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STUDY REPORT

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Climate Change Adaptation on Livelihood of Women Farmers

Case study of Banke and
Bardiya Districts of Nepal

ActionAid Nepal
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Kathmandu



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Acronyms

AA	:	ActionAid
AAN	:	ActionAid Nepal
ADB	:	Asian Development Bank
AEPC	:	Alternative Energy Promotion Centre
AF	:	Adaptation Fund
CBO	:	Community Based organization
CC	:	Climate Change
CEN	:	Clean Energy Nepal
CFUG	:	Community Forest Users Group
DADO	:	District Agriculture Development Office
DNA	:	Designated national Authority
DRR	:	Disaster Risk Reduction
FGD	:	Focus Group Discussion
FHHs	:	Female Headed Households
GO	:	Government Organisation
GoN	:	Government of Nepal
ICIMOD	:	International Centre for Integrated Mountain Development
ICS	:	Improved Cooking Stove
INC	:	Initial National Communication
IPCC	:	Intergovernmental Panel on Climate Change
IUCN	:	Worlds Conservation Union
JICA	:	Japan International Cooperation Agency
KII	:	Key Informant Interview
KP	:	Kyoto Protocol
MHH	:	Male Headed Household
MoEST	:	Ministry of Environment, Science and Technology
MOP	:	Ministers of Party
MoPE	:	Ministry of Population and Environment
NAPA	:	National Adaptation Programme in Action
NGO	:	Non-governmental Organizations
NSSD	:	National Strategy for Sustainable Development
PREGA	:	Renewable Energy, Energy Efficiency and Green house Abatement
PVA	:	Participatory Vulnerability Analysis
SDAN	:	Sustainable Development Agenda for Nepal
ToR	:	Terms of Reference
UNDP	:	United Nations Development Programme
UNEP	:	United Nations Environmental Programme
VDC	:	Village Development committee
WUA	:	Water Users Association
WWF	:	World Wildlife Fund

Glossary of Nepali Terms

<i>Baadh</i>	<i>Flood</i>
<i>Bari</i>	<i>Upland mostly used for maize and mustard cultivation</i>
<i>Bikashee Biew</i>	<i>Chemical fertiliser</i>
<i>Chara</i>	<i>Feed for livestock</i>
<i>Chulo</i>	<i>Cooking stove</i>
<i>Dhan khet</i>	<i>Paddy land</i>
<i>Duban</i>	<i>Inundation</i>
<i>Hasiya</i>	<i>Small knife used for grass cutting</i>
<i>Jibika</i>	<i>Livelihood</i>
<i>Kachiya</i>	<i>Big knife used for firewood cutting</i>
<i>Kathha</i>	<i>Unit of land, 20 kathha equals to one bigha (1 bigha=0.67ha)</i>
<i>Khet</i>	<i>Paddy land</i>
<i>Lagani</i>	<i>Investment</i>
<i>Lalpurja</i>	<i>Land registration certificate</i>
<i>Mausam</i>	<i>Weather</i>
<i>Pesa</i>	<i>Traditional occupation to run family livelihood</i>
<i>Sanstha</i>	<i>Institution /organization</i>
<i>Sarkar/(i)</i>	<i>Government, often titled as governments organisations</i>
<i>Sukkha</i>	<i>Droughts</i>
<i>Talim</i>	<i>Training</i>
<i>Ubjani</i>	<i>Production</i>
<i>Bhakari</i>	<i>Grain storage vessel made from wood or bamboo</i>
<i>Deheri</i>	<i>Grain storage vessel made from mud</i>
<i>Haat</i>	<i>Local weekly market</i>

Executive Summary

1. Global climate change (CC) is the continuous phenomena of changes in the earth's climate due to the human induced interfere to the natural systems of the earth. South Asia is most sensitive to CC. This region has also been suffering from many of the climate related adversities viz. frequent storm events, increased events of drought, and other adverse climatic situations that are attributed to the global CC. Crop yields could decrease up to 30% by the mid-21st century, and mortality due to diarrhoea primarily associated with floods and droughts will rise.
2. Of course, CC affects everyone. But, not all social groups are equally vulnerable to CC or flood-related disasters nor are they exposed to the same combinations of involuntary risks. The poorest of the poor especially female headed households (FHHs) are more vulnerable due to CC. In order to cope with the adverse effects of CC, women have started to build their adaptation mechanism.
3. This study covers two districts namely Banke and Bardiya, which are along the river basin of Rapti and Karnali respectively. From these districts, Matehiya and Suryapatuwa village development committees (VDCs) were selected for the purpose of micro-level analysis.
4. Women experience that their livelihood are changing with alterations in flood patterns and rainfall. The women from FHHs of Matehiya said that now the production of the crops has drastically decreased. They opined that their *pesa* (traditional occupation) is also changing as those who dependent on agriculture and livestock are no longer fully reliant on these occupations and diverted to off-farm activities. The women from MHHs have also similar thoughts. Earlier, they only confined in agriculture and livestock but now they are forced to adopt others off-farm activities too. The changing pattern of floods is observed by elderly people. In their version the effects flood was started to seen after 2041 BS (1984). For instance, Mr. Ramananda Tiwari, 53, Teacher, Matehiya, key informant (KI) said *"the production is also reduced by 25% in paddy and 15-28% in winter crops within last 10 years. The per unit investment cost is increased by 40-50 % within this period due to expensive inputs: seed, fertiliser, pesticides and labour cost"*.
5. The impact of flood in women agriculture livelihood is even severe. These are the reasons that women are immersed in debt. *"As my husband is in India for two years, I have no alternative other than go to landlord's door and get loan in expensive interest (72%)* said Ms Prema Tiwari, 55, FHH, Matehiya. Similarly women expressed that they are compelled to invest larger part in agriculture but receive fewer returns. Damages to stocked seeds and grains, living with fear and trauma, erosion of social networks and institutions, and additional work burden of women are other impacts of flood.
6. Women started to change their cropping patterns to ensure their livelihood and reducing the risk of crop failure. Mentha, banana, fishery are introduced as an alternative crop. There was a practice of keeping land fallow after the paddy harvesting for livestock grazing. Women opined that after the introduction of chemical fertiliser, different diseases are seen. Women have poor access in inputs. Post harvesting practices are also changing. The flood and conflicts also disrupted the marketing facilities. In Suryapatuwa, *haat* are closed several days due to disruption in transportation and damage of agriculture commodities like vegetables. In Matehiya, *haat* bazaar is closed due to a decade long armed conflict. The irregularities of transportation means due to damage of roads in several locations, local merchants are displaced from village due to conflicts and poor access because of continuous flooding and inundation.

7. As part the of adaptation priorities of women, several aspects are identified. Selection and management of suitable crops, carry out multiple cropping and intercropping practices, selection of appropriate seed, livestock rising, assisting community managed agro-vet and manage easy loan to women farmers are some of the women adaptation priorities. Apart from these, homestead rising for safer place, assist for inputs and skills, reclaim the agriculture land along the river bank, and improve low cost irrigation facilities are other priorities. Improve the seed storage devices, enhance knowledge and skills for cash crops and livestock and skill development training to ensure income are other identified adaptation priorities.
8. Still women are facing several barriers and constraints in order to ensure their livelihood in the changed CC context. Few of such are poor in knowledge, information and skills development. It is difficult to mobilise service centres and service providers. The residual effects of conflict situations of the past are also barrier as this situation hinders too many service providers to come and work with people. Poor access to cash and credit and facilities of easy loan is also problem. Similarly, other barriers are introduction of rural friendly labour intensive technologies, homestead rising and poor marketing facilities.
9. Given in the overall context discussed above, women want the adaptation fund to be used in the promotion of skill development training to link additional income generation, sharpen the knowledge on various aspects of agriculture and livestock, practices of multiple cropping and intercropping to reduce the risk of crop failure through demonstration and distribution of mini kit, and technical support in the adoption of market-led cash crops like banana, fishery, off-seasonal vegetables, Mentha and peppermint in the larger scale. Other areas as identified and willing to adapt by women are: homestead raising to reduce the effects of flooding and inundation, and increase the performance of irrigation through drip tube well (DTW), shallow tube well, treadle pumps, rehabilitation of traditional irrigation system and ponds, etc to increase production and reduce flooding and inundation.

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Climate Change Impact on Livelihood of Women Farmers

Dhruba Gautam¹, Shyam Jnawal², Amrita Sharma³, Ambika Amatya⁴

Chapter I Study Background

1.1 Climate Change Context in the country and the region

South Asia is most sensitive to CC. It depends very heavily on the precipitation of the variable regional monsoon as well as water derived from the glacier melt in the Himalayas; both of these affected by CC. Flood disasters are the most frequent and devastating natural disasters in this region. This region has also been suffering from many of the climate related adversities viz. frequent storm events, increased events of drought, and other adverse climatic situations that are attributed to the global CC. Crop yields could decrease up to 30% by the mid-21st century, and mortality due to diarrhoea primarily associated with floods and droughts will rise.

1.5 Livelihood scenario of women in the national and regional level

What are the livelihood women involved in Nepal and the selected districts? In Terai region of Nepal, a rice-growing civilization has been continuing since long. The landscape has been managed for floods for centuries. Communities whose livelihood depends on the productive functions of 'normal' seasonal flood cycles have learned to live with devastating effects of floods. Irrigated agriculture is the main sources of livelihood. Despite of abundant potentialities of water, majority of the farmers are still dependent on rain-fed condition. Still, unpredictable rains, incessant rains for couple of days, longer droughts and excess rain in unwanted season are causing crop damage and crop failures.

1.6 Types of livelihood groups

There are four types of livelihood groups. Majority of the people depend upon agriculture and livestock. Others are depending upon governments services, seasonal labour, sharecropping others land and daily wage labour within the village.

1.7 Current agricultural patterns

The majority of the women of rural Nepal have been involved in conventional farming practices.

Due to poor access of women to inputs and technologies, the current agricultural pattern is at subsistence level. Additionally, the crop yields are reducing due to poor quality of seed and manure, insecticides and pesticides. Women have poor access on resources/services and marketing facilities too where they can sale and buy their agriculture commodities. The closed societal culture in the Teraian caste women also hinders their mobility, which hampers in adoption of new agricultural tools and techniques.

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² Study Coordinator, Sr. Theme Leader, EDM-HSST/AAN,

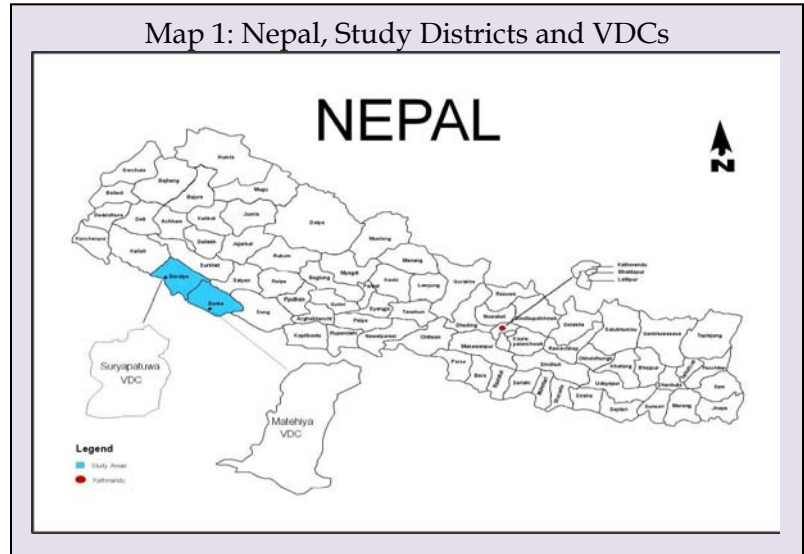
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1.6 The study area

In Nepal, two districts located in mid-western development region, namely Banke and Bardiya, were chosen for this study. From these districts, Rapti and Karnali Riverrine areas were chosen, as these two rivers are main tributaries of Ganges. From these districts, Matehiya and Suryapatuwa village development committees⁵ (VDCs) were selected for the purpose of micro-level study. Each VDC is comprised of 9 wards with two or more than two hamlets within one ward (*Please refer Map 1*).

