Building roads and improving livelihoods in Nepal




External review of the

DISTRICT ROADS SUPPORT PROGRAMME (DRSP)

Final Report

Paul Starkey *(Team Leader)*

Ansu Tumbahangfe *(Social and rural development specialist)*

Shuva Sharma *(Rural Transport Infrastructure Specialist)*

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Swiss Agency for Development and Cooperation (SDC)
Embassy of Switzerland, Ekantakuna, Jawalakhel,
PO Box 113, Kathmandu, Nepal

District Roads Support Programme (DRSP)
Manbhawan, PO Box 113, Kathmandu, Nepal
www.drspnepal.org

The views in this paper are those of the authors and they do not necessarily reflect the views of the District Roads Support Programme (DRSP) or the Swiss Development Cooperation (SDC) for whom the report was prepared

Paul Starkey
Team Leader
Consultant in Integrated Transport and Rural Livelihoods
64 Northcourt Avenue, Reading RG2 7HQ, UK
Tel: +44 118 987 2152 Skype: paulstarkey
Email: p.h.starkey@reading.ac.uk and paul@paulstarkey.net

Ansu Tumbahangfe
Social and rural development specialist
Email: ansu.tumbahangfe@gmail.com
Mobile: +977 9851079164

Shuva Sharma
Rural Transport Infrastructure Specialist
Scott Wilson Nepal
Email: shuva401@gmail.com
Mobile: +977 98510 22621

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Paul Starkey, Ansu Tumbahangfe and Shuva Sharma

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Executive summary

DRSP and the external review process

The Swiss Development Cooperation (SDC) commissioned a final review of the impacts of the 13-year District Roads Support Programme (DRSP). DRSP was established to contribute to better social and economic opportunities for rural people in Nepal through the construction and maintenance of rural roads. Roads were constructed and maintained using labour-based, environmentally friendly and participatory methods with decentralised systems of organisation. In 1999, DRSP started to assist District Development Committees (DDCs) to build and maintain roads in Kavre, Sindhupalchowk, Dolakha, Ramechhap, Okhaldhunga and Sindhuli Districts. In the final fourth phase that started in 2010, work commenced with the DDC in Khotang.

This review focusses on the socio-economic impacts of the programme and how people, particularly disadvantaged groups, have benefited from labour-based employment and improved access. It considers the sustainability of the impacts on institutions, people's capacities and national policies.

In December 2012, the review team held discussions with key stakeholders in Kathmandu and in six districts. The team designed surveys that were implemented in January 2013 in close collaboration with the DRSP. To assess the impact of six roads constructed by DRSP, there were household surveys (N=1526), surveys of transport operators and users (N=200) and surveys of enterprises and services along the roads (N=278). To assess the impact of labour-based employment, labourers were surveyed on three DRSP roads under construction (N=730). In February, the team analysed survey results and presented the review findings to SDC and key stakeholders in Kathmandu.

The structure and activities of the DRSP phases are summarised. The roads surveyed for this review are described briefly with maps illustrating improved proximity to roads. On the six completed roads surveyed, 50,000 people came to be one hour's walk from a road, with 100,000 people up to four hours away.

Improved access and transport services

Survey results showed the 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. Services ranged from one outgoing trip a day (Okhaldhunga) to eight travel opportunities a day (Dolakha). Half the passengers were men and one third were women. Fares ranged from NPR 3-8 per km. Buses were important for small freight which cost 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 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. There were no regular jeep services which may be due to powerful bus cartels. The issue of transport services was not in DRSP's work plan. Although the importance of transport services for the target population was raised in the 2009 external review DRSP did not investigate how rural transport services developed on DRSP roads. It is not known whether or not there remains exclusion due to inadequate or expensive transport services.

Impact of roads on agriculture, incomes and livelihoods

Agriculture remains the main source of household incomes, with evidence of larger crop areas and higher yields. Remittance income along DRSP corridors was low compared to national figures. Of those that did migrate, 51% were Janjati. Most migrants of all ethnic groups went to the Gulf.

Off-farm activities are emerging. On four road corridors, entrepreneurial enterprises had doubled in number. New enterprises including shops, tea rooms and workshops had been established, mainly

by Janjati people. Some retail outlets have become wholesalers, supplying goods to new shops along the roads. Traditional periodic markets are declining as people now have access to nearby shops.

DRSP training and 'beyond the road' activities benefited people. Labourers trained as skilled artisans by DRSP have earned good livelihoods after road construction. Women said they had been empowered by their training, inclusion in committees, the women's construction groups, equal pay and the savings and credit groups. Some women built on DRSP experiences to establish enterprises. Women considered safe day-return trips to market were a major gendered benefit of the roads.

Since the DRSP roads opened, average household incomes increased by 25%. While disadvantaged groups benefited (increase of 15%), non-disadvantaged groups benefited more (increase of 37%) as they had more assets to take advantage of new opportunities. Amongst the various castes/ethnic groups, Janjati benefited the most. Food security had improved but 55% of respondents were only self-sufficient in food grains for six months a year. Most of these were Dalits. A quarter of household expenditure went on food grains, with 16% on school fees. Most (75%) of respondents belonged to one or more savings and credit group. DRSP had initiated some of these.

Living standard indicators had improved significantly along the road corridors. Metal roofing sheet use rose from 9% to 74% for disadvantaged groups. Cement use was higher. Lower freight costs due to roads influenced these changes. Road access assisted service provision, including electricity.

Economic impact

Economic analyses were carried out on three DRSP roads using Roads Economic Decision software. With no baseline data, the 'pre-project' transport situation had to be estimated. Total construction costs were also estimated as no project had been straightforward. The model assumed traffic growth of 7% per year which was reasonable (or modest) as two DRSP roads recorded annual growth of 40% (including motorcycles) and 11-16% for buses. The resulting economic internal rates of return (EIRR) were 17%, 19% and 29%. The high EIRR was for a DRSP road with traffic coming from another road section so the investment cost used may have been too low. The results were robust in 20% sensitivity tests. The EIRRs were above the 12% used to justify investments.

Further economic analyses were based on increased agricultural production and land values and assumed social benefits. With these scenarios, EIRRs of 33-39% were achieved. Land area assumptions had been low; even higher EIRRs could be calculated. Despite debateable assumptions, the two economic evaluations demonstrated clearly the economic benefits of the roads.

Impact of employment, social inclusion and other influences

About five million days of employment were provided during the four DRSP phases. On the roads surveyed, households gained an average of 98 work days. About half the workers were from disadvantaged groups. The highest increases in earnings due to road construction were seen in Dalit households. For most households, income was spent on food and school fees. For the 2% of families with employment for more than one year, earnings went to pay off debts and buy additional land.

DRSP helped create committees and working groups that involved disadvantaged groups particularly Dalits, women and marginalised communities. This led to greater awareness about issues of equal pay, rights and privileges. Through road-level and district level organisations, DRSP promoted much understanding and ownership relating to roads and labour-based approaches. DRSP has influenced national policies and donor-supported projects through the Rural Roads Forum (RRF) it supported.

While the roads have generally had good impacts, there may have been negative outcomes which are difficult to assess. Roads may have contributed towards deforestation, pollution, the spread of HIV/Aids and cultural dilution, including the spread of international drinks and convenience foods.

Sustainability of impacts

DRSP roads were well-engineered and constructed to earthen surface standards with essential retaining and drainage structures and bioengineered environmental protection. Their design and

quality made it possible to upgrade some roads to be part of the strategic network. The successful, labour-based approach has been well-documented. Various low-volume pavements have been evaluated. DRSP has advocated good, labour-based maintenance and has support district-level maintenance plans. However, maintenance requires funding and districts did not put sufficient resources and management to develop adequate long-term maintenance systems. DRSP trained district-level officials, but the sustainable impact was low due to high staff turnover.

Conclusions

Through its labour-based approach, DRSP not only constructed well-engineered rural roads but also provided valuable employment and skills for improved livelihood opportunities. Through its social inclusion approach, household incomes increased, particularly for Janjatis. A wide range of people benefited from the access provided by roads, with disadvantaged groups having greatly improved indicators concerning incomes, housing quality, school attendance and sanitation. Inevitably, non-disadvantaged groups with resources have been best able to benefit from the economic and social opportunities provided by the roads. DRSP did not target people with disabilities nor did it investigate how disadvantaged groups could benefit from better transport services.

DRSP has influenced rural transport thinking in Nepal, including district planning for construction and maintenance, bioengineering and sustainable, labour-based pavements, such as cobblestones. It has championed labour-based approaches and provided excellent examples of successful labour-based construction. However, at national level, labour-based techniques have had little adoption and limited support. Even in districts and local communities, people see the advantages of machinery and neglect the pro-poor benefits of labour-based construction. Equipment-based methods are perceived to be quicker and cheaper, easier to tender and manage, more modern and there may be opportunities for corrupt private gains from the contracts. Labour-based cobble stone pavements suffer from similar issues. Their durability and low lifetime costs should make them attractive but there appears little enthusiasm for them at national or district levels. The government has policy statements that favour labour-based approaches, but much needs to be done to convince national and district decision makers and donor agencies. DRSP has one more year to win over hearts and minds if it is to have a sustainable legacy. To date DRSP has advocated for a pure, labour-based approach. Mixed approaches generally lead to increasing use of equipment. However, DRSP may have to consider whether a labour-based legacy within a mixed approach is better than nothing.

DRSP has helped to initiate and develop sustainable tools and practices for labour-based maintenance. However, the intended adoption has been low and impacts are few. Problems relate to resources, management and people's preferences for new construction and working with equipment. DRSP and the planned Local Road Improvement Programme could have a major impact by getting sustainable maintenance systems adopted.

DRSP has been a great success story for SDC and a good experience for the rural roads sector in Nepal. Dedicated teams of Nepali professionals have managed local labour to build good roads in areas of difficult topography, geology, weak governance and social unrest. Labour-based construction contributed to poverty reduction among disadvantaged groups, with millions of days of employment. This was thanks to DRSP's effective central coordination, devolved responsibilities, transparent governance, high professionalism and excellent team morale. This has been facilitated by SDC's commitment, planning, delegation and support. With DRSP's excellent methodologies and reputation, SDC has been able to influence other donors and leverage funding. SDC could have improved DRSP by insisting on baseline data-collection and expanding its concept of social inclusion to include people with disabilities and communities without adequate transport services. SDC should help maximise the benefits of DRSP's legacy: the valuable lessons of DRSP's proven, technically-sound and socially-beneficial method of constructing and maintaining good roads should be shared to influence national and district-level decision-makers in Nepal as well as donors. SDC should ensure DRSP's valuable experiences are shared internationally to benefit other countries.

Acronyms and abbreviations

AADT	Annual average daily traffic
ADB	Asian Development Bank
Aids	Acquired immune deficiency syndrome
ARMP	Annual Roads Maintenance Plans
BCR	Benefit Cost Ratio
BP	Bishweshwar Prasad Koirala Nepal's first democratically-elected Prime Minister
CBS	Central Bureau of Statistics
CDA	Community Development Advisor
CHF	Swiss Franc (CHF1 ≈ USD 1.06 ≈ NPR 92)
CISC	Central Implementation Support Consultants
DAG	Disadvantaged groups
DDC	District Development Committee
DDF	District Development Fund
DDPP	District Development Periodic Plans
DTO	District Technical Office
DFID	Department for International Development, UK (UKAid)
DoLIDAR	Department of Local Infrastructure Development and Agricultural Roads
DRCC	District Road Coordination Committee
DRILP	Decentralised Rural Infrastructure and Livelihood Programme
DRSP	District Roads Support Programme
DRSP-DTO	DRSP District Technical Office teams
DRSP-PSU	DRSP Project Support Unit
DTMP	District Transport Master Plan
eg	for example
EIRR	Economic internal rate of return
ENPV	Economic Net Present Value
GESI	Gender, Equality and Social Inclusion
GIS	Geographical information systems
GoN	Government of Nepal
GPS	Global positioning system
HH	Household
HIV	Human immunodeficiency virus
HDM4	Highway Design and Maintenance Standards version 4
HQ	Headquarters
ie	that is to say
IFRTD	International Forum for Rural Transport and Development
IMT	Intermediate means of transport
IRI	International roughness index (IRI) kg kilogram
km	kilometre
LDO	Local Development Officer
LEP	Labour-based, environmentally friendly and participatory
LIP	Local Infrastructure Development
LRCC	Local Road Coordination Committee
LRIP	Local Road Improvement Programme
LRUC	Local Roads User Committee
m	metre
MoF	Ministry of Finance
MoFALD	Ministry of Federal Affairs and Local Development
N	Number (sample size)
NGO	Non-governmental organisation
NPC	National Planning Commission
NPR	Nepal rupee (USD 1 ≈ NPR 86 at time of review)
NPV	Net Present Value
PICC	Project Implementation and Coordination Committee
PSU	Programme Support Unit
RCG	Road Construction Group
RCIW	Rural Community Infrastructure Works
RED	Roads Economic Decision model
RRF	Rural Roads Forum
RTI	Rural Transport Infrastructure
NPR	Nepal Rupee
RRRSDP	Rural Reconstruction and Rehabilitation Sector Development Program
RTS	Rural transport services
SCF	Standard Conversion Factor
SDC	Swiss Agency for Development and Cooperation
SERF	Shadow exchange rate factor
SMO	Social Mobilisation Officer
SRN	Strategic road network
SWAp	Sector-wide approach
SWRF	Shadow wage rate factor
tonne-km	Unit representing one tonne transported for one kilometre
UC	User Committee
UK	United Kingdom (of Great Britain and Northern Ireland)
UN	United Nations
UNDP	United Nations Development Programme
USA	United States of America
USD	United States Dollar (USD 1 ≈ NPR 86 at time of review)
USDc	Cent of United States Dollar (NPR 1 ≈ USDc 1.16 time of review)
VDC	Village Development Committee
VOC	Vehicle Operating Costs
VOT	Value of time
WFP	World Food Programme
YPO	Yearly plan of operation
ZoI	Zone of influence

1 Introduction

In 1999, the Swiss Development Cooperation (SDC) worked with the Government of Nepal to initiate and co-fund the District Roads Support Programme (DRSP). Roads and access are crucial for poverty reduction in isolated rural areas. The aim and main focus of the DRSP has been on constructing, rehabilitating and maintaining rural roads using labour-based, environmentally friendly and participatory methods. In addition, the programme has been targeting disadvantaged groups by providing short- and long-term employment opportunities from the road works. DRSP has also undertaken training and capacity-building activities and has implemented various schemes designed to increase incomes and reduce poverty in its zones of intervention. DRSP is currently in its fourth and final phase, which is now due to end in 2014.

DRSP has worked in seven districts of Nepal: Kavre, Sindhupalchowk, Dolakha, Ramechhap, Okhaldhunga, Sindhuli and Khotang. These are shown in Figure 1.

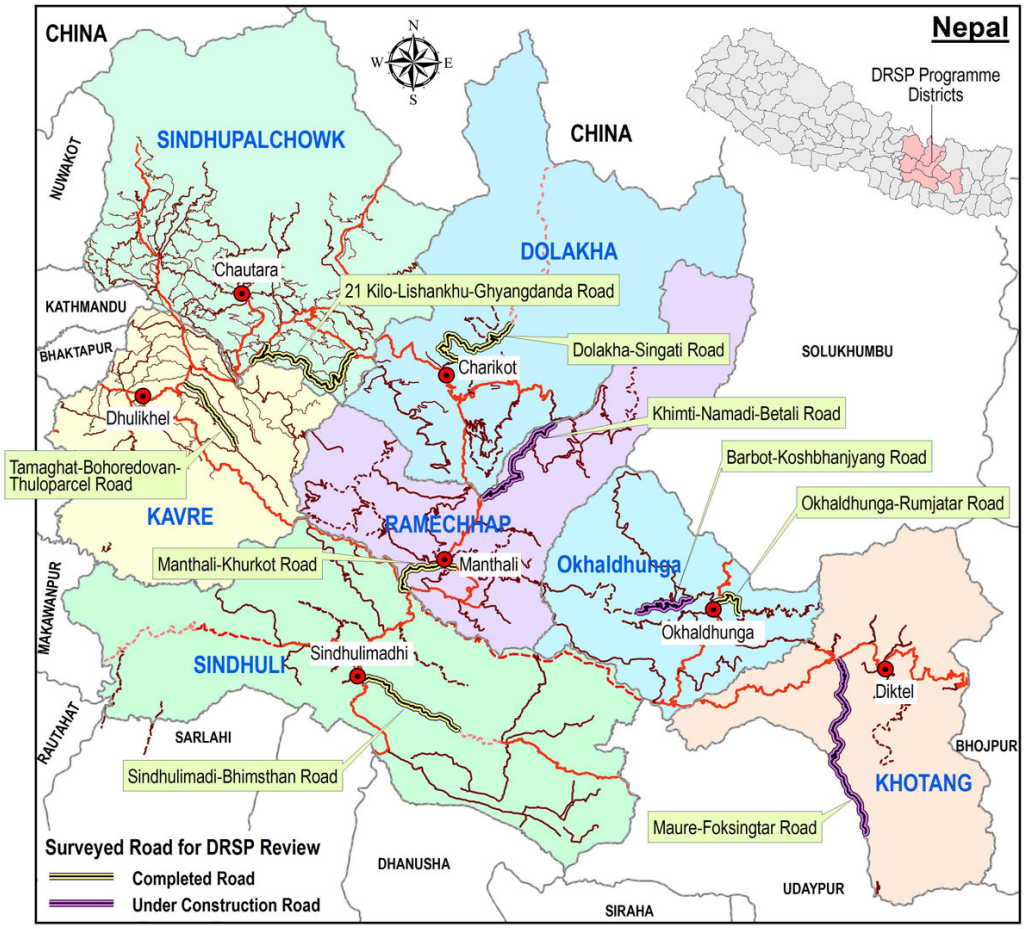


Figure 1: Map of the DRSP districts in Nepal, showing the roads selected for review surveys

In the course of its activities, DRSP has constructed 160 km of new road and it has upgraded and rehabilitated 450 km of existing tracks to an all-weather standard. The construction, rehabilitation, upgrading and maintenance of these roads have improved the access of hundreds of thousands of rural people in seven districts to markets, services and economic opportunities. In the process of providing this enhanced access, about five million person-days of employment were generated for people living in remote areas. In addition, DRSP has built upon its experience by facilitating rural infrastructure programmes funded by the Asian Development Bank (ADB) and the British Department for International Development (DFID) and has collaborated with infrastructure initiatives supported by the World Food Programme (WFP). Further details of the many activities and achievements of DRSP are provided below and in Annex 5 and Annex 6.

In 2012, SDC commissioned this study that was anticipated to be the final external review of DRSP that would assess the impacts of the whole thirteen-year programme. This review was expected to focus on the socio-economic impact and how people, particularly disadvantaged groups, have benefited in the long term from improved access, institutional systems and enhanced capacities. The Terms of Reference for this review are in Annex 8.

The review team met in December 2012 and held initial discussions with SDC and DRSP in Kathmandu. It was agreed from the outset that the review would be conducted in close cooperation with DRSP. The review team would be able to benefit from the knowledge, experience and skills of the DRSP staff while retaining the objectivity required for a review assignment.

The team then undertook a programme of interviews with key institutional stakeholders, including the hosting organisation, the Department of Local Infrastructure Development and Agricultural Roads (DoLIDAR). They also had discussions with various donor-assisted projects and development banks. The team visited several DRSP-constructed roads in six of the seven districts of DRSP activities. They also talked to various stakeholders, including working members of road construction groups, district-based DRSP staff and District-level officials. A list of stakeholders contacted during the review is provided in Annex 7.

During January 2013, the surveys were undertaken in the seven DRSP districts. They included household surveys, surveys of road construction workers, surveys of transport service users and operators and surveys of enterprises and services located along the selected roads. Focus group discussions were also undertaken with the members of the Local Roads Coordination Committees (LRCC) and Local Road User Groups (LRUC). The surveys were conducted in collaboration with DRSP field staff and hired enumerators (most of who had previously worked for DRSP). Detailed explanations of the methodologies employed are provided in Annex 2.

DRSP has worked for thirteen years and has undertaken many activities, including collaborative programmes with several different funding agencies. The achievements of DRSP are many, but this report is intended to be brief. Therefore the authors have concentrated on highlighting key features, particularly those that provide lessons for future development interventions. As noted, the report has been prepared in close collaboration with the DRSP team, and so it should not be considered an independent, external evaluation. Rather, it is an external review of the progress and impact of DRSP, based on the opinions of many key stakeholders, including the DRSP team.

This report briefly summarises DRSP's institutional arrangements and the activities and outputs of the four phases (with additional information summarised in Annexes 5 and 6). The various impacts of the roads are examined, drawing on the recent survey data. The impacts of the labour-based methods and the social programme are discussed. Results of economic impact analyses are presented. Other impacts, including the influence of DRSP on local, district and national capacities and governance are reviewed. The sustainability of the programme's achievements and structures are considered. The overall conclusions and recommendations of this review are then presented.

2 DRSP structure, activities and achievements: 1999-2013

2.1 Development objectives and main focus of the distinct phases

The development objectives of DRSP were

- To contribute to better social and economic opportunities for rural people and to the improvement of their living conditions.
- To promote decentralisation to the level of District Development Committees (DDCs) for the responsibilities of local road networks.

2.2 Operational structure and collaboration framework

DRSP has been a collaborative programme funded by SDC and the Government of Nepal that involves the Department of Local Infrastructure Development and Agricultural Roads (DoLIDAR) and the District Development Committees (DDC). Under DRSP, the District Technical Offices (DTOs),

which are the technical units of the DDCs, have managed the construction and maintenance of selected roads with the support of DoLIDAR. The DRSP District Technical Office teams (DRSP-DTO) have been facilitated by the DRSP Project Support Unit (DRSP-PSU) based in Kathmandu.

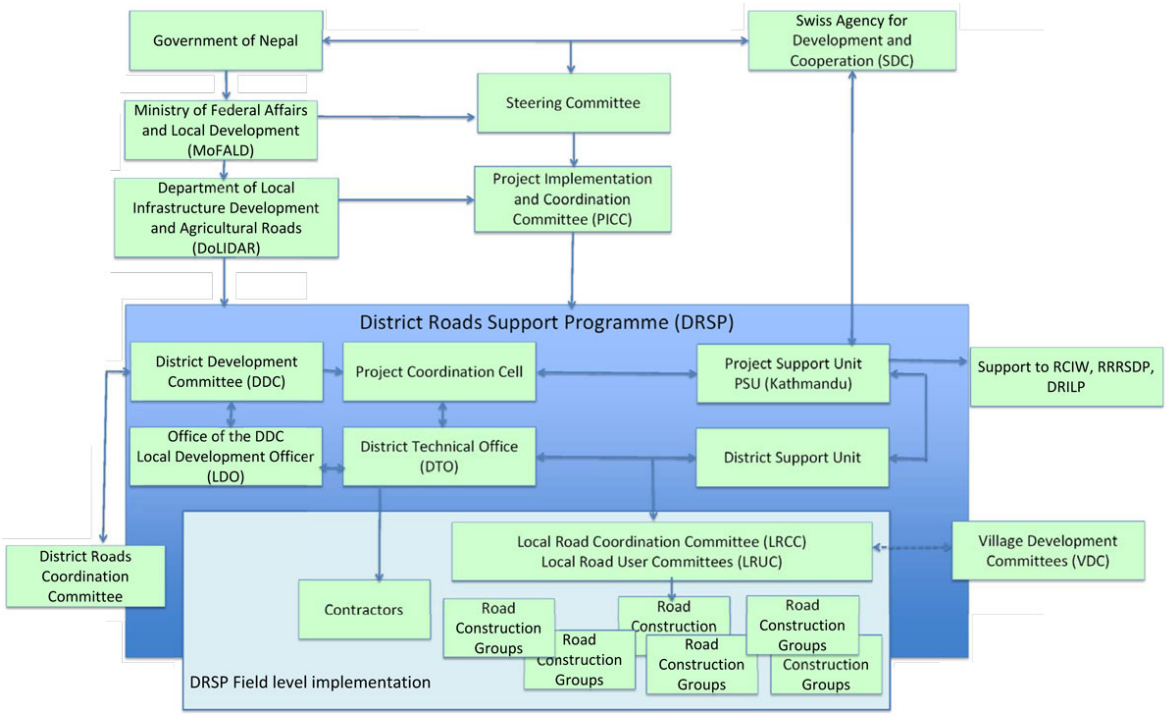


Figure 2: Organogram of DRSP

The main institutional arrangements for the implementation of DRSP are summarised in Figure 2. To ensure strong policy linkages and overall direction, there has been a Steering Committee at the central policy level and programme level coordination committees. The key national-level institutional stakeholders represented in the Steering Committee are the Ministry of Federal Affairs and Local Development (MoFALD), DoLIDAR, the National Planning Commission (NPC) and the Ministry of Finance (MoF) and SDC.

The Steering Committee and the Project Implementation and Coordination Committee (PICC) have been informed of the DRSP district-level activities and outputs through meetings and occasional field monitoring visits, organised by DRSP-PSU. As the review team confirmed, this has resulted in national policy makers being fully aware of the labour-based approaches being effectively implemented by the DDCs with the help of the DRSP-DTOs.

MoFALD has been directly responsible for DRSP implementation as ownership and management of the local infrastructure development has been vested with the DDCs (under MoFALD) with technical guidance of the DTOs resting with DoLIDAR (also under MoFALD).

The whole process has been supported by the central DRSP-PSU team and the DRSP-DTO teams. Swiss consultancy firms have been contracted by SDC to manage the DRSP-PSU and provide planning support, quality control and monitoring supervision to the DRSP-DTO teams.

At the district level, DDCs, through the Local Development Officer (LDO) and the DTOs have been responsible for all of the procedures to implement the rural roads, from the planning stage involving the prioritisation and selection of roads, to the survey, design and the implementation itself. They authorised all transactions related to road planning, construction works and maintenance in their districts. Therefore, the implementation of DRSP has been by the DDCs and their DTOs, facilitated by DRSP-PSU.

District-wide planning has been provided by the District Road Coordination Committees (DRCC) which are committees established under the DDCs to assist in planning, construction and maintenance. However, for individual roads, there have been Local Road Coordination Committees

(LRCCs). These have been responsible for managing specific road works including maintenance and issues associated with land acquisition and road alignment. LRCCs link the DDCs/DTOs with the Local Road User Committees (LRUCs). The main roles of the LRUCs have been to manage the actual works related to road construction and maintenance. These committees have been responsible for organising the work force. They have had control over tools and equipment, supported supervision of works, taken part in the measurement of completed works and taken charge of distributing the payments to each individual worker. The actual supervision of labour has been the responsibility of the Road Construction Groups (RCG). These working groups of men and/or women were formed to actually undertake the labour-based works on particular sections of roads, typically using hand tools. The relationships of these different committees and groups with the DDC and DTOs are illustrated in Figure 2.

SDC has provided about CHF 45 million for the four DRSP phases, as summarised in Table 1. Swiss consultancy companies have been contracted to provide technical assistance and manage the flow of funds to the DDCs. About three-quarters of these contracted funds have been transmitted to the districts as SDC's contributions to road construction, road maintenance and social interventions.

Table 1: SDC contracts for the DRSP phases covering road works, social programmes and technical assistance

Phase	Contractor	Start	Finish	SDC Budget *(CHF million)*
DRSP 1	Frisa ITECO JV in association with SKAT	Jan 1999	Mar 2002	6.0
DRSP 2	Frisa ITECO JV in association with SKAT	Apr 2002	Jul 2006	9.2
DRSP 3	Frisa ITECO JV in association with SKAT	Jul 2006	Jul 2010	12.5
DRSP 4	ITECO Engineering Ltd	Jul 2010	Jul 2013	17.4
	Total SDC *(excluding extension to 2014)*			**44.6**

Source: DRSP management

The Swiss consultancy firms responsible for DRSP-PSU have also been contracted to provide technical assistance support to three other road transport infrastructure programmes in Nepal. The DRSP-PSU team has acted as Central Implementation Support Consultants (CISC) to:

- Decentralised Rural Infrastructure and Livelihood Programme (DRIP), a DoLIDAR programme co-funded by the Asian Development Bank (ADB).
- Rural Reconstruction and Rehabilitation Sector Development Program (RRRSDP), a DoLIDAR programme co-funded by ADB, the British Department for International Development (DFID), the Government of Nepal and SDC.

DRSP-PSU has also supported the Rural Community Infrastructure Works (RCIW), a programme of the government of Nepal with food for work provided by the World Food Programme of the United Nations. RCIW enabled food (mainly rice) to be provided as wage to working groups in food deficit areas of four DRSP districts (Kavre, Sindhupalchowk, Dolakha and Ramechhap).

2.3 DRSP Phase one: build-up phase

DRSP Phase One (January 1999 to March 2002) was primarily designed as a build-up phase in six districts of Kavre, Sindhupalchowk, Dolakha, Ramechhap, Okhaldhunga and Sindhuli. Phase one included significant institutional, technical and social inputs in developing the capacity of the stakeholders particularly at the district and local level. A range of training to DDC technical teams was provided. Approach manuals consistent with DoLIDAR guidelines were formulated for the preparation of District Transport Master Plans (DTMP) in all six districts. Key social and transparency tools and methodologies were designed. Following this, DRSP set up to maintain and rehabilitate the existing network, and new linkages in priority areas of six programme districts. This resulted in bringing to maintainable standards nearly 150 km of existing roads and addition of 23 km of new road sections.

DRSP Phase One investments provided the programme districts with the tools, awareness and capacity to maintain the existing network while investing in new roads in a selective and prioritised manner.

