% points per year between 1999 and 2006, according to the study released by Oxford Poverty and Human development Initiative (OPHI). Human Development Report shows that Nepal's HDI value increased from 0.279 to 0.548 between 1980 and 2014 with the average annual increase of about 2.0%. The percentage of poor people in Nepal dropped from 64.7% to 44.2% between 2006 and 2011.

Rural Transport Connectivity and Food Security

Almost 81% of Nepalese live in rural areas and majority of them depend on agriculture for their livelihoods. However, household food insecurity is a major concern in most of the rural villages, where about half of the children under five years of age are undernourished.

Although transport is not explicitly mentioned in the SDG Goal 2, rural transport is vital to achieving this goal. Evidence shows that investment in rural roads leads to greater food security. Improved rural transport infrastructure and services can make food more accessible and affordable for the poor by reducing costs of the agriculture products. Studies reveal that lack of proper transport facility and road linkage results in considerable proportion of agriculture products getting lost or wasted in rural Nepal. Most of the Nepalese farmers used to spend three to five hours to carry their agriculture produce to the market causing a loss of 20-25% of their agriculture products due to lack of transport services. Other study indicates that annually, Nepalese farmers lose about 25-30 percent of their food products before reaching to the market (New Spotlight, Vol: 06 No.23 May31, 2013). Similarly, the estimated post-harvest loss of fruit and vegetable in Nepal lies in the range of 20-50 percent (Gautam and Bhattarai, 2006- Post Harvest Horticulture). This considerable proportion of post-harvest loss of fruit and vegetable is a matter of great economic concern. Efficient rural transport systems and better supply chain and logistics connect rural communities with market and farm input suppliers which significantly contribute to end hunger.



Figure 7. Sustainable Development Goals directly or indirectly connected with transport by UN member countries (source: UN)

Rural Transport Support to Access Health Care

The availability of reliable transportation impacts a person’s ability to access appropriate and well-coordinated healthcare. Rural population most likely to need transportation services to maintain their health and well-being. Access to healthcare services in Nepal is critical for rural residents. Because of poor transport facility many rural residents often experience barriers to healthcare. These high barriers limit their ability to get the care they need. Accessible transportation options can make the difference between access to healthcare and no access for many people in rural areas. Often children, elderly and physically disabled persons have greater healthcare needs than others, and living in rural areas isolated from healthcare providers causes them additional difficulties. Studies have shown that providing transportation for medical treatment and quality health services to rural community is cost-effective, and improves the quality of life. However, Nepal’s rugged terrain and the lack of transport infrastructure and services make it highly inaccessible, limiting availability of basic health care for the rural residents. In many rural villages, the only mode of transportation is by foot. This results in delay of treatment and particularly in the emergency case; medical attention is not possible. Similarly, due to lack

of proper public transport options, most births take place at home in rural areas. The use of skilled birth attendants at delivery among rural women in Nepal is very poor, which is one of the major challenges in improving maternal healthcare in Nepal. As a result, many women lose their lives during childbirth.

Box 6. Example of access to health facilities in rural Nepal

In-terms of access to health facilities, with the advent of road connecting Khimti to the Tamakoshi-Khimti Road, for example, the health post in Khimti can access the facilities provided by the Dhulikhel hospital. Thus, households in VDCs around Ramechhap and Dolakha that previously didn't have access to health facilities will now be able to travel a shorter distance to acquire quality health services. This shows that the targets set under SDG 3 (i.e., reduce maternal mortality rate to below 70 per 100,000 live births and eliminate prevalence of HIV, TB, malaria and other water borne diseases) is achievable through rural transport connections.

Rural Transport and Access to Education

The aim of the SDG 4 target is to achieve 100% completion of primary education, 95% enrollment and completion of grades one to eight and 90% enrollment in pre-primary education by 2030. The provision of equal opportunity access to safe and reliable transport can promote equality and equitable educational opportunities for all.