Matehiya is 21 Km far from Nepalgunj, the district headquarters, and is considered one of the remote VDCs within the district. It is situated in the lap of Churia and its 95% land is flat land. There are no transportation and electricity facilities. A decade long conflicts further propagate the area in isolation from service providers. Its total area is 3945ha of which 725 ha is *khet*⁶ land, 169 *bari*⁷ and remaining forest land. The climatic condition is hot tropical as the temperature sometimes reaches up to 44°C. The total number of HHs is 1282 and



average HHs size is 5.47. Matehiya is dominated in majority by Teraian caste groups (97%) followed by Hills migrants (2%) and Tharu (1%). *Awadhi* is the major language spoken. The literacy rate of male and female is 30.75 and 11.65 respectively. The livelihood of majority of the population depends upon agriculture (60%) followed by livestock (15%), off-farm including seasonal labour (20%) and services in GOs and NGOs (5%) [District Development Committee's Profile, 2006]. Social unity and religious tolerance among the people irrespective of caste and ethnicity is the ornament of this VDC. Very limited NGOs are working here and the performance of GOs in terms of service delivery is extremely poor and limited. The livelihood pattern of the people is based on the seasonal labour work apart from agriculture and livestock. Except in few part of Motipur village, there is no irrigation facilities. The small Rivers flows from Churia also devastating in nature as they carry out boulders, stones and sand with water. There are no agro-vets, agriculture cooperatives and financial institutions. The people from this VDC also suffering from many hazards (*Please refer annex 2 for hazards of Matehiya*).

Similarly, Suryapatuwa VDC lies along the east bank of Karnali River, roughly 23 km far from Guleriya, the district headquarters. The geography of the VDC is flat land. There are 1234 HHs and the average family size is 5.58. Tharu is the major caste with 72% population followed by 24% hill migrants and 4% others. *Tharu* is the major language spoken in the VDC. The livelihood of majority of the population depends upon agriculture (73%) followed by livestock (10%), off-farm including seasonal labour (12%) and services in GOs and NGOs (3%) [District Development Committee's

⁵ VDCs are called Gaun Bikas Samitees. These are the lowest administrative units of the Government of Nepal (GoN).

⁶ Paddy land

⁷ It is up land with low water holding capacity and is targeted to cultivate maize and wheat.

Profile, 2006]. Like in Matehiya, the past conflict situation also make people further deprivation and marginalisation. There are irrigation facilities through farmers managed irrigation system. The Rural Reconstruction Nepal (RRN), a NGO, has supported in this regards. The Aaurai River caused many problems along with River Karnali. Like in Matehiya, there are no agro-vets, agriculture cooperatives and financial institutions. Some savings groups are operating by women. The people from this VDC also suffering from many hazards (*Please refer annex 3 for hazards of Suryapatuwa*).

1.7 Objectives of the study

The specific objectives of the study are to:

- Document women's experiences and perspectives on how their livelihoods can adapt with climate change impacts
- Provide specific recommendation on what the Adaptation Fund should be spent on to meet the livelihood adaptation needs of poor women who depend on agriculture.

This will suggest concrete eligibility criteria and priority areas, which can be adopted in Conference of Party (COP)-13/Minister of Party (MOP)-3.

1.9 Methodology used

The broad framework for analysis was to assess the status and situation on each of the key areas outlined in the terms of reference (ToR). As discussed earlier, this study is located in two river basins viz. Rapti and Karnali.

In the beginning, the study team reviewed the relevant literatures to familiar with the objective and purpose of study. Several round interaction meetings and orientation from Sr. Theme Leader, Emergency and Disaster Management (EDM), AAN and Shashanka Saadi, Field Coordinator of this study, were helpful to finalise the product framework. In the field, consultative meetings with young and elderly women (both indigenous and migrated) were organized to assess the overall livelihood scenario, the problems and constraints to run their livelihood.

The extent of vulnerability (both people and area) along with timeline and trend exercise was made before the KII and FGDs to create their interest in the discussion. A total of 10 KIIs were organized with teachers, ex-VDC representatives, and social elites, saving and credit groups, water users association and community forest users group representatives. Similarly, FGDs were organized at the field with both women from female-headed HHs (FHHs) and male-headed HHs (MHHs), separately and in the mixed groups with the help of checklist (*Please refer annex 4 for checklist used during fieldwork*). Women from FHHs and MHHs were chosen to cover the wide range of occupations viz. agriculture, livestock, and seasonal labour within and outside the village, of-farm activities etc (*Please refer annex 5 for livelihood profile of the women and other key informants*). The gender, social inclusion and occupation aspects were considered while selecting these informants. Exit meetings were organised towards the end of the fieldwork in each VDC with key informants for further verification of the information collected from various means. The information drawn from the field study, secondary information and observation were referred to arrive to specific findings. The profile of the

Chapter Two

Women's Livelihood Coping with Flood

2.1 Overview of changing pattern of women livelihood

The livelihood patterns of women were reported to change after the continuous floods, droughts and other unusual climatic conditions. Comparatively, women observed their livelihood patterns becoming different these days than two decades back. Earlier, women were totally involved in the agriculture and animal husbandry. As the production was ensured and there was enough grazing land for livestock, there was no problem for livestock rising. Involvement in off-farm activities was very nominal. Now the situation is steadily changing, hence the modes of livelihood too. They are now attracted towards off-farm activities. The pattern of off-farm employment is gaining popularity in the recent years among which foreign employment in India and even Arabian countries is regular. *"Now the production of the crops has drastically decreased. Previously, our crops were safe from the diseases and there was the ensured production. We were happy with the local varieties of crops. Animals were not suffered from the diseases. But now we are continuously losing our livestock from unidentified diseases. From the 22 HHs of Motipur of Matehiya, we lost about 72 goats and 112 chickens this year through unidentified diseases. Last year too, we lost half of the livestock in the village. In such a situation, how can we survive and run our livelihood? Our pesa (traditional occupation) is also changing with the change in mausam (weather) because those who dependent on agriculture and livestock are no longer fully reliant on this occupation and slowly diverted to off-farm activities,"* said Ms. Mani Bohara, 37, FHH, Motipur, Matehiya.

The inferences of the MHHs are also similar to FHHs. *"New challenges are in front of us once our earning patterns changes. Earlier, we only confined in agriculture and livestock but now we are forced to adopt others occupations too. It is because there is no ensure to get benefits from every occupation. We invest our efforts in agriculture but no ensure of production, we invest in livestock but there is no guarantee to make this business productive because of high death case. In my opinion, increase in flood is the seed of many problems,"* said Ms Sandhya Devi Sharma, 55, Matehiya.

2.2 The changing pattern of floods

Through the intensive discussion with women through FGDs and KIIs with other key informants, the flood patterns from 2034 BS (1977) are drastically changed. The changes in the initial years up to 2040 BS (1983) were constant as usual. But the effects of flood as a devastating nature were started from 2041 BS (1984). Its frequency is in increasing order in last three years: 2005-07 (*Please refer annex 3 and 4 for detail*). The knowledgeable and elderly people during the discussion argued that the flood will also continue in the future too as the natural balance is continuously deteriorating. *"Now I am 75 years old. I have been experiencing the number of floods in my life as I have interest in fishing since I was young. I forget the entire past floods up to 2040 BS as the nature of these floods were very normal. Those floods did not hamper the crop land and the river cutting problem along the bank was also minimal. But the flood after 2041 BS (1984) was very big. The Karnali River in the first time washed several settlements along its bank with cutting of khet land. Since then the problem is continuing. But I feel that the nature of flood in the last three years is totally different. Now the flood enters into the settlements and for some hours it looks like a river course. I am surprised why water is entering into the village. I have no ideas but I think that the flood will again cause more problems for people in the forthcoming years,"* said Mr. Thaggu Tharu, 75, Suryapatuwa.

2.3 Impact of flood on agricultural livelihood

It was observed that the impacts of flood on agriculture livelihood are several. The major impacts inferences from the discussion with key informants are: river cutting the agricultural land, forceful migration of settlements that reside along the riverbank, and sedimentation of cropland by

boulders and sand. In the other hand, due to erratic rain, flash flood and longer droughts, the production of crop has decreased and its trend is continuously decreasing. The unexpected diseases in the crop during and post flood situation also caused in the decrease in crop production. It was shared that the size of the cultivated land going to be decreased whereas the population is increased every year. Mr. Ramananda Tiwari, 53, Teacher, Matehiya, said *"In Matehiya, about one-third agriculture land has either eroded or through sedimentation by the flood within 30 years. The price of land along the riverbank has drastically gone down. I experienced that many landlords have become landless within few years so they migrated to other places due to social prestige. The production has also reduced by 25% in paddy and 15-28% in winter crops within last 10 years. The per unit investment cost is increased by 40-50% within this period due to expensive inputs: seed, fertiliser, pesticides and labour cost. The cases of death from flood related phenomenon are the highest in the village"*.

2.4 Impact of flood on women agricultural livelihood

The poor, marginalized and the disadvantaged women from study VDCs, who solely depends on natural resources and climate sensitive sectors such as agriculture and forestry for their livelihood, are more vulnerable from CC impacts. For instance, majority of the small farmers depends on the monsoon rain in the study district. So changes in the rainfall pattern are proving fatal for these farmers. Similarly, the extreme rainfall and downpour causes landslides and soil erosion in the upper catchments and destroy the property or even take life in the downstream, i.e. Terai.

