

Impact of River Training Works on Livelihood: A Case Study of Molung Khola, Okhaldhunga

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Abstract

The study is carried out in the periphery of Molung Khola where River training works (RTW's) has been carried out. Soil erosion, mass movement of slopes including landslides, rock failure, and debris torrents cause tremendous destruction of productive land, irrigation systems, foot trails, road alignment as well as settlements and other infrastructure in the mid-hills. The aim of the present study is to examine the impact of improved Rtw's on the livelihoods of the rural people in Molung Khola periphery. Using a semi-structured questionnaire and an interview guide to collect data from 25 respondents and 4 key informants, the findings show that study area was significantly impacted due to construction of RTW's. In addition, before river training infrastructure provisions, inhabitants were affected detrimentally, but after the RTW's they were able to improve their livelihood by improvement in factors associated with it. The lives of the inhabitants have improved markedly through acquisition of household assets, income opportunities, safety assurance and access to services some distance away. However, there is a need for more government and people-centered efforts in the improvement and provision of various services to the community.

Keywords

River Training Work, Livelihood, Food Security, Household Assets, Social Services, Rural Area

1. Introduction

Most of the rivers and streams in Nepal flow from the north towards the south, generally with high velocity due to high river gradient. Molung Khola is one of the important rivers of Okhaldhunga (feeds water for Irrigation and domestic purpose secondly major population is living on the bank of river) that carries high sediment load. Molung Khola has reasonable flow within study length around 26 km with its origin in the mid hill range with numbers of tributaries. When the river enters in down hill area, deposition and erosion becomes prominent. In the lower hills due to loss of velocity encourages the river to be meander and at the same time enhances lateral shifting which has become a common trait of sediment laden river (DWIDM-5, 2018). As the topography of hill is steep, rugged and fragile with complex geology and very high intensity of rainfall during the monsoon season causes floods, landslides and debris flow. Flood water carries heavy sediment load, rise riverbed and increases river width, finally inundation problem increase every year (Dahal, R., K., 2006).

Different combinations of river training structures were proposed for Molung River flood control management and against erosion. Those structures are stone revetment, gabions and concrete walls. Economical study revealed that studs are the most appropriate economical option among proposed river training work options (DWIDM-5, 2018). The different problems such as farmer protests, existing valuable agricultural land and legal issues were caused and imposed undesirable changes on the layout of the structures for some areas.

The socio-economic as well as cultural and religious life of the area is closely linked with the Molung Khola. Since ancient times, settlements in the area have been in close proximity to this river mainly due to easy accessibility to water for domestic use. Farmers are using water for irrigation purposes during monsoon and dry season by constructing earthen bund across the river which is very temporary and its use as a source of irrigation for intensive agriculture is still awaited. The banks of Molung Khola consist of fertile land. Farming becomes the main occupation of the area.

However, since the past decade or two, vulnerability to erosion has increased considerably. Molung khola flood affects directly or indirectly the periphery of villages of remote Hills(DWIDM-5, 2018). Primary victims from these water induced hazards are always the marginal poor community of the country living densely along the flood plains of the river bank and along the steep slopes of the rugged fragile terrain within the mountain area.

This research is carried out in collaboration with DWIDM, Division office-5, Okhaldhunga which had been implementing River training work in Okhaldhunga district since 2015 A.D. and this research uses the secondary data obtained from this office. The programme aims to contribute towards building resilient communities, reducing vulnerabilities and impact of disasters on lives, property damages etc. in the villages along the edges of Molung khola. The project has focused on these major areas i.e.; disaster risk reduction of lives, property and farmland community based on strategies through structural and non-structural intervention measures to enhance community preparedness and resilience.

This research is carried out to study the impact of river training works on livelihoods in the rural areas along Molung River. The study involves measuring the impact to agricultural productivity, food security and social services including education, health and identifying acquisition of household assets, including land and livestock.