Because of distance-related obstacles and lack of transportation facility, rural children in Nepal face many problems in reaching schools. As a result, school dropout rates are very high in rural areas, compared to that in urban areas. Increase in access to educational institutions through rural road connections not only reduces the travel time of the students but also decreases absenteeism. Rural transport connectivity and rural-urban linkage has significantly improved in the past few decades in Nepal, which has significant positive impact on different dimensions of sustainable development.

New construction of rural roads has revitalized the rural economic growth, raising incomes of the rural poor, and improving the living standard and quality of life of the rural communities. Farmers from Terai and Hilly regions are taking advantage by taking their agricultural products to markets; school enrollment of disadvantage groups has increased considerably; and health care facilities have improved significantly in Mountains. As a result, between 1980 and 2014, Nepal's life expectancy at birth increased by 23.0 years, mean years of schooling increased by 2.7 years and expected years of schooling increased by 7.6 years.

Gender Equality and Rural Transport

In Nepal, there is a huge gap between men and women in terms of access to education, health care, and participation in decision-making. Infant mortality is much higher for girls than boys, and illiteracy is far more prevalent among women compared to men. Many rural women live in extreme poverty, without any means of improving conditions for themselves and their families. Within households, women often have less to eat than men, and mothers' insufficient calorie intake has led to chronic malnutrition among infants. At the same time, more women are heading households and taking on the burden of sustaining the rural economy. Women constitute of more than 60% of the agricultural labour force but have little access to land, production technology and training. In recent years, lack of economic opportunities has prompted many girls and women of rural households to migrate from Nepal. Safe, efficient and socially inclusive rural transport system opens new opportunities for women and girls that improve access to education, health care, markets, administrative and welfare facilities and employment opportunities.

Although Nepal has formulated Gender and Social Inclusion (GESI), challenges remain in the national and local implementation to achieve genuine social inclusions. In this regard, through the District Development Committees (DDCs), Village Development Committees (VDCs) and the Municipalities, the Government of Nepal has given considerable emphasis for implementing GESI approaches, and intended to ensure the participation of women and disadvantaged groups (DAGs) in decision-making process.

Improved Rural Transport for Economic Growth

Improved transport infrastructures and services play a major role for economic growth. Nepal Living Standard Survey 2010/11 illustrates that during the last 15 years, accessibility has improved almost universally for all types of facilities, which have significant impact in the economic growth in the rural areas in Nepal. Efficient rural-urban connectivity helps connect rural areas to urban centers, boosts trade and commerce, and creates new jobs. It further allows for safe and efficient movement of people and goods from production to consumption through better supply chain and logistics.

Most of the studies demonstrate that investment in minor rural road remarkably reduces the travel time from farm to market, which in turn significantly reduces the transport cost of the agriculture product, and improves the productivity and economic growth in the rural areas.

Realizing the fact that the good transport infrastructure and services are essential conditions for economic growth and poverty alleviation, the Government of Nepal has given considerable emphasis on the development of the rural roads. As a result, transport connectivity has significantly improved in past few decades. Since then, rural connectivity has been playing an important role in economic growth of rural areas.

Improved rural transport connectivity further helps the rural people to enhance their traditional skills, support for micro enterprises in rural areas, promote tourism industry and support the planning and implementing other infrastructures such as hydropower, and industry etc.

5.2. Importance of Rural Transport Connectivity in Nepal

To drive rural economy and uplift the social environment, rural connectivity has been playing an important role in Nepal's development endeavor. Lately, rural transport infrastructure has gone into a substantial transformation from an early stage mule track to motorable road. The rural road connectivity within the district started only after the district got connected with the National Road Network. At the end of Eight Periodic Plan (1993-1997), only 19 districts were not connected to the National Road System (NRS). Today, only two districts- Humla and Dolpa remain to be connected into the National Road System.

In 1997, 13 districts were identified by ICIMOD study as the worst performing districts in 11 combination of four dimension of development performance: namely, poverty and deprivation, socio-economic, institutional and infrastructure development, women's empowerment, and natural resource endowment and management. Out of those 13 districts, 10 districts¹⁷ were not connected to National Road System at the time of the study in 2001. A comparative assessment of Human Development Index of 2001 and 2011 reveals the fact that the pace of human development¹⁸ in districts that were not connected to the NRS in 2001, is significantly higher than those of other districts which were recorded with higher HDI in 2001.