Women said reduced crop production due to climate related risks such as drought, heavy rain, hailstorm and so on; loss of fertile land due to flood, soil erosion and deposition of sands; introduction of new fungal and bacterial diseases propagates the famine and hunger.

i. Immerse in debt: Every year, the flood damages the crops and land whereby making women further poor, and forced them to fall in the vicious circle of poverty. It reduces the socio-economic strengths and compels to take loan from private moneylender to run their livelihood (interest rate is 60-120% in Matehiya, Banke). The financial institutions working in the village have closed their services due to a decade long armed conflicts. The FHHs are not much involved in the saving and credit groups in the village; hence they have poor access in the easy loan. Hence, they are immersed in debt every year as there are no alternatives to pay back the loan. *"My husband is in India from last two years, hence I have to decide for my kids and family about how to run house. My Chhimeki (neighbours) are in saving and credit groups so they are benefited as they could take loan in low interest rate. I am unable to be a member of the groups because I could not save the fixed amount as group decided. Therefore, I have no alternative other than go to landlord's door and get loan in expensive interest (72%). As I am sukumbasi (landless), I could not get loan from sarkar (government),"* said, Ms Prema tiwari, 55, FHH, Matehiya. The pattern of taking loan in the case of MHHs is slightly different. For instance, Ms Parvati Yadav, 59, Matehiya said *"As we are in the Bachat Samuha (saving groups), we decided to allocate the loan among the members monthly in the rotational basis. My life is getting easy after becoming a member of samuha. Otherwise, I also have to take loan from sahu-mahajan (moneylenders)"*.

ii. Damage of stored seed and grains: The flood damages stored seed and grains due to flooding and inundation. Its direct impacts are visualised by the women on the crop of next year planning and thus on the food security. *"Look, we will be unable to run our houses next year and we will suffer from bhukh (hunger). It is because we are unable to buy expensive seeds from outside. The wet seed caused by flood will not easily germinate, hence its effects are in the total production"* said Mr. Pim Bahadur Basnet, 56, Social worker, KII, Matehiya.

iii. Larger investment and fewer return discourages the women: Larger investment and fewer returns from the agriculture activities discourages the women to involve in this sector. But there is

no alternative. Hence, poor investment further impacts on the production and it discourages them to fully rely on agricultural activities. *“Last year I invested Rs 9000 to transplant the paddy in 11 Kathha of land (hire oxen and tractor for plough, seeds and fertiliser). But I could not harvest the paddy of Rs 3500 because of baadh (flood) and explosion of pat batarne kira (special diseases in paddy). In such a situation, how could we reap benefits from dhan kheti (paddy crops)?,”* said Ms Birma Budhathoki, 36 MHHs, Matehiya. But women from FHHs have different problems. *“As we can not afford of additional lagani (investment) in selection of good seed and manure, the total benefits we expect are continuously decreasing. The price of all inputs is so high that we could not afford. If such trends are continuing, nobody will take others land for sharecropping because there is no benefits from continuous duban (inundation),”* said Ms Harichayeni, 45, FHHs, Suryapatuwa.

iv. Living with fear and trauma: The women during the discussion shared that erratic rain, floods, droughts and other natural calamities are the common phenomenon in the study village and women experienced these unusual situations for 12 years. These situations are inviting new fear and trauma. Gautam (2007) observed that in the flood affected area, people are suffering from many socio-psycho problems. This is due to relocation, poor social closure, collective action and poor community safety. Others reasons are poor social network, inequality, social institutions and integration. Likewise, poor social insurance and social solidarity make them of the condition of hopelessness hence suffering from continuous fear and trauma. *“We lost our power and enthusiasm. Hence we are suffering from many problems. How can we escape from these problems as there is no guarantee of production from transplantation of paddy and our life have threatened due to flood? We were unable to sleep for several nights because of possible risks from the flood. The damage of crops in such a situation is secondary”,* said Mr. Sashi Budhathoki, Teacher, Matehiya.

iv. Erosion of social networks and institutions: When a community is hit by natural calamities, all of its social institutions are likely to be affected. Gautam (2007) identified that after natural calamities, the entire social fabric that defines a population as a community is seriously weakens. Women have to relocate some permanently, hence neighbourhoods are destroyed, friendships are severed, support networks are broken and family relationships come under greater stress. Schools, social groups and families are apt to never be the same. *“After the big flood, family roles and responsibilities undergo considerable change. Economic hardship and living conditions worsen. It is because we are compelled to seek alternatives. Women are now also involving in the foreign employment in Arabian countries to ease the family problems. As a result, family structures undergone unmanaged,”* said Taranath Neupaney, 56, Headmaster, Mahedra Secondary School, Matehiya. *“Due to dangerous flood of 2041 BS (1984), we migrated fourth time within and outside the districts. We are compelled to do so to live and ensure our jibika(livelihood). Hence, we lost our kin, neighbourhood and brotherhood. It means we lost everything. It is very difficult to adjust in the different caste people in different cultural condition”,* said Ms Makaiya Chaudhary, 50, MHHs, Matehiya.

v. Additional work burden: Women reported that most of the poor and *ex-kamaiya*⁸ are more affected from the flood because they are compelled to live in low land and along the riverbank. The production is also considerably decreased in the recent years due to flooding. As a result, most of the male population after the paddy transplantation go to India for seasonal labour work living women, children and elderly people at home alone. As a result, these women have additional work burden at home and have to face flood alone and became more vulnerable due to their poor coping capacities. *“I am not willing to send my husband to work outside of village. Earlier, it was not necessary to go outside as the children were few in numbers and the production was suffices to feed the family members. Girls are also regularly attending the school. I still remember that I used to involve in the family activities*

⁸ bonded labours

only and my husband took agriculture related tasks. But now everything is changing rapidly as dreams. Now I have to involve and decide in all sorts of activities. My elder daughter dropped the school as I asked to help me in agriculture work and involving in the daily wage labour. My neighbours suggested enrolling my daughter again in the school but it is not possible, because I know my problems better than others do," said Ms Mintu Tiwari, 36, Matehiya.

vi. Seasonal migration outside the village

As the production of crops is not sufficient to run the livelihood of growing population, women started to seek alternative options. For instance, some women from Muslim community of Matehiya and Tharu from Suryapatuwa went India and Arabian countries to earn. "I think it is itself a challenging work. Before 2050 BS (1993), no single woman from these communities was outside the village in search of employment. In Suryapatuwa, one member of each Tharu family went outside as seasonal migrants. This practice is continuing as we still face the problem of labour shortage during peak agricultural period and may be agriculture would receive less priority in forthcoming years," said Ms Harchayani Chaudhari, FHH, 45, Suryapatuwa.

"I also want to go out of country for employment but there is no one to look after my children and their education. Similarly, lending money at higher rates is also risky for me. I am not sure whether I can earn that money or not," said Ms Setu Budathoki, FHH, 35, Matehiya.

The women of FHHs mostly take loan in higher interest rate from private moneylender. "As my husband is outside the village and I need occasional loan to run my family, I have no alternative other than visiting to moneylender to seek loan even in high interest rate. It is therefore, we need micro-credit facilities targeting the women from FHHs like me," said Ms Laxmi Chaudhari, FHH, 45, Suryapatuwa.

2.5 Cropping pattern

It was observed from the discussion that women started to change their cropping patterns to ensure their livelihood and reducing the risk of crop failure. It was shared that a decade back, majority of the people relied on paddy only in monsoon crops. There were little practices of cultivating winter crops. Wheat was introduced only after the 2052 BS (1995) in Matehiya. The *Alas*, *Chana* (beans) are also new crops for both VDCs.

Due to unpredictable climatic conditions that women faced during this decade, they are seeking alternatives crops along with paddy. In Matehiya, Piperment and in Suryapatuwa, Mentha is introduced as an alternative crop. Women are enjoying with these crops though the coverage is very minimal. The FHHs have poor access in these new crops due to poor investment capacity, skills and knowledge. "I started to seek alternative crops to reduce the risk of crop failure of every year. Off-seasonal vegetables production, fisheries, and banana cultivation in Suryapatuwa are started and I am one of the women farmers. These crops are less suffering from flood and unpredicted *sukhha* (droughts) as compared to paddy. I started to cultivate vegetable in kitchen garden as well as for commercial purpose. There is no alternative other than changing the cropping patterns to reduce the risks of crop failure," said Ms. Lautani Tharu, 56, MHH, Suryapatuwa. It was reported that majority of the FHHs are still following the conventional agriculture practices. It is because of ignorance, poor investment and lack of risk bearing capacity.

The culture of food habit is also changing with the change in cultivation of different crops. "In Tharu society, even until few years back, there was a belief that the wheat cultivators are poor people (those who cultivates wheat in more land is poor). It was the reason that I am not happy to marry my daughters with wheat cultivators. It is because, in Tharu society, we prefer to eat rice rather than Chapati. But these cultures

are no longer remaining because of changing patterns of mausam. We are forced to change our food habits with changing in kheti pranali (cropping pattern)" said Mr. Hereru Tharu, MHHs, 56, Suryapatuwa.

2.6 Cropping intensity and crop diversification

Two decades back, there was a practice of keeping land fallow after the paddy harvesting. It was solely for livestock grazing. The coverage of winter crops was very minimal. Now, with the growing demands due to population pressure and continuous problems of flooding and droughts, people started to cultivate varieties of winter crops. The practice of keeping land fallow is drastically reduced. "How can we live unless cultivating winter crops? I am unable to harvest paddy in last two years due to inundation then sedimentation. This year, I tried to transplant paddy three times but was not successful. All investments were in vain without any return. This is the reason that I started to cultivate Masuro, Wheat, Gram, Maize in bari land and Mustard, Aalash, Peanuts, lentil, Potato, Vegetables in khet land" said Mr. Ramananda Tiwari, Teacher, KII, Matehiya. Cultivation in bari land is comparatively a new practice in Matehiya. In Suryapatuwa also, women shared the increase in crop intensity and diversification. "This year, I tried to cultivate variety of crops one after another season without keeping land fallow. The good production of wheat, lentil and mustard was helpful to fill the gap of paddy failure. Though I need much amount to invest but I am satisfied that I will continue to adopt these practices. I think we need to go with changing pattern of weather," said Ms Santu Chaudhari, 55, FHH, Suryapatuwa.

2.7 Agricultural diseases

It was perceived that high humidity creates a favourable environment for the growth of fungal and bacterial diseases. It was also seen that in hope of better production, women started to use more chemical fertilizer, haphazard use of insecticides and pesticides without consultation with relevant technicians. The reduction in compost manure is due to decline in HHs labour force in the recent years and its impact was reduction in number of livestock. This is primarily because of nuclear family structures, tendency of seasonal labour in India and because of minimal grazing area.

"Previously I used bikasi mal⁹ in my farmland. In my knowledge, bikasi mal has been seed for different insects and pests. We hardly experienced diseases like now in crops before the use of this fertilizer. But the trends of new diseases are increasing with the excess use of bikasi mal and pesticides," said Ms Bishnu Adhikari, 32, FHH, Suryapatuwa. Women realized the explosion of pest and diseases after a decade back once the mausam is changing. Gavaro and Paat batarne kira are mostly seen in paddy especially during longer droughts. Despite of several efforts, the pesticides do not work properly. "Diseases are not only in crops but we experienced in human being and in livestock too. Diarrhoea, dysentery, fevers, skin related infection, swelling of feet, and headache and flu are the most common diseases in human being. Diseases are increasing because temperature is continuously rising. Animal husbandry is good alternative for income generation but we are unable to invest more in livestock because of new diseases. The trend of last few years is not much encouraged for us. There must be some relationship among the disease with flood and sukhha," said Mr. Munsu Yadav, 48, KI, Matehiya. Similar finding is also recorded by Gautam (2007), in Himeniya VDC of Banke, children are more sufferers from different problems of cold, headache, etc in the recent years. There is a strong correlation among flood, droughts and diseases in crops, human being and livestock.