2. Study Area

The study area is located in okhaldhunga district. The total area of the district is 1074.5 km². Molung Khola originates in the Upper part of Okhaldhunga from Mid-range at an elevation of nearly 1900m. Geotropically, it lies within latitude 27°11'34" N to 27°29'17" North and longitude 86°0'44" E to 86°30'22" E. The population statistics (CBS,2068) are as follows:

Total number of local units: 8 (7 rural Municipality and 1 municipality)

Total Population: 147,984

Out of these 8 local units, the study area (i.e. periphery of Khola river training work project) covers 4 local units which have 29 Besi.

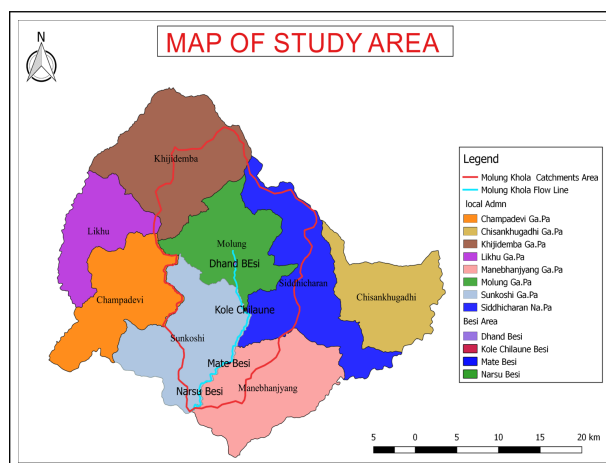


Figure 1: Location map of Study Area

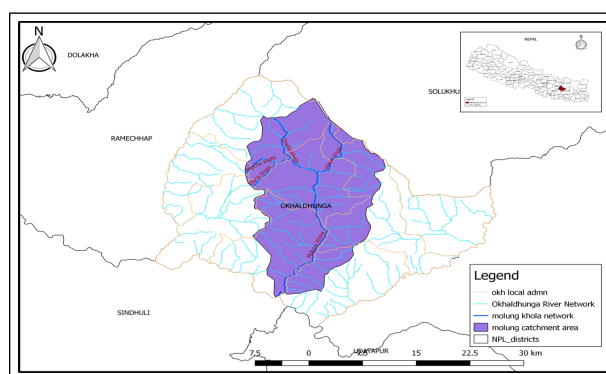


Figure 2: River Network Map of Study Area

3. Literature Review

3.1 River Training Work and Livelihood

“A livelihood comprises the capabilities, assets and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base”(DFID, 1999).

River Training Works

The structure constructed for the purpose of guiding and taming the flow are called river training works . River training works fulfill following objectives:

1. Protection of bed and banks of river from erosion
2. Directing the river flow in desired direction
3. Maintenance of river channel for navigation
4. Protection of surrounding land from flooding
5. Protection of important hydraulic structures

6. Reclamation of submersible land

Common types of river training works are:- embankments, Guide banks, Studs, Spurs, Cut offs, Bed pitching and Revetment.

3.2 Framework of the Livelihood Analysis

The livelihood analysis was carried within the framework of Human, Social, Natural, Physical and Financial capital. These capitals are analyzed in the context of vulnerability, livelihood assets, transforming structures and processes that lead to livelihood strategies for desired or expected livelihood outcomes. These outcomes would include more income for the target population, increased well-being (increase in investment in sanitation and health), reduced vulnerability, improved food security and more sustainable use of natural resources(DFID,1999).

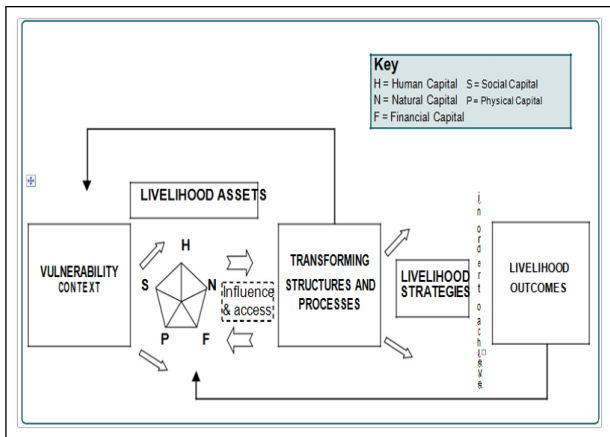


Figure 3: Research Framework
Source:(DFID, 1999)

3.2.1 Vulnerability Context

The Vulnerability Context refers to the seasonality, trends, and shocks that affect people’s livelihoods. The key attribute of the factors(Human, Social, Natural, Physical and Financial) is that they are not susceptible to control by local people themselves, at least in the short and medium term. It is therefore important to identify indirect means by which the negative effects of the Vulnerability Context was minimized – including building greater resilience and improving overall livelihood security by RTWs. This is of particular importance for the poor, since a common response to adverse seasonality and shocks is to dispose of assets(DFID,1999).