Nepal Living Standard Survey 2010/11 confirms that during a period of the last 15 years, accessibility has improved significantly. Within the same period, the accessibility to paved road has just doubled and whereas for accessibility to dirt road has increase by 37%.

¹⁷ Districts: Achham, Bajhang, Kalikot, Humla, Mugu, Doti, Jumla, Bajura, Rukum, Dailekh, Jajarkot, Rolpa and Baitadi.

¹⁸ The average increase of HDI in 10 years (2001-2011) of these 7 districts (Bajura, Bajhang, Humla, Kalikot, Achham, Dolpa, Mugu) not connected to road network in 2001 is estimated to be around 29.7%. The average increase for developed districts (Kathmandu, Lalitpur, Kaski, Bhaktapur), the increase is only 4.9%.

A comparative finding of the Nepal Living Standard Surveys carried out in 1994/95, 2004/05 and 2010/11 is given in the following table (Table 12). It shows that the improved connectivity has made a significant impact on enlarging the coverage of household in making access to the basic services within 30 minutes.

Table 12. Percent of household within a reach of 30 minutes			
Facility	Nepal Living Standard Survey		
	1994/95	2003/04	2010/11
Primary School	88.4	91.4	94.7
Secondary School			71.5
Higher Secondary School			56.3
Health Post/Sub-health Post	44.8	61.8	61.8
Public Hospital			33.6
Private Hospital/Clinic			53.4
Bus Stop	33.1	53.0	66.2
Paved Road	24.7	37.2	51.4
Dirt Road Vehicle Passable	58.0	67.6	79.8
Dirt Road Vehicle Impassable		94.3	97.1
Local Shops/shops		86.2	92.0
Haat Bazaar	41.4	60.7	64.0
Market Center	24.2	34.4	44.7
Agriculture Center	24.5	31.9	42.8
Cooperatives	25.9	33.7	53.9
Bank	20.7	27.8	39.9

Public and private buses are the most common means of long-distance travel in the country. Access to bus stop is conditional upon access to road. About 66% of households are within 30 minutes of reach to the nearest bus stop. For nearly one-fourth of households, it takes around 30 minutes to 3 hours, and for around 10% of households, it takes more than 3 hours to reach the nearest bus stop. Among development regions, the central development region has the best access to bus stops (78 % households can reach a bus stop within 30 minutes) while the far-western development region has the worst access, only 43% of households are within this reach. In case of urban households, the mean time taken to reach a bus stop is much lower (12 minutes) than the time taken for rural households (73 minutes). Increase in access to road encourages mobility of goods and expands the labor market, which in turn positively affects living standards of people.

The survey gathered data on three types of roads: paved road, vehicle passable dirt road and vehicle impassable dirt road (including horse trail). Overall, 51% households can reach the nearest paved road within 30 minutes, and three out of four households can reach the nearest paved road within two hours. Around 80% of households, on the other hand, are can reach the nearest vehicle passable dirt road within 30 minutes. Access to the paved road

decreases with the household consumption quintiles. Mean time taken by a household in the richest quintile to reach the nearest paved road is 66 minutes and that for a household in the poorest quintile is 253 minutes. Changes in the proportion of the number of households within the reach of 30 minutes from a facility are summarized in Table 12.

Improved rural transport connectivity is one of the biggest factors in reducing the incidences of poverty, as discussed in Chapter 4. If planned and implemented properly, this could aid in achieving the SDG 1 target (i.e., reduction of poverty from 23.5% in 2014 to 5% in 2030). NPC (2015) specifies that eradication of poverty will be possible through an economic growth that is spurred by transfer of technologies and “support for innovation”. This type of economic growth is unimaginable without access to markets that road connectivity provides.

