

COMMUNITY APPROACH TO FLOOD MANAGEMENT IN NEPAL

A Pilot Case Study

1.0 BACKGROUND

Nepal- predominantly a mountainous country, located in between the Tibetan Plateau and the Indo-Gangetic plain, has 147,181 km² of land area and inhabited by 23.5 million of ethnically diverse people. The country is criss-crossed by the numerous rivers and rivulets. One estimate puts the number of rivers and rivulets to be about 6,000 of which, about 1,000 are more than 10 km long and about 100 of them are longer than 160 km. The rivers flowing from the north to the south have divided the country into a number of zones, which can be distinctly classified. Starting from the west to the east, a total of eighteen divisions of the river system have been delineated. Characteristically, all the rivers go out of Nepal through its southern boundary with India.

1.1 Geographical Characteristics of Floodplain

The geophysical diversity of the landscape ranging from a minimum level of 60 m to 8,848 m (Mount Everest), the highest peak of the world, puts Nepal in a unique situation of river related problems. Country is virtually divided into two halves by the geological fault that delineates Tibetan Plate and the Gangetic Plate. There are frequent tectonic movements in the vicinity of the fault. This geographical feature accompanied with young and weak rock formation makes landscape too unstable and prone to land slides due to natural and anthropogenic activities. The steep slopes of the mountains and the intense monsoon add to the problem causing widespread landslides bringing in large quantity of sediment into the river system. Besides, numbers of glacier lakes are found in Himalayan foothills and such glacial lake outburst flood (GLOF) carries enormous quantity of the sediment and makes to rise river bed vertically and laterally. The high velocities of flows in the steep slopes of the mountains frequently cause bank erosions damaging permanently the agricultural lands. Immediately after emerging out from the mountain ranges, the abrupt change in river slopes from steep to flat, forces the rivers to drop the sediment. The rivers in this area become wide and braided with unstable plan form with wide spread damages. These are characterized by erosion of banks and deposition of infertile coarse material on the cultivated land. The channel capacity of the rivers in this regime is typically too small to accommodate large floods; as a result the adjoining area suffers from inundation. Similarly, the increased human intrusion into marginal and fragile forest land have increased the degradation bringing in more sediment into the river thus increasing the problems especially in the southern flat Terai. One of the important aspects of the damages from floods is also the inundation.

1.3 Key Socio -Economic Factors

In the recent decade, the development activities such as roads and irrigation canals have added to the river related problems. The excavation works for construction of these infrastructures are associated with disposition of a large amount of spoiled soil on the riverside slope of the mountains and becomes an added quantity of sediment. Also increasing population of livestock to graze over a limited land surface in the mountains is one of the causes of aggravating soil erosion. On the steep slopes of the lower mountain hills, ethnic tribes still use the slash and burn system of agriculture in

¹ S.N. Poudel, Director, Executive Member, Jalsrot Vikas Sanstha., Nepal

² R. K. Pandit, Research Associates, Jalsrot Vikas Sanstha, Nepal

³ R. Subedi, Research Associates, Jalsrot Vikas Sanstha, Nepal

which clear a part of the forest and do farming for some years before they clear another part abandoning the present one and the cycle of clearing and farming continues.

In the foothills of the mountains adjoining to the southern Terai and in the plain itself, the situation is much grimmer. The Terai is heavily populated. With the increase in population, the landholding is decreasing implying more and more number of persons to feed from a plot of land. The population pressure has increased human intrusion into marginal and fragile forestland. Firewood is the major sources of the energy for the rural population. This has pressured on the forest resources resulting fast deforestation. The Siwalik (Churia) ranges at the foothills are of very recent formation. Removal or thinning of the forest cover triggers gully erosions and mass wasting bringing in large amount of sediment into the river system.

1.4 Floods and Associated Damages

The floods and landslides contribute significantly to the loss of life and property. Although, the available data are for very short period, there is an impression that the annual loss of lives and damages to property due to floods and landslides are on the rise. Geographically, the nature of damages due to flood is different for different area. In the high mountains the damages are due to large landslides and mudflows. Quite often, the landslides, sweep away the whole villages. The mudflows cover terraced land with boulders and debris damaging the standing crops and making the land useless for agriculture. In the foothills and the floodplain of the rivers in the valleys, the floods cause deposition of coarse sediment over the adjoining floodplain damaging crops and converting the land in to infertility. The riverbanks here are subject to severe erosion and loss of soil, which provides more sediment to deposit on the downstream. In fact, continuous widening over decades starting from the foothills in many rivers indicate gradual changes in the plan form with the expanse of the braided reach downstream in response to the added sediment.

2.0 RIVER MANAGEMENT

In National perspective, it can be seen that various aspects of river management are imbedded in various sectoral plans such as irrigation, roads, hydrology and meteorology, watershed management, disaster mitigation, etc. Earlier the Department of Irrigation (DOI), now the Department of Water Induced Disaster Prevention (DWIDP) under the Ministry of Water Resources (MOWR) is the prime institution, which has mandate and financial resources to carry out river training works across the country. Protection of banks against erosion, protection of low lying flood plains against overflowing floods, protection of major public infrastructure are the three objectives of river training works.