⁹ Chemical fertilizers

2.8 Access to inputs (seed, loan)

It was revealed that majority of women lacked access to cash and credit as well as knowledge and access to hybrid seed or fewer opportunities to exposure on new agriculture tools and technologies. These conditions create situations to make unattainable capacities for women. It was shared that mostly well-off farmers use hybrid varieties of paddy like 6201, Kabir, 763, and Sabitri. The cost of hybrid seed is very expensive (Rs 250/kg).

In the other hand, women have poor capacity to take risks, as there is no guarantee of increase in production even with the use of hybrid seeds. Hence in FHHs, women are compelled to use the local seeds and conventional technology. *"I am deprived from two ways. First, as I am unable to invest more money to buy good quality seeds and technologies to produce more yields and second, diseases affected the local seed more after the introduction of hybrid varieties in village. How can I cope with these situations? If this situation continues even in the forthcoming years, I will die because I will not be able to grow paddy in my land. It is therefore, the sarkar (the government) should manage easy loan for us to initiate new agriculture practices in order to adapt with diseases and pests,"* said Ms Parvati Yadav, 59, Matehiya.

2.9 Productivity

From the several round discussions with women, it was inferred that temperature, humidity, and precipitation are important climatic factors for crops. The changes in these factors are leading to failure of some crops and decrease in production. *"I am 60 years old and I never experienced flooding, sukhha, hot winds, and hailstones before as of the recent years. Nowadays I am always in fear with these problems unless I harvest the crops. It is not even sure to save the harvested and stored grain as I am suffering from the flooding and inundation problems. I am puzzled why these problems are happening continuously. Whatever the reason is, the trend of crop failure and decrease in production is in decreasing order,"* said Ms Chandrika Tiwari, 60, Matehiya. There are several similar opinions made by other women as Ms. Tiwari. *"Before last year, I was able to harvest 30 mond (1 mond equal to 40 kg) paddy from 12 kathha of land. Last year despite of sukhha and flood, 22 mond paddy was produced. But, this year, the paddy was inundated for several days but I again transplanted the paddy. Now the growth of paddy is not impressive and the longer sukhha caused more problematic. I guess, I could not able to harvest not more than 11-12 mond paddy. In such a situation, how could I engage in the khetipati (agriculture work)? The total earning made by my husband from India is invested in this unproductive business as I am suffering from flood and sukhha continuously for few years. There are no irrigation facilities,"* said Ms Sunita Tiwari, 30, MHH, Matehiya.

Table 1: Crop-wise Production in Matehiya

Crop per kathha	Production in Kg	
	1997	2007
Paddy	100	50
Wheat	Not practiced	20-25
Maize	Not practiced	50-100
Mustard	30	40
Aalash	25	40
Lentil	25	25
Potato	50	45
Gram	50	10

Source: FGDs, Personal communications

The irrigation canals originated from *churia* in Matehiya were abandoned after the high degree of soil erosion. This results the disruption in irrigation facilities that originated from the lap of *churia*. Hence, inadequate irrigation facilities is also hindering factor for low production. The use of low quality of chemical fertilizer also caused the reduction in yields. The outbreaks of many diseases are other reasons. It was also reported that the less productivity is also due to labour shortage during peak agriculture period as most of the male willing to go outside the village for seasonal labour work. The production trend of Matehiya is given in table 1. *"Climate change put crop yields down by 30 per cent over last two decades. And its rate is increasing continuously. If this trend is even continuing, I am unable to invest money for agricultural activities. I still remember that when I was 18 years old, my mother shared the she could able to produce 5 mond mustard from 1 kathha of land now I am unable to*

produce even no more than 1 mond mustard from the same land,” said Mr. Ishwori Bashyal, 41, social worker, Suryapatuwa.

The sedimentation in the cropland is likely to decrease the total production of the crop. It has forced the poor women either to sale land or to migrate to other area or engage in off-farm activities to run their livelihood. The land value has drastically decreased once the production has gone down. *“In the beginning, we bought land in the lap of Churia in order to use sediments from flood (first flood is considered good for soil). Before 2052 BS (1995), there were no problems of flood in my land. The production was much higher then and the same was the cost of land. But now, both are in the decreasing order. Now, instead of water the land areas is continuously reducing due to sedimentation and encroachment,”* said Ms. Anuwara Mukeri, 52, MHH, Matehiya.

2.10 Post harvesting practices

It was found that the types of grain storage devices used are depends upon the well-being of the women. Those who have capacities to invest more and access in forest resources used to construct *bhakari*¹⁰ otherwise go with *deheri*¹¹. It was found that most of the FHHs have *deheri* rather than *bhakari*. During the inundation, most of the *deheri* are damaged, hence often loss of grain but the grain in the *bhakari* remain same except produce going wet. There is a local practice of keeping firewood, grass and grains by making *attiyas* (strong stairs like thing made up of wood).

“Due to frequent inundation problems, I started to raise my deheri and construct some bhakari. This is additional burden for me to make it in higher elevation and invest for bhakari as it is itself costlier. When the floor level gets moist, the attack of insects and pest also increases. This is the reason that we started to keep seed by mixing with wood ash and other medicines. Before a decade back, there was no need of mixing medicine with wood ash. Wood ash was sufficient to protect the stored seed. The post harvesting practices are also changing over the years,” said Ms. Raj Kumari Pasi, 50, FHH, Matehiya.

2.11 Marketing behaviours

Women repeatedly expressed that because of several days of flooding and inundation in recent times, their mobility outside the village has reduced. *“In Suryapatuwa, this year haat¹² was closed for several days due to disruption of transportation and damage of agriculture commodities like vegetables. In every Tuesday, there is haat bazaar (temporary weekly market) in Orali Bazar, next to Suryapatuwa village. Until 2040 BS (1883), the haat bazaar used to take place was along the bank of Aurahi khola (river). But the flood of 2040 swept that place. Now, apart from Orali bazaar haat, I used to visit Kothiyaghat, Sanoshree and Taratal for marketing purpose but only in winter. In monsoon these places are mostly inundated and often flood destroys the village road that links to this place. Such frequent flooding of market area also hampers me to sale fresh vegetables as the markets are closed during flooding,”* said Ms Chidda Tharu, 35, MHH, Suryapatuwa.

In Matehiya, *haat* bazaars are closed due to a decade long armed conflict. Hence women were compelled to visit either Jamuna, Sarabasti of UP/India or in Nepalgunj for the marketing purpose. People preferred to visit India, as it is nearer than Nepalgunj. In FHHs, women are more responsible for marketing activities also. *“The exposure of Muslim women like me in marketing activities has also increased when male members of the family are outside the village. Being a Muslim woman, I was reluctant to go outside but now it is common. There is no alternative. I started to sale goods within and outside the village, which are mostly bought from India. This is a new practice for me. It is not my interest*

¹⁰ Made from wood or bamboo

¹¹ A mud made vessel to store grain. It is originated from Tharu culture but now used by every one in the Terai of Nepal.

¹² It is the local market where people buy and sell their domestic and farm products. They are very popular for the social gathering where they can interact on other issues. They are becoming social platforms in many places

but the income meets some requirement of my households demand”, said Ms Tayara Begam, 52, Matehiya. The irregularity of transportation because of damage to roads in several locations has caused the slow marketing transactions at local level. In Matehiya, women during the discussion revealed that they are unable to sale and buy commodities as the local merchants have displaced from village due to the residual effects of a decade long armed conflict. The flooding and inundation also has hampered the marketing facilities within the village (disruption of road, agriculture commodities, chances of sweeping away by flood etc).

2.12 Hunger and famine-like situation

Women during the discussions opined that the production is continuously decreasing while investment in agriculture is increasing. This is also the demand of time. The investment in agriculture is often risky due to unpredicted climatic conditions. The growing population pressure results in heavy encroachment along the riverbank. In such a situation, FHHs are compelled to take loan in higher interest rate from private moneylenders to cope with their livelihood. Similarly, poor access to and control over the local resources like forest, water and land, and more investment on treatments of family members during post flood situation caused women to entrenched in poverty and hunger. *“As the crop yields have decreased and with the limited income opportunities particularly during flooding season, I am compelled to curtail the amount of regular meal we are taking or even have to sleep with empty stomachs. The high interest rate of loan caused additional burden for my family. The amount earned by my husband from India is suffices to pay interest only and I am unable to pay back loan to my master. This is the reason that I compel to sale 2 kathha of land in cheaper rate. It is difficult to get loan if there is no collateral. I am thinking to keep my 1 kattha in the badhaki (mortgage) in order to take extra loan to run my house. It is sure that in few years we will completely become landless. These are the reason that my family is struggling with hunger and poverty,”* said Ms Bina Adhikari, 25, MHH, Suryapatuwa.

2.13 Cause and effects of flood on agriculture livelihood

Major causes of the floods: Upon asking the women about the major causes of flood and inundation, they opined that probably the deforestation in the upper catchments of river basins, deposition and siltation and increasing of riverbed, construction of Laxmanpur and Kailashpuri Dam by India in border area of Banke and Bardiya districts respectively are the major contributing factors. *“We perceive the construction of Kailashpuri dam along the boarder area is the main reasons for inundation. Actually the problem of inundation was experienced after the construction of dam. In my opinion, the volume of water in the river has remained same. I am surprised that why they (India) block the water?”* said Ms Puja Tharu, 56, MHH, Suryapatuwa.

Small torrent flows from Churia¹³ like Singahiya also caused siltation and flooding in the northern part of Matehiya. The extraction of boulders and sand from the riverbank like in Kothiyaghat, Bardiya is also responsible in lowering riverbed, which eventually invites the river cutting and flooding. As shared by the women, *Khoriya*¹⁴ cultivation in the upper catchments, poor drainage system in the village, and river encroachment due to increased exploitation for sand and silts are among the other factors for flooding.

Major effects of these constraints: There are several effects of flood in women's lives and livelihood as shared by majority of women. First, the major effect is decrease in crop production. Second, flood damages majority of the thatched houses. Those who still stay in their houses are living with fear because these houses are at risk and can possibly fall down at any time. Ms. Chandrawati

¹³ The first range arising north of the Indo-gangetic plain, up to 1000 m, geology and soil composition consists of clay stone, sandstone, conglomerate and loamy skeletal. The term Siwaliks is used throughout the Himalayan region. Churia (or chure) is a Nepali word for Siwalik range. Locally, the word chure is used to describe a single hill crest, and Churia to describe a group or a range of hill crests.

¹⁴ Clean cultivation for shifting farming practices

Tiwari, 60, from Bhagawanpur said, *"We could not cook food for five days, flood swept away everything, our clothes and food. We suffered a lot. The first flood of this year also damaged our stocked seeds, grains of cereals and vegetables when it entered into the village in night"*. Third, flood always come with another creeping disaster of epidemics like fever, typhoid and cholera, which again worsens the post flood situation. *"After every flood, I am experienced that there is an outbreak of water borne disease. This may be due to poor quality of drinking water. Insects and pest are in increasing order on farmland with every flood as numbers of birds are decreasing in the area. Earlier, birds eat those insects but now few or no birds can be seen in agriculture field."* says Mr. Ishwori Basyal, social worker. Suryapatuwa. Forth, women are suffering from psycho-social problems as male member leaves for outside the village for seasonal employment when there are catastrophic effects of flood in the family during monsoon. This adds burden to already impoverished women. *"When husband is not around during flood, I am always in fear of whether I have to save myself or the kids, or the house, livestock or the agriculture land"* said Ms Laxmi Chaudhary, 45, FHH, Suryapatuwa. Fifth, schools are closed for several days due to flooding. Sixth, off-farm seasonal activities are hampered due to flooding and seventh, animal husbandry is mostly affected due to unavailability of grass, and litter, poor grazing facilities, etc. High mortality rates of livestock are also recorded due to sudden disease attack in during and post flood situation. The contaminated water is the causes for several diseases in human being, and livestock.