Human Development Report, 2014 says Nepal’s HDI value for 2014 is 0.548, which puts the country in the low human development category— positioning it at 145 out of 188 countries and territories. Between 1980 and 2014, Nepal’s HDI value increased from 0.279 to 0.548, an increase of 96.2 percent or an average annual increase of about 2.00 percent. The rank is shared with Kenya. The following Table 13 reviews Nepal’s progress in each of the HDI indicators. Between 1980 and 2014, Nepal’s life expectancy at birth increased by 23.0 years, mean years of schooling increased by 2.7 years and expected years of schooling increased by 7.6 years. Nepal GNI per capita increased by about 140.5 percent between 1980 and 2014.

Table 13: Nepal’s HDI trends based on consistent time series data					
Year	Life expectancy at birth	Expected years of schooling	Mean years of schooling	GNI per capita (2011 PPP\$)	HDI value
1980	46	4.8	0.6	961	0.27
1985	50	5.9	1.2	1,080	0.32
1990	54	7.8	2.0	1,209	0.38
1995	58	8.4	2.2	1,374	0.41
2000	62	9.3	2.4	1,563	0.45
2005	65	9.9	2.8	1,712	0.48
2010	68	12.1	3.3	2,014	0.53
2011	68	12.4	3.3	2,055	0.53
2012	68	12.4	3.3	2,135	0.54
2013	69	12.4	3.3	2,190	0.54
2014	69	12.4	3.3	2,311	0.54

Source: Nepal Human Development Report 2017

External evaluation¹⁹ of six district project roads constructed and maintained by District Road Support Program²⁰ presents a strong case for the positive impact on socio-economic aspect of the project area contributed by improved road connectivity. The findings are summarized in the following Table 14.

Impact	Indication	Link to	Remarks
Access to Roads	<ul style="list-style-type: none"> • The proximity to road increased (i.e., to four hours or less walk to road) for about 100,000 of the population residing around the six roads • Half of the beneficiaries are under one hour of the road. 	Connectivity	
Access to Services	<ul style="list-style-type: none"> • 95% of the sampled population using access roads to reach district headquarters. • 55% of the population used the access roads to travel to the regional markets with small retail shops being set up along the roads. • Increase in the number of women accessing health posts for antenatal care. • Women could travel and come back the same day. • Education facilities were opened nearby. 	Access to Market, Education and Health Facilities	
Transport Services	<ul style="list-style-type: none"> • Heavier vehicle such as buses, cars were more common. • Fare prices were in the range from NPR 2.6/km in Kavre and Sindhupalchowk to NPR 6.9/km in Okhaldhunga 	Affordability	
Impacts of Roads on Rural Livelihoods	<ul style="list-style-type: none"> • Although importance of agriculture has declined, it remains the main source of income followed by non-agriculture wage labor, micro-enterprises, etc. 	Support to Agriculture	
Impact on Agriculture Sub-Sector	<ul style="list-style-type: none"> • Increased productivity of cereal crops with increase in the cropped area for all crops, excluding maize. • Commercialization of potatoes and oranges with increase in access to markets 	Support to Agriculture	
Impact on Off-Farm Activities	<ul style="list-style-type: none"> • Increase in off-farm income from 7% to 17% • Increase in livelihood diversification of the population in the disadvantaged as well as non-disadvantaged groups. • New skills related to masonry and gabion weaving were acquired through road construction due to which the population with the skills could earn higher wages. 	Support to Agriculture and skills development	

¹⁹ External review of District Roads Support Project: Final Report. Paul Starkey, Shuva Sharma and Ansu Tumbahangfe , May 2013

²⁰ Swiss Government funded project implemented in six districts: Kavre, Sindupalchowk, Dolakha, Ramechhap, Okhaldhunga and Sindhuli