2.4 DRSP Phase two (April 2002 to July 2006)

The DRSP Phase Two was designed to further strengthen the achievements of Phase One and sought to enhance the technical capacity of participating DDCs to maintain, rehabilitate and construct 300 km of rural district roads and an additional 100 km constructed in partnership with other donors. This was to be achieved while maximising long-term benefits to the poor and deprived communities along the road corridors. This phase established a process of information sharing and policy dialogue with government and donors on issues associated with the district road sector. It also aimed to enhance DoLIDAR's capacity to develop policies and management systems for the district road sector.

The activities under this phase resulted in more than 316 km of roads being maintained or constructed with the DRSP budget while 125 km were added in partnership with Rural Community Infrastructure Works (RCIW). More than 1.25 million person-days of wage employment were provided to the local beneficiaries, mainly those in the marginalised segment of the society. More than 80 groups worked for more than 90 days in a year, helping themselves to reduce their poverty levels. DRSP worked with DoLIDAR to review its 'norms' to reflect actual productivity while supporting it to improve its database of district road assets. DRSP supported the Local Infrastructure Development (LID) preparation process. In the same spirit, it undertook a number of action-research initiatives to find out cost-effective pavement systems. DRSP worked with the local government systems while channelling its funds through the DDC. 'Beyond-the-roads' programme support was provided to enable saving and credit groups to form cooperatives. NGOs were trained to build their capacities in social mobilisation and in using transparency tools. DRSP designed and incorporated more conflict-sensitive tools that took them closer to the communities increasing their ownership of the road construction processes.

During Phase Two, DRSP learned a number of lessons while working with the communities and key stakeholders. Its partnership with RCIW showed that work progress could be expedited in collaboration with other programmes. This phase also saw a popular demand at the community level for all-weather road surfaces. The alternative of the road closing during the rainy season was not practical as farmers wished to sell their produce during this period.

2.5 DRSP Phase three (July 2006 to July 2010)

Almost seven years on from start of the programme, DRSP Phase Three (July 2006 to July 2010) was designed with a strong social objective to improve the livelihoods of the disadvantaged and poor who would be empowered to equitably benefit from improved access to resources and opportunities. This was going to be achieved while providing continued focus on the rural road investments to improve accessibility and increase local economic opportunities.

Over the four-year programme period, 45 km of new motorable roads were constructed and 337 km of the existing network in remote areas were rehabilitated while supporting periodic maintenance of 114 km of roads. More significantly, however, was the continued generation of waged employment to rural communities. Just over one million person-days of employment were provided, of which 37% was taken up by women, and 73% of the total employed were from disadvantaged groups. Social sector empowerment led to LRCC/LRUC institutions having at least two female members in them and overall 45% to 55% of their members came from disadvantaged groups. Application of the transparency tools of public hearings and public audits helped to ensure that the workers were paid in time and fairly.

The cash injected into the communities was brought to more sustained use through 131 savings and credit groups that were formed with savings of at least NPR 25,000 in a group. Despite the persistent focus on the maintenance of the existing network, the DDCs were still showing reluctance to fund maintenance. Therefore DRSP supported policy changes and applications for DDCs to prepare and apply Annual Roads Maintenance Plans (ARMPs) that came with incentives for compliance. DRSP continued its support to Rural Roads Forum (RRF) to actively support policy development and information sharing among professionals in this sector.

Lessons learnt from activities in this phase showed that the growing road network districts required adequate, secure and appropriate funding to ensure the necessary level of maintenance and sustainability of the investments. There was also the realisation that disadvantaged people could not sustain their improved level of livelihoods that had been derived from wages from construction phase. They would require support with life skills in association with other SDC projects.

2.6 DRSP Phase four (July 2010 to July 2013, with extension to 2014)

The fourth and final phase of DRSP started in 2010 with work in four districts: Ramechhap, Okhaldhunga, Sindhuli and Khotang. In this Phase, DRSP set the key objective to reach out to the remote rural population so that they could benefit from motorable access to resources and opportunities. It sought to achieve this while ensuring that institutional structure and capacities at all levels supported good governance and an acceptable level of workers' welfare.

Rural road construction, rehabilitation and maintenance works and beyond-the-road social interventions were followed in all four programme districts. Together, more than 70 km of road were constructed and another 30 km rehabilitated while 260 km were regularly maintained. This led to the generation of about 2.1 million person-days of employment (to March 2013). Increased level of focus and empowerment of disadvantaged groups helped to ensure that nearly 60% of road construction group members were from disadvantaged groups. Members of discriminated groups held 65% of key positions in the local committees (LRUCs and LRCCs).

DRSP worked with mainly with Local Road Users Committees but also with some private sector contractors. DRSP concluded that the LRUCs actually performed better and work management was smoother. DRSP also considered that insurance was a necessary part workers' welfare. The insurance companies, through their local agents, had to be responsive to victims of accidents. Good governance through E-bidding was seen to be working well for contract works using professional contractors. Experimentation with pavement designs such as cobblestones produced encouraging results but required perseverance by the programme to ensure that DRSP experiences and best practices would be adopted by DoLIDAR and DDCs nationwide.

The phase was due to end in 2013. During the time of the present review, SDC agreed to extend the phase till June 2014. This will allow on-going work to be finished and ensure the programme has a continuing presence in the target districts. This should allow a smooth transition to the proposed follow-up Local Road Improvement Programme (LRIP) that is being planned.

3 The DRSP road surveyed

The review team, in consultation with DRSP and SDC, selected six established roads and three roads under construction to collect new data to help assess the impact of the roads (Table 2). As noted, the surveys included household questionnaires, traffic counts and surveys about access (interviews with transport operators and users) and surveys of enterprises and organisations located on or near the roads. On three of the roads, data were used for economic analyses. The surveyed roads are described in Annex 1. The general location of each road is shown in the Figure 1.

Table 2: The roads surveyed

Name	Road length *(km)*	Construction period	District
Well-established roads			
Timalbesi–Thuloparcel	20.6	2005-2007	Kavre
Ghyangdanda–21 Kilo	7.4	2001-2004	Sindhupalchowk
Dolakha–Singati	20	2001 2006	Dolakha
Manthali–Khurkot	15	2000 2007	Ramechhap
Okhaldhunga–Rumjatar	11	2002-2006	Okhaldhunga
Sindhulimadi–Bhimsthan	22	2002-2007	Sindhuli
Roads under construction			
Khimti-Betali-Namadi	37.7	2012-2013	Ramechhap
Mahire-Foksingtar	48	2010-2013	Khotang
Barbot-Koshbhanjyang	27	2010-2013	Okhaldhunga

4 Impacts of DRSP roads

4.1 Access to roads

The maps shown in the Figure 3 and Figure 4 illustrate how people's access to roads has been greatly improved as a result of the roads constructed. They show the contours of access associated with the roads. Light green shows the locations that are up to 30 minutes' walk from a road. Yellow represents areas that are up to one hour from the road. Pink areas are 1-2 hours from the road and blue areas are 2-4 hours from the road. White areas are more than four hours from the road. The maps therefore show the changing access due to the road construction. Similar maps showing the changes in people's access on all of the nine sampled roads are provided in Annex 1.

DRSP estimates that for the six completed roads that were surveyed, about 100,000 people were brought into road proximity (being four hours or less to walk to a road). The three roads currently under construction will bring an additional 50,000 people to with four hours' walk of a road. About half of the beneficiaries are within one-hour of the road and half of these (one quarter of the beneficiaries) are within 30 minutes of the road.

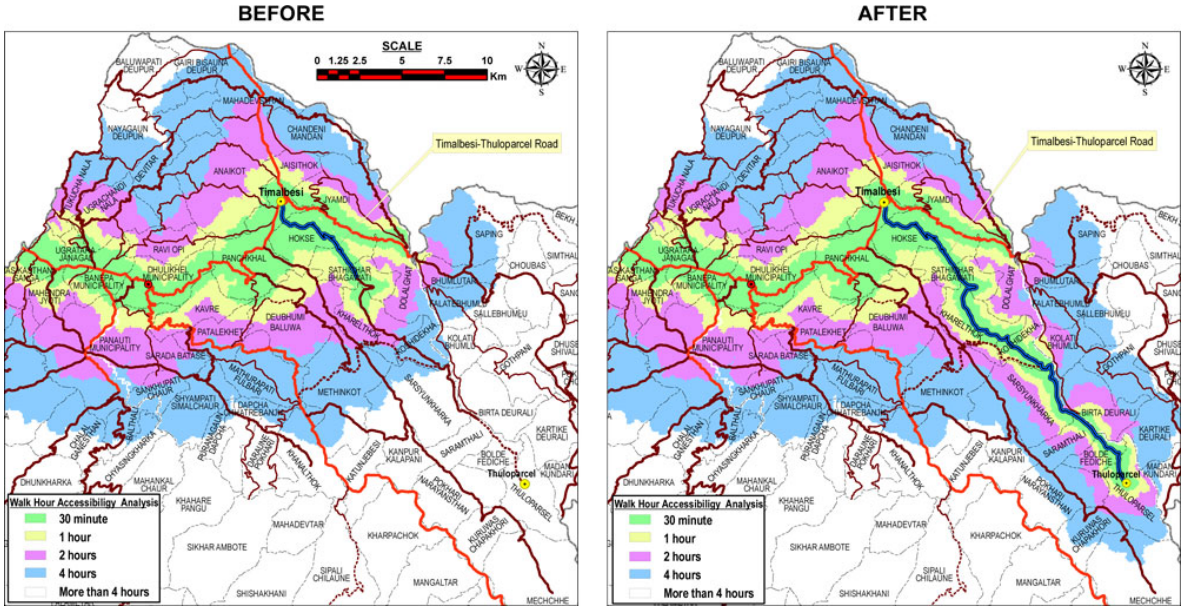


Figure 3: Map of the Timalbesi–Thuloparcel road showing access contours before and after construction

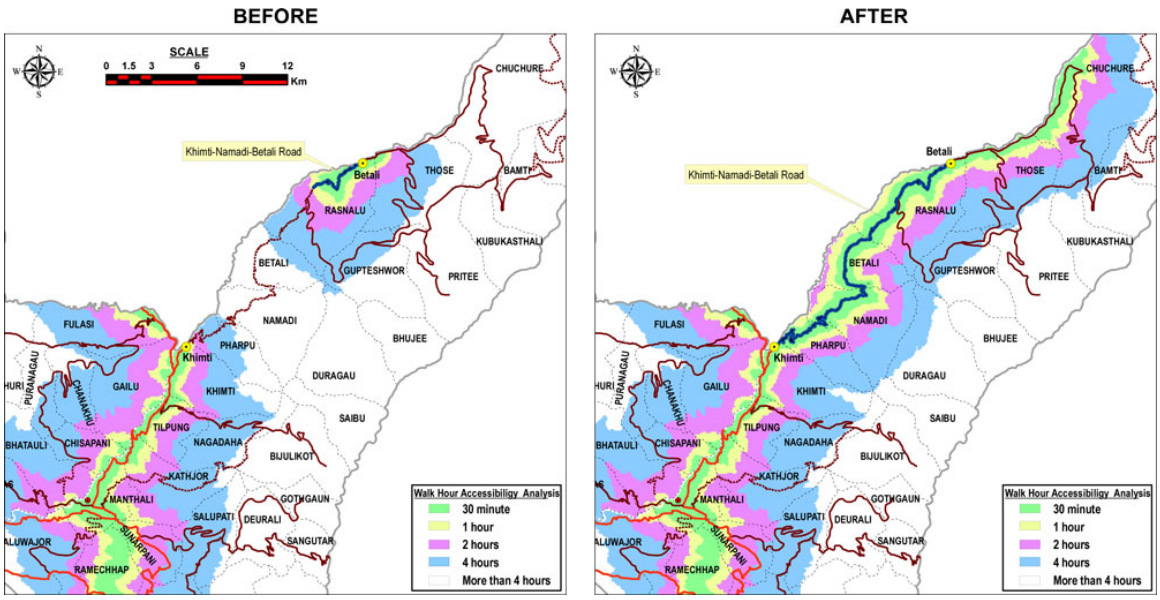
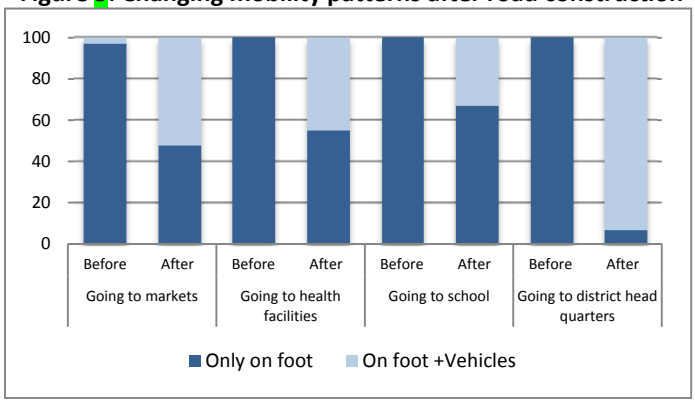


Figure 4: Map of the Khimti-Namadi road showing envisaged access contours before and after construction

4.2 Access to services

Figure 5: Changing mobility patterns after road construction



Source: Household Survey 2013

Prior to the construction of the roads, most people travelled on foot to access service centres. After construction, 95% of the sampled population were using the roads to access district headquarters (which are often 3-4 hours away from the villages by foot), while 55% were travelling by vehicular transport for reaching regional markets (Figure 5). In the context of rural mobility this was significant, as the roads and the associated public and private means of transport, allowed for longer trips to be made along with return trips. From a gendered perspective this was found to be particularly important, as it allowed women to undertake day return journeys without having to stay overnight.

It was observed that many services, such as retail shops, agro-vets, medical clinics, money exchange centres and dairy collection sites began to be established along the road corridors after the road construction. This greatly enhanced access as people did not have to travel so far for important facilities and services.

Roads also created conditions for services and service providers to reach rural villagers. For example, along the Sindhulimadi-Bhimsthan corridor, villagers remarked how the construction of the road had led to the establishment of a secondary school with the support of funds from India. One of the prerequisites for funding the school was the presence of a road for the transportation of construction materials. Schools also reported that it was easier to recruit and retain teachers after the construction of the roads. Also if teachers had to travel for administrative duties, their absences was shorter due to the availability of transport services.

People were asked about savings in their journey times due to the presence of the road and transport services. The results are shown in Table 3. The highest savings were naturally for long journeys, such as accessing district headquarters (nearly two hours saved) as well as journeys to markets, health facilities, agro-vets and social activities (about an hour saved). The average time savings for travelling to schools were very small. This is to be expected as most rural primary school

children walk to school. Travel to secondary schools may involve longer journeys and public transport may be used where there are suitable services (and people can afford them). On none of the roads studied were there transport services with timetables that would have been appropriate for daily return trips for students.

Table 3: Time saved for various journeys (in minutes)

Road Segments	Journey destination					
	Markets	Health facilities	School	Agro-vet	District HQ	Social activities
Thuloparcel-Timalbesi	110	79	10	85	197	120
Ghyangdanda-21 Kilo	76	55	6	51	115	25
Dolakha-Singati	40	42	2	40	134	39
Manthali-Kurkot	38	65	11	60	67	158
Rumjatar-Okhaldhunga	6	10	1	30	60	42
Sindhulimadi-Bhimsthan	59	20	3	29	84	77
Average	*55*	*45*	*5*	*49*	*109*	*77*

Source: Household Survey 2013

DRSP collaborated in an international study on 'Mobility and Health' coordinated by the International Forum for Rural Transport and Development (IFRTD). This assessed the linkages between DRSP roads and health practices had concluded that there was a "… definite link between road conditions and the frequency with which women use road transport for maternal health visits". However, the planning and location of services were noted by the study to be "… not coordinated for mutual advantage, which has often resulted in inappropriate positioning of facilities, directly affecting disadvantaged communities" (Shrestha and Workman, 2008).

During the present study, the importance of roads for both maternal health care and medical emergencies was stressed by many stakeholders. Both women and health service providers indicated that there were increases in the number of women coming for antenatal care as a result of the roads. The use of the DRSP roads by ambulances was recorded on the traffic counts. Along the Dolakha-Singati road, health workers indicated that the road had created conditions for better access to emergency medical care through ambulance services. Even when stretchers were used to transport some people to hospital in Dolakha (due to costly ambulance services) the road had an important function as patients and porters preferred the gradients of the roads to those of the steeper (but shorter) footpaths when it came to carrying pregnant women and emergency medical cases.

Figure 6: Motorcycles are increasing on all DRSP roads

4.3 Traffic counts and transport services

Seven-day traffic counts were conducted to see the patterns of passenger and freight movements on the six DRSP roads surveyed. The results are summarised in Table 4. Vehicles travelling in either direction were counted each time they passed the census station. Some of the vehicles (notably buses, trucks and jeeps) may have been travelling the full length of the road. Other traffic

(motorcycles, tractors and trailers, ambulances, bicycles and pedestrians) may have been travelling shorter distances and their numbers may not have been uniform along the road.

Table 4: Daily traffic counts and passenger and freight statistics

Traffic count statistics	Thuloparcel-Timalbesi (Kavre)	Ghyangdanda-21 Kilo (Sindhupalchowk)	Singati-Dolakha (Dolakha)	Manthali-Khurkot (Ramechhap)	Rumjatar-Okhaldhunga (Okhaldhunga)	Sindhulimadi-Bhimsthan (Sindhuli)
Bus	8	4	16	9	3	9
Truck (light/medium)	2	5	22	8	1	5
Car/Private jeep/4x4	1	2	16	7	12	21
Motorcycle	8	7	21	92	22	68
All vehicles incl. tractors	**20**	**20**	**75**	**135**	**40**	**105**
Pedestrians and cyclists	0	140	35	45	40	190
Daily bus passengers	207	477	850	564	145	540
Daily bus freight (tonnes)	2.4	2.4	2.6	1.0	0.9	9.0
Daily truck freight (tonnes)	2	7	69	7	5	13
Men (% bus passengers)	56	46	47	46	56	46
Women (% passengers)	29	33	34	33	30	33
Children (% passengers)	16	21	17	21	12	21

Source: Traffic Counts 2013

On all the roads, most bus passengers were men (46-56%), about one third of the passengers were women and the remainder (12-21%) were children. On the two routes with little passenger traffic (Thuloparcel-Timalbesi; Rumjatar-Okhaldhunga) the proportion of women and children was lower than the other routes.

Apart from motorcycles (which are increasingly used on all roads), there were very few intermediate means of transport. Bicycles, animal-drawn carts, three-wheelers and two-wheel tractors were very uncommon. This is partly due to the hilly terrain. Such means of transport are widely used on the roads of the Terai and in some towns.

For most people, the important transport statistics are not the traffic counts but the frequency and price of safe transport services. Table 5 provides some key transport services statistics for the six surveyed roads. The first indicator is the number of travel opportunities per day in the direction of the main town to which people wish to travel (eg, district town or Kathmandu). This ranged from just one (on the Rumjatar-Okhaldhunga road) to eight (on the busy Singati road). People expressed clear dissatisfaction with the opportunities to travel on the roads surveyed in Ramechhap, Okhaldhunga and Sindhuli (Table 5).

Table 5: Key transport service characteristics and user satisfaction

	Thuloparcel-Timalbesi (Kavre)	Ghyangdanda-21 Kilo (Sindhupalchowk)	Singati-Dolakha (Dolakha)	Manthali-Khurkot (Ramechhap)	Rumjatar-Okhaldhunga (Okhaldhunga)	Sindhulimadi-Bhimsthan (Sindhuli)
Travel opportunities / day	4	3	8	4	1	4
User satisfaction	*3.5*	*3*	*3*	*2*	*2*	*2*
Bus fare in NPR/km and (USDc/km)	2.6 (3)	2.7 (3)	4.3 (4)	4.0 (3.5)	6.9 (8)	4.6 (5)
User satisfaction	*3*	*3*	*3*	*2.5*	*3*	*3*
Bus freight NPR per tonne-km (USDc per tonne-km)	39 (34)	22 (26)	40 (46)	59 (68)	88 (102)	57 (66)
User satisfaction	*4*	*3*	*4*	*3*	*4*	*3*
User satisfaction on five-point scale: The higher the score the better. 1 = Very dissatisfied. 2 = Dissatisfied. 3 = Medium. 4 = Satisfied. 5 = Very satisfied						

Fare prices per kilometre ranged from NPR 2.6 (USDc 3) in Kavre and Sindhupalchowk, to NPR 6.9 (USDc 8) in Okhaldhunga. These prices are broadly in line with comparable situations in other countries (bus costs often range from USDc 2 per kilometre for long trips on main roads to USDc 8 per kilometre for short trips on challenging roads). People appeared fairly stoical about the prices,

with most people being neither satisfied nor dissatisfied, but accepting that that was the cost of travelling. Similarly, the doubling of prices during the monsoon period was accepted as being better than stopping the bus services at this time. On most routes, children and students paid lower fares (about half price), but there were no concessions for the elderly or disabled. Prices for carrying freight in buses, ranged from NPR 22 (USDc 26) per tonne-kilometre in Sindhupalchowk to four times this amount in Okhaldhunga (Table 5). Again, people accepted these prices and appeared satisfied with them. So the key concern for most people was the frequency of travel opportunities per day, rather than the prices of the transport services.

Figure 7: Buses on DRSP roads

Both passengers and operators seemed to consider public transport services to be quite safe, with very few reports of accidents or security incidents. The elderly and people with disabilities were particularly dissatisfied with the levels of comfort and accessibility of the buses. People working on development issues confirmed that buses made little effort to assist people with disabilities.

Operators were generally satisfied with the roads, but were dissatisfied with their access to operating capital/credit and the technical facilities in the rural areas. Regulators noted that the compliance of bus operators with insurance was good, but their technical and environmental compliance was poor. Motorcycles often operated without regard to regulations. People regarded the development impact of buses as very positive, particularly in terms of agriculture (transport of inputs and produce).

4.4 Adequacy of transport services

On none of the roads surveyed were there any public transport microbuses, jeeps or mixed open trucks (passengers and freight). Microbuses require good roads and generally only operate on black-top routes. Jeeps and mixed trucks operate on other DRSP roads, but not on roads where there are regular bus services (mainly due to bus cartels). The high capacity of buses (50-80 passengers) allows them to provide lower fares per passenger-kilometre. Operators do not like to run buses that are half empty and it takes a long time to fill up a bus. Jeeps (10-20 passengers) and mixed trucks (often similar passenger numbers) may be appropriate for roads and times of day with low demand for transport. In good, integrated transport systems, there is a mixture of public transport types. For example, buses at times of peak demand and smaller transport types (microbuses and jeeps) allowing regular services at other times of the day (Starkey et al, 2013). The 2009 external review (Stickland, 2009) suggested that DRSP should investigate options for more frequent transport services based on smaller vehicles, but this was not followed up.

In many countries of the world (including Myanmar, Cambodia, Indonesia, Nigeria and Colombia) motorcycle taxis play an invaluable role by providing passenger and freight transport throughout the day (Starkey, 2011). Their fares per kilometre are high, but their convenience makes them highly appreciated by women and men, who can summon them by mobile phone to provide door-to-door services. At present, there is no indication that such services exist in Nepal. In other countries they

have developed very rapidly, spontaneously and without regulation, providing transport benefits but also safety problems.

During the traffic counts, vehicle registration numbers were recorded to see how many vehicles were making return trips. In many countries, the same public transport vehicles make one or two return trips a day, or on alternate days on longer routes. There was little evidence of such patterns, as some buses were only making a few trips per week. The routes are controlled by cartels, and the operations are shared by many buses. On the busy Singati-Dolakha-Kathmandu route there were 16 bus movements a day and these were shared by about 50 buses, each averaging 2-3 trips per week.

Cartels are formed for the self-regulation of public transport routes and freight operations. When there is an over-supply of vehicles, cartels tend to control where and when individuals may operate. This reduces free-market competition and makes it easier for operators to travel with full loads. Cartels tend to be anti-competitive: they prevent their members from reducing their tariffs and they may try to 'eliminate' competition from non-cartel member. There were reports of jeeps that were operating on bus routes being burned: it was widely believed that the bus cartel members did this to remove competing services and to act as a warning to others.


Figure 8: Jeep and mixed truck on DRSP roads: these seldom operate on roads with buses

Many stakeholders mentioned the problems of cartels, sometimes in lowered voices, and often with a sense of fear and intimidation. People suggested that the cartels were more powerful than legitimate authorities and beyond the law. While their power and reputation for ruthlessness would make it difficult to try to confront them, it might well be possible to negotiate with them: this was how the Maoist insurgency was ended. Better operational practices could be in the interests of transport operators and users, and allow an expanding, profitable transport market.

In 2009, the DRSP external review (Stickland, 2009) pointed out that most rural people have no use for roads themselves: they do not own motorised transport and so they cannot drive on the roads. They depend on transport services for access, and the transport services are highly variable, in terms of frequency and cost. DRSP did not follow this up this review finding and it did not assess whether the transport services had been meeting the needs of rural people, including women and disadvantaged groups. If rural transport services are inadequate or unaffordable, it should be possible to work with the private sector (including any cartels) to identify ways of improving services. If DRSP were just a road-building programme, the decision not take the advice of the external review would have been understandable (if disappointing). However, DRSP has always argued that it was more than a road-building programme, being concerned with poverty alleviation and with reducing social inclusion. It therefore seems surprising that it did not investigate the adequacy of transport services on the roads from the points of view of the rural people and disadvantage groups it was trying to assist.

4.5 Impact of roads on rural livelihoods

The construction of the rural roads has led to greater intensification and some diversification of agriculture within the surveyed sites. Off-farm activities have also slowly started to emerge,

although their overall contributions to household incomes remain small. Overall, agriculture continues to be the single largest source of household income, across all ethnic and economic groups, though its relative importance has declined since the construction of the roads. Prior to construction, 73% of households were engaged in cereal farming. After the construction of the roads, the proportion decreased to 61%. Meanwhile off-farm activities (non-agriculture wage labour, establishment of micro-enterprises/business, salaried jobs) were found to have slowly developed across all social groups, while the contribution of remittances was found to be low (see Table 6).

Table 6: Main livelihood sources by caste/ethnicity and disadvantaged groups (in %)

Livelihood sources	Before Road Construction					After Road Construction				
	Dalit	*Janjati*	*Brahmin/ Chhetri*	*DAG*	*Non-DAG*	*Dalit*	*Janjati*	*Brahmin/ Chhetri*	*DAG*	*Non-DAG*
Cereal farming	70	77	69	70	76	50	62	68	51	68
Cash crop farming	0	2	2	1	1	1	3	3	2	3
Wage labour	23	17	15	24	13	38	27	16	38	17
Micro-enterprise/ Business	3	2	2	2	1	4	3	3	3	3
Remittance	3	1	1	1	1	4	2	1	3	2
Salaried job	1	2	12	2	8	2	3	10	3	7

Source: Household Survey 2013

4.6 Impact on agricultural sub-sector

Within the agriculture sub-sector, increased intensification and productivity of cereal crops was recorded. Cropped area for all crops (except maize) increased. Rice area expanded by 12% and production grew by 35%. The wheat area had expanded by 22% and its production increased by 33%. Changes in the cropping patterns have not been significant and diversification into commercial production has been low. Some commercialisation, primarily potatoes and oranges, had started where the conditions were advantageous (appropriate soil, irrigation) and where market access had improved.

It was noted that the increase in cereal production had primarily led to greater household consumption, implying greater food sufficiency. Fewer than 1% of the households were found to be selling rice, maize or wheat. The majority of households were found to have benefited from reduced transport costs of inputs, goods and services, along with higher farm income gained due to increased productivity and the diversification of crop production. Qualitative findings from focus group discussions further suggested that the roads had led to greater access to agro-vets, which in turn had led to increased usage of high-yielding seeds, fertilisers and technological know-how. Return trips by vehicles further allowed individual farmers to take their produce to markets for selling. This was especially relevant for women, who were found to be active in selling their produce. Increased frequency of vehicles to collect and transport bulk produce to markets was found to occur during specific seasons. Amongst the different social and economic groups, the highest increases in cash crop farming as a livelihood source after road construction was seen amongst Janjatis, Brahmin/Chhetris and non-DAGs.

4.7 Impact on off-farm activities

The surveys showed that average income from off-farm activities rose from 7% to 17% following road construction. Off-farm activities included the establishment of micro-enterprises and small businesses (eg, retail, tea shops, tailoring shops, hotels, briquette factories, wood/carpentry shops and poultry farms) as well as non-agricultural wage labour and salaried jobs. This suggests that the construction of the rural roads has led to livelihood diversification. This was found to be true for

disadvantaged groups as well as non-disadvantaged groups (Table 6), although new micro-enterprises along the roads were mainly owned by Janjati (Table 7).

Table 7: Characteristics of the enterprises along the road corridors

Enterprises	Thuloparcel-Timalbesi (Kavre)	Ghyangdanda-21 Kilo (Sindhupalchowk)	Singati-Dolakha (Dolakha)	Manthali-Khurkot (Ramechhap)	Rumjatar-Okhaldhunga (Okhaldhunga)	Sindhulimadi-Bhimsthan (Sindhuli)
No. before road construction	19	35	31	7	33	21
No. after road construction	20	35	55	43	70	40
Increase (number)	**1**	**0**	**25**	**36**	**37**	**19**
Caste / ethnic composition of owners (in %)	Janjati: 100	Dalit: 3 Janjati: 97	Dalit: 4 Janjati: 96	Janjati: 58 Brah/Chhet: 42	Dalit: 7.5 Janjati: 54 Brah/Chhet: 38.5	Dalit: 3 Janjati: 70 Brahm/Chhet: 27
Typical monthly turnover (NPR)	7,100	11,500	42,600	64,800	12,900	9,300

Brah/Chhet= Brahmin/Chhetri. Source: Enterprise Survey 2013

Learning of new skills, such as stone masonry and gabion weaving, during road construction had enduring consequences. Trained individuals have been able to earn higher wages and utilise the newly acquired skills for income-generating purposes even after road construction was completed (see case study box). In one exceptional case, a gabion maker trained by DRSP was even given an international contract to train gabion makers in Tanzania. On average, the labour survey recorded that prior to DRSP training, labourers earned on average NPR 300 a day. This increased to NPR 460 after the training.