Assets and the Vulnerability Context: assets are both destroyed and created as a result of the trends, shocks and seasonality of the Vulnerability Context.

Assets and Livelihood Strategies: Those with more assets tend to have a greater range of options and an ability to switch between multiple strategies to secure their livelihoods.

Assets and Livelihood Outcomes: Poverty analyses have shown that people’s ability to escape from poverty is critically dependent upon their access to assets. Different assets are required to achieve different livelihood outcomes.

3.2.2 Transforming Structures and Processes

The institutions and policies of the Transforming Structures and Processes have a profound influence on access to assets. They: Create assets – e.g. government policy to invest in basic infrastructure (e.g. DWIDM division office invests in RTWs).

3.2.3 Livelihood Strategies

Livelihood strategies is used to denote the range and combination of activities and choices that people make/undertake in order to achieve their livelihood goals (including productive activities, investment strategies, reproductive choices, etc).This research will try to reveal to what extent current livelihood strategies are affected by river training work. Different livelihood activities have different requirements, but the general principle is that those who are amply endowed with assets are more likely to be able to make positive livelihood choices. That is, they will be choosing from a range of options in order to maximize their achievement of positive livelihood outcomes. The different factors associated with the Livelihood are:

Human capital: labor capacity (physical ability to work); education; employable skills; and local employment opportunities.

Natural capital: access to land; access to irrigation infrastructure; livestock holding; and crops (staples, cash, vegetables, fruits).

Financial capital: Income; and individual or communal savings

Physical capital: water supply; housing, roads, and access to markets; livestock shelters; and infrastructure.

Social capital: social organizations; links with friends; Empowerment

4. Methodology

The study was conducted in 3 phases: desk study, field study, and post field work. The study involved utilization of various tools for the information assimilation. Major data were collected through Primary sources with the help of structured questionnaire, direct field observation and key informant interviews.

4.1 Sources of Data

For this study two types of data were used namely; primary and secondary.

4.1.1 Primary Sources

Individual Interviews: Small and Marginal farmers, members of the local self-help group (SHGs) were individually interviewed to seek personal opinions. 25 such individual interviews were conducted. This was done based on stratified random sample basis.

Observations: It includes observation of site, visual and instrumental recordings.

Key Informant Interview: Individual interviews were also conducted with key informants as traders, elected local government body members, old age peoples and others intermediaries who have been associated with the livelihood systems of society since long.

4.1.2 Secondary Sources

Relevant documents, papers were collected from the key information source like the irrigation department, water induced disaster management office, Rural Municipalities, Municipalities, and Central Bureau of Statistics(CBS) who have been closely associated with the work. Alongside this, map study and other relevant available data were also collected. The same were reviewed to enhance understanding of the livelihood system.

4.2 Sampling Procedure

The sample survey is conducted based on stratified random sampling method where four Beshi were selected in four local units of Okhaldhunga district for this study. Sampling Calculator is used to find sample

population. For a Confidence Level(CL) of 95 percent, Confidence Interval(CI) of 18.5 and sample population(in terms of House Holds) of 198, sample population obtained is 25 as presented in Table 1.