2.1 Structural Intervention

Structural measures normally protect against the bank erosion and flooding. Such measures are adopted for two purposes, viz. (a) flood fighting and (b) River Training. The flood fighting work is done for temporary purposes during emergency. However, river training works are conducted to protect land or property for longer period. Spurs, levees and bank revetments are the most commonly practiced structural measures adopted. Government, bilateral agencies and various donor agencies have been involved in river training works. Beneficiary community participation also exists in several cases.

2.2 Non Structural Intervention

The use of bioengineering works accompanied by plantation of high value trees and grass along the embankments and in their vicinity is getting popular. Till recently, watershed conservation works were concentrated on the middle mountains. The achievements are reported in terms of physical

works performed and number of activities accomplished. The impact of these programs has not been evaluated. The major components incorporated in donor-supported projects are soil and water conservation, community and private forestry, infrastructure development, income generating activities, and conservation education and extension. While this approach addressed the overall need of the local people, it results in over-stepping by one government agency into the domain of other in attempting to execute so many varied programs.

2.3 Regulatory Measures

Regulatory measures include mitigation strategies, financial strategies, national land use and land cover plan, risk assessment, policy on disaster reduction measures, policies related to Non Governmental Organizations (NGOs), private sector and communities involved in disaster management, environment and indigenous technology in disaster reduction, promotion of regional and sub-regional cooperation between the countries and establishment of documentation center on disaster management, directed to reduce the loss of lives and damage of properties. Nepal has prepared the Action Plan for reducing disasters under the supervision of International Decade for Natural Disaster Reduction [1990-2000] (IDNDR), National Committee.

2.4 Hazard Preparedness

Many agencies allocate materials and financial resources for use in emergencies but these are mostly on an ad hoc basis and depend largely on the availability of budgets. Some important activities such as identification of hazard prone areas and establishment of flood warning systems are yet to be initiated. A procedure of implementing rehabilitation works involving the local government agencies, local elected bodies, political parties, NGOs, Community Based Organizations (CBOs), and the beneficiaries has been set up.

2.5 Community Efforts (NGO and Private Sector Inclusive)

Community involvement in flood management is widely spread and in many cases quite effective. An action plan has been developed for the effective and timely mitigation of the chronic flood related problems. Community aspects, approaches and involvement in flood management have been made more or less mandatory. Such non-structural measures as flood preparedness and response, flood proofing activities, response to flood warnings, preparations ahead of flood, coping during floods and post flood relief and rehabilitation are included in the community approaches. These approaches would include the activities vis-à-vis flood management by NGOs, CBOs and local government bodies reflect participatory planning and management in dealing with flood hazards.

3.0 PILOT CASE STUDY

Attempts made so far in mitigation of the chronic flood related problems, lessons learned from the engineering, non-engineering and community participation efforts in two severely affected flood prone settlements, Launiya & Tilathi Village Development Committees (VDCs) of Saptari district and Gaur Municipality & Brahmapuri VDC of Rautahat district of eastern and central Terai have been discussed. These areas are selected for launching and promoting a pilot program of community approach in the flood management.

3.1 Study Area

In Rautahat the study area comprises of Gaur Municipality and other eleven VDCs with the area of about 6,600 ha and in Saptari overall sixteen VDCs have been selected with the area of about 5,700 ha. The study site details are provided in Table 1.

Table 1: Study Area Details

District	Selected VDC and Municipality	Total Area (ha)	Remarks
Rauthat	Badarhawa, Basatpur, Brahmapuri, Banjara, Bairiya, Hajminiya, Jhunkhunuwa, Laxmipur Belbichhuwa, Mudbalewa, Dipra Bhagwanpur and Rajdevi VDCs and Gaur Municipality.	6,600 ha	Study Area
Saptari	Birpur, Tilathi, Launiya, Rampur Malhaniya, Sakarpura, B isariya, Madhepura, Bamangama Katti, Kolhadi, Inarwa, Hanuman Nagar, Bisrain, Joginiya-1, Joginiya-2 and Bathanaha	5,700 ha	Study Area

3.2 History of Flood Occurrence in Selected Sites

a) Rautahat

Recurrence of flood is common every year during monsoon. Area suffers from inundation and flooding although embankments are made along the banks of both Bagmati and Lalbakeya rivers. The major flood of 1993 washed away thousands of hectares (ha.) of cultivable land and many families became homeless and 100 persons died throughout the district. Similarly, last year's flood has seriously devastated the paddy land and several dozen families were displaced (Source: PRA 2002). The 1993 flood has seriously affected Brahmapuri VDC, Kanakpur (Simarai Tole) and Raj Devi VDC of ward no 9 as well as other 3 locations. It is estimated that around 895 ha paddy land was filled with boulder, 935 ha paddy land was washed away and 25,620 ha standing crop, 1,982 ha seasonal vegetables, and 47 ha fish farming were partially damaged by the flood in the district. Last Monsoon flood of 2002 is considered as a second heaviest after 1993. Around 1,250 ha of standing crops, 142 ha of seasonal vegetables and 10 ha of fish farming were damaged and around 87 cattle swept away (Source DAO Rautahat).