Skills learnt during construction helped people to become self-employed

Deepak Khatri from Katunje VDC started working along the Barbot-Koshbhanjgang road corridor in Okhaldhunga in 2010. He initially worked as a labourer, digging and chipping away rocky segments. After a couple of months, he signed up for masonry skills provided by DRSP. Following a week of training, he began working as a skilled labour. This enabled him to earn higher wages. During his first year, he managed to pay off debt worth NPR 50,000. In his second year, he saved enough to buy an adjacent plot of land. Now he is saving to build a house. Currently, he is also transferring the skills he has learned to other labourers, who are employed on the same road segment. He is teaching them how to prepare stones for the gabion walls.

In a couple of months, construction on the road will come to an end. Though Mr Khatri knows that he will soon be out of a job, he is hopeful that the new skills that he has learnt will allow him be self-employed. Even now, he mentions that people from other villages ask him to help construct their houses. He is now hoping that with the completion of the road, new houses and shops will be established along the corridor, so that he can move on from the roads and continue to utilise the new building skills that he has learnt.

New marketing opportunities (retail shops, tea shops, poultry farms, briquette factories, wood/carpentry factories) have emerged after road construction. This has been associated with greater availability and diversity of goods brought into villages by motorised transport using the improved access provided by the roads.

Enterprise surveys undertaken within the sampled road corridors provided some indicative figures confirming that the road construction led to the emergence of new marketing opportunities for small enterprises. On four of the six road corridors, the number of enterprises increased significantly (doubling, and in one case increasing six fold as shown in Table 7). The apparent lack of enterprise growth on the roads surveyed in Kavre and Sindhupalchowk is surprising. The review team members had interviewed several new and expanding enterprises on other roads and regard these survey results as anomalous.

Figure 9: New and expanded enterprises are being developed along DRSP roads

Another influence of the roads has been a decline in the importance of traditional market areas, such as *Sikre bazaar* in Sindhupalchowk. Greater access by roads and the establishment of new or better-stocked retail shops within their communities has allowed people to shop nearer to their homes. They therefore do not have to travel regularly to the more distant traditional markets.

Seventy per cent of the 263 enterprises surveyed along the road corridors were owned by Janjati groups. Interviews with enterprise owners indicated that some retailers along the DRSP road corridors had been able to take advantage of the improved connectivity to become wholesalers. In addition to their retail sales, they also acted as distribution points for the smaller retail outlets in the hinterlands. Some wholesale shops had monthly turn-overs of over one million rupees. On the Manthali-Khurkot and Singati-Dolakha roads, in particular, larger wholesale enterprises have developed close to the district towns. On these roads, the average monthly turnover of enterprises was very high (NPR 42,600-64,800) compared to that on the other four of roads surveyed (NPR 7,100-12,900).

4.8 Migration and remittances

The survey findings showed that after road construction remittances contributed only 2% to the household incomes of the respondents (Table 6). This was surprising as national statistics suggest a much greater dependency on remittances: according to Nepal Living Standard Survey 2010/11, 56% of households depended on remittances (CBS, 2012). The survey results suggest that along the survey road corridors, agriculture and local employment remain much more important for household income and livelihoods than remittances.

Amongst those that did migrate out for employment, the majority were men and were from Janjati (51%) followed by Dalit (25%) and Brahmin/Chhetri (24%). Differences amongst the various caste/ethnic groups revealed that a larger proportion of Dalits were going to India (21%) than the other groups. However, Gulf countries were the main destinations for all the social groups, with 60% of Janjatis, 51% of Brahmin/Chhetris and 47% of Dalits migrating to these countries (Table 8).

The employment of local people as waged labourers during road construction may have influenced migration patterns. An earlier study showed that if people were employed for at least 90 days, male

out-migration from the villages was reduced (Sharma and Magar, 2005). Interviews and focus group discussions during this study confirmed that people preferred to work near their homes when opportunities to earn money on a regular basis could be guaranteed. This is not surprising, as out-migration is risky and has costs in terms of the absence of productive household members.

Table 8: Migration pattern of different caste/ethnic groups

Destination	Dalit	Janjati	Brahmin/Chhetri
Within Nepal	20%	8%	22%
India	21%	15%	12%
South East Asia	12%	17%	15%
Gulf countries	47%	60%	51%
Total	100%	100%	100%

Source: Household Survey 2013

4.9 Changes in household incomes

Prevailing social structures and concentration of productive assets were found to have led to varied impacts across different social and economic groups. Household surveys showed that on average incomes increased by 25% since the construction of the roads (Table 9). Janjati and non-disadvantaged groups benefited the most. These groups were found to have larger landholdings and assets and were the most mobile in terms of taking advantage of new opportunities generated (eg, cash crop cultivation, establishing micro-enterprises). Many had agriculture surplus to sell and funds to invest in inputs and off-farm activities. They also had sufficient land and food security to explore and diversify into cash crop cultivation.

Disadvantaged groups were found to maintain their subsistence cereal farming after the road construction. Many were unable to markedly improve their agricultural productivity or diversify their livelihood strategies. This suggests that structural constraints continue to have great bearing on how advantages can be accrued from roads. These are mostly outside the influence of road construction projects and suggest that complementary and integrated development measures are required to enable disadvantaged groups to fully benefit from better physical access and mobility opportunities.

Table 9: Changes in average annual household incomes

Groups	Annual HH income before road construction *(NPR)*	Adjusted annual HH income before road construction *(NPR)*	Annual HH income after road construction *(NPR)*	Percentage change
Dalit	47,000	88,000	103,000	+ 17
Janjati	57,000	108,000	146,000	+ 36
Brahmin/Chhetri	66,000	126,000	154,000	+ 22
DAGs	45,000	*94,000*	*108,000*	*+ 15*
Non-DAGs	64,000	*121,000*	*165,000*	*+ 37*

Note: Annual income before construction has been adjusted for inflation for each road corridor based on the Consumer Price Index (CPI) of the year in which construction was started
The percentage change is in addition to changes attributable to inflation

Source: Household Survey 2013

In its first three phases, DRSP had an income-generating component as a part of its 'beyond the road' interventions for economic development. This included facilitation of saving and credit groups, establishing revolving funds, 'passing on the gift' (of livestock) and various training activities (including vegetables and handicrafts). The 2005 social impact review concluded that the employment opportunities often led to good saving programmes allowing people to 'graduate' from extreme poverty (Sharma and Magar, 2005). This report also noted that the passing on of goats was less successful, especially amongst the poorer households. High goat mortality was recorded amongst Dalits due to low investment, poor farm management, inadequate care and lack of technical support (Sharma and Magar, 2005). Better-off families were in contrast noted to have significantly improved their income levels. These findings underlined the importance of targeted

measures and the need of sustained integrated activities that supported the target households right through the cycles of production, transportation and marketing. The beneficial 'beyond the road' activities illustrate the fact that DRSP has been much more than a rural roads programme.

4.10 Changes in household expenses and savings

A large proportion (55%) of the surveyed respondents reported that food production (from their own lands) only allowed them to be self-sufficient for six months of the year. Of those that reported deficiencies, the majority were Dalits (73%) followed by Janjatis (59%) and Brahmin/Chhetris (35%). The surveys indicated that largest share of household expenditure (25%) was spent on buying food grains and that 11% was spend on other basic food items such as vegetables, oils and spices. These figures suggest food-poverty is an important issue. Farming families that are not producing enough for themselves and are having to spend a quarter of their household incomes on food grains will not be able invest in other productive activities (agriculture, education, micro-businesses). Meanwhile focus group discussions suggested that people felt that food security had improved after the construction of the roads. This was in part due to an increase in local cereal production as agricultural inputs became more readily available. It was also associated with overall increases in income levels and easier access to local markets.

Children's school fees also accounted for a significant proportion (16%) of household expenses. During focus group discussions, both men and women stressed that education for their children was now a priority. They wanted their children to have better opportunities than they had. While many factors influence people's interest in education, the road is likely to have been important.

In the survey, 75% of the household respondents reported to be a part of at least one savings and credit group, which had been started through DRSP's social initiative or by another agency. The majority of savers in the survey were women. Focus group discussions revealed that most of the loans were utilised for buying livestock. Discussions also indicated that the habit of regular saving of earnings from road construction had been established through DRSP activities implemented in conjunction with the road construction and rehabilitation work. Each savings and credit group had its own set of criteria for its members with NPR 20-50 being typical for monthly savings. Members were then allowed to take loans with interest rates of 15-20%. These interest rates are much lower than the 30-40% charged by local moneylenders. Borrowing money from moneylenders nevertheless persists as the funds available from the savings and credit groups were generally unable to meet the local demand.

4.11 Changes in living standards

Overall living conditions of the inhabitants along the road corridors have improved significantly. Table 10Table 10 shows that these changes have occurred across all socio-economic groups.

There have been very significant increases in the use of metal roofing sheets, from 9% (disadvantaged) and 18% (other) to 74% (all groups). This is likely to be associated with the increased availability and decreased price of metal sheets attributable to the lower freight costs of road-based transport. Similarly, cement and other construction materials are cheaper and more available, and this had been reflected in increased use of cement for house construction (Table 10).

One of the more significant changes has been in use of permanent latrines, which has increased from 7% for disadvantaged groups and 41% for non-disadvantaged groups to 65% and 80% respectively. Focus group discussions indicated that the construction of the toilets and changes in behaviour practices were frequently associated with increased incomes and greater exposure to hygienic practices (from media, schools, awareness campaigns).

Road access also facilitated better penetration of state services into previously remote areas. Expansion of electricity through the national grid was one aspect that many respondents identified as having occurred after road construction. The roads made it much easier for electricity lines to be constructed and maintained. Similarly, the roads have made it much easier for medical, educational and agricultural services to reach rural people.

Table 10: Changes in living conditions before and after road construction

Living standards		DAG		Non-DAG	
		Before	*After*	*Before*	*After*
Drinking water sources	Tap at home	15%	52%	12%	35%
	Community tap	33%	9%	29%	10%
	River	2%	0%	4%	0%
	Well	21%	34%	28%	36%
Type of toilet	Temporary	42%	20%	41%	15%
	Permanent	7%	65%	23%	80%
	No toilet	52%	15%	37%	6%
Source of cooking energy	Firewood	100%	13%	98%	30%
	Kerosene	0%	83%	0%	63%
	LPG Gas	0%	1%	0%	1%
	Bio-Gas	0%	2%	1%	1%
	Electricity	0%	1%	0%	6%
Source of lighting	Kerosene	12%	67%	22%	42%
	Electricity	13%	31%	11%	56%
	Solar	73%	0%	65%	1%
Type of house/ roofing	Mud, thatched	72%	23%	66%	23%
	Mud, Zinc roof	9%	74%	18%	74%
	Cemented	2%	14%	2%	12%
	Bamboo	6%	2%	4%	1%

Source: Household Survey 2013

4.12 Gender empowerment

Men and women have different transport needs and are responsible for varied tasks and activities. In undertaking their productive and social obligations, women are more likely to face a range of physical, income and cultural barriers while travelling and using available public transport (Fernando and Porter, 2002). Within the DRSP road corridors, the surveys indicated that women generally travel on foot around their local area. Travelling outside their villages was occasional and for specific purposes. When they did travel, the reduction in travel time on transport services (1-3 hours saved when travelling to the district headquarters) was significant and had enhanced their mobility. As noted, the provision of transport services that allow return trips to be made securely the same day is an important gender issue. When transport time-savings combined with appropriate transport services timetables permit day-return journeys, women can become more productive and explore opportunities outside their villages to market produce, to access shops and to visit health facilities.

During road construction, the targeting and encouragement of women to undertake construction work, along with equal pay for equal work, were also found to have led to greater confidence and empowerment, with women having control over their earnings (see case box). Discussions revealed that involvement in road construction had had led to greater time pressures, as women continued to be responsible for household chores and agriculture. They also noted that from their perspectives, the cash incentives had significantly outweighed the greater time and effort required.

In addition to the savings component, discussions with women members of saving and credit groups indicated that the formation of the group-based activities had extended to sharing of ideas and knowledge about a wide range of issues, including maternal health, children's education and empowerment. This was in accordance with the findings of the DRSP's social impact assessment of 2005 which had noted that the social interventions "… had reached to the poor and disadvantaged areas where no such activities had taken place before" (Sharma and Magar, 2005). But, the same assessment also identified that "… communities (have) not acted on the information and knowledge (provided by the social activities) provided by DRSP" (Sharma and Magar, 2005). The study noted

that greater coordination and integration between the engineering and social components was required to extend and sustain 'beyond the road' benefits.

Employment opportunities for women leading to greater exposure and savings

Laxmi Bhujel of Betali VDC proudly displays her gold earrings. She, along with nine other women, has been employed in an all-women road construction group along the Khimti-Betali-Namadi road corridor in Ramechhap for over two years. According to Ms Bhujel, when construction first began, women from her community were sceptical and reluctant to go and work on the roads, even though their husbands had started working as soon as construction had begun. She was initially unsure about the nature of the work and also thought that it would be embarrassing, as women from her community did not often work outside their homes and farms. She eventually agreed when one of her friends persuaded her and eight others that they could also earn a good living. Since then she has not regretted her decision. Every day, she comes to work after finishing her morning household chores and works till 5 pm. The work is physically demanding, but she says that she is happy to be earning cash, just like her husband. She recounts that her earnings, along with those of her husband, have allowed her family to pay off debts and set aside some savings. Other women now seek her advice on whether or not to start to work on the roads, and she encourages them whole-heartedly.

4.13 Economic impact and benefits

The economic analyses were fraught with problems from the outset. Firstly, it was not always easy to estimate the true cost of construction. While there were records of DRSP/SDC disbursements, contributions from the Government of Nepal, food-for-work programmes and bridge-construction collaboration were less easy to estimate. Certain roads (notably the Manthali-Khurkot and Singati-Dolakha roads) had been significantly upgraded after DRSP's investments. Several roads had been constructed in sections, each section funded as a specific project. However, current flows of traffic relate to the whole network. For example rehabilitating the 7.4 km Ghyangdanda-21 Kilo road in Sindhupalchowk was a Phase one initiative. Subsequently it was extended 7 km to Lishanku and was then upgraded. It is now linked to a 36 km road to the Arniko highway. The present traffic cannot be attributed only to the initial investments. It is unclear what should be the most appropriate 'project cost' figure for this road, or other investments. During discussions on some roads, possible 'project cost' figures differed by over 100%, making subsequent sensitivity analyses insignificant.

Secondly, when DRSP started, it did not collect baseline data. This made it very difficult to have realistic assumptions of the traffic movements before the road construction, including the annual average numbers, loads and costs of porters and mules (and motor vehicles, if there were any then). It also made it difficult to estimate the benefits of the road due to agricultural production, social services and land values.

The access surveys carried out for this review had collected some information from transport operators on the DRSP roads. This could have been used to estimate Vehicle Operating Costs (VOCs)

but it was difficult to integrate the new data on financial VOCs into the RED economic model. However, there was a module of RED/HMD4 available that had been 'calibrated' for use in Nepal. While it would have been unlikely that the model's assumptions relating to vehicle capital costs, loading levels and annual operating distances matched those of the transport operators, it was the best tool available.

In several parts of the economic analyses, assumptions had to be made, and one of the key ones was the projected growth in traffic. In the analyses, traffic was envisaged to grow by 7% for the first ten years and 5% thereafter. This was in line with assumptions made by international development banks. On two of the roads, there were traffic count data for 2009, and these allowed the reviewers to calculate the actual growth in traffic, as shown in Table 11.

Table 11: Daily traffic on two DRSP roads in 2009 and 2013

	Rumjatar-Okhaldhunga (Okhaldhunga)				**Sindhulimadi-Bhimsthan (Sindhuli)**			
Indicative daily traffic	*Traffic count 2009*	*Traffic count 2013*	*Growth 2009-2013 (%)*	***Annual growth (%)***	*Traffic count 2009*	*Traffic count 2013*	*Growth 2009-2013 (%)*	***Annual growth (%)***
Bus	2	3	50	**11**	5	9	80	**16**
Truck (light/medium)	0	1			0	5		**59**
Car/Private jeep/4x4	3	12	300	**41**	1	21	2000	**114**
Motorcycle	4	22	450	**53**	23	68	19	**31**
All vehicles incl. tractors	**10**	**40**	300	**41**	**30**	**105**	250	**37**
Pedestrians and cyclists	-	40			250	190		

Sources: Stickland (2009) and Traffic survey, 2013

The figures show very high annual growth rates (40% for all traffic, 11-16% for bus traffic). The high percentage increase can be partly explained by the low starting point (going from two buses to three buses is a high percentage increase, but it still low traffic). The rapid increase of motorcycles influenced the overall growth. Nevertheless, these figures do suggest that the traffic growth forecasts used in the economic analyses are reasonable, and perhaps even over-cautious.

The economic internal rates of return (EIRR) were 19% and 17% for the Dolakha-Singati and Sindhulimadi- Bhimsthan roads respectively. Table 12 presents the results of the economic evaluations of the three roads based on the benefits to the users of reduced transport costs (vehicle operating costs) and savings in time. The EIRR for the Ghyangdanda-21 Kilo road was higher at 29%, but this may be because the traffic benefits derived from more of the road network than that which had been included in the project costs. Development banks generally consider an EIRR of 12% as justifying the investment, and so all roads passed this. On the sensitivity analysis the Sindhulimadi-Bhimsthan road's EIRR dropped to 11% when both costs and benefits were adversely changed by 20% (Table 12).

Table 12: Results of the economic evaluation based on traffic growth on the three roads

Indicator	**Dolakha-Singati**	**Sindhulimadi-Bhimsthan**	**Ghyangdanda-21 Kilo**
Net Present Value (NPV) *in NPR million*	114	32	38
Benefit Cost Ratio (BCR)	1.4	1.3	2.2
Economic Internal Rate of Return (EIRR) %	19	17	29
EIRR sensitivity (capital costs +20% and benefits -20%) %	13	11	23

Being aware of the low traffic volumes, the review team wished to see if the road investments could be justified in economic terms by the various development benefits. Unfortunately, the lack of baseline data made it difficult to identify parameters that could be used in such economic analyses. It was possible to obtain data on agricultural yields from the household surveys and compare these with district agricultural records. One critical assumption that greatly affected the outcomes of the analyses was the area of agricultural land considered to be influenced by the road. The figures used were equivalent to a strip of continuous agricultural production about one kilometre on either side of the road.

It was reported that there had been significant increases in the value of land close to the new roads. The rise in value of agricultural land can be considered an economic benefit of the road (Jacoby, 2000), as can rises due to enterprise developments. Assumptions had to be made as to how much land would be considered in the analyses. Areas equivalent to strips of 25, 50 or 100 metres either side of the road could be justified, but each would lead to hugely different outcomes. For these analyses, it was decided to opt for narrow strips of land (25 metres on either side of the road). The total area was further reduced by assuming that only one quarter of this land was suitable for development and subject to the increasing land values.

For social benefits, quantifiable parameters with available data could not be identified. It was decided to assume these to be 30% of the overall benefits.

The results of this second series of economic analyses are shown in Table 13. The results gave EIRRs of 33-39% for all three roads. Even higher EIRR figures would result if it were assumed that higher areas of land were influenced by the roads in terms of land values and agricultural production.

Table 13: Results of the economic evaluations based on agricultural production, land and social benefits

Indicator	Dolakha-Singati	Sindhulimadi-Bhimsthan	Ghyangdanda-21 Kilo
Net Present Value (NPV) *in NPR million*	157	154	47
Benefit Cost Ratio (BCR)	1.8	2.9	2.9
Economic Internal Rate of Return (EIRR) %	33	39	35
EIRR sensitivity (capital costs +20% and benefits -20%) %	19	24	23

It is difficult to determine what proportion of the benefits of the second economic evaluation would be in addition to the benefits derived from the lower transport costs of the road. It would be complicated to combine the two figures, as this could lead to double accounting. Some or all of the benefits of the increased agricultural production, the social benefits and the changes in land values could be ascribed to the assumed lower transport costs of the first evaluation.

Despite some debateable assumptions, the two economic evaluations undertaken for three of the DRSP roads have quantified the beneficial economic impacts of the roads. The investment in the DRSP roads can be justified by the clear economic benefits resulting from the road construction.

5 Impact of labour-based road construction

5.1 Impact of payments for labour

DRSP records suggest that at total of about five million person-days of employment have been generated by road construction during its four phases. This is a very substantial quantity of work generated in rural areas, where income-earning opportunities are sparse and seasonal in nature.

Data from the household surveys on the completed road corridors revealed that on average 98 person-days or little more than 3 months of employment is generated. This was in accordance with DRSP's objective of providing at least 90 days of employment per year. Dalits and disadvantaged groups were found to have been employed for more days, but the differences were quite small (Table 14). Overall 51% were from disadvantaged groups.

Table 14: Average work days and earnings during road construction

Ethnicity	Average no. of household members engaged	Average no. of person-days of employment	Average earnings (NPR)
Dalit	1.4	114	13,400
Janjati	1.3	91	15,800
Brahmin/ Chhetri	1.3	97	10,900
Overall average	**1.4**	**98**	**13,800**
DAGs	*1.3*	*99*	*16,600*
Non-DAGs	*1.4*	*96*	*11,300*

Source: Household Survey 2013

Overall, households were found have earned an average of NPR 13,800 during 98 days of employment (Table 14). This amount was found mainly used to assist households to improve their food security by enabling them to purchase food grains (65%), followed by other household necessities (21%) and children's school fees (8%).

Figure 10: Labour-based construction provides labouring and skilled employment

From the labour survey of roads under construction, overall incomes had increased by 9% compared to the time before road construction. The highest increases (34%) were seen in Dalit households. Overall disadvantaged groups increased their incomes by 12%, while the incomes of non-disadvantaged groups increased by just 6% (Table 15). During the road construction the targeting of labourers has clearly allowed disadvantaged groups to benefit most from the income-earning opportunities.

Table 15: Average annual household incomes before and during road construction

Groups	**Annual HH income before road construction** (NPR)	**Adjusted annual HH income before road construction** *(NPR)*	**Annual HH income during road construction** *(NPR)*	**% Change**
Dalit	49,000	65,400	87,400	+ 34
Janjati	53,000	70,500	70,600	0
Brahmin/Chhetri	56,000	74,700	82,200	+ 10
DAGs	46,000	61,500	68,900	+ 12
Non-DAGs	61,000	81,400	86,200	+ 6

Note: Annual income before construction has been adjusted for inflation for each road corridor based on the Consumer Price Index (CPI) of the year in which construction was started
The percentage change is in addition to changes attributable to inflation

Source: Labour Survey 2013

It is interesting to compare these short-term increases in income (Table 15) with the longer-term changes in income presented in Table 9. In the medium term, incomes (adjusted for inflation) have increased by about 15% for disadvantaged groups and by about 36% for non-disadvantaged groups. These increases are partly explained by the effects of the short-term injection of cash during road construction. The social development activities associated with the road construction may also have contributed. A major contribution to the increasing incomes is likely to have come from the entrepreneurial activities and income generating opportunities associated with the improved access provided by the road. This may be why, even though significant benefits continue to accrue for the disadvantaged groups after the end of the targeting period, the non-disadvantaged groups are able to benefit more.

Not surprisingly gains are also larger when more household members are engaged in road construction for greater periods of time. Table 16 shows that the majority (82%) of households were employed between 30-90 days. This was consistent across all caste/ethnic groups. Only 2% were employed for more than one year, with the majority being Dalits. For these households, 90% had utilised the earnings for debt repayments and 77% for buying additional land.

Table 16: Number of days of employment generated

No. of days of employment	Ethnicity			Total
	Dalit	Janjati	Brahmin/ Chhetri	
30 - 90	80%	81%	84%	82%
91 - 180	8%	11%	9%	10%
181 - 360	9%	6%	4%	6%
361 - 720	2%	1%	2%	1%
> 720	1%	0%	1%	1%

Source: Household Survey 2013

5.2 Impact at village and community level

DRSP has worked closely at community level. At the grassroots level, it has supported the organisation of Local Roads Users Committees (LRUCs) which manage the Road Construction Groups (RCGs). The Road Construction Groups, which actually construct the roads, comprise community members particularly from disadvantaged groups (DAG). Their local planning is led locally by the Local Roads Coordination Committees (LRCC). These work closely with the District Road Coordination Committee (DRCC) that provides district-level coordination on all road network development processes.

DRSP has created significant awareness at local levels of labour-based approaches to road construction and its associated benefits. It has persistently advocated for the creation of waged employment for the disadvantaged groups particularly the Dalits, women and marginalised communities. Among the impacts are noted were:

- There is wide recognition that road building is an opportunity for disadvantaged families to earn income, although this has not always been the case for non-DRSP roads.
- Families associated with Road Construction Groups have received a range of complementary skills to help them improve their livelihoods and income generation. These included savings and credit groups and micro projects such as vegetable gardening and livestock rearing.
- Many adults, particularly women, have learned to read and write through adult literacy programmes.
- A wider awareness has been created among households of their rights and privileges. This has been promoted through opportunities to participate in and lead local committees (LRUC, LRCC, DRCC) where women and representatives of disadvantaged groups have been given key roles.
- Increased emphasis on maintenance has meant that there is local pressure for resource allocation by DDC to support regular maintenance of the road infrastructure they built.

5.3 District level impact

The district-level road network development activities are technically supported by the District Technical Office (DTO), the technical wing of the DDC. The District Technical Office is led by a senior Engineer from the Department of Local Infrastructure Development and Agricultural Roads (DoLIDAR) of the Ministry of Federal Affairs and Local Development (MoFALD).

DRSP has worked closely with the DDCs, creating a sense of ownership by the local government institution of the infrastructure supported by the project. This appears to have been possible with the funding and working approach adopted by DRSP which enabled DRSP funds to pass through the local treasuries of the DDC to the District Development Fund (DDF) owned by the DDCs. Similarly, the technical activities were also widely shared with the DDC technical team, including those from DTO and those locally recruited by the DDC. Consequently, the joint partnership has meant that the DDC staff felt engaged in DRSP activities while DRSP-DTO and DRSP-PSU teams have ensured the work progress and quality control have been maintained. Impacts at district level have included:

- DRSP has supported the objective of maintenance-focused planning of transport infrastructure through District Transport Master Plans and Annual Roads Maintenance Plans and their implementation and monitoring.

- Capacity of the DDC technical and social teams were notably enhanced in undertaking technical functions and social mobilisation processes as they worked closely with more experienced and skilled DRSP teams. As some of these government staff stayed on in their districts, the skills were retained.

5.4 Impact on governance

For several years, the activities of DRSP took place in an environment of political instability triggered by insurgency and ecacerbated the absence of elected political leadership at the district level. DRSP was operating at time when the country was moving rapidly towards the widespread mechanisation of local road building, with decentralised decision making increasing fiduciary risks within districts. DRSP put in place public audits and public hearings which helped to minimise the opportunities for corruption in relation to the DRSP roads.

DRSP design included a number of transparency tools that were required to be used by the projects. These included:

- Erecting notice boards at agreed locations that showed financial and implementation information relating to the project (eg, cost of the work, names of members of key committees)
- Awareness programmes on the proposed project with household level communication by the social mobilisers to inform communities on the employment opportunities available to the local households, with focus on poor and vulnerable groups
- Public audit at the completion of the project works
- Project books that documented project approaches and labour information.

With these tools in place, the DRSP activities were broadly known to be providing fair opportunities for the poorer people and maintaining equal wage policies for men and women. While some delays were noted in the initial phases of DRSP in the distribution of wages to the workers, the time lag in payment was gradually reduced to less than a month. This helped to ensure that the working group members did not fall into the trap of local business persons who provide food items on credit, but charge very high rates of interest.

One of the most notable features of DRSP has been the very high levels of project ownership within the districts. District-level stakeholders associated with the DRSP work spoke highly of the quality of the organisation and the quality of the construction work. Unfortunately for DRSP, the rapid turnover of appointed officials has reduced the disrict-level institutional memory.

5.5 National level impacts in influence

DRSP is a well-recognised programme in Nepal that has had important impacts at national level. Significantly, it was one of the earliest projects in rural infrastructure sector in Nepal with a very clear focus on the importance of maintenance. Most other projects at that time were funding new road construction with only nominal commitment to maintenance. At the same time, the programme also emphasised local level capacity building in managing the road network, and with it came the institutionalisation of transport planning through the District Transport Master Plans (DTMP).

DRSP design was different from many conventional rural road programmes in that it was able to maintain a good balance in working through the government systems. It therefore imparted a strong sense of local government ownership of the programme. DRSP also had adequate checks and balances to ensure quality and progress, a feature not always clearly seen in projects funded entirely by government. The funding and institutional modality that DRSP adopted came to be known as the DRSP model that was discussed in the planning and operation of other projects.