Table 1: Sampling Data

SN	Name of the Beshi	No. of HHs Benefited	Sample Number
1	Kole Chilaune Beshi	45	6
2	Dhand Beshi	100	10
3	Mate Beshi	38	4
4	Narsing Beshi	15	5
	Total	198	25

4.3 Method Overview

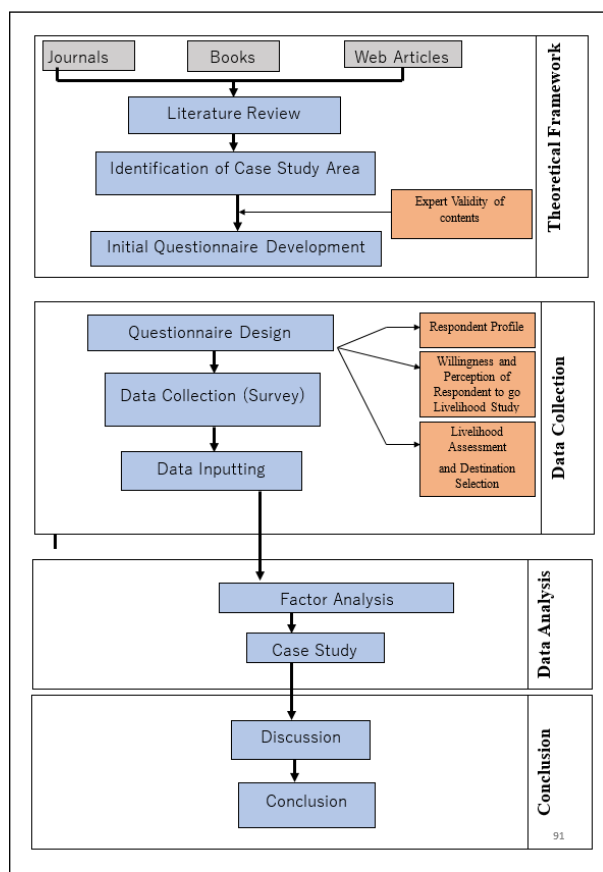


Figure 4: Flow Chart of Research Method

4.4 Overall Framework of Research

The research methodology is implemented into four phases: data preparation and collection, analyzing, interpretation and conclusion. The overall

methodology is shown below.

Preparation work: Research Topic Finalization, Literature Review, Secondary Data Collection, Preparation of Questionnaire.

Field Work: Verification of Study, Observation, Interview with Locals, Evaluation of contribution of each factor.

Post Field Work: Analysis of Field Data and interpretation.

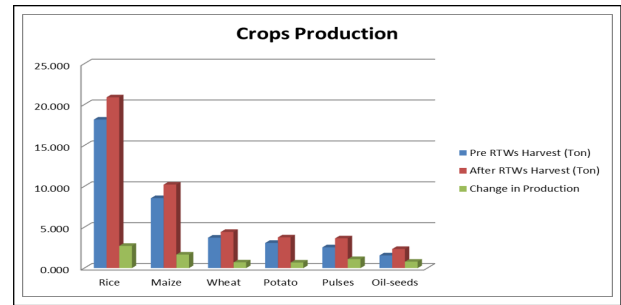


Figure 6: Schematic view of Crops production

5. Findings and Discussion

The collected data is analyzed and interpreted comparatively with the help of graphic, table and charts etc. as illustrated below.

5.1 Impact on Agricultural Sub-sector

Within the agriculture sub-sector, increased intensification and productivity of crops was found. Cropped area for all crops increased and hence its production as well based on data for the year of 2016. The majority of households were found to have benefited from River training works along with higher farm income gained due to increased production. The discussion suggests that increment in productivity is attributed not only to increase in production area but also due to awareness, investment increment and safety of property i.e. land. It falls under Natural capital.

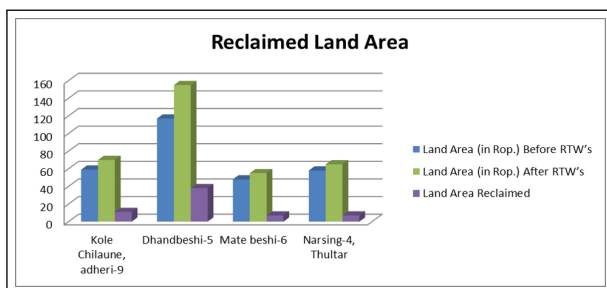


Figure 5: Schematic view of Reclaimed land

5.2 Impact on Off-farm Activities

Off-farm activities included the establishment of small businesses (e.g., retail, tea shops, small hotels, and poultry farms) as well as non-agricultural wage labor and salaried jobs.