For the study area, information received was 62 families displaced, 631 houses fully damaged, 4,450 families moderately affected, and 4 wounded and 3 dead. The figure for the municipality is 78 households fully damaged and 815 families affected and 1 dead (Source: Red Cross Rautahat).

b) Saptari

The riverbank of the study area is prone to erosion every year. It is learnt from the field inquiries and observation that banks were eroding at a rate of 0.5 m/annum on average. The floods of 1998 and 2002 have caused severe inundation to the nearby areas. Recurrence of flood is common every year. Intensity of the devastation is very serious in some years and less in other.

The following damages were recorded:

1983: Land and houses in various VDCs including Sakarpura, Tilathi and Bisariya damaged and river changed the course. Both Tilathi and Sakarapura community have dispute over the route of Khando.

1993: About 100 ha of paddy land inundated and about 100 households shifted for 2 months in the school and on the bank of fishpond. The flood killed large numbers of cattle

2000: The paddy crops in Tilathi and Bisariya damaged and 20 to 30 houses inundated

2001: Embankment (gabion boxes) constructed by DOI damaged, one house destroyed and 10 ha of crop inundated

2002: At Launiya about 25 ha of land silted up, 40 ha submerged and paddy replanted, two ponds completely and two partly damaged, 26 huts swept away, 60 houses partially destroyed, 100 houses inundated, and Koshi canal no. 6 and the minors silted up and banks damaged in places

At Bisariya 25 houses inundated where water level rose to above 3 ft and 10 ha of crops silted up, at Tilathi 100 households shifted at schools for 7 days, 100 ha inundated and 3 ponds destroyed.

3.3 Selection Procedure

Initially the study team collected secondary information from concerned agencies and then the field visit was carried out to assess the field condition of both locations. The areas were selected on the basis of severity and frequency of flood events. In Saptari every year Khando has continuously affected Launiya, Bisariya, Tilathi and other villages. Similarly, in Rautahat the Lalbakeya and the Bagmati rivers affected Gaur Municipality and several other villages, caused heavy damages to life and property every year and the flood is considered as the chronic problem.

3.4 Approach

Three field visits were carried out in each location for PRA. The study team discussed and interacted with the affected people, VDC functionaries, local level party activists, social workers and deprived group members. With respect to the Gaur Municipality and Brahmapuri, community participation was not in a desirable level in terms of gender and ethnicity however attendance during PRA was satisfactory.

Similarly, the team visited the field and observed the present condition through the transect walk along the Khando River in Saptari. The visit began from the Koshi canal bridge in the Bisariya to the Indian border, Kunauli. During the visit discussions were held with the various groups and information gathered. The Community was preinformed on PRA at both Tilathi and Launiya. In Launiya, both male and female members of the affected families participated whereas in Tilathi only male members attended. Most of the participants expressed their experience and opinion on the floods and flood coping practices.

3.5 Geographical Characteristics and Climate

Gaur municipality is located in the southern part of the district and is surrounded by Rajdevi, Mudbalawa and Laxminiya VDCs to the east and Bairiya and Banjhara to the west, Hajmaniya, Pipra Bhawanipur and Rajpur Phardhawa to the north and Indian border Bairganiya in the south. Similarly, the second location Brahmapuri VDC is surrounded by Bagmati River in the east, Laxmipur Belbichhuwa in the west, Rajdevi in the North and India in the South. The elevation of the area varies from 100 to 120 m above mean sea level (amsl). The district headquarters Gaur and Brahmapuri both are connected with east-west highway by 42 kilometer long Chandranigapur-Gaur road Daily bus services from the both sites and air service from Simara are available for Kathmandu. The road distance of Gaur from Kathmandu is 334 km (Fig 1).

There are 114 VDCs and Rajbiraj municipality in Saptari district. The two locations Launiya and Tilathi are located in southern part of the district with the gross area of about 700 and 550 hectares, respectively. The elevation of the area is between 70 to 90 m amsl. The locations are about 10 km

away from Rajbiraj. Bus service is available to Tilathi whereas Launiya is about 2 km away from the nearest road head, Birpur (Fig 2).

Table 2: PRA Locations

District	PRA location	Total Area (ha)	Remarks
Rautahat	Gaur Municipality and Brahmapuri VDC	2,497	Figure 1
Saptari	Tilathi and Launiya,	1,250	Figure 2

Both the study areas are fertile cultivated Terai plains. Clayey loams to sandy loamy types of soils are common. Areas lie south of the east-west Highway and spread up to the Indian border. The study covers about 6,600 ha in Rautahat and 5,700 ha in Saptari. The areas have tropical and sub-tropical climate with hot temperature in summer. The average minimum and maximum temperatures recorded are 19.6°C and 31.1°C respectively. Annual precipitation is about 1200-1300 mm.