The DRSP model sought to work with and through the government, rather than to develop a temporary project structure that was external and parallel to the existing instituations. This allowed

DRSP to influence from the inside to help improve some inherent weaknesses of the government systems. As a part of the process, SDC through its other programmes in the DRSP districts supported the DDCs in preparing or updating the District Development Periodic Plans (DDPP). These are 5-year development plans that the government requires districts to prepare and to follow. Through these documents, DRSP and SDC were able to ensure that functional and realistic plans were prepared in the target districts that had wide ownership and were ready to use.

DRSP helped to establish and support of the Rural Roads Forum (RRF) to encourage discussion on a wide range of issues relating to rural roads. Meetings have been attended by transport professionals in government departments, development projects, donor agencies and NGOs. The discussions and networking promoted by the RRF have influenced project programmes and methodologies.

The fact that the DRSP-PSU team have also been providing technical support for other programmes (DRILP, RRRSDP and RCIW) has greatly increased DRSP's influence in the country, as these projects together have been active in about half the districts in Nepal. DRSP-PSU prepared documents such at the project procedure manual for DRILP based on DRSP experiences and practices.

The importance DRSP has placed on the welfare of those working on the roads has been reflected in the government policies. DRSP put emphasis on labour insurance, either through commercial insurance companies or through community-based approaches. DRSP advocated and practised equal wages to men and women carrying out similar works. DRSP promoted the provision of suitable working environments for mothers (with child care options) and assigning women and disadvantaged group members to decision making positions in the community-based organisations such as DRCC and LRUC road committees. Such social and welfare issues are now incorporated in some rural infrastructure projects and are part of the government's Gender, Equality and Social Inclusion (GESI) policy.

5.6 Impacts through international influences

While this review has naturally concentrated on the impact of the DRSP in Nepal, the reviewers recognise that the reputation of the programme extends beyond Nepal. As a result of its output publications and presentations in international gatherings, there is awareness in other countries of the work and methodology of DRSP. DRSP staff contributed to national and international workshops on mobility and health. The International Forum for Rural Transport and Development (IFRTD) organised an initiative on mobility and health and DRSP contributed a report relating to the impact of roads on maternal health (Shrestha and Workman, 2008).

In 2011, the International Road Federation, based in Geneva, awarded DRSP second prize in its Innovation Award for Road Transport in Developing Countries (InARoaD) for its 'inspirational' work in Nepal (World Highways, 2011).

Professional staff (expatriates, Nepali experts and Nepali interns) who had worked for DRSP have moved to other assignment, taking with them the ideas and lessons of DRSP. There are experts in Congo, Indonesia, Myanmar, Pakistan, Sudan and Tanzania that learned about labour-based methods through therir work with DRSP. Just as Nepal trail bridges (also supported by SDC) have an international reputation, so DRSP has given Nepal and SDC good reputations relating to labour-based technologies. Because the DRSP team has naturally been concentrating on local implementation, this international influence is perhaps not as strong as it deserves to be. DRSP still has an opportunity to share its valuable legacy with other countries that could benefit greatly from its experiences and lessons.

6 Sustainability of DRSP interventions

6.1 Sustainability and durability of road structures

DRSP roads have been constructed as a complete package to the earthen standards and include a range of road structures such as retaining walls, longitudinal and cross drainage structures and slope and erosion protection measures (bioengineering works). What is notable is that these complete

packages of road structures are being built in an environment where DDCs and VDCs are often constructing non-engineered roads using their internal resources,. These roads are characterised by extensive earthworks (often using heavy machinery) and very minimal structures.

In this context, a provision of complete road sections along with necessary protection structures to the districts sets a good example in assuring that structures are important for the sustainability of the road sections and for reducing maintenance costs. This is an example of where DRSP has made an important contribution through its demonstration of good transport infrastructure.

6.2 Labour-based construction approach

The review noted significant emphasis put by DRSP in applying and promoting labour-based construction approaches. There has been true commitment demonstrated by the programme in applying labour-based methods in all of its activities. All of its road support activities have been fully labour-based, and the resulting infrastructure has provided much needed confidence in the communities that they themselves can construct long stretches of roads using hand tools and simple compaction machines.

In furthering this approach at the national level, DRSP was instrumental in supporting the Secretariat for the Rural Roads Forum (RRF). RRF is a group of individuals from projects supporting the development of rural roads network in Nepal. The RRF claims to have prepared several publications, but the review team saw no evidence of these.

Although DRSP has invaluable experience of organising labour-based construction there have been few compelling documents to share the experiences and promote the technologies. There are no detailed studies accessible on the DRSP website. The nearest appears to be a charming story about the hare and the tortoise (DRSP, 2004). There are well-produced and attractive end-of-phase reports, but what have been missing have been focussed documents that make well-argued cases for labour-based construction and provide clear lessons and guidelines. A new document that will make the case for labour-based approaches will soon be available (Beusch, Shrestha and Lama, 2013).

6.3 Exploration of innovative techniques in rural road surfacing

During the course of DRSP implementation, a number of initiatives were funded to research into alternative techniques and designs in road development. These included:

- Application of Ottaseal as alternative surfacing to costlier bituminous surface was explored. This was in response to popular demand from the users and shifting government priority to go for all-weather surfacing. A 3 km stretch of the Sindhuli-Bhimsthan road used Otta seal but expensive maintenance was needed soon after (Sindhuli, 2010) . It appeared that the Otta seal could not work well unless there was good supervision of the sealing process. The typical life of Otta seal in Nepal appears to be only a few years, which makes life-time costs very high.
- Use of cobble stone surface for all weather surfacing was also experimented in several road sections, particularly in steep or residential sections of a road. Cobble stones application has not yet been adopted within the government systems. Cobble stones are perceived to be good, but appear old-fashioned and not as good as black-top pavements. Neither local communities not district administrations are enthusiastic as they hope to get black top roads.
- Bioengineering was widely applied to reduce soil erosion and to stabilise small cut slopes, with lessons learnt captured to feed into future designs. A useful report has been produced and is available on the DRSP website (Rai, 2011).

Figure 11: Montage of DRSP activities relating to pavement trials, cobblestones and bioengineering

6.4 Sustainability of maintenance systems

DRSP has been promoting sustainable maintenance approaches. It has supported DoLIDAR in the preparation of the Rural Roads Maintenance Directive (DoLIDAR, 2008) and manuals to support effective maintenance systems. In order to develop a maintenance culture, DRSP experimented with carrying out routine maintenance through 'length workers' responsible for specified sections of the road. The source of the funding for this has primarily been the DDC funds, and DDCs have not proved effective at managing maintenance funds and personnel. There were some attempts to raise funds for localised road toll collection by setting up barriers. While some barriers are maintained, there do not appear to be examples of sustainable funds being generated and used. DRSP has assisted four districts (Sindhuli, Okhaldhunga, Ramechhap and Khotang) to prepare Annual Roads Maintenance Plans (ARMP). These are designed to help the districts to plan and invest in prioritised maintenance of rural roads.

However, the continued and regular maintenance of the roads at the district level are very poor. This applies to DRSP as well as non-DRSP roads, implying that the districts still have not internalised the maintenance focus. The maintenance budgets allocated by the DDCs are still very limited for any meaningful maintenance. Budgets are mostly used for emergency maintenance using heavy equipment in case of landslides or major damage to road sections. Good, regular labour-based maintenance has not yet been internalised in the districts.

6.5 Sustainability of capacity building of stakeholders

Overall DRSP has effectively strengthened the capacities of stakeholders at village, district and central levels. This will contribute towards the sustainability of the DRSP physical structures and the various methodologies and technologies developed. For 11 years, DRSP provided on-the-job training for 10-15 technicians from Jiri Technical School. Most of these people have jobs in the the road construction industry in various parts of Nepal and they continue to contribute to improving Nepal's infrastructure.

By working together with the district authorities, the DRSP expert teams haveprovided strong and regular sharing of knowledge and skills with DDC teams. The DDC and DTO teams have been the prime beneficiaries of learning process in road building. They have been regularly invited to central and district-level meetings organised by the DRSP. They have benefitted from other periodic sharing and capacity building events organised by the DRSP. Unfortunately, most (or all) districts in Nepal suffer from frequent transfers of government staff. The high turnover of personnel in district teams has inevitably reduced the effectiveness of DRSP's capacity building at the DDC level. As district teams have gained from the capacity building, the staff have been changed and team building and knowledge sharing has had to start from low levels again. Capacity building at district level has therefore been a constant and frustrating process.

Internship programme: empowering women engineers

Since 2007, DRSP has been offering one-year internships to engineers to gain first-hand experience of implementing labour-based rural road programmes. Targeted towards women and minority groups, the programme has enabled 31 engineers (28 women) to develop their skills. Interns have been trained to undertake survey and design work and to supervise construction work. They have worked with district staff and road construction groups and learned the practicalities of labour-based operations.

Ms Samjhana Poudel was one of the 2012-13 interns. She has recently completed her internship from Ramechhap district and is now preparing for further studies abroad. According to DRSP records, 70% of the interns continue to work with DRSP or DRILP for a year, after which the majority have gone on to higher studies abroad. For most, the practical technical experience they gained from their time with DRSP have formed an invaluable foundation to further their career development.

7 Conclusions and recommendations

7.1 Overall effectiveness of social inclusion approach

DRSP has clearly demonstrated that it is possible to combine the construction of well-engineered rural roads with an effective social inclusion approach. Not only has DRSP contributed to poverty reduction and economic development by providing road access, it has also, in the process, contributed to social inclusion, with beneficial consequences for rural incomes and local food security.

DRSP assisted women and people from disadvantaged ethnic groups by purposely targeting them for employment opportunities and beyond-the-road development initiatives. In the on-going road construction projects surveyed, the percentage increase in annual incomes for disadvantaged households (12%) has been double that of non-disadvantaged households (6%), with Dalits benefitting the most (34%).

Without criticising the social inclusion approach, it should be noted that DRSP only considered the disadvantages of ethnic/cultural group and gender. It did not attempt to include people with disabilities in its programmes. People with disabilities are a small but significant proportion of the population and represent a very important disadvantaged group. The United Nations estimates that perhaps 10% of the world's population are living with disabilities taking into account problems of locomotion, eyesight, frailty and mental capacity (United Nations, 2012). In rural areas, the problems of access and economic deprivation are greatest for people with disabilities (AusAID, 2013). In any future programme SDC might consider targeting people with disabilities for possible assisted employment within working groups and assistance with improved access (transport infrastructure, accessible means of transport, concessionary fare passes).

All rural people can potentially benefit from the roads. Many goods become more easily available and cheaper. One clear example is roofing sheets. Along the DRSP road corridors, only 9% of 'disadvantaged' households had metal roofing sheets on their houses before the roads. With the roads, this has risen to 74%. People now have greater access to health care, agricultural inputs and income-earning opportunities. On the road corridors, incomes of disadvantaged groups have risen by about 15% above inflation since the road opened. Incomes of non-disadvantaged groups have increased by 37%. People have greater food security. Although it is difficult to ascribe clear cause and effect relationships to the various benefits associated with road construction and use, it is clear that DRSP has contributed significantly to poverty reduction and economic development in the targeted areas.

SDC had hoped that the benefits of the roads would be greatest for disadvantaged groups. This is difficult to demonstrate. In most circumstances, people with greater resources (ie, non-disadvantaged groups) are normally able to benefit most from new opportunities that are not

targeted. Along the road corridors, the incomes of non-disadvantaged groups rose more than those of disadvantaged groups. Although disadvantaged groups do seem to have gained particularly from new wage-earning opportunities, most of the new roadside enterprises have been established by people from richer households (notably Janjatis). To enable disadvantaged people to benefit from the roads themselves, there would need to be more targeted development interventions, which could include (for example) supported savings-and-loans schemes and concessionary fares on public transport services.

The long-term impact of the social inclusion processes could be highly significant. There are many reports of women gaining in confidence as a result of DRSP activities and taking on new leadership roles in their communities. Women playing key roles in management committees and being paid the same as men are likely to have had a beneficial effect on people's perceptions in the districts.

Many of the principles used by DRSP have been enshrined in the government's 2066 Gender, Equality and Social Inclusion (GESI) policy of the Ministry of Federal Affairs and Local Development (MoFALD). Therefore it would be easy for other road construction projects and development initiatives to build on the beneficial experiences of DRSP. While DRSP has provided an effective model, it is not yet clear the extent to which national or district level initiatives will actively and determinedly apply social inclusion interventions in their new infrastructure projects.

7.2 Rural transport policies in Nepal

DRSP has had a major influence on rural transport thinking in Nepal. DRSP has been at the forefront of good, participative district level planning, which remains central to rural transport policies in Nepal. DRSP has championed and facilitated District Transport Master Plans. The importance of decentralised decision making and implementation is widely acknowledged, although the lack of continuity and stability in district-level administrations remains a serious constraint.

DRSP has also clearly demonstrated that, with good engineering, it is possible to produce reliable roads of good quality using labour-based methods. While not everyone is convinced about the future of labour-based roads, no one appears to doubt that good, durable roads can be produced in difficult, mountainous terrain using labour-based, environmentally friendly and participatory (LEP) methods. In contrast, it is widely acknowledged that bulldozed roads are often of very poor quality (UNDP, 2011), although this is often due to inadequate design and engineering.

DRSP has been influential in promoting the importance of bioengineering. It is now widely acknowledged that bioengineering should be an integral part of road construction in Nepal, although the theory is not always implemented in practice.

DRSP has been rightly proud of its road-building achievements and improving access hundreds of thousands of rural people. However, most rural people do not themselves drive on rural roads. They depend entirely on rural transport services that need to be affordable, safe and timely. Many studies, including this review and the 2009 DRSP review (Stickland, 2009), have shown that investments in roads do not spontaneously lead to the provision of appropriate and affordable transport services by the private sector. DRSP has not investigated whether the transport services available on DRSP-constructed roads are actually meeting the needs of rural people including disadvantaged groups or the extent to which poor transport services may be contributing to social exclusion.

DRSP has made a major contribution in promoting cobblestone pavements. This labour-based and very durable technology has been well tested in several districts. DRSP has provided demonstration roads to allow technologies to be compared, and the cobblestones have proved more durable than concrete or Ottaseal. Due to their durability, the lifetime costs of cobblestone pavements are lower than most alternatives, including Ottaseal. They are not suitable for all circumstances, as they do require a close source of cobblestones and well-trained, disciplined labour. Unfortunately, they have not yet been widely appreciated by transport professionals in Nepal. They are seen to be old-fashioned, labour-intensive and quite expensive. People tend to discount two of their main

advantages: their durability and the fact that their labour-intensive construction has poverty-reducing consequences. A 'black-top' Ottaseal pavement can be applied more quickly, it will be universally popular (in the short-term) and will be applied by contractors who may be willing to 'show their appreciation' to those decision makers signing the contract. Six years later, when the black top is disappearing, people will be clamouring for a new surface, but are unlikely to remember that a cobblestone pavement would still be in place. Within the districts, some road users, including transport operators, talk highly of the quality of DRSP roads, but unless they understand the long-term implications, they would always opt for a black-top pavement over cobblestones. Similarly, at national level, DRSP has not yet won the argument and it has not convinced many donors and funding agencies to promote actively the benefits of cobblestones.

Cobblestone pavements are a relatively minor aspect of labour-based construction, but the problems and the issues exemplify how rural transport policy decisions in Nepal are complicated by issues relating to modernity, short-term horizons and self-interest. DRSP has had the 'luxury' of being provided with relatively long-term funding from an idealistic donor agency. It was therefore able to develop a 'purist' methodology, without capitulating to other pressures within the transport sector. It must also be recognised that when DRSP started, the rural road situation was very different, with whole districts lacking any roads. DRSP was able to take five-years to go slowly and steadily from foot trails to good roads. The stakeholders were all grateful and DRSP was able to build up the required teams of people. However, DRSP earned a reputation for slow progress. The fact that people have associated labour-based methods with very slow progress has proved politically damaging. Politicians and rural people want roads to be built quickly, and machinery is much quicker than labour–based methods. In recent years, DRSP has worked at a faster rate, but it is still benefitting from the teams and organisational procedures developed at the slower pace.

There are 75 districts in Nepal. DRSP has been working in only seven districts. Even in these districts, equipment-based construction is taking place. DRSP's excellent and highly-beneficial model is not being widely copied.

While the DRSP model is good, it is easy to understand why rural transport decision-makers generally opt for machinery-based approaches.

- Transport decision makers do not have to take into account the pro-poor benefits of labour-based approaches unless national or donor policies clearly specify this.
- Some transport engineers and planners are not familiar with labour-based systems
- Equipment-based operations will be quicker than labour-based operations
- Equipment-based operations appear more modern and are generally popular with politicians and with local people
- Equipment-based operations appear to be easier to supervise and manage (although DRSP experience suggests that this is not always the case)
- Equipment-based operations may well be cheaper (daily machinery costs have been coming down, labour costs have been rising)
- National tendering and contracting processes favour simple arrangement with equipment-based contractors
- There may be private gain associated with equipment-based contracts.

With this analysis, it is not surprising that people are ignoring the DRSP lessons. However, DRSP has pointed out that its reputations for slow speeds and high costs are due to the fact that it has been building structures of high quality and it has been following all the national rules and guidelines. DRSP has always included good professional designs with retaining structures and bioengineering. It has carried out environmental impact assessments, addressed resettlement issues and held public hearings. Many of the 'faster' mechanised road construction projects have cut corners and produced roads of lower quality.

Nevertheless, unless the Government of Nepal and the donors insist that social benefits need to be taken into account, the prospects for labour-based approaches seem poor. The Government of Nepal and all donors say they are committed to poverty alleviation and acknowledge that labour-

based construction provides real benefits to the local communities. Both national and donor policy frameworks could be used to justify the promotion of labour-based approaches. Local Infrastructure Development Policy 2061 and the Three Year Plan (2010-2013) of the National Planning Commission (NPC) stress the importance of local employment and poverty alleviation. Despite the apparent commitment, the adoption of labour-based approaches in Nepal remains very low.

DRSP has recently been granted a one-year extension. If it wishes its valuable lessons to benefit more districts and more people, DRSP, with SDC support, should make a more concerted effort to convince national decision makers and donors.

In order to make a compelling case, DRSP may need to recant from its purist approach. It may have to accept the benefits of mixed technologies, for example allowing machinery for breaking large rocky outcrops. The legacy of a mixed approach including labour-based methods might be better than no legacy at all.

Finally, DRSP was not able to establish any sustainable funding mechanisms for labour-based road maintenance at District level. This has meant that maintenance has tended to be neglected. With an expanding rural road network, the need for good and regular maintenance is increasing in all districts in Nepal. There is great potential for effective labour-based and mixed systems of road maintenance. The models of road-level and district-level organisation that DRSP used for road construction could be adapted for road maintenance, provided appropriate funding mechanisms can also be developed. The final phase of DRSP and the planned Local Road Improvement Programme could build on valuable DRSP experiences to contribute to the huge challenge of rural road maintenance that is affecting every district in Nepal.

7.3 SDC comparative advantages

DRSP has been a great success story for SDC. With little (but crucial) expatriate technical assistance, dedicated teams of Nepali professionals have succeeded in recruiting and training large numbers of local people to build good roads in areas of very difficult topography and geology. Even more remarkable is that this has been achieved despite a very difficult socio-political environment, with weak district-level governance, endemic corruption and an insurgency. Not only have the roads been built successfully, but the targeted system of labour recruitment ensured that the programme contributed to poverty reduction among disadvantaged groups, with millions of days of gainful employment.

The DRSP programme has been highly effective due to good central coordination and devolved responsibilities for actions. This has been complemented by transparent governance and clear accountability at all levels, including road-level operations. DRSP management has somehow been able to combine rigid adherence to principles and schedules with great openness and flexibility. This has resulted in excellent team morale and high standards of professionalism in the Kathmandu office and the district teams.

While the DRSP management and team can take the credit for these achievements, this was only possible because of the high principles and sustained commitment of SDC. The SDC team undertook proactive and pro-poor planning and then delegated effectively, monitored closely and used its diplomatic influence when required. SDC was instrumental in getting DRSP to adopt outcome monitoring and its cluster approach allowed better 'beyond the road' initiatives. SDC's committed and empathetic approach has contributed to a poverty-reduction and road-building programme that has arguably been more effective in its administration and more beneficial in its social and technical impacts than several other donor-supported programmes in Nepal.

While the DRSP achievements speak for themselves, evidence-based lessons are particularly valuable. The lessons of DRSP's impact were slightly weakened because SDC did not make early provision for base-line data collection. Furthermore, the 2009 external review explained that the impact of DRSP roads on rural people would depend on the transport services available to them. Despite this, SDC did not encourage DRSP to investigate the adequacy of transport services on the

roads it had worked on. This seemed surprising given the importance SDC has attached to the impact of the roads on the rural population and disadvantaged groups. These two observations are not criticisms of SDC, but are ideas designed to assist future project planning and implementation.

Partly because other donor-agencies respected the achievements of DRSP, SDC was able to work with other donors to negotiate collaborative programmes with significant funding from other donors and development banks. SDC is reported to have been able to 'leverage' seven dollars of funding from other donors for each Swiss franc it invested in DRSP. This has benefited all concerned, and was due to the strong comparative advantage of SDC in identifying and managing effective and socially-beneficial road construction projects.

As a consequence of its support for DRSP and the achievements of DRSP, SDC has had a significant and beneficial influence on the Government of Nepal and on other donor agencies working in Nepal. This has helped to bring various principles and practices into current policies and funded programmes. Examples may include national policies and donor support relating to social inclusion, district-level planning, labour-based construction and road maintenance. Perhaps SDC could have achieved even more if it had widened its vision of social inclusion to include people with disabilities and potential exclusion due to inadequate transport services on the newly-constructed roads.

However, although there has been influence, DRSP supported by SDC has not yet been sufficiently convincing. The 'hearts and minds' of the key transport professionals in Nepal responsible for preparing policies and funding and implementing programmes relating to rural transport have yet to be won. This remains vital for the 'legacy' of DRSP. There is a real risk that DRSP will simply be remembered as a good project that promoted labour-based technologies at a time when they were relevant. The reviewers believe DRSP's legacy should be much more than this: it has demonstrated a proven, technically-sound and socially-beneficial method of constructing (and maintaining) good rural roads. This has on-going relevance for Nepal and for other countries. SDC should use its comparative advantage and influence to ensure that the legacy of DRSP can provide future benefits to rural people in Nepal and elsewhere. This will require proactive diplomacy within Nepal.

SDC should also ensure that other countries can benefit from the experiences and lessons of DRSP. The DRSP methodologies could well be adapted to particular situations in countries in Asia, the Pacific, Africa, Latin America and the Caribbean. Counter-arguments in favour of 'modern', machine-based approaches that are simpler to organise will always be present and attractive to decision-makers and transport professionals with little experience of labour-based methods. That is why SDC should make an effort to provide such people with the evidence, arguments and methodologies they could use to benefit poor rural people in many countries of the world.

Nepal is not the only country with huge problems of rural road maintenance. It is one of the biggest problems in all developing countries, and decision makers are often unaware of effective, labour-based maintenance options. There is an excellent opportunity in the final year of DRSP to clearly demonstrate to Nepal, and to other countries, how well-managed labour-based maintenance can improve rural roads, provide poverty-reducing employment and benefit all stakeholders. It is also envisaged that the 'Local Road Improvement Programme' being planned will build upon the many valuable lessons of the DRSP.

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9 Annex 1: Descriptions of surveyed roads and impacts on proximity

1. Sampled roads

Nine road corridors were sampled during the study with roads in all seven DRSP working districts. Amongst these, six road corridors that were constructed more than five years ago were selected to assess the long-term socio-economic benefits at the household level (Table 2). Three on-going road construction corridors were also sampled to find out relevant livelihood issues amongst labourers (Table 2).

In the following sections, key characteristics of each road are summarised. For each road, a pair of higher-resolution access maps is presented. These show the contours of access associated with the roads. Light green shows the locations that are up to 30 minutes' walk from a road. Yellow represents areas that are up to one hour from the road. Pink areas are 1-2 hours from the road and blue areas are 2-4 hours from the road. White areas are more than four hours from the road. The maps therefore show the changing access due to the road construction.

2. Well-established roads surveyed

2.1 Timalbesi–Thuloparcel road, Kavre District

This 21 km road was constructed between 2005 and 2007. It was built to link the people in the valley and hillsides around Thuloparcel with the Dhulikhel, the Kavre district headquarters which is on a main road to Kathmandu. The area is quite sparsely populated and only about 4000 people live in the road corridor (up to four hours walk from the road). The road has little traffic (about 20 vehicles a day, including motorcycles). Four medium buses a day travel to Kathmandu, each carrying about 25 people. Pedestrian do not use the road much, preferring the older, more direct trails. The context of the road with walking-time access contours is shown in Figure 12.

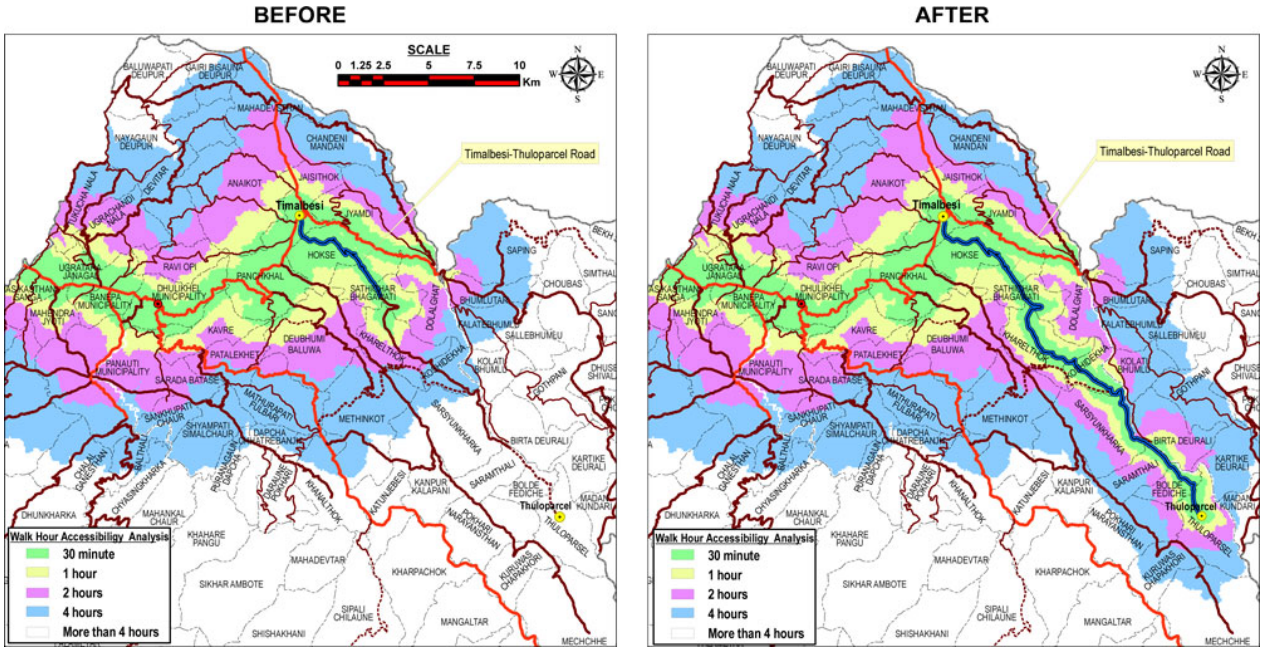

Figure 12: Map of the Timalbesi–Thuloparcel road showing access contours before and after construction

2.2 Ghyangdanda-21 Kilo, Sindhupalchowk District

The original Ghyangdanda-21 Kilo road in the southeast of Sindhupalchowk District was just 7.4 km long. It runs from 21 Kilo, on the Lamosangu-Jiri highway, to the small village of Ghyangdanda. Prior to its construction between 2001 and 2004 there was a trail on which people travelled on foot with goods transported by porters. The road was then was extended 7 km to Lishanku, which became a more important transport hub. Lishanku is sometimes known as Lishanku-Ghyangdanda and it is now is linked to a 36 km road to the Arniko highway. Traffic on the 21 Kilo-Ghyangdanda-Lishanku road section is light, at about 20 vehicles a day including 7 motorcycles. Two buses a day leave Lishanku for Kathmandu, each carrying about 35 passengers. These buses pass via 21 Kilo to the Lamosangu-Jiri highway. Wheat, maize, rice, pulses and potatoes and the main crops and the road has made it much easier to transport potatoes to market. Poultry enterprises have recently been established, with a view to the Kathmandu market. The catchment population of the Lishanku-21 Kilo road corridor is about 12,500 people, but people beyond Lishanku also use the road to access Kathmandu and the expanding modern market town of Mude. Retail shops have been established along the road and this had led to the decline the traditional periodic market at Sikre. The context of the road with walking-time access contours is shown in Figure 13.