Migration and Remittance	<ul style="list-style-type: none"> • After roads were constructed, remittance contributed to only 2% to the household income. • Agriculture and local employment remained more important for income than remittances. 	Local income	
Changes in Household Incomes	<ul style="list-style-type: none"> • Average increase in the income since the roads were constructed was 25% with Janajati and non-advantaged groups benefiting the most. • Many disadvantaged groups were not able to have a substantial improvement in their agriculture productivity or diversify their livelihood strategies. 	Increase in average income	
Changes in Households Expenses & Savings	<ul style="list-style-type: none"> • Only 55% of the surveyed population said household produce was only sufficient for six months in a year • 25% of household expenditure was spent on buying food grains, which was followed by expenses on children's school fees and buying vegetables, oils and spices. • 75% of the respondents were part of at least one savings and credit group with majority of them being women. 	Increase in household savings	
Changes in Living Standards	<ul style="list-style-type: none"> • Increase in latrines from 7% to 65% for disadvantaged groups and from 41% to 80% for non-disadvantaged groups. • Significant increases in the use of metal roofing sheets. • Access to the national grid due to grid expansion with the advent of the roads. 	Access to better sanitation	
Gender Empowerment	<ul style="list-style-type: none"> • Increase in security for women as they could travel to their destination and return on the same day. • Equal pay and work during construction of roads empowered the women • Formation of groups gave opportunities to share knowledge about women's health, education, etc. 	Gender equality	
Economic Impact and Benefits	<ul style="list-style-type: none"> • The economic rate of return (based on traffic growth) of the Dolakha-Singati road, Sindhulimadi-Bhimsenthan road and Ghyangdanda-21kilo road is greater than the projections of the development banks. • Increase in the value of land in closer proximity to the road. • The economic rate of return (based on agricultural production, land and social benefits) of the Dolakha-Singati road, Ghyangdanda-21kilo road and Sindhulimadi-Bhimsenthan road are in the range 33-39%. 	Economic return	
Impact on Governance	<ul style="list-style-type: none"> • The DRSP transparency tools helped to provide fair opportunities for the poor and women. • Public audits and public hearing helped in smooth running of the project. 	Support to good governance	

Chapter-6

6. Key Findings and Future Steps

6.1. Conclusions

The contribution and impacts of improved rural connectivity is a well understood phenomenon. Various projects that are in different stages of implementation in Nepal have proved this phenomenon to some extent. There are lessons to be learned from the experiences gained in this sector. As the country's population resides predominantly in the rural areas, there are ample opportunities in promoting and facilitating the improvement of rural transport connectivity and rural-urban linkages to achieve SDGs well ahead of target date of 2030. The condition is that if the rural road is well planned, designed and properly implemented, the improved rural transport connectivity and rural-urban linkage would:

- Connect the rural community with education, health, markets, access to drinking water, energy, administrative and welfare facilities including employment opportunities;
- Create additional jobs through engagement in construction and maintenance of rural roads;
- Promote gender equality through provisions of equal opportunities and equal wages;
- Provide opportunity for the rural people to enhance their traditional skills using local technology and local tools used for construction and maintenance of roads;
- Promote cohesive societies and communities by continuous consultation with the project beneficiaries and their involvement in each decision-making process;
- Support micro enterprises in rural areas by creating resource pools and identifying potential markets;
- Promote non-motorized transport in the rural area to facilitate the increased movement of goods and passenger services;
- Promote market potentials for facilitating the marketing of farm goods;
- Promote tourism;
- Promote horticultures and farming of cash crops through improved seeds distribution and organizing cooperatives; and
- Support the planning and implementation of other infrastructures including hydropower, industry, etc.

The future strategic direction in making Nepal’s rural road connectivity fully supportive of achieving SDGs, as discussed in the previous chapters, is by fully integrating economic, social and environmental aspects in all stages of policy formulation, project planning and implementation of rural road program. The following table (Table 15) provides an outline of the various tasks that would be useful for consideration during various stages of project planning, design and implementation of rural roads.