Rivers and Streams

Major rivers flowing within Rautahat district include Bagmati, Lalbakeya, Chandi and Jhanjh. Bagmati is located in the eastern part and 51 kilometer of its length lies in the district. Irrigation facilities are developed from Bagmati and Lalbakeya, these rivers create danger to life and property during high flood due to bank cutting near settlement and cultivated areas. In addition to this, land submergence due to flood is more problematic. Other three rivers are less dangerous and are also being used for irrigation purposes.

Similarly, major rivers in Saptari are Koshi, Khadag, Khando, Mahuli and Sundari. Koshi is located in eastern part of the district and provides irrigation to the district. A barrage has been constructed to protect the floods of Koshi river. Often the river meanders downstream of the barrage and sometime causes damage to the property and life.

South Saptari is regarded as flood prone due to numbers of flashy rivers. Most of the seasonal rivers originate from Siwalik. They carry large quantity of sediment and deposit on fertile land. Churiya is mostly deforested and the people and animals are encroaching. With the deterioration of the environment monsoon floods are creating havoc in various localities. According to the District Soil Conservation Office, about 70 VDCs are affected moderately by flood and 20 are highly affected.

a) Bagmati River

The Bagmati River, rises in the Shivpuri range at about 16 km north-east of Kathmandu at an elevation of 2,800 m. Bagmati the tributary of Koshi merges with it at Baltara in India after traveling a distance of 195 km in Nepal and 402 km in India. The total catchment area is about 13,400 km² of which about 7,000 km² lies in Nepal. Maximum discharge of 100 years return period has been estimated as 10,500 m³/s.

From the origin up to its length of 154 km the catchment is hilly and forested while further down up to its confluence with the Koshi, it is almost plain. In the Nepal Terai from Bairia to Karmaiya (22.5 km) and from Karmaiya to Gaur (41 km) the river has bed slopes of 1.44 and 0.53 m/km respectively. The Bagmati is generally braided in Nepal Terai up to Nepal-India border and below that the river is of meandering type with constantly shifting courses. The high concentration of silt together with the flat terrain is the main cause of the shifting of the river and the inundation of villages and agricultural land along the riverbanks. The geology of the catchment is unstable and susceptible to heavy wear and tear, bringing increasingly large sediment loads. The embankment on the both banks extends from India to all along the affected Nepalese territory. This has subjected to flood inundation due to river spills.