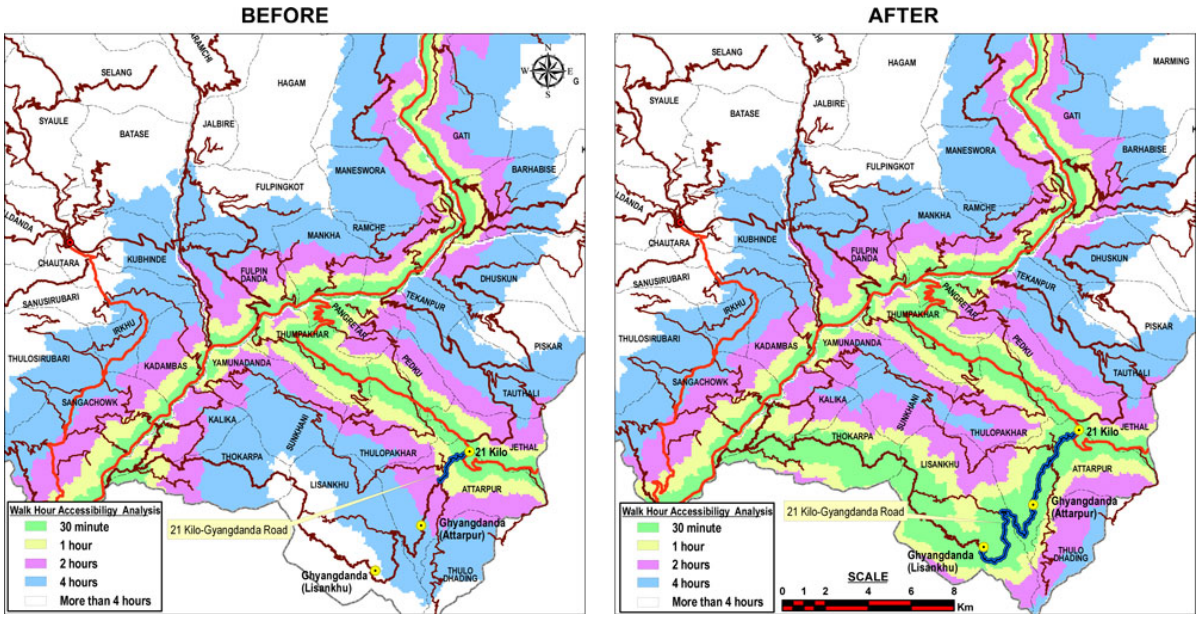

Figure 13: Map of the Ghyandangda-21 Kilo road showing access contours before and after construction

2.3 Dolakha-Singati road, Dolakha District

This 20 km road links Dolakha, the district headquarters, with the town of Singati and the north of the district. Prior to construction, the only access was on trails, with goods carried by porters or mules. The road was constructed between 2001 and 2006, with initial work carried out in collaboration with the Rural Community Infrastructure Works (RCIW) Programme that provided food for work. The road facilitated studies on potential hydro-electric sources and these led to the Upper Tama Koshi Hydroelectric project, which is currently under construction in Lamabagar VDC, beyond Singati. As part of this scheme, the DRSP road was widened with provision for drainage. About 75 vehicles pass along the road each day, including 20 motorcycles. Eight buses a day in each direction carry about 50 passengers each, with most buses going to and from Kathmandu, via Dolakha. Freight is carried on the buses and in twenty trucks a day. About 21,000 people live in the road corridor (up to four hours walk from the road). The context of the road with walking-time access contours is shown in Figure 14.

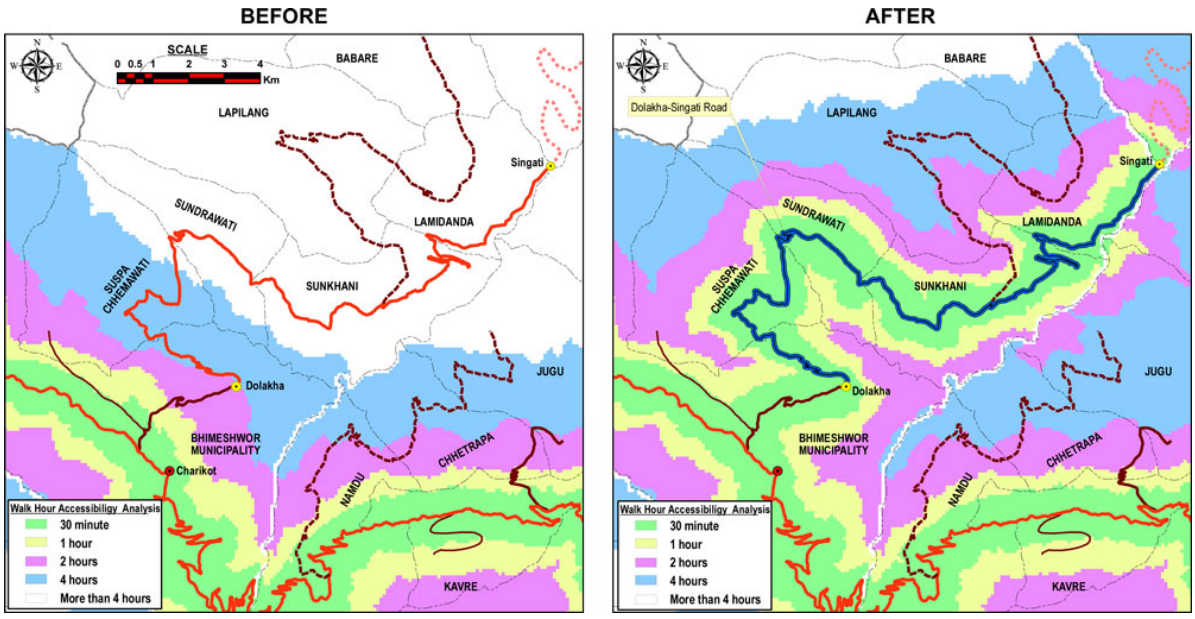

Figure 14: Map of the Dolakha-Singati road showing access contours before and after construction

Figure 15: Sections of Dolakha-Singati road with two buses

2.4 Manthali-Khurkot road, Ramechhap District

The 15 km Manthali-Khurkot road runs from Manthali, the Ramechhap district headquarters, to the banks of the Sunkoshi Nadi with a footbridge connection to Khurkot, a small village across the river in Sindhuli. The road, which was constructed from 2000 to 2006, follows the course of a tributary river, but the topography dictated there had to be many ascents and descents to avoid hard rocky outcrops. The road is much more than an agricultural access road as it is now part of the national Strategic Road Network (SRN). When a major bridge is finished at Khurkot, the road will link the district with Sindhuli and the Terai. When the BP/Japan Highway is completed, Khurkot will be on a fast road to Kathmandu, so that this DRSP road will take national traffic. Because of the future importance of this road, the Department of Roads upgraded the road, and it is now blacktopped. Daily traffic on the road comprised about 130 vehicles, of which 90 were motorcycles (motorcycles are able to use the footbridge to Khurkot). Public transport consisted of about five buses a day in each direction, each carrying 50-70 passengers. Twenty 4-wheel tractors and trailers a day used the road to collect building materials from the river. The modest number of freight trucks (currently four a day) is likely to increase significantly when the Khurkot bridge is finished. Only about 4000 people live in the road corridor (up to four hours walk from the road). The context of the road with walking-time access contours is shown in Figure 16.

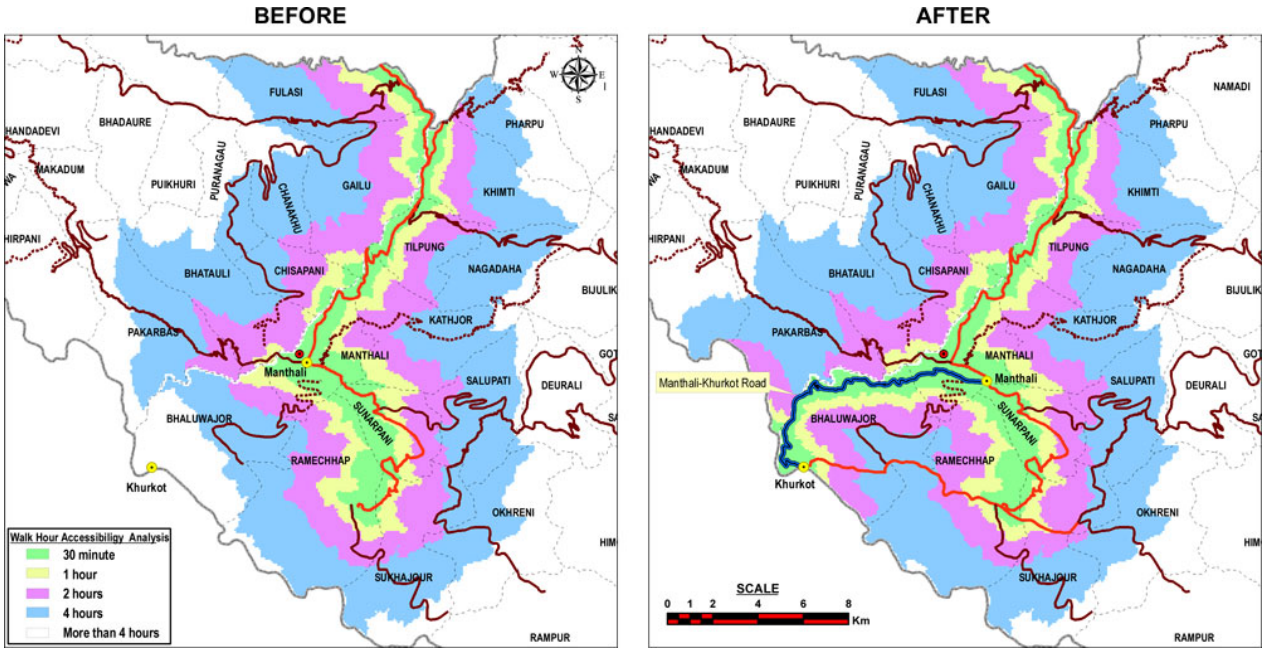

Figure 16: Map of the Manthali-Khurkot road showing access contours before and after construction

Figure 17: Sections of the Manthali-Khurkot road

2.5. Okhaldhunga-Rumjatar Road, Okhaldhunga District

This 11 km road in the east of the district was constructed between 2002 and 2006. The environment is very hilly and from Okhaldhunga, the road climbs to a ridge and then descends to the Rumjatar plateau. When the road was planned, Okhaldhunga had few roads and poor connectivity with Kathmandu. There was an airstrip at Rumjatar, but travel between Rumjatar and Okhaldhunga was on foot, with porters and mules for transporting goods. The main function of the road was to connect Okhaldhunga with the Rumjatar airport and provide access for the people living on the Rumjatar plateau and its hinterland. During the study, daily traffic on the road was about 40 vehicles, including 22 motorcycles. Public transport service comprised one or two buses a day in each direction, each carrying 30-50 passengers. About twelve jeeps and pickups a day use the road (they are private and official vehicles), but this number would be expected to be slightly higher when the airport, which is currently closed for maintenance work, resumes its operations. About 7000 people live in the road corridor (up to four hours walk from the road). The context of the road with walking-time access contours is shown in Figure 18.

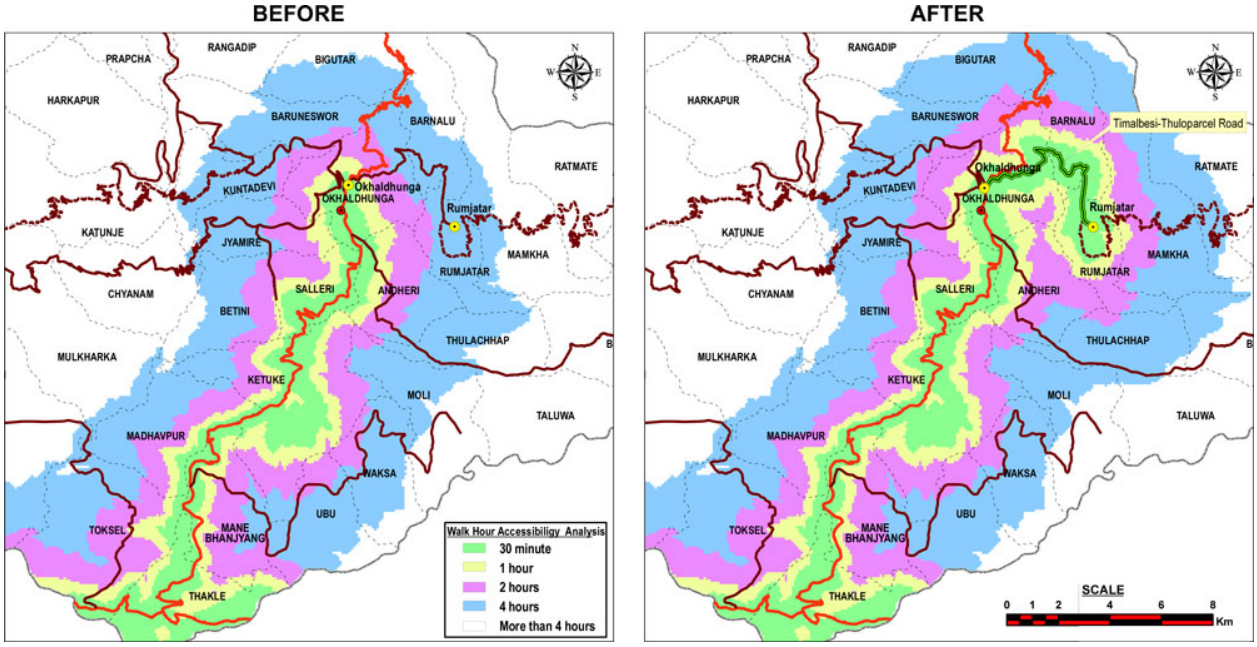

Figure 18: Map of the Okhaldhunga-Rumjatar road showing access contours before and after construction

Figure 19: Sections of the Okhaldhunga-Rumjatar road

2.6. Sindhulimadi-Bhimsthan

The 22 km Sindhulimadi-Bhimsthan road lies to the east of Sindhuli district. It starts in Kamalamai Municipality, near the district headquarters. Unlike most DRSP roads, it runs through relatively flat countryside. Prior to the construction, the main mode of transport was on foot. During the dry months, tractors used to come into the villages on a rough track passing on dry river beds. Vehicles were rare and were mostly for transportation of construction materials. The main function of this road was to link the villages in Bhimsthan and Chakmake with the district headquarters and expand the influence of the Bardibas-Sindhuli road. After construction, it was observed that retail shops, poultry farms and dairy collection centres have been established along the road corridors. About 110 vehicles a day use the road, including 70 motorcycles and nine buses each carrying about 60 passengers and a tonne of goods. About 40,000 people live in the road corridor (up to four hours walk from the road). The context of the road with walking-time access contours is shown in Figure 20.

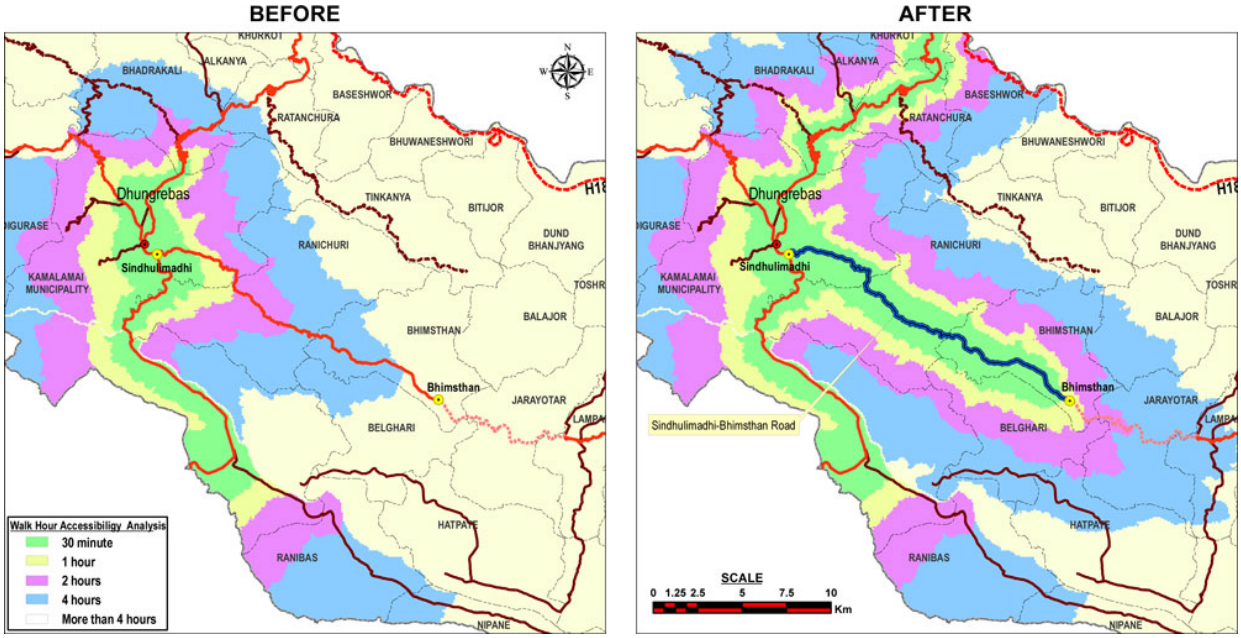

Figure 20: Map of the Sindhulimadi-Bhimsthan road, Sindhuli, showing access before and after construction

Figure 21: Sections of Sindhulimadi-Bhimsthan road with length person, bus, ambulance and cobblestones

3. Roads under construction surveyed

3.1 Khimti-Betali-Namadi road, Ramechhap District

When completed, this 34 km road will be part of the shortest route from the mid-hills of Dolakha and northern Ramechapp to the Terai, via Manthali and Sindhuli District. There are series of hydropower plants, which have been built or are under construction along the road corridor. To March 2013, over 730,000 person-days of employment had been generated. About 13,000 people live in the road corridor (up to four hours walk from the road). The context of the road with walking-time access contours is shown in Figure 22.

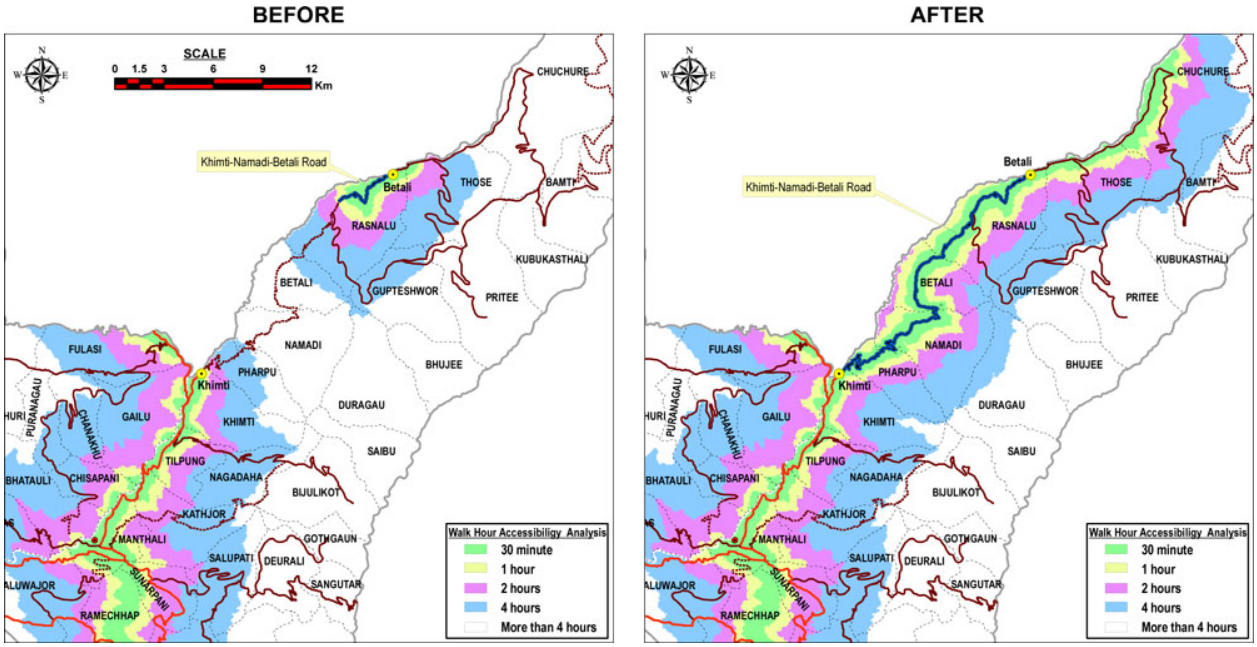

Figure 22: Map of Khimti-Namadi road, Ramechhap, showing predicted access before and after construction

Figure 23: Construction on the Khimti-Betali-Namadi road

3.2. Barbot-Koshbhanjyang road, Okhaldhunga District

This 27 km road will link settlements located in the Koshbhanjyang-Barbot watershed with the Okhaldhunga district headquarters. Initial work started in 2007/8. Between 2011 and March 2013, half a million person-days of employment had been generated on the road. About 20,000 people live in the road corridor (up to four hours walk from the road). A hydropower plant is expected to be built at Mandre with the road providing the necessary access. The context of the road with walking-time access contours (including projections when construction is completed) is shown in Figure 24.

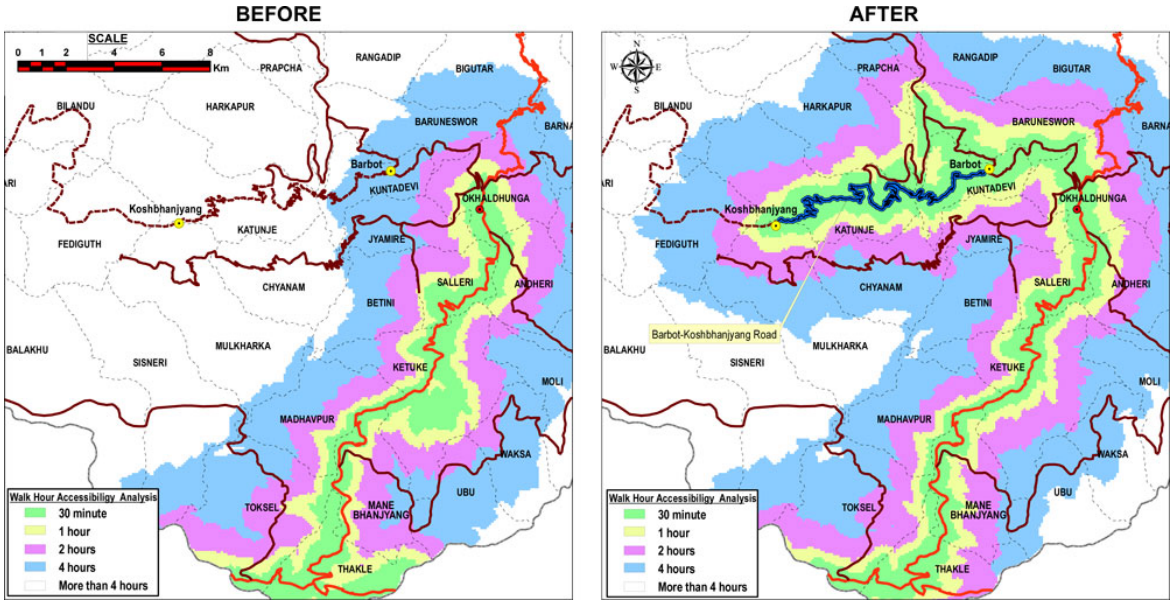

Figure 24: Map of the Barbot-Koshbhanjyang road showing predicted access before and after construction

3.3. Maure-Foksingtar road, Khotang District

Following preparatory work, construction of the 48 km Maure-Foksingtar road began in 2011. By March 2013 it had generated over 630,000 person-days of work. It will be part of the national Strategic Road Network as part of the Sagarmatha Highway from Diktel (Khotang District Headquarters) to Gaighat (Udaypur District). The route will provide the shortest access between the district headquarters and the Terai. About 14,000 people live in the road corridor (up to four hours walk from the road). As a strategic road, many more people than this are likely to benefit from the road. The context of the road with walking-time access contours (including projections when the construction is complete) is shown in Figure 25.

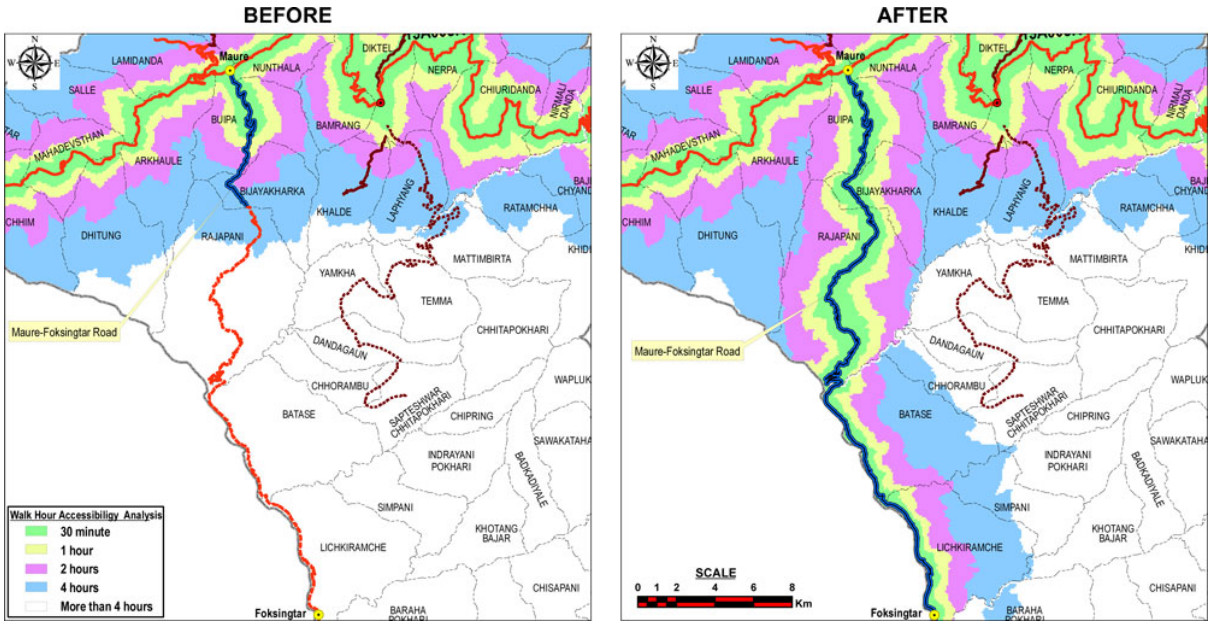

Figure 25: Map of the Maure-Foksingtar road showing predicted access before and after construction

10 Annex 2: Survey methodology

Study tools

All the study tools were intended to be mutually reinforcing components of the methodology to ensure robustness. One key constraint was the lack of baseline data of the selected road corridors. This hampered direct 'before and after' comparisons, leading the consultants to rely on recall of past situations prior to road construction. For economic analysis, appropriate adjustments were made to ensure that the findings reflected the most reliable picture of the changing circumstances.

Household surveys

Socio-economic surveys were undertaken along the six well-established roads (Table 17) throughout January 2013. These surveys were supervised by the consultants with the collaboration of DRSP staff and hired enumerators, who were trained prior to the start of the surveys.

Table 17: The well-established roads surveyed

Name	Road length *(km)*	Construction period	District	Surveys
Timalbesi–Thuloparcel	20.6	2005/06-2006/07	Kavre	a. Household. b. Access
Ghyangdanda–21 Kilo	7.4	2001/02-2003/04	Sindhupalchowk	a. Household. b. Access c. Economic
Dolakha–Singati	20	2001/02-2005/06	Dolakha	a. Household. b. Access c. Economic
Manthali–Khurkot	15	2000/01-2006/07	Ramechhap	a. Household. b. Access
Okhaldhunga–Rumjatar	11	2002/03-2005/06	Okhaldhunga	a. Household. b. Access
Sindhulimadi–Bhimsthan	22	2002/03-2006/07	Sindhuli	a. Household. b. Access c. Economic

A stratified quota sampling approach was applied, with caste/ethnicity being the three main stratums. This approach enabled the consultants to tease out the differences amongst the three main categories. It also allowed for disaggregation of finding among disadvantaged and non-disadvantaged groups. The consultants had initially intended to compare the program activities with 'control areas', where the non-programme areas would be villages situated at least four hours from each road corridor. However, soon it was realised that the rapid expansion of road networks meant that most people are now living within a four hour's walk from a road. These people could therefore not form an appropriate 'control' group and as such the idea was disregarded.

Altogether 1526 households were surveyed. Based upon ward and VDC population data along the road corridors a confidence level of 95% and a sampling error of 2.5% were calculated. The majority of respondents were Janjatis (48%) followed by Brahmin/Chhetri (29%) and Dalits (23%) as shown in Table 18.

Table 18: Sample size of the household surveys

Ethnicity	Road Segment						Total
	Thuloparcel-Timalbesi (Kavre)	Ghyangdanda-21 Kilo-(Sindhupalchowk)	Manthali-Khurkot (Ramechhap)	Singati-Dolakha (Dolakha)	Rumjatar-Okhaldhunga (Okhaldhunga)	Sindhulimadi -Bhimsthan (Sindhuli)	
Dalit	13%	16%	19%	34%	30%	25%	23%
Janjati	52%	76%	46%	34%	37%	43%	48%
Brahmin/ Chhetri	34%	8%	35%	32%	32%	30%	29%

Surveys of access

The impact of DRSP on access was assessed on all the sampled six well-established roads constructed by DRSP. The selected roads are shown in Table 17. The review tools included traffic counts and qualitative and quantitative surveys undertaken to understand how road access is perceived from the perspectives of the users, the transport operators and various influential people.

In total, 200 users and public transport operators were surveyed. These included farmers, traders, students, elderly and disabled people who were using public transport to access health care, maternal health care, employment, financial services and socio-cultural activities.

The questionnaires and input sheets relating to the access assessment were modified from an on-going research initiative developing international indicators relating to access and rural transport services that has been building on a World Bank methodology for the rapid assessment of rural transport services (Starkey, 2007; Starkey et al, 2013).