2.14 Initiatives undertaken by GOs and NGOs to cope with flood problem

The existing services delivered from GOs and NGOs are not sufficient to cope with the effects of flood. The government institutions are idle to deliver the services and the NGOs are still followed 'wait and see strategy'. *"Compared to the extent of damages caused by flood, the initiatives undertaken so far by Sarkari (government) offices and NGOs are very limited. In Matehiya, we formed Mahila Bachat Samuha to ease the loan among group members. In my view, there are several needs to ease the effects of flood. We need irrigation, pure drinking water, easy loan, skills to improve khetipati (agriculture crops) and earn additional income, etc. We were able to invest some amount in deep boring to ease irrigation facilities for some part of Motipur village. Plan Nepal has supported us in this initiative. In my view, we are not able to get other support from other sansthas (organisations). We heard that many sansthas are still reluctant to work here with the effects of conflicts,"* said Ms Sandhaya Devi Sharma, 55, MHH, Matehiya.

Compared to Matehiya, the numbers of NGOs are more in Suryapatuwa. *"In Suryapatuwa, Rural Reconstruction Nepal (RRN), Plan Nepal and Lutheran have been delivering their services directly and indirectly to cope with flood's effects. "Plan Nepal has been helping us in the formation of bachat samuha (saving group) and supporting us in seeds, manure in subsidy basis. RRN provided 65 pieces of gabion wire to make check dam in the Aaurahi river. Lutheran is supporting us in the income generation activities through skill promotion. Department of Water Induced Disaster Prevention (DWIDP) provided 116 set gabion wires to improve the farmer managed irrigation system. Similarly, under the initiation of Plan Nepal, we planted Bamboo, Sesame, Lahare Pipal, Chinese Simal, and khar (hay) along the riverbank to control the soil erosion. We are satisfied with the services of NGOs but we never get support and advice of sarkari offices. We need more support from sarkari offices too to reduce the effects of flood,"* said Mr. Ishwor Bashyal, 45, KI, Suryapatuwa.

2.15 Barrier of existing policies to improve the agriculture livelihood

Women during the discussion shared that the provisions made in existing policies are also hindering factors for improving their agriculture livelihood. *"We have 7 kathhas of land. The lalpurja (land registration certificate) is in the name of my husband. During the emergency, I could not take loan keeping land in the financial institutions as collateral. This is the foremost problem for me as my husband is mostly worked in India,"* said Ms Laxmi Chaudhari, 45, FHH, Suryapatuwa. *"Until now, men are considered as defacto family head but very few male are living in the village throughout the year. As my husband is outside the village, I unable to be a member of irrigation water users group and farmers groups,*

etc as they are seeking the presence of my husband. That is why I could not able to receive the services. I don't know why such provisions are keeping in the rules (policies), "said Ms Satwanta Yadav, 40, MHH, Matehiya.

Table 2: Summary of key aspects of livelihood, coping strategy, and constraints in coping

Key aspects of livelihood affected by flood	Coping strategy	Constraints in coping
<i>Selection and Management of suitable crops</i>		
	Introduction of market-led crop varieties to earn more	Inadequate knowledge and skills for adopting market led crops, poor market facilities, reluctant to invest in these crops due to poor confidence
	Beginning of early paddy of short duration to safe from flood	Agriculture technician are not helping in initiating early paddy, poor exposure
	Cultivation of flood and drought resistance crops to reduce the crop failure	
<i>Carry out multiple cropping and intercropping practices</i>		
	Started in small scale mostly in winter crops to produce more, reduce the risk of crop failure	Problem of irrigation, not have adequate knowledge, reluctant to take risk,
<i>Selection of appropriate seed</i>		
	Choice of hybrid variety of seed to produce more	Hybrid seeds are costlier, not easily available, less risk bearing capacity
	Making gaps in seedbed preparation to reduce the risk of flood, inundation and longer droughts	Problem of irrigation
<i>Assisting community managed agro-vet</i>		
	Use improved seed, use chemical fertilizer and pesticides mostly buy from India	Women are reportedly cheated by Indian merchant, no services available by technicians, no agro-vet within the village, poor technical know-how
<i>Manage easy loan to women farmers</i>		
	Provide subsidy to women to adopt new technologies to take easy loan	Not all women are member, subsidy policies are is not pro-poor,
	Strengthening saving and credit groups and establish cooperatives to initiate micro-enterprises	Saving groups focused on only saving, poor mobilization of credit, nor cooperative to get more services available within the village
	Initiate group farming to build the social security in case of emergency	Problem of social unity because repayment rate of some member is extremely low, caused dissatisfaction among the women
<i>Homestead raising for safer place</i>		
	Try to escape from flood, seek neighbour help to stay during inundation	Dense cluster, not able to invest, interest of conflicts, problem of land entitlements
<i>Assist for inputs and skills</i>		
	Use of inputs and skills to produce more	Poor investments for inputs , low risk bearing capacity of women, poor skill and exposure

Reclaim the agriculture land along the river bank		
	Plantation of fodder, litter and grass along the river bank, reclaim some land along the river bank to cultivate	Unavailability of seedlings and saplings within village, unable to invest in gabion wire and other tools
Improve low cost irrigation facilities		
	Use DTW to cover some area, rehabilitate small irrigation system managed by farmers	Poor irrigation facilities, mostly depend on rainfed, traditional irrigation systems are silted or abandoned by torrents and floods
Improve the seed storage devices		
	Mostly use <i>bhakari</i> and <i>deheri</i> for the purpose of grain storage. Some use <i>Aataiya</i> to safe seed and grains from flood and inundation	Poor women mostly have <i>deheri</i> so easily damaged by flood, unable to invest to make wooden <i>bhakari</i>
Enhance knowledge and skills for cash crops and livestock		
	Cultivation of crops and raising livestock in traditional approach, Initiation of improved varieties of livestock , sell meat and milk	Suffered from unidentified diseases, no agriculture and veterinary services from <i>sarkari</i> technicians, reducing of grazing land, no availability of fodder, grass and litter

Chapter Three Adaptation Priorities

This section discusses the short and long term adaptation priorities of women and potential barriers and constraints and solution.

3.1 Selection and Management of suitable crops

A. Market-led crop varieties with proper inputs and demonstration

The changing climate and its associated effects make women to introduce market-led crop varieties to run their livelihood. Women during the discussion expressed that the monsoon crops in the recent years were no longer reliable due to frequent flood and droughts. Very few women are started to cultivate market-led crop varieties. *"We prefer to grow mentha, vegetables, fisheries and banana. Mentha crop is very popular because of its high market value (cost of 1 kg mentha is Rs 800 and it is used for oil extraction). The benefits of these crops are four fold greater than cereal crops. The extent of flood damage is also less in these crops as compared to paddy. Given situation, there is a need of introducing market-led crop varieties,"* said Ms Rama Neupaney, MHH, 40, Suryapatuwa. Similarly, Ms Prema Tiwari, FHH, 55, Matehiya also highlighted the importance of market-led crops. She said *"I started Piperment and sweet potato to grow for first time once I heard about their benefits. But there is a problem of marketing of these products. In my community, even Muslims women involved are in milk and firewood selling business to India. It was never in practice before in Muslim culture. If we do not able to change ourselves to cultivate and initiate the business as per the changing situations, we could not survive. It is therefore, we strongly need market-led crop varieties with inputs and demonstration. "*

In the opinion of Mr Bhupal Neupaney, Suryapatuwa, the changes in climate has forced to introduce market-led new crops. He further added, *"We have started to our new initiatives once we victimized by the changing patterns of mausam. If the production is ensured as 15 years back, there is no need to go with different alternative crops. These crops need more investments and care too. We are surviving in the under tight marketing system. Therefore, we need both inputs (materials and training) and demonstration too"*

It shows that women want to get enough inputs with proper demonstration for the cultivation of market-led cash crops.

B. Inputs support to introduce early paddy

In the study villages, only few women who have access to new technology, exposure to new skills and knowledge have started to cultivate early paddy to escape from the problem of flood and inundation. Mostly well-off women have such access as they can invest and use DTW for irrigation but some of the women from FHHs have no access in these inputs. They also are demanding to access in inputs as other well-off women so that they can protect them from vulnerability. *"Frequent damages by flooding and decrease in crop yields has leaded me poor. How to escape from sukha and flooding/inundation. We are unable to manage inputs for early paddy because of poor mobility, confidence, lack of skills and unable to invest for this. If there are resources to support them, we can initiate early paddy as heard that these are beneficial to fight against flood. we need good varieties, chemical fertiliser and skill training on how to cultivate early varieties, how to install seedbed, transplantation, proper use of fertiliser and pesticides "* said Ms Laxmi Bohara, 34, Motipur, Matehiya, member of CFUG.

C. Support in the cultivation of flood and drought resistance crops

Women during the discussion repeatedly stressed that the amount of rainfall has reduced but it tends to be erratic and variations in temperatures are observed over the few years. Some women have learned the effects of climate change because they heard about it from FM radio. In this context, they are in the opinion of cultivating varieties of crops that are even cultivable in flooding and longer drought. For this they are requesting to receive the technical knowledge and skills. *"This year's flood has no comparison to yesteryears'. This time flood has discouraged us extremely. All villages were affected; there was no place to escape, everywhere was inundated. The paddy was damaged and we are unable to transplant again. That's way we are seeking some alternatives may be we have to go for flood and sukhha resistance crops. We heard from FM radio but not have clear idea who can support us in this regards. Therefore, if we get both inputs and know-how through talim (training), we can produce more through flood and droughts resistance crops,"* said Mr. Ishwor Bashyal, 45, KI, Suryapatuwa.

Case Study 1: Changing mausam caused life problematic

I am Ms Nim Kumari Bohara (FHH), 32, living in Matehiya-4, Motipur with my son and husband. Because of low or no income, my husband went to India for seasonal labour. In each year, he often goes there after paddy transplanted to earn some money otherwise we could not run our house. This practice is continuing for last eight years, as the production is very low. In my opinion, regular *Baadh* and *Sukhha* are some reasons for low production. Agriculture, daily wage labour, selling fire wood, are some of our main sources of income. The earning sources are also limited like fetching firewood because the nearby forest is converted in to community managed forest. I am unable to save some amount in case of emergency. I used to earn Rs.50 per day or 5 kg grain as wage. I prefer to use local variety of paddy to cultivate in my 3 *kattha* of land. We also grow mustard and *masuro* (lentil) as winter crops.