Figure 1: Gaur Municipality and surroundings

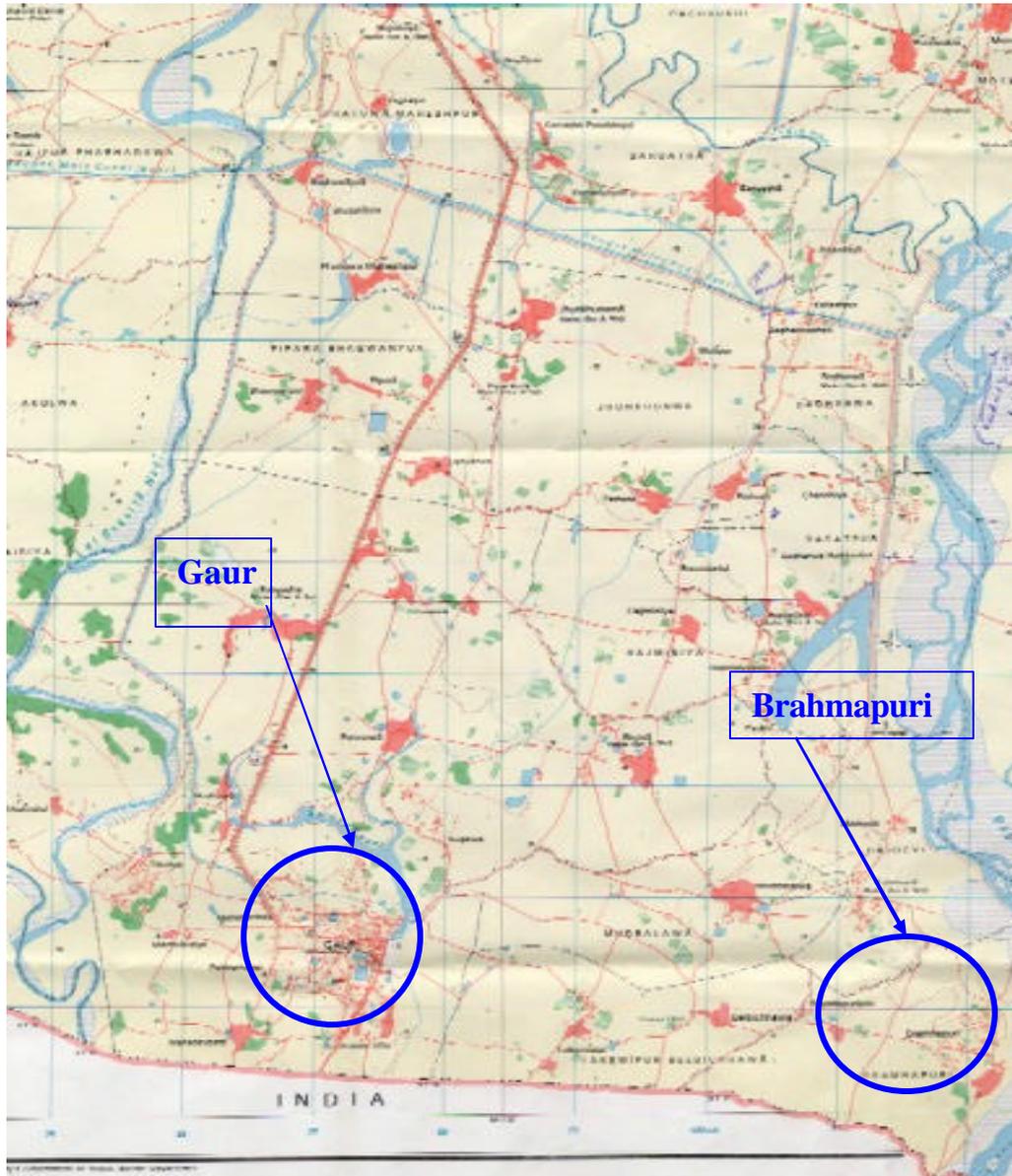
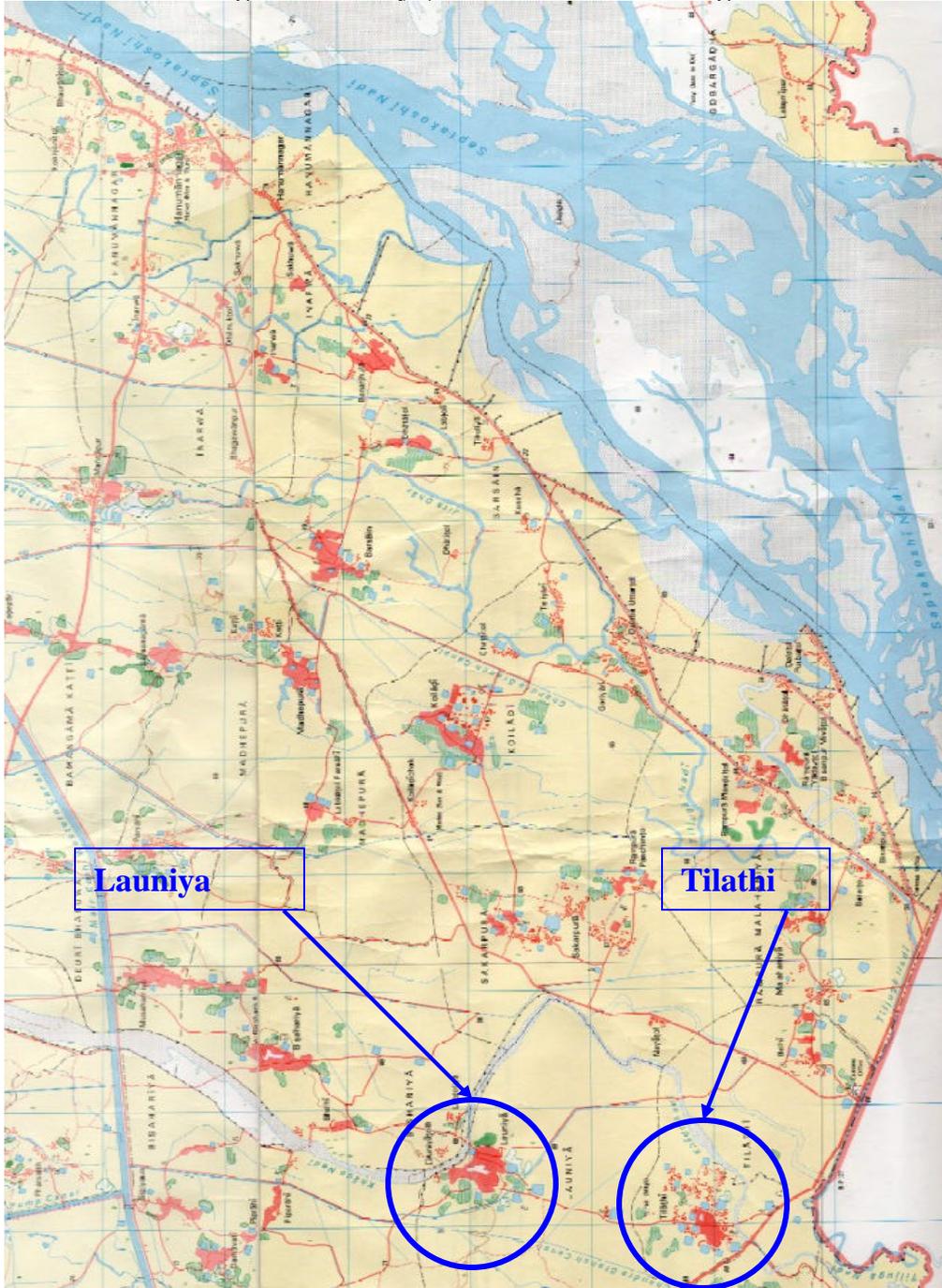