The traffic counts were undertaken seven day in the period December 2012–January 2013. The time period included both 'normal' and 'busy' days (eg, market days).

Surveys of employment impact

The impacts of DRSP on livelihoods were assessed on three roads that were currently under construction in Phase 4 (Table 19Table 17). These surveys focussed on assessing earnings (individual and household), expenditure patterns and living standards.

Table 19: The roads under construction that were surveyed

Name	Road length *(km)*	Construction period	District	Surveys
Khimti-Betali-Namadi	37.7	2012-2013	Ramechhap	d. Labour
Mahire-Foksingtar	48	2010-2013	Khotang	d. Labour
Barbot-Koshbhanjyang	27	2010-2013	Okhaldhunga	d. Labour

In total, 730 labourers were surveyed (Table 20). This allowed for a confidence level of 95% and a sampling error of 3.3%. Similar to the household survey, a stratified quota sampling was undertaken. Amongst those who were surveyed 69% were men and 31% were women.

Table 20: Total number and ethnicity of workers employed on the surveyed roads

Road segment	District	Total number of labourers	Total sampled	Dalit	Janajati	Brahmin/ Chhetri
Khimti-Betali-Namadi	Ramechhap	1249	255	10%	55%	35%
Mahire-Foksingtar	Khotang	2467	255	9%	70%	21%
Barbot-Koshbhanjyang	Okhaldhunga	928	250	15%	22%	63%

Surveys of enterprises and services

Surveys were also carried out on each of the six established roads of the enterprises and service providers associated with the road corridor. Altogether 255 enterprise owners were interviewed and information was collected on their monthly turnovers, transport costs and the changes before and after the construction of the rural roads. Similarly, information was gathered from 23 service providers such as NGOs, schools, health facilities and extension services based on or near the road.

Economic analyses

Economic impact analyses on three roads were also undertaken. These were:

1. Singati-Dolakha, Dolakha
2. Sindhulimadi-Bhimsthan, Sindhuli
3. Ghyangdanda-21 kilo, Sindhupalchowk

Analysis was based on surveyed data (traffic counts, agriculture productivity, social outcomes) gathered from the three sampled road corridors.

GIS assessment of proximity

Analyses of enhanced proximity due to the DRSP roads were also carried out using GIS maps through the support of DRSP.

Stakeholder views

The consultants also held interviews and focus group discussions with more than 100 stakeholders to try to gauge the impact of the DRSP interventions. A list of some of the stakeholders contacted is provided in Annex 7.

11 Annex 3: Economic analyses of three DRSP roads

Prepared by Ishwar Shrestha and Paul Starkey

1. Introduction

Background

The District Road Support Program (DRSP) funded by Swiss Development Co-operation (SDC) has been engaged in the construction, rehabilitation and maintenance of rural roads of Nepal since 1999. The program is due to end in 2014. SDC has commissioned an external review of DRSP to assess the socio-economic impacts of the whole thirteen year program. The economic analyses are one of the activities of this review.

Objectives and scope

The objectives of the present economic analyses are to assess the economic impacts of three selected road projects. In accordance with the Term of Reference the economic analyses require to compare economic situations in the road corridor before and after the construction project and carry out economic evaluations of the impacts of the roads.

The consultants endeavoured to:

- use Roads Economic Decision Model (RED) software to undertake 'conventional' assessments of the economic impacts of the roads in terms of transport cost savings and value of travel time savings and calculate indicators of the impacts such as Economic Net Present Value (ENPV) and Economic Internal Rate of Return (EIRR) and Benefit Cost Ratio (BCR)
- carry out economic analysis of the project roads in terms of development benefits, land prices and social benefits and calculate indicators of the impacts such as Economic Net Present Value (ENPV), Economic Internal Rate of Return (EIRR) and Benefit Cost Ratio (BCR).

Methodology and approach

The economic analyses were carried out using the Roads Economic Decision (RED) software model. RED is a derivative of the Highway Design and Maintenance Standards version 4 (HDM4) model that is widely used by development banks. HDM4 is designed for highways with large traffic flows (over 200 per day). RED was developed for use on lower volume roads (Archondo-Callao, 1999a).However, it was not really intended for use on very low traffic volumes, which may be fewer than 50 vehicles per day (Lombard and Coetzer, 2007). Three of the six surveyed DRSP roads had fewer than 50 vehicles a day. Nevertheless, in the absence of suitable alternatives RED software is used by the Asian Development Bank, the World Bank and DFID-supported road projects.

The RED software was used in conjunction with a module of HDM4 that had been calibrated previously for use in Nepal. This contained the prevailing economic prices for data relating to Vehicle Operating Costs (VOCs) and the value of travel time (VOT)that needed to be entered in to the RED software.

The approach used for the economic analysis was the conventional appraisal methodology used for road impacts. This compares the 'without project situation' (ie, before road construction or rehabilitation) with the 'with project situation' (ie, the road after the construction or rehabilitation works). The traffic is assumed to have the same origins and destinations in both situations.

Only those factors which could be quantified or estimated were considered for the economic analysis. The costs included project implementation and maintenance costs. The benefits included cost savings to road users and quantifiable incremental increases in agricultural production. Development benefits from industrial and enterprise developments were not included in these analyses although several of the roads had increasing numbers of small enterprises. The various social benefits (improvements in access to markets, health facilities, government offices, education and information as well as issues such as the empowerment of women and marginalised people) were estimated as a percentage of other benefits, as explained below.

The costs and benefits were estimated in economic prices only. Data measured using financial prices were not included without conversion factors or assumptions relating to economic prices. It was considered that the major economic benefits could be estimated through savings in vehicle operating costs (VOCs). Benefits such as reduction in the financial prices of consumer goods were not included to prevent double accounting: they were considered to be a consequence of reduced VOCs which were taken into account as an economic benefit.

Analysis parameters and conversion systems
Economic analyses of the projects were carried out with a twenty-year timeframe. Annual costs and benefit streams were converted to represent 2012/13 values using a social discount rate of 12% per annum.

Costs and benefits were estimated in economic prices. The economic prices were obtained by excluding the duties, taxes and subsidies included in the financial prices. Economic costs were estimated using the 'Domestic Price Numeraire' consistent with the Asian Development Bank's Guidelines for the Economic Analysis of Projects (ADB, 1997). A Standard Conversion Factor (SCF) of 0.9 was used to calculate the economic cost of the project from financial capital costs. Similarly, the economic maintenance costs for the 'without project' and 'with project' situations were also calculated by applying the SCF of 0.9 to the financial costs. The SCF used was broadly in line with those used by several other rural infrastructure projects, including the Rural Reconstruction and Rehabilitation Sector Development Program (RRRSDP). These had SCFs ranging from 0.88 to 0.94. The economic cost of local materials was derived by deducting excise duties and taxes (which total about 10%). A shadow exchange rate factor (SERF) of 1.10 was applied to the financial costs of foreign materials less all taxes and duties (currently 10% in Nepal) to convert into economic cost (Nepal SERF = 1 + net trade taxes/total trade). It was assumed that the wage rate of skilled labour is not distorted and the financial and economic costs of skilled labour are considered to be equal. However, the cost of unskilled labour was estimated at 70% of financial cost by applying a shadow wage rate factor (SWRF) of 0.7. This is standard practice in Nepal to reflect the low productivity of unskilled labour drawn from poor areas. A Standard Conversion Factor (SCF) of 0.9 can be derived when the SERF, taxes and duties and shadow wage rate are applied on the estimated costs of foreign materials, local materials and unskilled labour components of the financial investment costs of the project.

As the economic analysis methodology was the same for all roads, with similar arguments and assumptions, the data and the results for the three roads will be presented together. The roads analysed were selected in consultation with SDC and DRSP and were:

- Dolakha-Singati road, Dolakha District
- Sindhulimadi-Bhimsthan, Sindhuli District
- Ghyangdanda-21 Kilo, Sindhupalchowk District.

Further details of these roads, together with maps, are provided in Annex 1 of the review document.

2. Road details, traffic and cost estimates and assumptions
Key statistics relating to the three roads are provided in Table 21.

The international roughness index (IRI) is used by RED software as a way of estimating the level of vehicle operating costs (VOCs). A rougher road has a higher IRI and, it is assumed, higher VOCs. While machines can be used to measure IRI on highways, on earth roads these are generally estimated. Examples of such estimations based on driving experiences and visual appraisal are given in Table 22. In these economic evaluations, the average IRI on all three roads was assumed to be 8, allowing comfortable travel at 70-80 km/h.

Table 21: Key statistics and assumptions for the three roads

	Dolakha-Singati	Sindhulimadi-Bhimsthan	Ghyangdanda-21 Kilo
District	Dolakha	Sindhuli	Sindhupalchowk
Road type	Earth	Earth	Earth
Length (km)	35	22.5	7.4
Width (metres)	4.5	4.5	4.5
IRI estimate (m/km)	8	8	8
Daily traffic (AADT)			
Buses	16	9	4
Trucks (medium)	7	3	0
Trucks (light)	15	0	5
Jeeps, pickups, cars	16	22	4
Motorcycles	21	68	7
Tractors	0	5	0
Total traffic (AADT)	**75**	**107**	**20**
Traffic growth 1-10 yrs	7%	7%	7%
Traffic growth 11-20 yrs	5%	5%	5%

Table 22: International roughness index (IRI) estimation by subjective evaluation

IRI	Comfortable speed	Description
1.5 to 2.5		Very smooth surface
3.5 to 4.5	80-100 km/h	No potholes, negligible depressions
7.5 to 9.0	70-80 km/h	Some potholes and wheel bounce Moderate corrugations (6-20mm/0.7-1.5m)
11.5 to 13.0	50 km/h	Frequent depressions, occasional deep depressions or potholes. Strong corrugations (eg, > 20mm/0.7-1.5m).
16.0 to 17.5	30-40 km/h	Frequent deep transverse depressions and/or potholes (eg, 40-80mm/1.5m at frequency 5-10 per 50m); occasional very deep depressions (e.g. 80mm/1-5m). Not possible to avoid all the depressions except the worst.
20.0 to 22.0	20-30 km/h	Frequent deep depressions and/or potholes (e.g. 40-80mm/1.5m at frequency 10-15 per 50m) and occasional very deep depressions (> 80mm/0.6-2m).

Source: After Archondo-Callao, 1999b

Economic evaluations are based on a comparison of the situation before the intervention ('without project') and after the investment ('with project') with benefits projected into future years. The baseline ('without project') is crucial as all incremental benefits are derived from this situation. As there were no baseline surveys to provide accurate data, the assumptions have had to be based on people's recall of what the situation may have been like prior to road construction. On the three roads, it was assumed that the infrastructure of the baseline ('without project') situation were foot trails and did not involve motorised transport. All movements were on foot, with porters or mules providing freight transport. The assumed average numbers of pedestrians, porters and mules that were operating each day prior road construction are shown in Table 23. As there had been modal shifts from porters and pack animals to buses and trucks, further assumptions had to be made to have some equivalents. From the traffic perspective, it was therefore assumed that 50 pedestrians were equivalent to one bus; 100 porters, each carrying 50 kg would be equivalent to one medium truck carrying five tonnes; similarly, 62 mules each carrying 80 kg would be equivalent to one medium truck carrying five tonnes. These equivalents were considered to be the 'normal' traffic in the 'without project' scenario. The growth of this 'normal traffic' on the trails would only have been 3%. The various pre-road ('without project') assumptions are summarised in Table 23.

Table 23: Assumed transport situation before the construction for the three roads

	Dolakha-Singati	Sindhulimadi-Bhimsthan	Ghyangdanda-21 Kilo
Pedestrians	105	190	130
Porters	30	30	30
Mules	25	25	20
Pre-road traffic ('normal traffic') equivalent to [1]	2 buses 2 medium trucks	4 buses 2 medium trucks	3 buses 3 light trucks
Transport cost by porters and/or mules before the road *(NRS per kg per km)*	0.30	0.45	1.00
Assumed traffic growth 'without project'	3%	3%	3%

[1] Assumptions: buses carry c. 50 passengers. Porters carry 50 kg, mules carry 80 kg. Medium truck carries 5 tonnes. Light truck carries 2 tonnes

Information on construction dates and costs was provided by DRSP and is presented in Table 24. Although some information relating to maintenance was obtained from DRSP, some of the figures used in the analyses were adjusted based on other similar rural road projects in Nepal. These are also shown in Table 24.

Table 24: Construction dates and costs for the three roads

	Dolakha-Singati	Sindhulimadi-Bhimsthan	Ghyangdanda-21 Kilo
Project completion	2005/06	2006/07	2003/04
Economic capital cost *(NPR millions)*	205.5	100.7	29.1
Annual economic maintenance cost before project *(NPR/km)*	13,500	13,500	13.500
Annual economic maintenance cost after project (*NPR/km)*	13,400	20,100	20,200

The assumed Vehicle Operation Costs (VOCs) of motorised vehicles were taken from the RED model and an HDM4 module that had been calibrated to reflect the assumed vehicle operating costs of different vehicles on the roads of Nepal. These figures were intended to reflect the prevailing vehicle prices as well as the economic costs of fuel, tyres, oil and labour. The assumptions used are given in Table 25. These VOC figures are considered by RED to be typical of that class of vehicles. They are not based on data relating to the actual operating fleet and the actual conditions of operation.

Table 25: Assumptions on current vehicle operating costs provided by RED/HDM4 model on all roads

Vehicle types	Assumed current vehicle operating cost *(NPR/km)*
Motorcycle	5.1
Car/Van	19.9
Jeep	35.4
Bus	69.6
Truck	86.6
Tractor	40.8

Source: RED model with HDM4 module calibrated for Nepal

One of the economic benefits ascribed to the road relates to time saved on journeys by passengers in public transport vehicles and people travelling on private or official business. Assumptions have to be made relating to the time saved and the value of this time. This information may be obtained by surveys, but is more generally estimated by making assumptions about income levels and the types of work of the various travellers. The value of time for work or business trips was assumed to be related to average regional incomes. In this analysis, the local convention was followed of giving no value for non-work trips. It is acknowledged that travel time has some economic value for all individuals and for society as a whole. However, time did not allow the re-calibration of the model to take account of this. The value of travellers' time is higher for people considered to have higher incomes. The values used are shown in Table 26.

Table 26: Assumptions on value of time savings used in RED model on all roads

Transport type	Monthly income per passenger travelling for work purposes (NPR)	Passengers travelling in work time (%)	Value of time per traveller hour (NPR)	Passengers per vehicle	Value of time per vehicle-hour (NPR)
Motorcycle	7,500	10	3.61	1.7	6.1
Car/van	15,000	10	7.21	2	14.4
Jeep	6,000	20	5.77	5	28.9
Bus	6,000	20	5.77	51	294.2
Pedestrian	6,000	20	5.77	-	-

The construction of the project roads would have reduced travel time quite significantly for those able to move from walking to motorised vehicles. It was assumed that pedestrians walking before the road was constructed would have walked at 3 km per hour. The speeds of vehicles for the 'with project' situation were predicted by the RED model.

3. Estimated and assumed benefits of the road construction

The existing traffic count data has been split into 'normal traffic' (based on the equivalent of the assumed trail traffic before the road) and 'generated traffic'. The generated traffic is the extra traffic attributable to the road. These figures are shown in Table 27.

Table 27: Normal and generated traffic on the three roads

	Dolakha-Singati		Sindhulimadi-Bhimsthan		Ghyangdanda-21 Kilo	
	Normal	*Generated*	*Normal*	*Generated*	*Normal*	*Generated*
Buses	7	9	5	4	4	0
Trucks (medium)	3	7	2	1	0	0
Trucks (light)	0	15	0	0	4	0
Jeeps, pickups, cars	0	16	0	22	0	4
Motorcycles	0	21	0	68	0	7
Tractors	0	0	0	5	0	0
Total	**10**	**68**	**7**	**100**	**8**	**11**

Source: Traffic survey 2013 and Consultants' estimates

Following road construction ('with project' situation) it is assumed that there will have been more economic activities that result in traffic growth. A traffic growth rate of 7% has been assumed for the first ten years with a 5% growth in the following ten years. The current traffic figures and those forecast for the years of 2015, 2020, 2025 and 2032 are provided in Table 28. All traffic volumes are in mixed vehicles and include normal and generated traffic. They represent the Annual Average Daily Transport (AADT) and (in principle) they take into account the declining levels of traffic during the monsoons.

Table 28: Forecast traffic levels for the coming twenty years

	Dolakha-Singati					Sindhulimadi- Bhimsthan					Ghyangdanda-21 Kilo				
Year	*2013*	*2015*	*2020*	*2025*	*2034*	*2013*	*2015*	*2020*	*2025*	*2034*	*2013*	*2015*	*2020*	*2025*	*2034*
Buses	16	18	25	32	45	9	10	14	18	25	4	5	6	8	11
Trucks (med)	7	8	11	14	20	3	3	5	6	8	0	0	0	0	0
Trucks (light)	15	17	24	31	44	0	0	0	0	0	5	6	8	10	15
Jeeps/cars	16	18	26	33	47	22	25	36	46	65	4	4	6	8	12
Motorcycles	21	24	34	44	62	68	78	109	142	200	7	8	11	15	21
Tractors	0	0	0	0	0	5	6	8	10	15	0	0	0	0	0
Total	**75**	**86**	**119**	**155**	**218**	**107**	**122**	**172**	**222**	**313**	**20**	**23**	**32**	**41**	**59**

Source: Consultants' estimates

The projected traffic figures were used to estimate users' benefits based on reductions in travel time of the people and reductions in the transport costs of goods. Economic benefits arising from the

generated traffic were calculated as half the benefit to an equal amount of normal traffic. This 'rule of half' is because the benefit of generated traffic is measured by the consumer surplus triangle, which is half the area of the equivalent rectangle. An allowance was included in the economic model, for 30 days of road closures associated with monsoon rain. Therefore the user benefits were estimated for only 335 days per year. Such reductions of benefits would have been unnecessarily large for the Dolakha-Singati road where is disruption due to rain and road conditions is now minimal.

4. Economic evaluation based on traffic

The results of economic evaluation are set out in Table 29. The results show economic internal rates of return (EIRR) of 17%-29%, all above the 12% threshold rate that is often used by development banks to justify investments. The net present values (NPV) obtained using the 12% discount rate were positive. The Benefit Cost Ratios (BCR) were also above 1. The results show that implementation of the project generated sufficient economic benefits to justify the investment costs.

Table 29: Results of the economic evaluation based on traffic growth on the three roads

Indicator	Dolakha-Singati	Sindhulimadi-Bhimsthan	Ghyangdanda-21 Kilo
Net Present Value (NPV) *in NPR million*	114	32	38
Economic Internal Rate of Return (EIRR) %	19	17	29
Benefit Cost Ratio (BCR)	1.4	1.3	2.2

Sensitivity analysis

It is conventional to test for sensitivity by calculating the Economic Internal Rate of Return (EIRR) using the same overall assumptions but increasing the costs and decreasing the benefits. Table 30 shows the results such sensitivity tests in which the project costs have been increased by 20%. This also shows the results of reducing by 20% the assumed user benefits coming from reduced vehicle operating costs (VOC) and savings of the value of time (VOT). In both sensitivity scenarios, the EIRR is reduced, with the benefit assumptions being more sensitive to a 20% change. Nevertheless, even in the worst-case scenario (increasing costs by 20% and reducing benefits by 20%) all roads were found to have delivered significant economic impacts ranging from 11% to 23%.

Table 30: Results of the sensitivity tests of economic evaluation

Sensitivity	Dolakha-Singati	Sindhulimadi-Bhimsthan	Ghyangdanda-21 Kilo
	EIRR (%)	*EIRR (%)*	*EIRR (%)*
'Normal' model costs and benefits	19	17	29
Capital costs increased by 20%	16	14	24
VOC and VOT benefit decreased by 20%	15	14	27
Capital costs +20% and benefits -20%	13	11	23

4. Economic evaluation based on wider development and social benefits

There have been discussions about how to analyse social and economic impacts of roads using pro-poor perspectives and information other than traffic flows (TRL, 2004). One significant development benefit of a road can be the stimulation of agricultural production. Crop yields may increase due to the greater availability and reduced costs of inputs (fertilizers, seeds, extension advice). With greater access to markets, farmers may invest more in their production and increase their crop areas and alter their crop mixes. Table 31 shows crop areas, yields and production in pre-road ('without project' based on district agricultural records) and after-road ('with project' based on 2013 survey data) situations for the Dolakha-Singati road. The area of land selected was based on the reported cultivated land area in VDCs within the influence area of the project road, which can include fields up to four hours' walking time from the road. For the purposes of comparison, the cropped area used in the analysis was equivalent in area to a strip of continuously cultivated land 500 metres on each side of the road. For the Dolakha-Singati road, the household survey results showed that the total cultivated area dropped slightly after road construction However, overall production and total value increased, possibly due to farmers' strategies, changes in the crop mixes and/or natural seasonal variations. The economic prices of the crops were estimated from the data obtained from Department of Agriculture. The incremental production and value of the crops can be considered as an economic benefit due to the road. In the economic analyses, the economic benefits were assumed to increase by 2.5 per cent per annum.

Table 31: Local crop production before and after the Dolakha-Singati road

Crop	Economic price (NPR/t)	Pre-road ('without project')				After-road ('with project')				Increase in crops (t)	Increase in value (NPR million)
		Area (ha)	Yield (t/ha)	Total harvest (t)	Value(NPR million)	Area(ha)	Yield (t/ha)	Total harvest (t)	Value(NPR million)		
Rice	11,500	304	2	607	7.0	341	2.67	911	10.5	303	3.5
Maize	19,790	971	1.7	1646	33	814	1.8	1465	29	-181	-3.6
Wheat	17,780	942	1.2	1089	19	950	1.17	1112	19.8	23	0.4
Millet	75,000	814	1.7	1382	104	810	1.7	1375	103	-7.4	-0.6
Potato	18,760	309	10	3085	58	345	12	4140	77.7	1055	19.8
Pulses	55,000	41	0.77	32	1.8	52	0.87	45	2.5	14	0.8
Oil-seeds	90,000	34	0.85	29	3.2	42	0.9	38	3.4	8.8	0.8
Total		**3415**		**7876**	**225.3**	**3354**		**9085**	**245.9**		**21.1**

Source: District Profile of Dolakha District, Household survey and Consultants' estimates

The changes in crop production and value associated with the Sindhulimadi- Bhimsthan road are shown in Table 32. In this case the initial total cropped area was equivalent (approximately) to a strip of continuously cultivated land 600 metres on each side of the road while the 'after' road figure was increased to the equivalent of a strip 750 metres on each side.

Table 32: Local crop production before and after the Sindhulimadi- Bhimsthan road

Crop	Economic price (NPR/t)	Pre-road ('without project')				After-road ('with project')				Increase in crops (t)	Increase in value (NPR million)
		Area (ha)	Yield (t/ha)	Total harvest (t)	Value(NPR million)	Area(ha)	Yield (t/ha)	Total harvest (t)	Value(NPR million)		
Rice	11,500	1175	2.19	2457	28.3	1297	2.5	3200	36.8	743	8.5
Maize	19,790	1126	1.9	2150	42.5	1273	2.0	2542	50.3	392	7.8
Wheat	17,780	171	1.6	278	4.9	392	1.8	705	12.5	427	7.6
Potato	18,760	196	8.6	1676	31.5	343	11.5	3949	74.1	2273	42.6
Pulses	55,000	25	0.91	22	1.2	49	0.95	46	2.5	24	1.3
Oil-seeds	90,000	20	0.85	17	1.6	49	0.90	44	4.0	27	2.4
Total		**2713**		**6600**	**110**	**3403**		**10486**	**180**	**3886**	**70.3**

Source: District Profile of Sindhuli District, Household survey and Consultants' estimates

The changes in crop production and value associated with the Ghyangdanda-21 Kilo road are shown in Table 33. In this case the assumed initial cropped area was equivalent (approximately) to a strip of continuously cultivated land 1000 metres on each side of the road while the 'after' road figure was increased to the equivalent of a strip about 1100 metres on each side.

Table 33: Local crop production before and after the Ghyangdanda-21 Kilo road

Crop	Economic price (NPR/t)	Pre-road ('without project')				After-road ('with project')				Increase in crops (t)	Increase in value (NPR million)
		Area (ha)	Yield (t/ha)	Total harvest (t)	Value(NPR million)	Area(ha)	Yield (t/ha)	Total harvest (t)	Value(NPR million)		
Rice	11,500	401	2.2	891	10.3	463	2.3	1077	12.4	186	2.1
Maize	19,790	524	1.7	901	17.8	604	2.1	1289	25.5	388	7.7
Wheat	17,780	222	1.3	297	5.3	242	1.6	390	6.9	93	1.7
Potato	18,760	222	10.1	2236	41.9	242	12	2901	54.4	665	12.5
Pulses	55,000	20	0.95	19	1.1	40	1.1	46	2.5	26	1.4
Oil-seeds	90,000	17	0.85	14	1.3	40	0.9	36	3.3	22	2.0
Total		**1406**		**4358**	**77.6**	**1631**	**20**	**5739**	**105**	**1380**	**27.4**

Source: District Profile of Sindhupalchowk District, Household survey and Consultants' estimates

Increase in value of land

The review surveys revealed that there had been substantial increases in the price of land along the road corridors. Land prices had risen throughout the road corridor, but it was most obvious for land close to the road (within 25 m). Such land could be used for farming, with easy access to the road. However, it could also be used for housing or for the development of enterprises. The total land lying within 25 metres of the road (on either side) was calculated. One quarter of this was considered to be suitable for housing or enterprise development and therefore affected by the significant increase in land price. This allowed the total values of the increase in land values to be

calculated for the three roads, as shown in Table 34. The financial price and economic price of land was assumed to be similar. The rise in land values was considered as a benefit for one year, unlike the recurring benefits of increased agricultural production.

Table 34: Economic benefits from the increasing value of the land by the three roads

Indicator	Dolakha-Singati	Sindhulimadi-Bhimsthan	Ghyangdanda-21 Kilo
Total area of land 25 metres each side of road *(ha)*	175	113	37
Estimated area of land (25%) with risen value *(ha)*	44	28	9
Value of land before the road *(NPR million/ha)*	0.6	1.6	0.4
Value of land after the road *(NPR million/ha)*	2.0	3.0	1.6
Increase in value *(NPR million/ha)*	1.4	1.4	1.2
Total rise in land value *(NPR million)*	62	39	10

Social Benefits

After the construction of the roads there have been substantial improvements in social infrastructure and activities, some of which were picked up in the household surveys and focus group discussions. There have been increases in school enrolment and attendance. There have been improvements in health care systems and access to routine and emergency medical facilities. This is likely to have led to overall improvements in the health of the people living within the road corridors. There have been changes in people's awareness, greater confidence of women, and the formation of savings and loans groups and other forms of social cooperation. All these have accrued substantial social benefits.

To date, there do not appear to have been any studies in Nepal to quantify the various social benefits of road access (in addition to benefits relating to savings in transport costs). However, such studies have been carried out in India, Bhutan and Bangladesh (Pankaj, 2000). From these studies it was concluded that about 30% of the project benefits came from quantifiable social benefits after the construction of a rural road. It is unlikely that the social benefits in Nepal would be any less, and they might well be higher, due to the relative isolation of communities prior to the road construction. For the present economic analyses, it was assumed that 30% of the project benefits came from social benefits.

An additional economic evaluation of the construction of the roads was carried out to assess the economic impact of increased agricultural production, increased land values and assumed social benefits. The results for the three roads are shown in Table 35. The results show economic internal rates of return (EIRR) are all in the range 33% to 39%. They are all well above the 12% threshold rate used by many organisations to justify investments. The net present values (NPV) obtained using the 12% discount rates were all positive. The Benefit Cost Ratios (BCR) were all greater than two. These results suggest that investments generated significant economic benefits through their impact on production, land values and various social benefits.

Table 35: Results of the economic evaluation based on wider economic benefits on the three roads

Indicator	Dolakha-Singati	Sindhulimadi-Bhimsthan	Ghyangdanda-21 Kilo
Net Present Value (NPV) *in NPR million*	156	154	47
Economic Internal Rate of Return (EIRR) %	33	39	35
Benefit Cost Ratio (BCR)	2.2	2.9	2.9

Sensitivity analysis

As noted above, it is conventional to test for sensitivity by calculating the Economic Internal Rate of Return (EIRR) using the same overall assumptions but increasing the costs and decreasing the benefits. Table 36 shows the results such sensitivity tests in which the project costs have been increased by 20%. This also shows the results of reducing by 20% the assumed user benefits coming from agricultural production, land values and the various social benefits. In both sensitivity scenarios, the EIRR is reduced, with the benefit assumptions being more sensitive. Nevertheless, even in the worst-case scenario (increasing costs by 20% and reducing benefits by 20%) all roads were found to delivered good economic impacts, with EIRRs ranging from 19% to 24%.

Table 36: Results of sensitivity tests for the development and social economic evaluation

Sensitivity	Dolakha-Singati	Sindhulimadi-Bhimsthan	Ghyangdanda-21 Kilo
	EIRR (%)	*EIRR (%)*	*EIRR (%)*
'Normal' VOC/VOT model costs and benefits	19	17	29
'Development and social' model costs and benefits	33	39	35
Capital costs increased by 20%	26	31	29
Assumed benefits decreased by 20%	24	30	28
Capital costs +20% and benefits -20%	19	24	23

5. Discussion

The initial economic analysis followed closely the procedures used by development banks and donors in their evaluation of roads investments. These showed positive returns on the investments, for all roads, and the 20% sensitive test suggested the analyses were robust.