I have thatched house near the riverbank, so is mostly affected by *Baadh* and *duban* every year. I remember that in the recent years, we have been facing more problems. This is the reason that a large part of earning is invested to make safe place to live. There is a need of maintenance of house after each *Baadh*. I feel extreme hot in summer and less cold in the winter but no idea why such things are happening. People said that *mausam* is now changing and different than in earlier years but I have no idea. As the rain is always uncertainties to come, we started to make difference in seedbed preparation to reduce the risk of crop failure. Struggling with *Baadh* and *Sukhha* is our part of life. I wish of owing house in safe places so as to reduce the adverse impacts of *Baadh*. I am saving Rs. 10 per month in *Mahila Bachat Samuha* (Women Saving group). The money collected in a group was used for boring (artesian) installation. To me, it is important because we are unable to rely on the rainwater as its pattern is always changing.

In order to reduce these problems, make differs in seedbed preparation, and select appropriate variety of crops whatever I do to suit the situation, and adopt multiple cropping and intercropping practices to reduce the risk of crop failure. Equally there is a need of raising my homestead. Improving/rehabilitating traditional irrigation system is another important initiative to carry out. In my opinion, there is a need of introducing early paddy of short duration and *Baadh* and *Sukhha* resistance crops if available.

3.2 Initiate multiple cropping and intercropping practices

Women during the discussion opined that they need to adopt new cropping practices in order to reduce the risks monsoon crop failure. It is because after 2001, some well-off farmers started multiple and intercropping practices and their results was inspiring.

"In our village, traditional wells are drying. The hand pumps have lesser volume of water and the borings give less water than before. We heard that this is mostly due to continuous *sukhha*. In such a situation, we think that there is no alternative other than changed out cropping practices and choices of crops. Otherwise we could not survive as the *mausam* (weather) is not in the favour of us. We heard that in such a situation, multiple and intercropping pattern would help to retain the total production" said Ms Anita Rokaya, 22, Matehiya.

The opinion of Ms Bishnu Adhikari, 32, MHH, Suryapatuwa is representative of many women who reside in this village. "We are poor and continuously suffering from flood and droughts because we are not changing our cropping patterns. We visited last year in Banke to see how they are coping with the similar problems. We realised that unless the changing in patterns we can not able to run our *jibika* in the changed context."

Ms Meena Neupane, 33, MHH, Suryapatuwa said, "In my opinion, seeing the nature of problem in the monsoon, we need to adopt multiple cropping, intercropping practices. We need more information and knowledge as well as skills for such cropping practices, which we cannot get in our village neither in nearby markets. My dream is to establish agriculture cooperative to improve the livelihood."

Case 2: We need knowledge and information on advanced agricultural practices

I am Darshan Chaudhary (MHH), 35, living in Mahadevtar-Matehiya. I have six members in my family. As we are *Sukumbasi* (landless), the *bataiya* (sharecropping) and daily wage labour are the only means for our *jibika* (livelihood). Whatever we earned was insufficient for survival because the *Baadh* swept our entire land. Therefore, we migrated from Dang district 14 years back in hope of getting more *aalani* (non-registered government land) land here. My husband does carpentry and I go for daily wage labour as on-farm activities.

The premise of our house was inundated for several days during this year's *Baadh*. My family was forced to stay inside the house and we saved ourselves by sitting over the *attaiya* for three days. This posed difficulty in preparing meal so we spend three days with half stomach. Last year, due to *Sukhha* for longer periods, we could not plant paddy on our *aalani* land and this year's *Baadh* washed entire paddy three times. Other people say that nearby Laxmanpur Dam is the main reason for *Baadh* during heavy rainfall, which I agree too. Despite of putting every possible effort, I observed that crop yields are decreasing. I heard from FM radio about improved seeds and improved agricultural tools and process but we could not have access to it. Here, we don't have any support on agriculture and veterinary matters.

My family was deprived of relief after this year's *Baadh* although my name was listed in the roaster. We are poor and landless; therefore we are forced to bear this sort of depravity.

3.3 Selection of appropriate seed

A. Introduction of hybrid variety of seed

On the basis of women experiences, the flood tolerance capacity of hybrid variety is much higher than the local one. This is why women are also willing to cultivate hybrid paddy. But it needs more care and input supports. "We heard that hybrid seeds yield much higher than local varieties but it needs more care and money. So I prefer to go with local variety, because I have no time and money to invest. If there is an outside support, I certainly go with the hybrid variety," said Ms Lily Budathoki, FHH, 60, Matehiya.

But the barrier in front of FHHs is the matter of investment and care. As the cost of hybrid seed is very high, they could not able to buy. This is also associated with the degree of risks and manpower to look after the paddy. "As we have poor knowledge about the overall benefits of the hybrid seed, so, we are not much interested to go with hybrid. We have great deal of experiences on how to use and treat local varieties. We heard that unless chemical fertilizer, insecticides and pesticides used on time, the production of

hybrid is not much higher. But if there is some support in how to cultivate and management of seed, we are also interested to go with hybrid varieties " said Ms Mintu Tiwari, FHH, 36, Matehiya.

3.4 Livestock rising

A. Assisting poor women in buying a pair of oxen

In the rural village, numbers of oxen are often considered as the good indicator of well-being. In the version of Ms Prema Tiwari, 55, Matehiya, *"We don't have oxen at our own so we have to rely on other for ploughing. Therefore we compelled to prepare seedbed lately and so with the paddy transplantation. Some of our neighbour are preparing seedbed keeping some gaps. I could not do that because I am alone and have no oxen. They are preparing to catch the opportunity of first rain for the paddy transplantation but I make the seedbed with the first rain. This is the reason that the production in my field is always less. If I can invest to buy one pair of oxen, I can also make good production. If outside organisation will come with some scheme to support like me, I will first purpose to support me in buying oxen"*.

"I have a dream of goat raising and keeping a pair of oxen to earn some additional income. I could not explain the nature of this year Baadh. The erratic rainfall of many days inundated my paddy land badly and I was unable to re-transplantation work as I could not invest extra money and oxen", said Ms Nim Kumari Bohara (FHH), 32, living in Matehiya-4, Motipur. The similar types of opinion are made from Ms Makiya Chaudhary (MHH), 45, Matehiya.

"We do not have oxen so we started growing different kinds of vegetables such as tomato, cabbage, gourd, soybean and chillies. Oxen needs for sharecropping", said Ms Sanju Tharu. I'm 28 years old and live in Suryapatuwa.

"As we didn't owned bullocks, we were unable to transplant paddy on time in my aalani land. Hence, we took loan from moneylender to buy a pair of oxen this year in 72% per annum. The interest is continuously increasing as we could not pay back in time. Whatever is earned is spend to fulfil daily family needs. So, my family is in vicious circle of poverty. I wish to get easy/cheaper loan to escape from vicious circle of poverty", said Ms Darshan Chaudhary (MHH), 35, Mahadevtar-Matehiya. She further said, *"I have a desire of raising hybrid cow, as it gives more milk. But I could not fulfil all of my desires as I am an illiterate woman, belonging to a Tharu community, poor and landless and not also to invest to buy cow"*.

The potential challenges and barriers are many. Especially those FHHs who don't possess pair of oxen; they have to wait until others plough their land. It means they install the seedbed late and so is paddy transplantation. There is a belief that late transplantation of paddy causes reduction in yield as the flood damages newly transplanted paddy than already matured and during the flowering time, paddy would not get rain water. They cannot hire tractors as it costs higher. As the grazing land is reducing every year, the government forest nearby has turned into community forest the practice of tending oxen is greatly condensed in the FHHs.

3.5 Establishment of community managed agro-vet within the village

Animal husbandry became the potential means of livelihood in the village, but women are reluctant to invest more as the mortality rate is higher. They said that is it mostly due to poor knowledge and skills in one hand and poor veterinary facilities within the village in the other.

During the discussion with women, they emphasised to have their own community managed agro-vet centre within the village. "*Once I tried poultry farming, entire chicks died due to unknown diseases. Maybe I was unaware of how to raise chickens, how and what to feed them and about diseases. Along with two other landless Tharu families, I also raised some goats, which were also died last year by unknown disease. We are illiterate, so we have no idea how to treat animals immediately. I there is a agro-vet in our village, or we could be trained, we could save our livestock. I wish to establish agro-vet in the village,*" said Ms Darshan Chaudhary, MHH, 35, living in Mahadevtar-Matehiya

How can I invest much amount in the animal husbandry? Neither I neither met sarakari veterinary technician nor receive any support from them. Unless there is community managed agro-vet, I am not in the thinking of investing larger amount in animal husbandry. But, we should establish the reliable agro-vet in the village to get immediate support", said Ms Darshan Chaudhary (MHH), 35, Mahadevtar-Matehiya.

Case 3: We need support from responsible duty providers in solving our problems

I am Ms Tayara Begam (MHH), 52, living in Matehiya village. I have a big family of two sons, two daughters in law, four grand children and my husband. I work as a child health worker in Sub-health post however we also make our living by agriculture and remittance received from our sons from Saudi Arab. We have three *bigha kachha* (1 *kachha bigha* equals 2.25 *kathha*) lands which were swept during last year's *Baadh*. The small income from agriculture was inadequate for daily survival of my big family. Hence, my sons went to Saudi Arab last year by taking Rs 70,000 from Agriculture Development Bank as loan. He has sent Rs 25,000 this year. I own a small shop nearby to village school. My husband is slightly deaf thus depends upon me in all decision making.

I still remember that before 8-10 years, we experienced fewer *Baadh*, less rainfall and medium summer and winter. However, we are facing unpredictable rainfall from past few years that are causing damages to crops and to our lives. Similarly, earlier rainwater used to flow from canal but now its nature is totally different as it carries soil and small boulders with it and flows all over the village passage.

Frequently, I have to travel to Indian border for purchasing goods, seeds, veterinary medicines and other family needs. The shopkeepers often create hassles while purchasing the goods. Had there been easy market access nearby our village, or probably if there are at least gravel road links to Nepalgunj, we would not have to tolerate this.

In order to escape from these problems, I need outsiders help. If the outsider's organisations are ready to help me there is need of developing local *haat* bazar within the village.

3.6 Manage easy loan to women farmers

A. Subsidy to women to adopt new technologies

The tendency of seasonal migration outside the village invited the labour shortage in agriculture as well as in HHs activities. Hence, women are in thinking of some of the technologies that need less

labour. "We saw that some well-off families started to use chara (feed) machine for grass cutting instead of hasiya (knife) and kachiya (big knife), fan machine for winnowing and threshing machine. These machines are efficient and need less labour. The tractors and desi halo (improved plough) is also used recently for the purpose of better ploughing. As we have no access in these tools, we are unable to maximise our production.. poor investment capacity is one of the. If we have provided subsidy in procuring these technologies along with easy loan, some of us will certainly use it to eased the life and produce more grains," said Ms Laxmi Bohara, MHH, 34, Matehiya.

"Although I know about different equipments as our neighbour are using I couldn't afford them. I know the advantages of each of them but cost of these technologies is higher. Financial part has remained the barrier for me to adopt these technologies. The most important part is managing easy loan to us so that we can also eased our life," said Ms Mintu Tiwari, FHH, 36, Matehiya.

"I require some support in easy credit facilities to adopt agricultural tools and technologies, adoption of market-led crop varieties and investing for alternative irrigation facilities like treadle pumps. For these we need subsidy policy otherwise we can not adopt these technologies like others", said Ms Darshan Chaudhary (MHH), 35, living in Mahadevtar-Matehiya.