Table 15. Project Activities

Level/Stages		Task/Considerations
Policy		Rural road management policy supported by appropriate legal instruments with an aim to establishing <ul style="list-style-type: none"> • dedicated institution for rural road development; • good and accountable governance; • use of innovative and new technologies; • sustainable transport infrastructures and efficient services.
Technical	Planning	<ul style="list-style-type: none"> • Selection of rural road based on its potentials of generating economic and social activities in the area. (farm to market, connection to higher standards road, access to education, hospitals and places of social activity); • Selection of road stretch confined to the manageable length (7-10km); • District Transport Master Plan prepared and updated in every five years; • Network approach applied in selecting alignment; • Comprehensive road upgrading plan developed and prioritized; • Priority on resource allocation with maintenance first approach.
	Design	<ul style="list-style-type: none"> • Due to high risk of migration in Hills and Mountains, design period should be kept minimum; • Road specification revised and adopted to accommodate resiliency against disaster and climate change; • Social safeguard provision to be incorporated in design.
	Alignment	<ul style="list-style-type: none"> • Selection of alignment supporting environment against degradation; • Alignment compatible to the use of labour based technology; • Minimum adverse impact to the farm land; • Vertical alignment as far possible compatible to the non-motorized transport;
	Construction and Maintenance	<ul style="list-style-type: none"> • Construction by mobilizing community (Road Building Groups); • Use of local materials in construction works; • Additional income generating program targeted to Disadvantages Group/Communities; • Continuity of long-term maintenance ensured; • Environmental and social safeguard measures applied and monitored effectively; • Creation of high technology and skilled workforce at local level • Quality control to be assured
Financial		<ul style="list-style-type: none"> • Generally financing arrangement (funding) secured based on long-term support (10-15 years); • Annual resource allocated based on District Transport Master Plan;

Institutional		<ul style="list-style-type: none"> • Involvement of direct beneficiaries in planning, construction and maintenance of the rural roads; • Dedicated management for road maintenance; • Sound environment management;
Community participation monitoring and ownership		<ul style="list-style-type: none"> • Enhancing community participation; community ownership and involvement in policy, planning and design parts; • Community based organizations should be trained to monitor the quality of roads being built and identify issues at various stages of construction and maintenance;

6.2. Recommendations

Improved rural road connectivity has played a key role in reducing poverty as well as bringing social and economic transformation in the rural communities of Nepal. Despite the rugged terrain in Hills and Mountains and numerous river streams crossing in Terai, the progress made so far in improving rural connectivity in the country has been encouraging. The contribution made by the bilateral and multilateral donor agencies, supporting the government's initiatives of improving rural road connectivity, is equally significant. Different projects, under the support of development partners, have made a strong lead in incorporating social and environmental aspects into design and implementation of the rural road programs. In this environment, the future strategy for rural road improvement should focus on:

I. **Developing a National Rural Road Program to target and support SDGs:**

Presently, the development of rural roads is being undertaken on different platforms by using different approaches. There is a significant difference in approach taken by the government and the donor agencies in implementing rural road programs. However, this paper highlights the social and environmental impact made by the rural road projects under the funding of the developing partners, which is an important aspect of rural road infrastructure development. These social and environmental impacts are also very critical in achieving the SDGs in a timely manner. In this regard, the government should develop a National Rural Road Program, incorporating social and environmental aspects including lessons learned so far, in implementing rural road programs. This will provide a common platform for all rural road programs in achieving the SDGs. This will also help in strengthening the policy guidelines, which can then reflect on monitoring achievement of the SDGs.

II. **Sustainable Maintenance Strategy for rural road:** There are many low volume roads being constructed in Nepal. Funding and capacity required to maintain these roads are issues that need to be addressed in a timely manner. A proper funding

mechanism is equally important in keeping the minimum serviceability of the road. A Sustainable and Maintenance Strategy is necessary in providing a clear guideline of not only funding mechanisms but norms pertinent to the level of involvement and participation of the stakeholders, including rural road beneficiaries, in maintaining rural roads.

- III. **Network upgrading to sealed all-weather roads to ensure affordability, reliability and safety:** Due to the nine-months complete dryness and three-months excessive rain in Nepal, the unpaved earthen surfaced rural roads has proven to be very unpredictable in delivering effective transport services. There is a need to explore and apply low cost solutions to upgrade the earthen road to a sealed road standard. The focus should be made on research and development on maintaining the serviceability of the rural road, particularly in Hills and Mountains utilizing local resources.

- IV. **Updating District Transport Master Plan:** To guide the investment in this sector, it is essential that DTMP be revised and updated periodically. DTMP should also include a chapter on assessing social and environmental aspects of the rural community within the zone of influence of the rural road. This will help in monitoring the contribution made by improved rural road in achieving SDGs.