However, rather than just tick the 'good economic impact' box, the reviewers would like to suggest that all aspects of this economic evaluation depended on a wide range of variables for which there was little supporting evidence. This problem was not specific to these analyses, but appears likely to be the case for all evaluations of low-volume roads. The sensitivity analysis was plus or minus 20%, but many of the assumptions made could have easily changed by 100% or more.

One basic issue relates to the capital cost of the projects. On some roads (including the Dolakha-Singati road), some early costs were paid through food for work. Assumptions had to be made on how this was costed and the decisions made could have made a significant difference to the capital costs. This road has also been upgraded for the hydro-electric work, and while the costs of this work were not included, the benefits of the investments are likely to be affecting transport operations. The Ghyangdanda-21 Kilo has a high rate of return, and this may be because the costs for that 7.4 km section were quite modest. However, this road was extended 7 km to Lishanku, it was then upgraded, and it is now linked to a 36 km road to the Arniko highway. Some of the traffic benefits are likely to come from these other investments.

In all the analyses, it was assumed that the starting point was a simple earth trail, with goods carried by porters and mules. Certainly many DRSP roads started off this way, but for others there were earth tracks that could be used for some of the year. For the Sindhulimadi-Bhimsthan road there were motorable river-beds in the dry season for part of the road. Without good baseline data, it is impossible to have realistic assumptions about the 'before project' scenarios, including the actual annual daily movements and costs of porters, mules and (in some cases) tractors.

Maintenance costs have been included in the economic analyses with the assumption that this would be enough to keep the roughness of the road pavement constant over time (twenty years) at the estimated (growing) traffic loadings. Therefore road deterioration is not considered as part of the economic evaluation. This is clearly a highly questionable assumption.

The RED analysis model assumes constant maintenance costs that would be needed to keep the roads in constant condition (constant IRI) during the twenty years of the economic analysis projections. The figures used are unlikely to be realistic figures for the average maintenance cost of an earth road for 20 years in Nepal. Also, the analysis assumed there were maintenance costs for the trail before the investment, and that these would continue as part of the 'without project' growth scenario. The figures used were quite similar to the road maintenance costs after the road construction, and bear very little relationship to the reality of the situation.

The vehicle operating costs (VOCs) are fundamental to the users' benefits (and therefore the Economic Internal Rate of Return or EIRR). These are all based on generic assumptions in the RED model, albeit one calibrated for Nepal. It is difficult to obtain accurate VOCs in any situation. It is most difficult on rural roads where many vehicles are owned by the informal sector, and where their annual travel distances and loading levels varied hugely.

The RED model calculates the economic benefits based on improvements in the roughness of the road. In the economic analyses undertaken here, it was assumed that the average roughness of the roads was IRI 8 m/km, and that this would be maintained for the twenty notional years of the analysis. For some of the roads, a higher (rougher) assumption could well be made, which would immediately have influenced the user benefits and the EIRR.

Almost all the assumptions presented could be changed. For example, the estimates of portage and mule costs per kilogramme-kilometre prior to the road vary by a factor of three. The time savings of people using the road tend to be exaggerated, as they generally exclude the time required to wait for public transport. People travelling by public transport often have to wait long times at the roadside or transport terminal before their transport begins.

The RED model calibrated for Nepal that was used did not include the value of time saved by women and men who were not in paid employment: this appears to be an unreasonable assumption, particularly for an analysis of the benefits of a gender-sensitive, pro-poor development project.

The attempt to analyse the road benefits not directly attributable to transport estimates also suffered from lack of good baseline data. Assumptions had to be made concerning agricultural production, land values and various social factors. While there were some reasonable data relating agricultural production and land values, the related benefits could be altered hugely by making different assumptions about the total area of land to which these should apply. Without suitable data for the social benefits, there were simply assumed to be 30%, an apparently reasonable but questionable assumption. However, by using percentages, rather than estimated figures, the total values of the social benefits were directly linked to the assumptions made on the areas of land to which assumed higher land values and agricultural production applied.

5. Conclusion

The economic analyses were difficult due to the lack of adequate baseline data. However, using the RED model, it was possible to demonstrate substantial economic impacts that could be linked to the opportunities created by the roads. In conventional terms, the investments were well-justified by the benefits. The economic analysis depended on a large number of assumptions that could be challenged. Changing these could produce more positive (or less positive) results which could also be defended. Nevertheless, if these analyses are considered in conjunction with the many economic and social benefits of the roads captured by the surveys, they do help to complete the picture of very positive economic and social benefits from the investments in labour-based road construction in Nepal.

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12 Annex 4: Some unforeseen consequences of DRSP road building

Road building support through DRSP has contributed to a number of results that were either not foreseen or were considered outside the scope of the programme to influence. Some of these consequences were as follows.

Deforestation

Deforestation can be a key issue as rural road construction provides motorable access to previously inaccessible areas. Logging traders have easier access to forest resources. There may be collusion with forest user committees and/or District Forestry Offices to allow the extraction of unsustainable quantities of logs from the road corridors. DRSP-supported roads have certainly been used to transport forestry products. This conservation issue is a matter of national and local governance that is beyond the control of most DRSP stakeholders.

Figure 26: Road access can assist legal and illegal forestry extraction

Pollution

Pollution has been a significant problem mostly associated with earthen surface roads. While the roadside residents are initially very happy with the flow of motorised traffic, this euphoria is often followed by disappointment brought about by the plume of dust that every passing vehicle brings. The dust is noted to be damaging the health of the roadside residents and pedestrians as well as the animals and local plantations. In addition, the local streams are also affected adversely by greater dust or sediment content in the vicinity or through silt laden run-off coming from the road surface. This often leads to popular demand to gravel or black top the surface soon after traffic starts moving on a road section.

HIV/Aids

HIV/Aids is often seen to increase with traffic growth into otherwise isolated areas. The problem is often perceived to be associated with those returning from employment in India and/or with the staff of the transportation services. A DRSP review noted that there appeared to be reduced instances of HIV/AIDs in some locations due to the reduced migration of men seeking jobs outside the villages (Sharma and Magar, 2005). In the DRSP districts studied, migration to India was not very common, but there were increasing movements of transport operators along the roads. While there are various programmes in the districts working to minimise the threat of HIV/Aids, the actual levels and health impacts of HIV/Aids are not well known. The improved access of the roads is likely to have improved people's access to retroviral drugs and to HIV/Aids-related information.

Cultural dilution

Some 'cultural dilution' appears to be gradually taking place in the rural areas. This is associated with young people moving out from the districts, and new immigrants coming in to the recently opened accessible areas. Such people tend to concentrate on their own livelihoods and the education of their children, which has led to less participation in the cultural events. Ethnic mixing or creation of heterogeneous societies appears to be a consequence of the new rural access made possible by DRSP roads.

Shifting in food habits

Changing consumption patterns are one of the more visible social changes that have been taking place in areas recently opened up by road construction. Roadside retail stores, tea shops and local bars have increase in number and the diversity of products they sell, including fast food, packaged

foods and alcoholic beverages. As a result, the local population have gradually shifted to consuming more accessible foods that require little preparation, such as noodles, chow mein, processed rice, soft drinks, beer and bottled liquor. A study which included surveys on two DRSP roads in Dolakha District (Mude–Melung and Bhirkot–Chhaunde) noted that 'in road environs, people also change their consumption and recreation patterns towards imported products such as alcohol, noodles, games and sometimes even narcotics'(UNDP, 2011). During the field visit to the Dolakha–Singati road by the review team, the shopkeepers selling packed items and bottled beverages said that better road access also meant that people were looking more for fast food and imported food items. The shopkeepers also talked of increasing consumption of tobacco-based products and the growing popularity of ice cream and chocolates among children.

Figure 27: DRSP roads have made it easier for shops to stock a wider range of foodstuffs

13 Annex 5: Summary of DRSP activities and achievements in its four phases

Phase 1 : April 1999- March 2002

Budget : *NRs. 95,240,000 + 100,000 CHF (GoN/DDCs/VDCs : NRs. 28,840,000, SDC : NRs. 66,400,000 + 100,000 CHF)*

Task Manager : Bhim Prasad Upadhyaya *Chief Technical Advisor: Chris Roche*

No. of total employees under PSU : 31 *No. of employees under district units : 18*

Programme Support Unit (PSU) PSU is located at the centre, in Kathmandu, to support, coordinate and implement activities with national level partners, SDC and DDCs.	**Activities:** DTMP methodology and preparation works for six Districts YPO preparation Rural road construction, rehabilitation and maintenance works Community development, training and institutional development Partnership with

Programme districts	**Objectives**	**Activities**	**Achievements** RCIW	**Lessons**	**Information outputs**
Kavrepalanchowk	To contribute to participatory planning, formulation and implementation of district roads management To contribute to the development of appropriate standards, work methods and management systems for local resource based low cost road work in an affordable manner To strengthen the district level technical and managerial capability /capacity to plan, manage, implement and maintain road work	Timalbesi-Thuloparcel (Track opening=7.4 km, Widening= 7.4 km) Kabhrehanjyang-Dapcha (Rehab=12.3 km) Nala-Kashibhanjyang (Rehab=5.4 km) Tamaghat-Bohoredovan (Rehab=9.6 km) Routine and periodic maintenance is introduced in 27 km of roads	**22.3 km** of road is constructed **139.1 km** of road is rehabilitated **94.7 km** of road is regularly maintained; DRSP sets a requirement of **30%** women's participation in all activities, and **40%** participation in committees; **Adult literacy** classes have been very successful in enabling the deprived communities to read and write; Another success is the establishment of an **emergency fund**; **Appropriate technology** introduced and is being embraced by the local people. An example of this is	District organisations including the DDC, LRCCs, LRUCs, etc. are the central players of the programme and it is realized that their empowerment is must for the effective achievement of programme objectives. DRSP has assisted the DDC to bring the road to a maintainable condition by rehabilitating and maintenance. As a result of this, the commodity prices at the most distant point is become comparable to the prices found in the district centre. This is a good example of the economic impact that can be made with road rehab/maintenance by	Programme document for phase II Credit proposal for phase II YPO for financial year 2003/2003 Mid-term review of build-up phase (DRSP/SKAT) Beyond Roads: Social interventions for community development; Document Tools and equipment in labour based road construction Draft; Best practice for Design and construction approach Draft; Social
Sindhupalchowk		Ghyangdanda-Lisanhku (Track opening =17.2 km, Full widening = 7.5 km) Bhotechaur-Kauledobhan (Rehab = 11 km) Balephi-Jalbire (Rehab= 10 km) Ekkais kilo- Ghyangdanda (Rehab=7.4 km) Routine and periodic maintenance is introduced in 28 km length of road			
		Virkot-Chhaude (Track opening = 18.9 km			

Dolakha	To promote awareness, policy development and dissemination of results (achievements and lessons learned) To contribute to the coordination of all donors, government agencies and national stakeholders involved in the district transport sub sector for policy formulation and implementation .	Full widening = 2 km) Daregaunda-Melung (Track opening = 6.8 km) Dolakha-Singati (Rehab = 35 km)	simple machinery for breaking and moving large rocks such as feather and wedges, mechanical jacks, etc; **Bio-engineering** initiated The importance of **maintenance** has been embraced by the district, with some VDCs contributing to its cost and sharing maintenance costs where a road crosses two or more VDCs. Some have even started to collect tax to support maintenance. The principle of **equal wages for equal work** is introduced by DRSP in the road corridors where the programme is working. This principle has now been transferred from DRSP into the community, as workers in other sectors such as agriculture have seen the effect of this and have replicated it in their own areas.	bringing down vehicle operating costs and hence encouraging access to an area. The VDCs have witnessed the establishment of a savings and credit group in this district. The local people have set up the fund and have been managing it properly. The VDC have realised the importance of these groups and have donated extra money to top up the fund. This is a good example of how a well implemented programme can have a positive effect upon the local community.	Mobilization manual DTMP methodology and DTMPs for 6 District Administration rules and regulation manual DRSP overview report (Phase I) DRSP overview brochure 2003 DRSP Build-up phase video, 2002 DRSP Self-Evaluation cum Appraisal and Outlook 2001 District Road Construction Works - An assessment of mechanised and labour based construction approaches 2001
Ramechhap		Manthali –Khurkot (Track opening = 15.4 km Full widening = 3.4 km)			
Sindhuli		Kusumtar Bastipur (Track opening = 9.2 km, Final widening= 7.3 km) Bhiman-Harsahi-Tandi (Rehab= 10.2 km) Sindhulimadi-Bhimsthan (Rehab = 4.2 km) Sindhulimadi – Kusumtar (Rehab = 8.5 km) Routine and periodic maintenance is introduced in 30 km road			
Okhaldhunga		Okhaldhunga-Rampur (Track opening = 16.5 km, Final widening = 3 km) Okhaldhunga-Rumjatar (Track opening = 1.4 km, Final widening = 1.6 km)			

Phase 2 : April 2002- June 2006

Budget: *NRs.491,499,328 (GoN/DDCs/VDCs : NRs.111,610,000, SDC : NRs.379,889,328)*
RCIW Rice : 8504 Mt RCIW Cash :66,655,267
Task Manager : Pawan Kumar Shrestha Chief Technical Advisor :Josef Zimmermann
No. of total employees under PSU : 54 No. of employees under district units : 18

PSU	**Activities:** YPO preparation Rural road construction, rehabilitation and maintenance works For designing bridges for different road corridors, PSU has established a bridge unit within its office, which has established a standard local design for rural roads constructed under DRSP that can be customised to suit local conditions on site. Partnership with RCIW / Food for work DRILP on planning phase On road social mobilization to all 6 district Beyond road social intervention in all 6 district

Programme districts	**Objectives**	**Activities**	**Achievements**	**Lessons**	**Information outputs**
Kavrepalanchowk	To enhance the technical capacity of participating DDCs to maintain, rehabilitate and construct 300 km of rural district roads under the programme, with an additional 100 km constructed in association with other programmes and donors To maximise long-term benefits to the poor and deprived communities along the road corridors through on-road and Beyond-road social interventions To establish a process for information sharing and	Timalbesi-Thuloparsel (Widening= 7.4 km) Kabhrehanjyang-Dapcha (Rehab=12.3 km) Nala-Kashibhanjyang (Rehab=5.4 km) Tamaghat-Bohoredovan (Rehab=9.6 km) Banepa-Panchkhal (Rehab=13km) Panauti-Malpi-Bhumidanda (Rehab= 7 km) Mahendrajyoti-Panauti (Rehab=7.2 km) Bhaknudebesi-Mechhe (Rehab=7 km) Milche-Bankhu (Const=54 km) Katunju-Bankhu (Const=28km) Bohoredovan-Timalbesi (Const=8 km) 1 bridge construction complete	Almost **100%** of GoN budget for rural roads was channelized through the districts/DRF DoLIDAR has revised its norms, following feedback; Tendering by local contractors has improved; LRCC as DTOs have had some operational problems; Some 96 local Contractors have worked **316 km** of roads have been made motorable; length persons have been employed by the districts on the most important rural roads; an additional **125 km** of road have been made motorable through partnerships with RCIW; more than **1.2 million person days** of employment was generated The number of groups working	The self-evaluation and the independent social impact review reflected that, in the context of the present conflict, transparency and accountability are important to make space for development. Issues raised by communities in public hearings and other forums need to be adequately followed up The Green Road approach, which requires closing roads during the monsoon and controlling the vehicle loads on such roads, is not practical. Roads need to be constructed to higher standards (all weather). PSU	The Self Evaluation and Independent Social Impact Review Report Design and Implementation guideline (2006) Social mobilization and social intervention in the context of rural road (2006) End of phase report Award: The Hare and the Tortoise: A DRSP story on sustainability that won 1st price in a

	policy dialogue within the district road sector, among DRSP's development partners (government, nongovernment and other agencies) To enhance DoLIDAR's capacity to develop policies for the district road sector, coordinate, support districts, and develop appropriate standards, work methods and management systems for local resource based low cost road works To contribute to the coordination of all donors, government agencies and national stakeholders involved in the district transport sub-sector for policy formulation and implementation .		for 90 days or more annually been on an average of **80** per year; **12** savings and credit groups have converted to cooperatives; over **200** non-income generating groups are formed; local NGOs have been trained for social development; **6** CLCs have been built and are in operation DRSP has been the acting **secretariat for RRF**, RRF had become well established; LID policy has been approved, DoLIDAR capacity to develop policies has increased The **LID policy** was developed by DoLIDAR; the DoLIDAR database was developed and piloted in **10** districts, plans are under way to extend it to all 75 districts	realized to experiment with different surface types for rural roads, with respect to quality, durability and cost. The use of bio-engineering on DRSP roads has been very efficient and cost effective. With the partnership with RCIW, the road works were completed in a shorter time and the project activities had a better impact because of the joint efforts and resources of the two partners DRSP conducted action research on rural road pavement options, on the Mahendrajyoti-Panauti road in Kavre. Ten different road surfacing are being tested, including cobblestones, reinforced gravel and various types of concreting. This research is aimed at finding a cost effective and sustainable surface that can be used to keep rural roads motorable all year round.	global SDC competition.
			Public private partnerships for road maintenance were initiated in cooperation with the bus operators' association		
Sindhupalchowk		Bhotechaur-Kauledobhan (Rehab = 11 km) Balephi-Jalbire (Rehab= 10 km) Ekkais kilo- Ghyangdanda (Rehab=7.4 km) Attarpur–Wafal (Final widening = 13 km) Chautara–Melamchi (Rehab= 31.5 km) Melamchi-Bhotang (Rehab= 8.5 km) Barabise-Budhepa Road(Rehab= 8.5 km) Tilpane-Bhotang Road (Full widening = 11 km) Jalbire-Kattike Road (Full widening = 14 km)	All bridges constructed in Sindhupalchowk used local contractors. For unskilled work, local labour was a precondition for the contractors to ensure that maximum benefit went to the local communities. District already have a good networks of rural roads and DRSP's intervention focused on rehabilitation activities resulting most of the rural roads are vehicle plying most of the time.		

		3 bridges construction complete; 1 construction on- going			
Dolakha		Virkot-Chhaude (Full widening = 8.5 km) Mude-Melung (Const/Rehab/Upgrade = 22 km) Dolakha-Singati (Rehab/upgrading = 35 km) Siddakothan-Jugu-Singati (Final widening=13km)			
Ramechhap		Manthali –Khurkot (Full widening = 13.8 km) Jiri Those Bamti (Full widening = 46 km) Fulasi Doramba (Full widening = 36 km) Tilpung Dhobi (Rehab= 8.1 km)	Bio engineering is introduced and is widely internalized by local community and district authorities.		
Sindhuli		Kusumtar Bastipur (Rehab= 7.5 km) Bhiman-Harsahi-Tandi (Rehab/maint = 38 km) Sindjulimadi-Bhimsthan (Rehab = 18 km) Sindhulimadi – Kusumtar (Rehab = 8.5 km) Sindhulimadi-Kapilakot (Const=26.5 km)	Based on the amount of traffic on a and the demand for better standard of road, DRSP decided to upgrade the standards of two roads in the district (a total of 44 km), upgrading them from earthen to all weather gravel roads.		
Okhaldhunga		Okhaldhunga-Rampur (Final widening = 7 km) Okhaldhunga-Rumjatar (Final widening = 11 km) Technical support to Ghurmi Bridge (200 m)	On-the-job training was provided to the DDC technical team, users' committees, contractors and local stakeholders on construction management, supervision and monitoring, work measurement and payment.		

Phase 3 : July 2006- July 2010

Budget: *NRs. 695,720,000; GoN/DDCs/VDCs :NRs. 215,130,000; SDC :NRs. 480,590,000*
Task Manager: Ashok K. Jha; Krishna Kumar Mishara; Shyam Sundar Mishra; Chief Technical Advisor: Josef Zimmermann
No. of total employees under PSU : 88 (DRSP,RRRSDP, SWAp) ; 51 (DRILP); No. of employees under district units : 11

PSU	**Activities:** YPO preparation Rural road construction, rehabilitation and maintenance works; Outcome monitoring system DRILP in operation; RRRSDP in operation; RCIW completed; RTI SWAp in operation On road social mobilization to all 6 district; Beyond road social intervention in all 6 district Preparatory works for the phasing out from 3 districts and phasing in for Khotang

Location	**Objectives**	**Activities**	**Achievements**	**Lessons**	**Information outputs**
Kavrepalanchowk	Improved livelihoods of the disadvantaged and poor within the rural population The disadvantaged and poor people of the programme districts are empowered to equitably benefit from improved access to resources and opportunities.	Kabhrehanjyang-Dapcha (Rehab/maint=15.6 km) Nala-Kashibhanjyang (Rehab/maint =6 km) Tamaghat-Bohoredovan (Rehab/maint=20.6 km) Bhaknudebesi-Mechhe (Rehab=29 km)	**45.2 km** of new motorable roads were constructed and **337 km** rehabilitated in remote areas; average cost of transport within NPR **2.5/km**.; 500 **km** of remote all-weather roads were brought to motorable condition; **114.4 km** of roads were maintained periodically, **110 km** of additional roads constructed thru RCIW; **50 km** of new road constructed and **100 km** of road rehabilitated through DRILP. **131** savings and credit groups were formed with savings of at least NPR 25,000 in a group and 17% are converted into cooperatives; **1,046,000 person-days** (**37%** women) employment was generated; out of which **73%** were from DAG. In addition **3 million** person days of employment was created through Decentralised Rural Infrastructure and Livelihoods project; DDCs regularly plan and prepare the budget for road sector. However, maintenance of the existing roads remains still very weak. Though, some districts have started preparing Annual Road	The external review points out the need of securing adequate and appropriate funding to ensure the maintenance and sustainability of the investments. DRSP approach of working through the community was effective. Performance based allocation lead to overall improvement of performance of the districts. The employment generated during the road construction alone is not enough for sustained livelihood of DAGs. Therefore the proposed phase will not only concentrate in enhancing the life skills of DAGs in the construction n field but also try to link them up to other SDC projects.	Outcome monitoring reports (Annual) Draft Workers welfare strategy New social guidelines End of phase report Video : Manthali Khurkot Road
Sindhupalchowk		Bhotechaur-Kauledobhan (Rehab/maint = 19km) Chautara – Sipaghat (Rehab/maint = 28 km) Melamchi Tipeni (Rehab/maint= 20.7 km) Routine and periodic maintenance in additional 65 km length			
Dolakha		Virkot-Chhaude (Cont/Rehab = 18.9 km) Mude-Melung (Const/Rehab/Upgrade = 35 km) Dolakha-Singati			

		(Rehab/maint = 35 km) Sunkhani-Sangba (Regab/maint=9 km)	Maintenance Plans; Proportional representation: Each of the LRCC/LRUC has at least two female members; overall **45%** to **55%** of the members are from disadvantaged groups ; **72%** of all the RCG-members are from disadvantaged groups Public hearings and public audits are being held in each road corridor every year; the group accidental insurance to cover all workers is in place; **100 %** of workers received full payment within **30** days of measurement. The cluster approach has improved synergy with other SDC projects. Rural Roads Forum **(RRF)** continues to actively support policy development and information sharing among programmes in this sector on monthly basis, and is now run by an independent secretariat.		
Ramechhap		Manthali –Khurkot (Construction/maint = 14.8 km) Khimti Namdi Betali (Const/Rehab/maint = 25 km) Tilpung Dhobi (Rehab/maint= 20 km)			
Sindhuli		Kusumtar Bastipur (Maint= 9.2 km) Bhiman-Harsahi-Tandi (Rehab/maint = 38 km) Sindjulimadi-Bhimsthan (Rehab/maint = 22.5 km) Sindhulimadi-Kapilakot (Const/rehab/maint=28.5 km)			
Okhaldhunga		Okhaldhunga-Rampur (Final widening/Rehab = 16.5 km) Okhaldhunga-Rumjatar (Final widening/Rehab = 11.8 km) Barbot Koshbhanyang (Track opening = 27 km)			

Phase 4: July 2010- July 2014 *(summary up to February 2013)*

Budget: *NRs. 1,387,634,680 + 3,500,000 additional; GoN/DDCs/VDCs : NRs. 459,348,000; SDC : NRs. 928,286,680 + 3,500,000 CHF additional*
Task Manager: Sushil Chandra Tiwari, Jeevan Guragain; Chief Technical Advisor: Josef Zimmermann
No.of total employees under PSU : 149 (DRSP, RRRSDP, SWAp) ; 85 (DRILP); No.of employees under district units : 11

PSU		Activities: YPO preparation; Rural road construction, rehabilitation and maintenance works DRILP in operation; RTI SWAp maintenance is in operation in 4 DRSP districts Outcome monitoring continues; On road social mobilization to all 6 district; Beyond road social intervention in all 6 district			
Programme districts	**Objectives**	**Activities**	**Achievements**	**Lessons**	**Information outputs**
Ramechhap	The remote rural population benefit form motorable access to resources and opportunities. Institutional structure and capacities at all levels ensure good governance and acceptable level of workers welfare.	Khimti Namdi Betali (Const/Rehab/maint = 25 km) Survey and design of comprehensive safe drinking water supply project for 16 VDCs of Ramechhap	**71.8 km** of road have been constructed **29.5 km** of roads have been rehabilitated **260 km** of roads have been regularly maintained **1,386,458 Persondays** employment generated **885,329 Persondays** employment provided to DAGs **741** number of DAGs are trained on different skill trainings related to road construction **65%** members are from discriminated groups in LRUC/LRCC **80%** of the total financial volume of works are carried out by LRUCs	The quality and effectiveness produced from contract work is not good compared to UCs work due to presence of conflict amongst contractors. Cartel issue continues. Programme will continue as much as possible to **work through UC based contracts**. DRSP set up roadside camps and mobilised workforce from adjoining VDCs as ZOI workers alone were not able to complete works. No **insurance** representative in the district was available to check and process claims. Claims delayed and often rejected for no logical reason. DRSP PSU negotiated insurance contract with companies so company places representative in district if incidents; claims are directly paid to workers. **E-bidding** for contract works and general procurement was introduced. Results very encouraging. Districts can manage the procedures well. Will be continued. **Pavement strengthening** thorough cobble is encouraging; DRSP to make extra effort to replicate its experience in cobble pavement application within DoLIDAR and DDCs nationwide.	Planned maintenance introduced; ARMPs for 4 districts are prepared Bio engineering with slope stabilization in rural roads of Nepal (2011) Workers welfare guideline 2013 draft Appropriate technology study 2013 draft Workshop training for road pavement structure/cobble pavement to DTOs IRF Award: best rural infrastructure programme, second position
Sindhuli		Pipalmadi Karmiya (Const=18 km) Hariwon Kyaneswor (Rehab = 13 km)			
Okhaldhunga		Okhaldhunga-Rampur (Final widening/Rehab = 16.5 km) Barbot Koshbhanyang (Track opening = 27 km)			
Khotang		Maure-Phoksingtar (Const/Rehab =48 km)			

14 Annex 6: Summary of DRSP publications and documents

Title	Author	Date	No Pages
Phase I: April 1999 – March 2002			
District Transport Master Plan: Methodology Guideline to prepare 5 year plan of district road network and outline of long term plan (District Transport Master Plan and District Transport Perspective Plan). Developed 10 criteria for preparation, approval procedure and the implementation of DTMP.	DRSP/SKAT	July 2000	43
District Transport Master Plans/ District Transport Perspective Plans: DTMP for 2002-2006 including DTPP of 6 partner districts (Kavrepalanchok, Sindhupalchowk, Okhaldhunga, Ramechhap, Dolakha & Sindhuli).	DRSP	July 2001 to January 2002	56 + annex (110)
GIS Mapping in DRSP: GIS maps for DTMP and intra-district synchronization of 6 DRSP districts. Includes the details of Transport Infrastructure, District Road inventory, Proposed DTMP/DTPP Roads, Main Service Centers, Settlements, Zone of influence, Trade Flow Pattern, Land use and Agriculture Pocket Areas.	DRSP M Griesbaum K Nepal	July 2002	As above
Beyond Roads: Detailed outline of DRSP's Social Interventions approach for community developmentthrough non-income generating and income generating activities.	DRSP S Lafranchhi	February 2001	44
Social Mobilization Manual: Detailed methodology to involve the local community in DRSP works. Procedures for community mobilization, formation of local committees and workforce mobilization. Also outlines process for inclusion of wider community (children, non-participating households) in DRSP's community development activities.	DRSP		
Training Workshop for District Engineers and Overseers: Initial training manual for DDC engineers and overseers on DRSP approach.	DRSP	March 2000	60 + annex
District Road Construction Works – An assessment of mechanized and labour based rural road construction approaches.	DRSP	March 2001	
Draft; Best practice for Design and construction approach Technical Manual based on DoLIDAR approach Manual.	DRSP	February 2001	
Tools and equipment in labor based road construction: Description of appropriate tools for labor based road construction including their maintenance.	DRSP	April 2001	10
DRSP Self Evaluation cum Appraisal and Outlook: Mid-term internal evaluation and external appraisal provides	J Christen, SKAT & DRSP	May 2001	29+ annex
DRSP Overview Report (Phase I)	DRSP	July 2002	
Administration: - Administration rules and regulation manual - Finance/Accounts Guidelines - YPOs for financial year 1999 to 2002 - DRSP overview brochure 2003 - DRSP Build-up phase video, 2002 - DRSP Self-Evaluation cum Appraisal and Outlook 2002 - Project Document Phase II - Design and tender documents for each road under construction	DRSP Iteco-CH DRSP DRSP G Chitrakar DRSP DRSP/SKAT G Kohlheier DRSP/SKAT DRSP		