Case 4: We are victimized of enduring consequences of Baadh

Before 2040 BS (1983), we were recognized as well-off family in Lalpur village of Bardiya district. We were forced to migrate to Taratal as Geruwa River swept away 4 *bighas* of land along with 17 *bighas* of tenancy land. Our land was fertile and productive so we used to sale grains in large quantity. A flash *Baadh* made us landless within an hour. We stayed in Taratal for 5 years where my husband joined District Panchayat as messenger and I worked as daily wage labour in the nearby villages.

My name is Ms Makiya Chaudhary (MHH), 45, Matehiya and I have a big family of eight children. *Sarkar* provided us nine *katthas* of land in Taratal thereby recognizing us as landless. However, there were less income opportunities and whatever we earned was insufficient for our daily survival. Therefore, we deposited our land to private money-lender and took Rs 9000 and moved to Motipur, Matehiya in search of more *aalani* land. We got some *aalani* land here. Our live was moving smoothly and we were happy with whatever we had. Unfortunately, we could not accommodate with the hill migrant's people in Motipur. They made several attempts to remove us from there. Last year, they blamed my daughter as witch. Unfavourable situation was created thereafter and we shifted to this place, Mahadevnager where other Tharu families are also staying. Because of illiteracy and ignorance, we could not get social justice from the concerned. The local police also charged Rs 13000 as penalty and my husband stayed in police custody for three days. I feel that all these sorrows are the enduring consequences of *Baadh* we experienced in Bardiya.

My ultimate wish is to stay in this village without any social-psycho problem. We are adopting *adhiyas* system to run our *jibika*. We are laborious and hope to produce more yields from our *aalani* lands. We need skills on running new initiatives if we want to undertake, also equally the knowledge and information. But as we are ignorant and poor, we wonder who will provide us knowledge. We perceive lack of market as the big problem, and there is no electricity and road facility. On the top of this, we have been suffering from erratic rains, longer *Sukhha* and *Baadh/duban* problems, which is the major obstacles in our hope of producing more yields. There aren't any responsible village development committee or district offices, which can provide us relief and support during devastating effects of *Baadh*.

B. Technical backstopping of saving/ credit groups and form cooperatives

Women expressed that there is a need of strengthening existing saving and credit groups and form cooperatives. *"It could be great if we have agriculture cooperative. The provision of easy loan through saving and credit groups and cooperative is also needed. If so, it will easier to manage seed, seedlings, nursery facilities, and manure in right time. Equally these groups need talim and exposure tour to develop their capacity. If they are capable we get more support in time from these groups,"* said Ms Huitee Tharu, MHH, 60, Suryapatuwa. Several other women have similar types of expression. They are strongly demanded that the establishment of agriculture cooperative is the only mean to boost agriculture activities.

C. Manage leased land for group farming

In Matehiya, group farming was initiated by some women to increase their group fund. For instance, *Mahila Bachat Samuha* took seven *bighas*¹⁵ of land from local high school in contractual basis (Rs. 40,000 per year) for five years. The income made from group farming is being kept in the group fund. The amount is being used among the group members for micro-enterprises in cheaper interest rate. This idea was emerged when they started to face problem to run their livelihood due to flood and droughts.

"It is always not easy to work in group basis. The continuous problem of baadh and sukhlha enforced us to make this decision to farm in a group basis and we are able to collect some money for use during emergency period. I think this is the good option for us" said Ms. Gumi Buda, MHH, 58, Matehiya.

"Not all women are involved in the group farming. Seeing the benefits made by the group of women in our village, we are also in thinking of taking other land in the leased basis. If someone support us initially to pay the amount to landowner as per the agreement of leased land, we can also boost our jibika."

said Ms Parvati Yadav, FHH, 59, Matehiya. It shows that there is a need of making rules and regulation to accommodate the interest of all women especially from FHH.

Case 5: The Baadh has forced to adopt new crops

My name is Ms Sawari Tharu (FHH), 32, and living in Suryapatuwa. Our family migrated from Dhodari. We are freed *Kamaiyas* (landless bonded labour) and we received five *katthas* of land from *sarkar*. We are 10 members in our family. Initially, we made our living by daily wage labour. With support from our neighbours and relatives, we started cultivating vegetables like potato, cauliflower, tomato and onion in my limited land. But *Baadh* destroyed vegetables this year. We would have suffered much if we had not thought of starting new income options of fisheries recently.

My husband goes to India for seasonal labour work and I have additional responsibilities of tending children and looking after vegetable farm and fisheries as well. Initially, we put more than 1000 fingerlings of *Mangur* variety in our pond but again *Baadh* swept away few fingerlings. However, I succeeded to save majority of it. Had I been able to go district headquarter for training I wish I could have been doing excellent in vegetables or in fisheries. We have muddy road that links to Taratal and Sanoshree market but in rainy season *Baadh* blocks this road too. In such situation, there is a marketing problem for fisheries.

We have community forest nearby our community. In order to benefit from the available forest resources, it would have been better if we could have small cottage industries established in our village. So that it could provide jobs for many males like my husband. For the scaling up of the vegetables and fisheries, we need more skills and market. If there is ensured market, we are planning to take others land as leased basis to extend the business further.

¹⁵ It is popular unit of land mostly used in the Terai of Nepal. 1 bigha equals 0.67 ha. 20 Kathha equal 1 bigha.

3.7 Make homestead rising for safer place to live

Due to the continuous flood and inundation, women are continuously sufferer in seeking safer place to live during monsoon. It was also difficult to safe seed and stored grains. "My family had hard time during incessant rainfall. Water inundated our home making us frightening to live all the time. That's why we moved to my neighbour's house to stay for three days, If I have also the house in the raised land, there was no problem from inundation. Ms Nim Kumari Bohara (FHH), 32, living in Matehiya-4, Motipur. In the opinion of Ms Laxmi Bohara, MHH, 34, Matehiya "In the past, this season was very hot during the day and cold at night. But, we are surprised that the nights are also hot these days. We don't know why this is happening. We could not stay in the CGI sheet roofed house because of hot and thatched houses are easily eroded by floods. Hay is difficult to find as most of the riverbank is eroded by flood. It is therefore, we need to raise our houses so that our houses will not be easily destroyed from flood. But who can help us as we are unable to invest for raising our home".

"I need more money to maintain my house and raise its foundation. This year my neighbour did raise her house but it was hampering us. All water from their house come to us and it created further duban, "said Ms Santu Chaudhary, FHH, 55, Suryapatuwa. There are others problems like investment and land entitlement. In the opinion of Mr. Sher Bahadur Tharu, 52, KI, Suryapatuwa "It is still difficult for women from FHHs to adopt homestead rising due to two main reasons. First, it needs money, and second, the problem of land ownership also hinders to make their houses with flood resistance process (technologies).

The importance of homestead rising is expressed by many women. In the opinion of Ms Tayara Begam (MHH), 52, living in Matehiya, "for protection against Baadh and heavy rainfall, we need information on constructing our houses properly with

Case 6: Saving practices are helpful to reduce the distress of Baadh

My name is Ms Huitee Tharu, MHH, 60 and I live in Suryapatuwa with my big family consisting of my 3 sons, 3 daughters in law, 7 grandchildren and husband. We make our living as traditional farmers and sometimes do daily wage labour. One of my sons works in District Agriculture Development Office, Guleriya and another in India. We are practicing others land as sharecropping too. I spend my day by looking after goats and nurturing the grand children. We grow off- season vegetables such as chillies, cauliflower and tomato in our 7 *kattas* of land. Unfortunately, all vegetables were destroyed 2 months back by this year's rain. Water also flooded our house and swept away the utensils, two goats, some chickens and large quantities of stocked grains. We saved ourselves by tightly holding in the *attaiyas*. Fortunately, I manage to save one of my *buhari* (daughter in-law) from *Baadh*. Heavy rain destroyed our house and currently we are living by renovating it temporarily. After the *Baadh*, nothing was left for daily survival and to feed my big family, therefore we lend some money from the private moneylender. Now I am worrying about how we can pay back the loan on time.

I am a member of *Gochali Women Group* and I save Rs.5 per month, which was technically supported by Plan Nepal. All members deposits Rs. 50 as emergency fund. I perceive saving practices are helpful to reduce the distress of *Baadh*. This group gives us seedlings of vegetables if we desire to cultivate. The unpredictable damage due to *Baadh* every year has made us to think that we could remain safe if we construct by raising its foundation. We need knowledge and support on homestead rising. We also need support and relief during damages by *Baadh* whether as meal and necessary items for daily survival or renovating the house. We also need coordination from people who can give us information, knowledge on how to save our assets and ourselves. Overall, we are poor ignorant and we wonder mostly how we can raise our livelihoods.

In addition to these, I need technical knowledge on how to raise goat, crop off- season vegetables, how to select appropriate variety of crops etc. For this training is needed.

strong walls and by raising the foundation. This year, we could save livestock and ourselves but lost our stocked grains and some clothes. Some financial supports are needed otherwise we are unable to go with this alternative provisions".

3.8 Manage inputs and skills for adopting alternative energy technologies

Women are now demanding knowledge and skills to adopt the energy efficient technologies in the village. "I came to know that we can cook food with gohar gas (bio-gas) in a smoke free environment but we need to know how to install it and need some financial support initially. Some of our neighbours are using it and they save their time in taking fuel wood from forest," said Laxmi Bohara, MHH, 34, Matehiya.

Similarly, Ms Sita Gnyawali, FHH, 50, Suryapatuwa said "My neighbours, we afford are installing different alternatives for fuel wood. I am surprised that they are also lightening their houses. If I can learn how to install and get some financial support, I am also interested to install gohar gas and improved chulo (stove). May be easy loan and provision of subsidy might helpful for us."

Knowledge and skills are not sufficient but we need easy loan and subsidy policy to adopt these technologies "Though we frequently heard about biogas from FM radio, its adoption is associated with availability of number of cattle in house. Only knowledge and skills are not sufficient but we need easy loan and subsidy policy to adopt these technologies," said Ms Tika Budhathoki, 26, MHH, Matehiya.

3.9 Reclaiming agriculture land along the river bank

The size of land in the rural village is one of the main indicators of well-being. In order to save the land from possible damage of flood, people are demanded to adopt suitable practices. These may be bio-engineering and plantation of fodder, litter and grass along the

Case 7: Banana cultivation helped to forget the stress of paddy damage from Baadh

After separation of family assets, we made our living by planting paddy in 7 *katthas* of land. However, the income was inadequate to meet the needs of my family. My husband was thinking of shifting to some other alternatives. About seven years back, we planted bananas in two *katthas* of land. Actually my husband was influenced by one of the local schoolteacher about banana cultivation and its benefits. Initially, we undertook cultivating bananas in trial basis. But then, we steadily progressed on it. Later my husband also took training on banana farming of three days. On the early days of banana farming, our neighbours used to tease us by saying Bhupal (my husband) has gone mad. But nowadays the same people are surprised seeing our progress. We feel that banana cultivation had helped to forget the stress of paddy damage from *Baadh*.