Figure 2: Launiya, Tilathi and surroundings



Lalbakeya River

The Lalbakeya river, one of the perennial rivers in Nepal and North Bihar, rises at an elevation of 1,512 m in the Churia. The river is a major tributary of Bagmati and joins south of the Nepal-India border. Its length is 109 km of which 80 km lies in Nepal and the remaining 29 km in India. The catchment area of the river is 896 km². The left as well as right banks of the river spill over frequently during floods in Nepal and near to Bairgania area in Bihar (India). The maximum discharge of 100 years return period is estimated as 500 m³/s.

There are many tributaries contributing to the Lalbakeya River. The Churia range consists of alternate sand and clay beds, the river basically passes through this area. It carries much sediment and depth of the bed is very shallow. Lalbakeya has much smaller catchments. Its complexity lies in its tributaries, which are liable to change its course to drain into another river in the region. Although the river carries smaller discharge, but causes a lot of damages. The embankments along both the banks extend from Indian Territory to several km north to affected area.

c) Khando River

The upper catchment of the Khando River falls in the Siwalik Hills and the lower one entirely in the Terai Plain before it reaches and joins river Koshi in India. The river is a seasonal river and almost dry throughout the year except in the months of the rainy season. During monsoon substantial damages occur to the life and property. The catchment in the Siwalik Hills is sparsely vegetated. The geological condition is fragile with loose pebbles and cobbles contributing to the high bed load. The Terai catchment is relatively better as it is mostly the agricultural land. The catchment area of Khando is about 165 km² of which around 30% falls in the Siwalik. The elevation of the catchment varies from 65 m at the study area to 300 m at the Siwalik Hills. Maximum flood discharge is about 250 m³/s (100 years return period). The river channel is meandering in nature. After flowing in the plains it is wide due to excess deposition of the bed load in the initial Terai stretches. The width within the study area varies from 25 to 200 m. The river has changed its course over the years. It has been separated into two distinct courses just from up-stream of the study area. The present study area is in both the right and left courses of the river.

3.7 Demographic and Socioeconomic Characteristics

a) Population

Population and household number of the study areas in provided in Table 3. (National Census 2001)

Table 3: Population and Household Numbers at PRA Locations

District	Location	Population	Total HHs
Saptari	Tilathi	3,079	709
	Launiya	2,960	630
Total		6,039	1,339
Rautahat	Gaur	25,383	3,956
	Brahmapuri	4,014	966
Total		29,397	4,922

b) Economy and Land use Pattern

Agriculture is the mainstay of the economy in the study area. According to the District Agriculture Office, 79 percent people depend on agriculture for their livelihood and remaining on service, trading

and others. The main crops cultivated are paddy followed by sugarcane or mustard, wheat and potato. The predominant form of production till today is subsistence agriculture. Family is the basic unit of production. Female and child labor along with adult male labor is used for the purpose. There is hardly any surplus since the size of the landholding is very small. However, wealthy farmers are switching from domestic to commercial farming. The average land holding size in Saptari and Rautahat districts are 1.3 ha and 1.06 ha respectively.

c) Caste and Ethnicity

Both the study areas are dominated by the Terai ethnic groups and details are provided in Table 4.

Table 4: Caste and Ethnicity

Location	Ethnic Groups	Remarks
Saptari	Yadhav, Tharu, Khatbe, Dhanuk, Shah, Telli, Rajput, Kayastha, Dom, Chamar, Newar, Brahmin / Chhetri (hill), Haluwai, Mushar	no cost breakdown
Rauthat	Yadhav, Muslim, Tharu, Rajput, Brahmin, Chhetri, Kurmi, Baniya, Musahar, Teli, Dhobi, Mali	no cost breakdown

3.8 Participatory Rural Appraisal (PRA)

3.8.1 Information Base (forecasting & Warning)

As per the discussion with the community in Gaur and its vicinity the floods in the study area are usually flashy in nature lasting hardly for one or two days. Flood is the inevitable part of the life of the community and the minor flood is considered beneficial. The community is not aware of flood forecasting and warning system. However, those frequently fighting with the floods are often more competent and knowledgeable as flood managers than highly trained professionals from outside. The local flood affected community has extensive knowledge on the exact local physical conditions and history of the flood. Existing traditional know-how can be enhanced for the forecasting and warning system. During interaction it was found that the community is familiar with the recurrence and intensity of the floods. Also they were conscious and aware that if heavy rainfall occurred (i.e. more than 60 mm/day) in the Kathmandu Valley (catchment) their area also could be flooded. Hence, some of the elite families of the community listened to the weather forecasting of the Radio Nepal and disseminated information to others. They reported that Gaur Municipality was warned through mike of the impending flood during the last 2002 flood.