Phase II: April 2002 – July 2006

Child Journalism: Workshops and journals: Selected children from each of the road corridor compiled journals and illustrated handouts about programme activities from their perspective.	Children in each DRSP road corridor.	2003 to 2006	1 per road/ month
The Hare and the Tortoise: DRSP story on sustainability that won 1st prize in an SDC competition.	DRSP M Kaskin	2003/04	12
DRSP and the Conflict in Nepal: Summary of a workshop on conflict and conflict sensitive programme management held with SDC Coordination Office	DRSP/SDC coordination office	July 2004	12
Change, Cooperation, Conflict: DRSP Self Evaluation and adaptation to a changed project environment.	DRSP	Nov 2004	18 + annex
Staff Diversity in DRSP: Initial paper to initiate staff diversity measures within DRSP operation	SDC/DRSP	March 2005	12
Design and implementation guidelines, Social mobilization (Vol.I) and intervention (Vol.II) Technical and social guidelines for labour-based road construction works based on DoLIDAR approach manual	DRSP	2005/06	32 22 16
Bio Engineering Manual: Approaches and training manual developed for Bio-Engineering works in DRSP.	DRSP	2004	6
End of Phase Report: Overview brochure on approaches and achievements of DRSP Phase II	DRSP	2006	25
Administration: - Revised Operation Manual with staff diversity measures, conflict sensitive programme management and Basic Operation Guidelines. - YPOs for financial year 2002 to 2006 - DRSP overview brochure 2002-06 - Design and tender documents for each road under construction - Technical Papers for Rural Road Forum	 DRSP/SDC DRSP DRSP DRSP DRSP R Workman		

Phase III July 2006 – July 2010

Quarterly and Annual Outcome monitoring reports	DRSP		
Project Procedure Manual DRILP Manual detailing procedures for DRILP activities (Planning, Construction, Resettlement, Environment, Training & Monitoring). It incorporates the experiences gained from DRSP and has been widely adapted in ADB financed RRRSDP.	W Zimmermann R Schmid A Beusch H Byrne	2005/06	
Community Development Strategy: Simplified social interventions with focus on construction related trainings and certification of trainees through CTEVT	DRSP K Gimire	2006	6
District Transport Master Plans/ District Transport Perspective Plans: Updated DTMPs and DTPPs for 2007-2011 of Kavrepalanchok, Sindhupalchowk, Okhaldhunga, Ramechhap, Dolakha & Sindhuli districts.	DDCs/DRSP	2008	
DRSP Case Study on outcome monitoring: Outcome monitoring was presented in a NADEL Training Seminar. SDC regional Coordination in Bangladesh	Nadel-SDC	2009	Power Point
External Review of DRSP: Analyses the socio-economic impact and contribution to accessibility.	R Stickland	July 2009	38
DRSP Case Study on mobility in mountains: DRSP Project Nepal and Climate Change (Nepal Gvt Initiative for a 'Global Mountain Alliance') with a particular scope for the Himalaya-Hindukush region and South Asia.	UN Sustainable Development.	May 2010	
Social Impact of Manthali Khurkot Road: Assessment of impact of road construction on community	L Thappa and Team	2010	12 + annex
Outcome Monitoring Guidelines: Revised Outcome Monitoring framework	DRSP/SDC	August 2010	15

Administration: - Updated Operation Manual - End of phase report 2006-10 - Video : Manthali Khurkot Road - Standard Design documents for roads - Standard Bid Documents for Road works - Labour Attendance & Payment Cards - Technical Papers for Rural Road Forum	 DRSP R Workman		

Phase IV: July 2010 – July 2014 *(summary up to February 2013)*

IRF Award: Best Rural Infrastructure Programme: Second position			
Technical Audit Reports: Technical audit of compliance/noncompliance with design and other parameters by external auditors	National Vigilance Centre	March 2012	
Field Assessment of DRSP Roads in Khotang and Okhadhunga: External assessment of technical approach, standard, workmanship and modality of DRSP in road construction	K Pande	June 2012	
Achieving impact through leveraging: Poster on how DRSP managed to attract other programmes and generate funds from other donor partners.	DRSP-SDC	Oct 2010	Poster
Annual Road Maintenance Plans: Planned maintenance of district roads introduced; ARMPs for 4 districts are prepared	DRSP		
Bio engineering with slope stabilization in rural roads of Nepal (2011) An account of 100 sites along roads before and after intervention of bio engineering works.	DRSP S Rai		
Revised and Updated District Transport Master Plan for 4 districts: Updated DTMP of Khotang, Okhaldhunga, Ramechhap and Sindhuli following updated DoLIDAR guidelines.	DRSP		In final stage
Workers welfare guideline 2013 draft Guidelines encompassing present measures with suggestions for replicability.	DRSP		
Insurance scheme for Road Building Groups: Revised insurance scheme for road construction groups based on experience.	DRSP	May 2012	10
Training Manuals for Workshop on road pavement structure/cobble pavement to DTOs: Introducing cobble stone pavements in DDC DoLIDAR countrywide.	DSRP S Shreatha		
Appropriate technology study 2013 draft Study on appropriate technology application for district roads in hills and mountains of Nepal.	A Beusch S Shrestha Y Lama		
Administration: - Updated Operation Manual - Quarterly Outcome Monitoring Reports - Design and tender documents for each road under construction	 DRSP DRSP		

15 Annex 7: List of some of the stakeholders contacted during the review

Name	Organisation/Position
Mr Jean-François Cuénod	Head of Cooperation, SDC Nepal
Mr Aman Jonchhe	Team Leader, SDC, Nepal
Ms Jun Hada	SDC, Nepal
Mr Josef Zimmerman	DRSP/Team Leader
Mr Bishnu Shah	DRSP
Dr Suman Baidya	DFID-Nepal/Infrastructure Speacialist
Mr Govinda Gewali	ADB/Senior Project Officer
Mr Bhupendra Basnet	DoLIDAR/Director General
Mr Bhim Upadhyaya	DoLIDAR/Deputy Director General
Mr Deepak Shrestha	World Bank/Senior Transport Specialist
Mr Rod Stickland	Transport Specialist
Mr Jeevan Guragain	DoLIDAR/Task Manager for DRSP
Mr Deepak M Shrestha	World Bank/ Senior Transport Specialist
Mr Bharat Patel	RAP/Director
Mr Arjun Poudel	RAP/Deputy Director
Mr Pitambar Chhetri	Economist
Mr Raju Shrestha	DRSP-Sindhupalchowk/District Team Leader
Mr Dev Dahal	DRSP-Sindhupalchowk/Engineer
Ms Anita Kumbakar	DRSP-Sindhupalchowk/Social Mobiliser Specialist
Mr Suman Shrestha	DRSP-Sindhupalchowk/Assitant Sub-Engineer
Mr Laxman Shrestha	RTI SWAp/Planning
Mr Krishna Sapkota	Local Politician
Mr Ram K Tamang	Belaphi Users Committee/Member
Ms Gauri Thami	Singati Users Committee
Mr Chitra Thapa	DRSP-Ramechhap/District Team Leader
Ms Shardha Khatiwada	DRSP-Ramechhap/Social Mobiliser
Mr Min Lama	DRSP-Ramechhap/Social Mobiliser
Mr Gautam K Shrestha	Singati-Thosay Local Road Users Committee/ Chairperson
Mr Lal B Tamang	Singati-Thosay Local Roads Users Committee/ Secreatary
Mr Dabal B Shrestha	Singati-Thosay Local Roads Users Committee/ Member
Mr Kumar Lama	Singati-Thosay Local Roads Users Committee/ Member
Ms Laxmi Karki	Singati-Thosay Local Roads Users Committee/ Member
Ms Usha Sunuwar	Singati-Thosay Local Roads Users Committee/ Member
Ms Regina Nakarmi	Singati-Thosay Local Roads Users Committee/ Member
Ms Sukdoma Sherpa	Singati-Thosay Labour Group/Labourer
Ms chandra Sunuwar	Singati-Thosay Labour Group/Labourer
Mr Chhatra B Thapa	Principle/ Rasunla High School
Mr Narayan Prasad Mainali	DDC-Ramechhap/LDO
Mr Tara Nedi Subedi	Manthali-Khurkot LRCC/Chairperson
Mr Yam B. Budathoki	Manthali-Khurkot Users Committee/Chairperson
Ms Menuka Bhjel	Khimit Users Labour Group/Labourer
Ms Januka Bhujel	Khimit Users Labour Group/Labourer
Ms Meena Kumari Khadka	Khimit Users Labour Group/Labourer
Ms Sanu Devi Khadkha	Khimit Users Labour Group/Labourer
Ms Lila maya Bhujel	Khimit Users Labour Group/Labourer
Ms Sunita Bhujel	Khimit Users Labour Group/Labourer
Ms Laxmi Bhujel	Khimit Users Labour Group/Labourer
Ms Seeta Bhujel	Khimit Users Labour Group/Labourer
Mr Hira Jirel	DRSP-Ramechhap/Engineer
Mr Ram Poudel	DRSP-Ramechhap/Sub Overseer
Mr Lil B. Khatiwada	DRSP-Ramechhap/Social Mobiliser
Ms Samjhana Poudel	DRSP-Ramechhap/Intern Engineer
Ms Santoshi Giri	DRSP-Ramechhap/Assistant Sub-Overseer
Mr Dev Raj Karki	Betali Users Committee/member
Mr Bijay Lama	DRSP-Ramechhap/Assistant Sub-Overseer
Ms Hom Kumari Gurung	DRSP-Ramechhap/Social Mobiliser
Ms Laxmi Ghimire	Betali Labour Group/Labourer
Ms Seeta Ghimire	Betali Labour Group/Labourer
Ms Sabita Ghimire	Betali Labour Group/Labourer
Ms Nirmala Sunuwar	Betali Labour Group/Labourer
Mr Krishna B Sunuwar	Betali Labour Group/Labourer
Mr Bal P Ghimire	Betali Labour Group/Labourer

Mr Bir B Sunuwaar	Betali Labour Group/Labourer
Mr Deepak Ghimire	Betali Labour Group/Labourer
Mr Posh B Sunuwar	Betali Labour Group/Labourer
Mr Min B Sunuwar	Betali Labour Group/Labourer
Mr Dhan B Karki	Betali Labour Group/Labourer
Mr Hari Nepali	Betali Labour Group/Labourer
Mr Mahesh XXXX	DRSP-Okhaldhunga/Social Mobiliser
Mr Kapil Dev Thakur	DISC/Team Leader
Mr Ishwar Chamakar	DRSP-Okhaldhunga/Social Mobiliser
Mr Tula R. Parajuli	Katunje Local Road Coordination Committee/Member
Mr Durga Shrestha	Katunje Local Road Coordination Committee/Member
Mr Tanka Ghimire	Former representative of the VDC
Ms Nirmala Shrestha	Katunje Local Road Users Committee/Member
Ms Indira Gurung	Katunje Local Road Users Committee/Chairperson
Mr Narayan Pradhan	Teacher
Mr Padam Dahal	Teacher
Ms Iswada Wagle	Road User
Mr Pradeep Baniya	Barbote Manray Dovan Local Road Coordination Committee/Member
Ms Nirmala Wade	Barbote Manray Dovan Local Road Users Committee/Chairperson
Ms Chitra Devi Dahal	Barbote Manray Dovan Local Road Users Committee/Member
Ms Hem Kumari Dahal	Barbote Manray Dovan Local Road Users Committee/Member
Ms Mena Karki	Barbote Manray Dovan Local Road Users Committee/Member
Mr Kamal Baniya	Okhaldhunga Transport (Jeep) Operator
Mr Raju Khadka	Okhaldhunga Transport (Tractor) Operator
Mr Gorakh Tamang	Okhaldhunga Transport (Jeep) Operator
Mr Koshwal Katwal	Okhaldhunga Transport (Jeep) Operator
Mr Hari Koirala	Okhaldhunga Transport (Jeep) Operator
Mr Ganesh Katwal	DDC-Okhaldhunga/Planning Officer
Mr Bijendra Parajie	DRSP-Sindhuli/District Team Leader
Mr Ganga B.K.	DRSP-Sindhuli/Social Mobiliser
Mr Rajesh Sharma	DRSP/Engineer
Mr Chandra Shrestha	DRSP/Social and Monitoring Officer
Mr Durba Bahadur Khadka	DDC-Sindhuli/Local Development Officer
Mr Ram P. Gajurel	DDC-Sindhuli/DDC-DRSP Sub Engineer
Mr Bhupendra Lal Shrestha	DTO-Sindhuli/Senior District Engineer
Ms Sumitra Rana Magar	Pragati Mahila Bikash Rin Group/Chairperson
Ms Dhan Maya Ale	Pragati Mahila Bikash Rin Group/Member
Ms Mishra Rana Magar	Pragati Mahila Bikash Rin Group/Member
Ms Januka Ale	Pragati Mahila Bikash Rin Group/Member
Ms Sarita Thapa	Pragati Mahila Bikash Rin Group/Member
Ms Charu Ale	Pragati Mahila Bikash Rin Group/Member
Ms Dhan Kumari Ale	Pragati Mahila Bikash Rin Group/Member
Ms Benu Basnet	Pragati Mahila Bikash Rin Group/Member
Ms Bharati Lungeli	Pragati Mahila Bikash Rin Group/Member
Mr Nil Hari Poudel	Bhimsthan Road User
Mr Udam P. Koirala	Bhimsthan Road User
Ms Suhila Koirala	Bhimsthan Road User
Mr Tirtha Raj Koirala	Bhimsthan Road User
Ms Radha Subedi	Bhimsthan Road User
Mr Tri Lochan Subedi	Bhimsthan Road User
Mr Madav Poudel	Bhimsthan Road User
Mr Lok Raj Koirala	Bhimsthan Road User
Ms Seeta Koirala	Bhimsthan Road User
Ms Bimala Koirala	Bhimsthan Road User
Ms Sabitra Pariyar	Bhimsthan Road User
Ms Dil Maya Magar	Bhimsthan Road User
Ms Indira Magar	Bhimsthan Road User
Ms Sabina Koirala	Bhimsthan Road User
Mr Bimal Tamang	Bhimsthan Road User
Mr Chandra Koirala	Bhimsthan Road User
Mr Bhadra Magar	Bhimsthan Road User
Mr ishwar Shrestha	Transport Economist
Mr Laxmi Subedi	ADB/Social Development Officer
Mr Bhaba K. Bhattarai	National Planning Commission/Joint Secretary
Mr Ramesh Adhikari	Ministry of Federal Affairs and Local Development/Under Secretary
Mr Rajendra Shrestha	Economist

16 Annex 8: Terms of Reference

Terms of Reference for an External Review of District Roads Support Programme (DRSP)

Background

1. Poverty is widespread in Nepal and particularly severe in the rural areas. There is a strong correlation between poverty incidence and road access: remote, inaccessible areas are generally much poorer than areas served by roads. The provision of road access is one of the most effective ways to improve the livelihood of poor people in remote areas. This was the basic impact hypothesis behind the design of the District Roads Support Programme.
2. Therefore with an aim to improve the living conditions of the local people by facilitating easier access and improving mobility, SDC initiated District Roads Support Programme (DRSP) in 1999. The main focus of DRSP was on constructing, rehabilitating and maintaining rural roads in labour based, environmentally friendly and participatory (LEP) way in 7 districts of Nepal. In addition, the programme emphasized on targeting of Disadvantaged groups (DAGs)[1] living within zone of influence (ZoI[2]) of roads, who were considered as primary target beneficiaries to benefit from short and long term employment opportunities from the road works.
3. The original overall programme concept consisted of four distinct phases of 12 to 15 years duration in total. In the first phase, DRSP focused on programme set up and planning of district roads through establishment of District Transport Master Plans and its methods in the districts and within DoLIDAR.
4. Subsequently, the second phase of DRSP, which started in July 2002 focused on implementation of roads that are planned and labour based approach was followed. Especially during the conflict the engagement of local people in the programme and the labour based approach was well was found effective. The first collaboration to work with other agencies for e.g. World Food Programme on Rural Community Infrastructure Works started during this phase. The operational manuals and guidelines were developed and put in place so that the works are done more efficiently. These also include basic operating guidelines for staff's safety and security, which were strictly adhered to. The phase was concluded in July 2006.
5. Similarly, the third phase which started in July 2006 focused on scaling up of the construction works. Community participation, inclusion, workers' welfare policies came much into operation during this time. The biggest achievement was the leverage of resources and expanding coverage in other districts in the country through providing technical assistances to ADB funded project DRILP. The results based monitoring was established as Outcome Monitoring in the programme and has started measuring the results on programme outcomes. The phase concluded in July 2010.
6. The fourth phase started in July 2010 consolidating the learning from previous phases. This phase, focused only on few roads in fewer districts. Their implementation narrowed down in 4 districts, working extensively through user's committees, focusing more on capacity building aspects so that approaches and methods are sustained over the period after DRSP phases out. Another attempt was made on establishing maintenance and upgrading the quality of roads to all-weather standards. SDC plans to conclude DRSP in its current form and foresees a new generation of rural transport infrastructure programme into the newly evolving social and political context.
7. In total, over 600 km of local roads were brought into operation to an all-weather standard in the 7 districts of the country with the assistance of DRSP. This includes 160 km of new roads and, 450 km of existing roads upgraded and rehabilitated to the standard that is operable throughout the year. Of these total roads, about 400 km of roads are periodically maintained so that vehicles are operated along the roads all year round. The construction, rehabilitation, upgrading and maintenance of these roads have improved the access of more than 1,776,074[3] people to markets, services and economic opportunities including over 3 million person days of employment in 7 districts. The details of these roads are provided in Annex 1 (of the Terms of Reference).

[1] DAGs as defined by SDC are 'groups of (economically) poor households that suffer from caste, gender or ethnic-based discrimination.'

[2] ZoI is defined as physical areas along each side of a road within 1 and half hour's walking distance, which is used in the programme to identify DAGs living within the area, who could potentially come and work for the road construction and earn cash incomes.

[3] Population of 7 DRSP districts (Sindhuli, Ramechhap, Dolakha, Sindhupalchowk, Kavre, Khotang, Okhaldhunga) as per DoLIDAR's Inventory of Rural Roads

8. The project during 2001 and 2008 also provided the technical assistance in implementing UN - World Food Programme funded Rural Community Infrastructure Works (RCIW). During this time a total of 235 km of roads were built in Ramechhap, Dolakha, Sindhupalchowk and Kavre under the food for work approach. A total of 20,000 metric tonnes (equivalent to around 5 million person days) of rice were distributed to local people in the exchange of work done.
9. During 2006-2011, DRSP also provided a technical assistance for the implementation of Decentralized Rural Infrastructure and Livelihood Programme (DRILP) funded by ADB and GoN. In addition to the achievements stated above, additional 312 km of roads were built, 178 km of roads were rehabilitated and around 250 community infrastructure schemes including small drinking water supply, schools etc. were constructed creating 6.9 million person days of employment to local people.
10. In this context, an external review of District Roads Support Programme (DRSP) is planned in the final year of the programme. The external review is expected to focus on the impacts of the programme not only of this phase but considering the whole programme period since 1999.
11. It is important to note that a social impact assessment of DRSP was carried out in 2005, which looked at the inclusive processes employed by the Programme and an external evaluation was carried out in 2009 with a focus on economic impacts. These would be useful references for this final evaluation.
12. The proposed external review will therefore focus on socio-economic returns; particularly looking at how the DRSP interventions over the last 13 years have helped people to benefit from access to resources and opportunities on one hand, and on the other, how the institutional systems and capacities put in place at different levels will bring lasting benefits to the society. The cost benefit analysis tool using 'with' and 'without' situations to form intervention and control groups can be applied to assess and confirm more precisely and quantitatively, the results attributed by DRSP interventions on broader socio-economic terms.
13. This review should be undertaken by (an) independent, international or locally based, consultant(s). The review will look at the impacts of overall socio-economic benefits brought into the villages and districts by the investments made on DRSP roads, with a special focus on the Disadvantaged Groups (DAGs). It will cover (but not limited to) welfare of labourers, changes in standard of living of DAGs, broad economic impacts of the road in the area, as well as creating income opportunities for them beyond the phases of DRSP. The study should take place along roads that are essentially completed (even if that is fair weather) and in operation from at least a year.

Objectives:

14. The overall objective of the review is to assess the impacts of the DRSP especially with respect to the improved livelihoods and enhanced capacities of stakeholders and whether the impact hypothesis was correct. This review is expected to give a solid institutional memory and provide insights in designing a next generation of programme in support of the rural transport infrastructure in Nepal.
15. The specific objectives are:
    A. To review the impacts of local/district roads that DRSP has built/rehabilitated/upgraded and maintained since the last 13 years on the lives and the livelihoods of local communities with special focus to the DAGs including women.
    B. To review the sustainability of the DRSP interventions on strengthening capacities of stakeholders at village, district and national levels and the infrastructures built.
    C. To produce a consolidated report that will serve as an institutional memory of DRSP for GoN and SDC with concrete conclusions and recommendations for the future outlook of programme on Rural Transport Infrastructure focusing on local roads.

Research questions for Objective A.

a.1 Have the DRSP roads increased overall physical accessibility in the district? Make use of GIS mapping for determining increased accessibility – number of people living in 30 minutes, 2 hours, 4 hours' time band. What are impacts of accessibility in terms of improving situation of health, education and use of other administrative and market services?

a.2 How has DRSP interventions helped increase and intensify household incomes of people living in ZoI? How are the additional incomes being used within the households, especially focusing on household's food intake, nutrition and health?

a.3 How has DRSP interventions helped intensify local agricultural production and how has improved accessibility helped facilitate market linkages for produced commodities once DRSP roads are opened and operable?

a.4 How has the local economy changed after DRSP interventions in terms of increased flow of goods and services within the local markets in the districts, their prices including freight costs, the availability, quantities of import and exports etc.

a.5 Have the district and its population being able to take advantage of roads to have wider economic linkages with neighbouring districts or other market centres beyond their own districts? If so, how?

a.6 Who has benefited most from the programme interventions? How has the targeted approach of the programme worked for DAGs on their short and long term livelihoods objectives?

a.7 What are externalities brought about by the DRSP roads to the local society in the districts? Find out both positive and negative externalities – for e.g. on positive sides – environment protection through bio-engineering, people migrated outsides have come back, people are retained within the villages because electricity came in, more schools opened up and health facilities improved with the villages...etc. on negative sides - excess cutting of trees, road accidents, cartelling of transport operators, excess use of local resources – selling of stones/logs/timber etc.

Research Questions on the Objective B

b.1 How sustainable is the capacity building (at all levels) and the infrastructure that was built through DRSP over the last decade?

b.2 How has the capacities of Local Roads User Committees evolved in the recent years since its formation from 1999. What are they currently doing in terms of using their skills and knowledge gained over a period of time? What is the extent of their involvement in the local planning process apart from roads? How (and whether)DRSP was conflict sensitive in its operation, over control and use of resources and approaches? How are LRUCs benefiting from linkages with other programmes and projects beyond DRSP?

b.3 How has DRSP interventions helped disadvantaged groups including women to have more voices in the local planning process? How have they benefited from the overall district governance as a result of long term empowerment process of DRSP?

b.4 What are the results brought about by cross cutting issues such as governance (particularly transparency, participation and accountability) and gender mainstreaming(particularly looking at women's empowerment, their roles and decision making within and outside the households as members of LRUCs, Road Building Groups.)

b.5 How effective has been the targeting and social inclusion approach of DRSP, particularly focusing on qualitative than quantitative aspects on the results of these interventions? Have DAGs (including women) being able to fully benefit from the specific skill enhancement interventions they underwent in DRSP programmes in terms of their gainful employment in the longer term perspective?

b.6 How has the systems that DRSP helped put in place such as DTMPs and ARMPs being followed by the districts and that the planning and budgeting (resource allocations) follow these guidelines? Are the roads built maintained over the period of time so that they are operable throughout the years? Whether the staff turnover in the District Technical Offices affected DRSP and in what ways?

b.7 Have the districts and VDCs adopt labour based approach over other approach of road construction beyond DRSP programme period? If so, what are systems in place for replication and scaling up, particularly the institutionalization of DRSP working manuals, guidelines and policies?

b.8 How has the capacity of DoLIDAR at central level changed in terms of formulating policies particularly on worker's welfare, insurance and social inclusion, social accountability tools on local roads, harmonizing policies amongst many other donor funded programmes as well as monitoring enforcements of those policies?

b.9 How are these policies being replicated, and scaled-up in other districts?

b.10 Are the approaches and techniques applied by DRSP such as Cobble stone pavements, bio-engineering – sustainable over the period of roads' life cycle?

Research question on Objective C

c.1 What are the added values that SDC's involvement bring particularly in the local roads as well as in the overall transport sector development of the country? Assess the effectiveness of having PSU as a technical assistance unit for implementation of programme on behalf of DDC/DOLIDAR?

c.3 How effective has been the collaboration with other donor agencies involved in the sector and what was the value that SDC could bring to this collaboration.

c.2 Based on the above, what are the key challenges and constraints in developing overall RTI sector in Nepal? What will be the focus in this sector if new development assistance is continued in this sector and how the development assistances can be harmonized in such an uncertain socio-political context of Nepal? What are comparative advantages of Switzerland Government and its Actors in this sector?

Expected outputs

16. This study is expected to produce a concrete report (preferably not more than 20 pages, excluding annexes and an executive summary) with quantitative data and qualitative analysis of the findings. Among others, the report should specifically state whether and how the project:
    i. has helped significantly increase the socio-economic activities due to enhanced access and mobility in the district/locality to justify the investments made;
    ii. has benefited disadvantaged groups (also from a gender lens[4]), more than proportionally from the newly created opportunities;
    iii. makes sure that the costs and benefits are distributed in an equitable way; and
    iv. has effectively strengthened the capacities of all stakeholders concerned at village, district and central levels so that the results are sustained.

Methodology

17. This review will adopt an ex-post project evaluation comparing before and after situations of the people living in the road corridors, particularly in those districts where the project has established a comprehensive baseline data. The changes will be compared with the national average available from the recent census over the same period of time.The consultant will form a team of 2 people. The team leader (potentially international) shall be a transport economist, having a good understanding of the rural roads sector in Nepal. S/he will be backed up by Sociologist/social specialist, who will visit the DRSP districts as a team, in order to collect necessary information for the review. If needed, enumerators, GIS experts (for mapping the level of accessibility within 30 minutes, 2 hrs, 4 hrs walking distance of the road corridor) etc., shall be hired for the survey and collecting data.
18. The team leader shall submit an inception report with programme for the review along with the detail description of the work within one week of undertaking the assignment. The programme shall include the preparations required, the proposed visits to the districts, methodologies to select sample roads and beneficiaries, the transport and logistical requirements, the data collection, analysis and reporting time required and the date for submitting the report.
19. The team shall first make a desk study of the DRSP available documents and reports and meeting with the DRSP team in order to identify/select appropriate roads as representative samples (or all depending on availability of time and resources) to undertake the review. It is recommended that completed roads (fair weather or all weather) which are under operation from last one year and also that the samples are significant enough to be representative.
20. The team shall then design a checklist and semi-structured questionnaire, appropriate for collecting the required information. They shall also propose a methodology for conducting the interviews, for example:
    i. How many people to interview in each road corridor
    ii. Which people to interview, in order to gain a representative cross section of the community,
    iii. How to gain background information from district based DDC and DRSP personnel
    iv. When to collect field data so that the information to see the changes in pattern of road uses during different seasons – monsoon and festivals and their effects on vehicles and roads, particularly focusing on breakdowns of vehicles, maintenance requirements of roads etc.
21. SDC shall review and approve the consultant's proposals for the questionnaire and the methodology, within a week of its submission.
22. When these are approved, the team shall commence visits to the districts, facilitated by local DRSP or District engineers or social mobilisers. Interviews and data collection shall be carried out such that a representative sample is achieved, for example some group interviews and some individual interviews should be used, so that the less vocal people are also heard. The field team must focus upon finding the impact on the poorest sections of the community.
23. Once the field work is complete the team shall return to Kathmandu to write up the report. A draft report shall be submitted and approved by SDC, after which the report shall be finalized to incorporate any comments, and a final version shall be produced.

[4] Usually social cost of participation in construction activities is more for women and children in terms of physical health, work load at home, school dropout etc). The study should look whether these social costs are identified by the project and appropriate measures taken to reduce the costs. Please also try to get some concrete ideas and or evidences of how the construction (Road in this case) can be more women friendly and also tangible results of gender specific management if any. Kindly use SDC's gender checklist attached as Annex 2 of this for reference.

24. In the course of finalization of the report, presentations to Government officials, other SDC projects and SDC itself might be needed.

Timing

25. The review shall take place between the November 2012 and December 2012. The desk reviews can be done during November 2012, while the data collection can also be done in November – December 2012. The draft report shall be submitted and finalized by the 30th January, 2013.

Reporting

26. An inception report within 3 weeks of the start of the assignment.
27. The consultant shall submit a draft report to the Embassy/SDC within 5 weeks of the start of the assignment. This will contain the results of the field work in Annexes, plus the findings of the consultant in the main report.
28. The consultant shall finalise the report incorporating the comments after a debriefing of the findings to SDC and Government of Nepal.

References

29. The following documents should be referred to by the Review Team:
    i. DRSP Programme Documents (of all 4 phases)
    ii. Social Impact Review 2005
    iii. DRSP External Review 2009
    iv. Outcome Monitoring Summaries
    v. DRSP End of the Phase II and III Reports
    vi. Any other relevant programme reports and documents.
    vii. Annex 1- List of Roads DRSP has built/upgraded and rehabilitated
    viii. Annex 2. Gender checklist