As per table 2, the data shows that the percentage of peoples employed in duration basis for the project in respective Besi area. The employment opportunity generated from river training works also accounts for the livelihood as it increases the income of concerned directly. The data and figure presented indicates that these RTWs generates more than 80 percent (in average) employment opportunities which are of the duration 30-90 days followed by 16 percent of 91 - 180 days and remaining for more than 180 days.

Table 2: Offfarm activity Statistics

SN	Name of Beshi	30-90 days	91-180 days	>180 days
1	Kole Chilaune Beshi	80	16	4
2	Dhand Beshi	84	12	4
3	Mate Beshi	88	12	0
4	Narsing Beshi	76	16	8

5.3 Impact on Migration

The survey results suggest that along the river side, agriculture and local employment remain much more important for household income and livelihoods. Interviews 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 migration of people for foreign employment is risky and has costs

in terms of the absence of productive household members.

The study also reveals the decrease in migration as due to increased opportunity to work in farm as well as projects nearby home. AS portrayed by the figure below, migration within Nepal used to trigger in past due to threat in life and property which was obviously reduced due to assurance against threats possessed by the disaster(DWIDM, 2018).

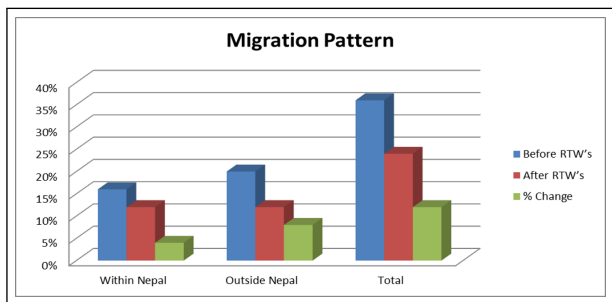


Figure 7: Schematic view of Migration Pattern

5.4 Changes in Household Expenses and Savings

The statistics reveals that food-poverty is an important issue. Farming families that are not producing enough for themselves and have to spend a quarter of their household incomes on food grains will not be able invest in other productive activities (agriculture, education, and micro-businesses). Meanwhile interviews suggested that people felt that food security had improved after the construction of RTW's as figure below illustrates decrease in expenditure for food. 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.

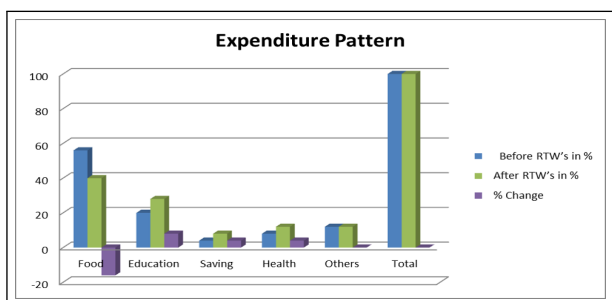


Figure 8: Schematic view of expenditure Pattern

5.5 Changes in Living Standards

Overall living conditions of the inhabitants along the river banks have improved significantly which is associated with the earnings associated to RTW's in conjunction with increased incomes and greater exposure to hygienic practices (from media, schools, and awareness campaigns).

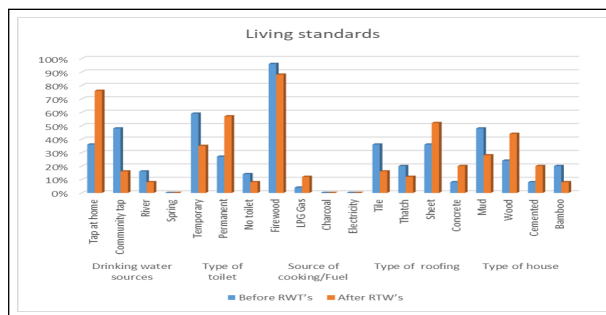


Figure 9: Schematic view of living Pattern

Also, livelihood is shaped by the regularity of Water supply facility and improvement in water quality . As depicted by the figure below, the regularity of water supply system has been reported to be improved by great extent. Percentage of people reporting intermittent water supply before river training work has decreased after RTW's.