As in the Rautahat, PRA meeting in both Tilathi and Launiya communities in Saptari revealed that forecasting and warning system has not been established. People were aware of frequently occurring floods and were mentally prepared for shifting away during the emergency. Even though there is no warning system, people have adopted traditional practices of watching sky over the Siwalik. Some community leader listened Radio news and passed weather information to the neighbors. During PRA, people could not provide answer to the best warning signal system needed.

Last year, Launiya community was severely affected by the Khando floods. But there was no human casualty, although the flood occurred in the morning of July 22, 2002 at 4.00 pm. In heavy rain Bachulal and Devilal whose houses were within 50 meters from the bank of the river in Launiya were watching the water level round the clock. When strange sound was heard and the riverbank started collapsing they shouted. Residents at sleep got up and escaped to the safer places. All survived but could not evacuate their food and property.

JICA had hired 2 watchmen from June to September 2002 to monitor the recently built embankment. They also provided information on floods to the community. It was informed that they are still

working without salary. People recommended continuing their services for the coming rainy season as well.

Table 5: Flood Information Collection Mechanism

District	Location	Traditional Practices (Yes/No)	System Established (Yes/No)	Remarks
Saptari	Tilathi	*Yes	No	*Watching the sky
	Launiya	*Yes	No	*Watching the sky
Rauthat	Gaur	*Yes	No	*Miking
	Brahmapuri	*Yes	No	*Watching the sky

3.8.2 Adaptation/Coping Practices

On adaptation/coping practices the team collected information segregating into 3 situational bases before flood, during flood and after flood.

a) Before flood :

There are no collective coping practices in the community. However, it was claimed that they have close affiliation with the flood and it was the inevitable part of their life for centuries. They have been fighting with the flood and were conscious and aware of it. To save life and property some traditional preventive measures were adopted. During the monsoon, community members made arrangement to collect additional food stuff, to protect equipment with plastic sheets, and to acquire tents, rubber tubes, empty drums and wooden boats and others. Similarly, they constructed elevated wooden platforms to protect clothes, utensils and food grains, etc. There was no pre-prepared coping mechanism in both Tilathi and Launiya. However, in Tilathi most of the community members were aware on the frequency of flood and mentally prepared in coping with it on an individual basis. It was revealed that most of the households in Tilathi have practices of keeping plastic sheets and few have tents for flood response. Similarly, some of the people managed their food stocks in the elevated locations. But in Launiya, there was no preparation for it. Most of the households of community have adopted wait and see strategy.

b) During Flood :

People were fully aware that flood by nature could hamper whole community at a time. During flood most of the households are compelled to manage individually as and when needed basis. The community as per their own traditional judgment moved away to seek safe places like schools, roads, and other embankments when the water level rises above risk level. Similarly, the families whose houses are completely damaged or destroyed take shelter on schools, health-posts and neighboring houses. Those who have tents and plastic sheets also move towards the safer places. There is also a chance of local level facilitation. Livestock also is kept on the uplands. In the households with permanent buildings people stayed upstairs and kept their cattle in the upland areas.

According to the community in Tilathi, the flood water remained for about 7 days to 1 month whereas in Launiya for about 3 to 4 hours. After flooding the community members took measures thought appropriate and within their reach. Some of the measures taken during the flood are:

- Moved away temporarily onto the uplands such as roadsides, banks of fishponds, school compounds, etc.
- Families with huts destroyed took shelter in school compounds, neighbor's houses, etc. and some in Tilathi used plastic sheets, tents.

- Cattle shifted to the uplands
- Families with houses submerged by 30 to 60 cm flood, remained upstairs.

c) After Flood :

This is the most crucial phase. Due to unavoidable circumstances people became socially, mentally and physically offset. At the same time they have to arrange things like clothing, shelter and food, which is very difficult. Similarly, when the water level starts to subside the epidemics like diarrhea, cholera, dysentery, pneumonia etc might cause heavy damage to human and animal life. The situations in both districts are similar. After the flood, affected families are involved in collection of remains of houses. Some of the community leaders provided assistance for the affected families. The adopted flood coping practices are summarized in table 6

Table 6: Flood Coping Practices

District	Location	Before flood	During flood	After flood	Remarks
Saptari	Tilathi	Store plastic sheets and tents	Move at safer locations	Manage oneself food and shelter. Villager provide support	
	Launiya	*No	Move onto uplands.	Shelter in neighboring houses, NGO/INGO provide relief packages	*wait and see strategy
Rauthat	Gaur	Store plastic sheets, tents, rubber tubes, empty drums, etc	Move on public buildings	NRCS and Plan provide relief packages.	
	Brahmapuri	Same as Gaur.	Move at safer places	Same as Gaur	

3.8.3 Agencies Involved in Flood Management

The major agencies involved in the flood management of both the localities are given in Table 7. Although there are many agencies working in the field but proper coordination and joint planning is lacking. All of them work detached and on ad-hoc basis.