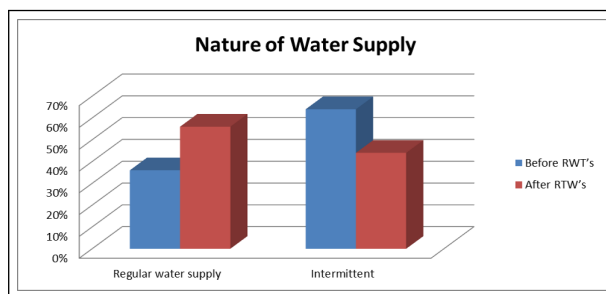


Figure 10: Schematic view of nature of water supply

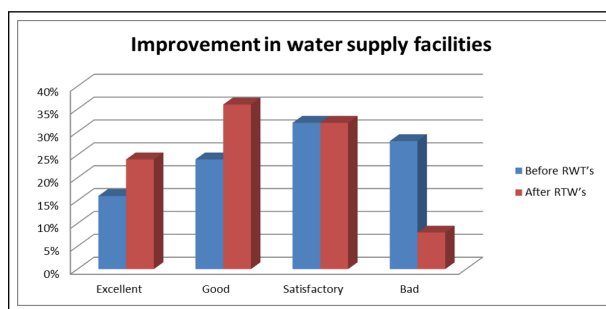


Figure 11: Schematic view of water supply improvement

Not only the Nature of Water supply system but the

water quality is also found improved in overall. The chart shows that bad and satisfactory percentage decreased whereas excellent and good mark in water quality is increased which also is related to livelihood.

5.6 Gender Empowerment

In undertaking their productive and social obligations, women are more likely to face a range of physical, income and cultural barriers. The discussions indicated that construction work had enhanced their mobility as result women can become more productive and explore opportunities outside their villages. During construction, the targeting and encouragement of undertake construction work were also found to have led to greater confidence and empowerment, with women having control over their earnings. In overall study reveals that enhancement in mobility, exploration opportunities, sharing of ideas and knowledge on wide range of issues, group formation and involvement in micro finance are the factors that helped gender empowerment.

5.7 Health and Education Sector

During our study we found that the investment of locals in education sector increased by substantial percentage. However, in health sector, we observed the number of people taking drug for diarrhea and dysentery in month of Ashad and Shrawan, and noticed that this was reduced to 35, 37, 23, 44 from 39, 52, 33, 54 in Besi of (Dhand, Narshing, kole chilaune and Mate) respectively. This signifies the reduction in number of people suffering from water borne disease after construction of river training work as water quality was found to be improved from questionnaire survey conducted. This improvement in health sector seems justified as the guided by improvement in water supply facility and water quality.

5.8 Economic Impact and Benefits

Firstly, it was not easy to estimate the true cost of river training works for economic analyses however, there were records of DWIDM disbursements, contributions from the Government of Nepal, which made easy to estimate. The present status cannot be attributed only to the initial investments. The agricultural production, social services and land values made it difficult to estimate the benefits of the RTW's however with the help of DWIDM the benefits is estimated as shown in

table below. The table shows cost or money saved as the result of construction of river training works.

Table 3: Economic Impact and Benefit

SN	Particulars	Total value (NRs)
1	Protection against erosion of river's bank-side cultivated land	3,200,000
2	Safety against damages to houses	480,000
3	Benefits from reclaimed land (taking the 60 percent rate for reclaimed land)	400,000
4	Benefit from protection of structure as canal, bridge, etc.	150,000
5	Protection of standing crops	150,000
6	protection of loss of land from erosion	800,000
	Total	5,180,000

6. Conclusion

The River training works have improved people's access to services, such as health, education, transport, water supply and sanitation and markets. As the study area is rural agrarian economy the river training work is ought to have more impact in terms of production. Thus the findings of study revealed that there is positive impact of river training works on livelihood from each aspect discussed above. Similar projects can be implemented on the hilly regions of similar context, which will be beneficial to the residents from livelihood aspect.

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