Table 7: Involved Agencies

Location	Agencies Involved
Gaur and Bramhapuri	VDCs, District Irrigation Office, District Soil Conservation Office, Central Regional Irrigation Directorate, DWIDP, Plan International and others.
Tilathi and Launiya	VDCs, Tallo Irrigation Project, District Soil Conservation Office, Earthen Regional Irrigation Directorate, Sagarmatha Integrated Rural Development Project, DWIDP, JICA, OXFAM and others

3.8.4 Assistance Offered:

District Natural Disaster Relief Committees (DNDRC) have been formed under the chairmanship of Chief District Officer, including police, army as well as development oriented line agencies like district offices of irrigation, forest, housing and town development, Agriculture Development Bank and Social organizations like NRCS with the major responsibilities to provide immediate relief to the

flood victim. Similarly, some INGOs like JICA, International Red Cross Society, United Mission to Nepal, United Nations Development Program, World Food Program, Save the Children Fund, Plan International were also found involved in the rescue. These organizations were involved in evacuation of flood victims, rescue, providing food, temporary shelter, clothing and financial assistance for repair and rebuilding of damaged houses, relief works etc. It was reported by the community that relief provided per head is usually very low and DNDRC is ineffective and inefficient too. At the same time neighboring Municipalities, Marbadi Sewa Samiti, VDCs and some local political parties were also involved in providing relief packages with patrician and prejudices.

But strong coordination and cooperation seems lacking among the service agencies and sometimes duplication of relief fund is also reported. The data available regarding the flood affected areas are varied. It was difficult to establish the number of deaths and losses of land and houses by the 2002 flood. Preventive measures were not taken as requested. Agencies were hardly able to provide any services to the flood affected people except providing some gabion boxes and some empty bags for sand filling.

3.8.5 Assessment of Risk:

The major problems are inundation and washout of settlement areas and cultivated land, loss of life and property, and loss of cattle. After flood many families find that they no longer have homes to return to. The displaced family's only choice is to seek shelter under a roof of plastic or camp out in the village schools. Everyone in the community faces similar problem. With the coming of the monsoon each year people know that river might change its course, or erode their precious land. Communities of both locations have similar perceptions on flood. According to them, every year risk is accelerating. The people perceive that it could cause heavy damage to property, land, house and cattle. There might also be chances of human loss if the condition aggravates. People feel uncomfortable and psychologically unsafe during the rainy season. Therefore, some of the relatively well-off are temporarily migrating from the area to other safer towns and cities. The communities have been really threatened by floods.

3.8.6 Potentialities:

The communities in both the locations were found committed to make any efforts from their side to adopt required preventive measures. They were ready to manage the flood in organized way through the participatory approach. However, the communities prefer structural measures rather than the non-structural ones. It is worthwhile to mention that both the measures have to be applied simultaneously. Some of the measures preferred by the community are:

- Identification of flood shelter and relief camps
- Awareness creation on flood fighting
- Pre- information regarding the impending flood
- Arrangements of first aid and necessary medicines of mainly waterborne diseases and provision of fast foods like beaten rice
- Formation of local level relief committee and training arrangement
- Immunization provision for both humans and animals
- Spray of insecticides after flood to save from epidemic waterborne diseases like diarrhea, dysentery, cholera, typhoid, pneumonia, etc
- Coordination and cooperation among the relief committees
- Arrangement of training to local teachers, VDC and NGO personnel

Some participants of Tilathi in Saptari opined that Khando river course should be made straight and the old course through the Sakarapura should be reactivated. It was learnt from the community that both Tilathi and Sakarapura community have serious dispute over the Khando route. They have dispute over the right of way issue due to regular changes of the river course.

During PRA, Rautahat communities provided following additional opinions;

- Timely arrangements of rescue materials like tent, plastic sheets and rubber tubes and empty drums
- Arrangements of small boats

3.8.7 Similarity and Dissimilarity in Two locations

It was revealed that both the districts have following and dissimilarities on flood management.

- No warning system established
- Traditional practices on flood warning system, watching the sky
- Temporarily shifting onto high lands, public places, schools, embankments, etc.
- No collective pre-coping mechanism exists. (All the activities are done on individual basis).
- Some of the households in all the communities have individual pre-coping practices such as storing foods, plastic sheets, tents, etc.
- Some of the members of Rautahat have practice of keeping Drums and tubes
- Lack of coordination among the agencies involved.