I'm Ms Meena Neupane, 33, MHH, and lives with my husband and two kids in Suryapatuwa. We have reaped enormous benefits from banana farming. We added 4 *katthas* of land near to our *khet* land and also managed to buy plot in nearby village. We also bought one tractor for transportation purpose. My only son studies in boarding school of Kathmandu. We sell banana in nearby markets and in district headquarter as well, in Rs 12 per dozen from the farm. We also installed biogas plant in our house, which has reduced the regular household chores of collecting fire wood. The overwhelming benefits of banana farming have encouraged us to achieve more and think of new schemes. We are thinking of building a new house and starting menthol cultivation.

Our neighbours have also tried to farm banana thereby taking advice from us but they could not succeed. May be they ignorant, has minimum assets and inadequate know how on banana cultivation. Comparatively, banana farming yields more benefits than paddy, as both farming requires equal proportion of hard work. For 7 years, we were enjoying with banana farming but this year's *Baadh* disappointed us. Majority of our terraces were flooded which resulted in 60% drop in production. We also noticed in reduction in banana's size this year. The excess amount of water can be still seen in our land, which is a harmful factor for banana production.

riverbank. "We need plantation of babio, khar (hay) and kass because they have soil holding capacity. Plantation of water-resistant plants like bamboo, banana and fodder like Amrisho, NB-21, Napier are also equally important. For this, it needs much investment. If we get support by establishing nursery within the village. Seeing the extent and magnitude of land cutting rivers, within a few year we will landless' said Mr. Raju Gyawali, 45, KI, Suryapatuwa.

"Plantation saves land from possible damages but I couldn't contribute much on this work due to poverty. If I get seedlings and saplings in free of cost from local nursery, we can able to safe our land. The management of gabion wire is beyond my capacity "said Ms Lily Budhathoki, FHH, 60, Matehiya.

"Although plantations save my land to some extent I prefer to construct check dams until plants grow. After that there is no need of gabion wire. It is true that plantation may not feasible where there is much water current. In such a situation, constructions of structures like gabion check dams are necessary. For this, we need the support on managing gabion wire, "said Mr. Sher Bahadur Tharu, 52, KI, Suryapatuwa.

3.10 Invest to improve low cost irrigation facilities

Due to uncertainties of rainwater every year, farmers have now started to seek its alternatives to produce crops. For instance, in Matehiya, DTW irrigation-based commercial crops is started covering a small area of land. Some women from FHHs have poor access in this resource, as they are unable to invest their share during the installation of DTW. Women hence emphasised a need of improving alternative irrigation facilities

along with improvement of drainage to reduce the effects of flood. "Those of us who can invest more can have the access in boring. As I cannot invest on it, I have to wait until rain comes. Therefore, there is a

Case 8: Vegetables farming are the best solution to run livelihood

My name is Ms Sanju Tharu. I'm 28 years old and live in Suryapatuwa with my family of five members. Our family migrated to this place from Khusarpatuwa 23 years back. Earlier, we were *Kamaiya* and after our liberation, we received 5 *katthas* of land from *sarkar*. We sell the vegetables using bicycle in nearby market like Kothiyaghat, Taratal, Belawa and Thakurdwara. I attained know how of vegetables farming by participating in a 3 days vegetable farming training organized by Plan Nepal. Then after, I initiated an endeavour of vegetable farming instead of paddy as I have a fetish for paddy farming lingering in my mind.

Vegetable farming remains a challenging works once *Baadh* influxes in the farmland. We lost newly germinated vegetables plants by this year's *Baadh*. So for precautions we raised few inches of the beds. Compared to paddy farming, advantages are excellent from vegetables farming though it requires similar efforts. There are four professional vegetables growers in our village. Along with me, they are also into this vegetable cultivation, which is sufficient only for market sale. This is because we cultivate vegetables in our limited land. We wish to have more lands. Perhaps we cannot afford it as we are poor and currently we have minimum assets. We irrigate our vegetable farms by using Laxmi treadle pump. During peak season, we reap good benefits from sale of tomatoes however cabbage's market is declines. I sow the seeds of cabbage and tomatoes in July-August and harvesting is done in November. Then again, I will plant it again which will be harvested in March. Then I will plant bitter gourd, cucumber, soybean and chillies, which will, again be harvested before July. The farming cycle repeats as similar to my daily lives. I go for daily wage labour whenever I am free from caring my vegetables. My husband wants to take carpentry and masonry training and want to work accordingly as an additional income. But there isn't any training providing centres in village or in nearby market. We either have to go district headquarter or Nepalgunj for training and other advanced information. But we cannot go, as we cannot afford to go there. I expect that someday some organisations and local government office would provide us knowledge and skills.

need of improving irrigation systems. If there is alternative irrigation facilities we can grow variety of winter crops to compensate the monsoon crops" said Ms Tika Budhathoki, 26, MHH, Matehiya.

"If there are proper irrigation facilities in village, then I would have tried vegetable farming (soybean, cucumber, potato, chillies). Therefore irrigation is the life of us. I don't know who can support us in this regards. I have no trust in sarkar", said Darshan Chaudhary, MHH, 35, living in Mahadevtar-Matehiya. Ms Tayara Begam, MHH, 52, living in Matehiya said that *"The first thing we should do is improving traditional canals and drainage improvement to reduce the effects of Baadh. For us, irrigation is our living god".*

3.11 Improve the seed and grain storage systems

The issues of damage of grains and seed by flooding and inundation problem were expressed by many women during the discussion. This was also the main reason for the crop failure due to poor germination. *"Seeing all constrains and challenges, I seek outsiders help in making attaiya for the storage of the grains. The deheries are all damaged by the flood",* said Ms Darshan Chaudhary (MHH), 35, Matehiya.

"As we are poor so can not invest in making wooden bhakari. The deheri are easily damaged by flood due to mud made. So there is a need of sarkari support to improve our seed and grain storage devices. Who else supportive in this regard. Otherwise we could not safe our grains and seed. Last year the damaged seed caused many problem for me as the germination of paddy and wheat was extremely low", said Ms Tika Budhathoki, 26, MHH, Matehiya.

3.12 Improved crops and livestock farming

Women said that unless the improvement in cultivating practices in cash crops and animal husbandry, the benefits could not be reaped. But there is problem of scaling up these occupations due to knowledge gaps and matter of investments. *"There is a need of improved knowledge and skills so that poultry and vegetable farming could be improved. If there are ensured and effective veterinary services, I will go with raising hybrid cow. But for this, improvement in agriculture and livestock services are most needed to ensure my livelihood. The investment is the prime factor for this"* Ms Darshan Chaudhary (MHH), 35, living in Mahadevtar-Matehiya

"We know that the investment in cash crops and hybrid livestock yields more benefits than others occupation in the village. But there is a problem of investment. Who will support us in this regard?. But the most crucial factor is knowledge gap. We need detail information about the different perspectives of how to cultivate cash crops and how to tend livestock because we are continuously suffering from different diseases. Therefore, we need additional knowledge and skills to sharpen our existing knowledge and information, first and need some investment in the second", said Ms Tayara Begam, MHH, 52, Matehiya

3.14 Skill development trainings

Skill development based on the local resources and emerging need of the women is the important one to generate some income at village level. *"The first things that is important for me is skill development training. If so, I can go with vegetable farming, poultry and goats farming because there is no problem of marketing. May be exposure tour to relevant places might be more helpful for us. Unless inputs and skill development, how can we initiate the improved farming",* said Ms Makiya Chaudhary, MHH, 45, Matehiya

The importance of skill development is also shared many women. For instance, Ms Lily Budhathoki, FHH, 60, Matehiya said "I have interest to participate in skill development training to improve the knowledge on new agricultural practices. I want to raise goats and poultry as it can give good income for a long run but I lack knowledge on how to start these initiatives in an advanced way. Hence, in order to improve my livelihood, I need additional skills and knowledge to involve in market-led new agricultural crops. The skill development trainings on the basis of local resources are more important for me".

Table 3: Women's priority to adapt the addition program, emerging programs and possible solution

SN	What activities are needed	How to initiate these activities	Emerging constraints	Possible solution
1	Market-led crop varieties	Managing appropriate inputs and demonstration, market linkage, distribution of mini kit, improvement local haat bazaar	Unable to get proper inputs from <i>sarkar</i> and poor technical know-how, unable to invest and get risk	Activate the agriculture technicians, impart training for know-how, provide easy loan and subsidy policy
2	Introduce early paddy	Link women to service providers and agriculture service centres, manage inputs (seed, fertilizer, pesticides and know-how) in subsidy rate	Not ability to invest much amount in improved varieties, poor access on services of agriculture technicians, poor irrigation facilities	Inputs management though subsidy policy provisions, improve the irrigation facilities, link women to inputs and service providers
3	Cultivation of flood and drought resistance crops	Inputs support, demonstration,	Poor know-how, reluctant to bear risks, unable to invest, unable to manage seed	<i>Talim</i> , inputs (seed and know-how) supports through subsidy policies
4	Multiple cropping and intercropping practices	Inputs supports, exposure and <i>talim</i> , demonstration, distribution of mini kits, share proper information and knowledge on time	Poor technical know-how, poor irrigation facilities, poor investment capacity	Improve irrigation facilities through STW, treadle pumps, establish agriculture cooperatives for inputs support timely
5	Introduction of hybrid variety of seed	Inputs support, demonstration, distribution of mini kits	Technical know-how, investment and care, high cost so unable to buy seed,	Manage seed through subsidy policy, agriculture cooperatives
6	Assisting poor women in buying a pair of oxen	Provide loan in group collateral basis, provide inputs	Difficult to hire oxen in peak agriculture period, reducing grazing land, converting government forest in to community managed	Promotion of agro-forest in private land, provide easy loan to women to buy oxen
7	Establishment of community managed agro-vet	Establish agro-vet within the village, manage relevant technicians to look after the agro-vet, manage inputs (medicine, seed, fertilizer, etc)	<i>Sarkari</i> veterinary technicians never visited the area, morality rate of the livestock especially goats and chicken is high, unable to go far to buy medicine	Manage immediate medicine supports through agro-vets, run de-worming and vaccination program, seek some support from district agriculture office
8	Provide	Share information on the	Gap in knowledge and	Coordinate with relevant

	<i>subsidy to women to adopt new technologies</i>	benefits, the organizations working in this sector, manage subsidy to invest in these technologies	skills, unable to invest, less number of livestock for gobar gas	organizations to install these technologies in subsidy rate, provide easy loan through cooperatives
9	<i>Technical backstopping of saving/ credit groups and form cooperatives</i>	Organization assessment of saving groups to impart capacity building training, formation of agriculture cooperative	Poor leadership, transparency, repayment timely	Impart training and exposure based on the gaps as identified from organizational assessment
10	<i>Manage leased land for group farming</i>	Coordinate with schools, individual and VDC to get land in the leased basis	Issue of land tenureship, breach of agreement, conflicts and disputes, etc	Prepare clear agreement if land managed through VDC and schools, make low rate to inspire women
11	<i>Make homestead raising for safer place to live</i>	Local resource mobilization and management, secure technical support from outsiders organizations	Unable to invest, land entitlements, reluctant to invest as the living is temporary in nature	Special emphasis for landless and ultra poor women, provide easy loan, external material support, etc
12	<i>Reclaiming agriculture land along the river bank</i>	Establish nursery, impart demonstration talim on how to plants along the river bank	Difficult to manage seedlings and saplings, no ideas the types of plants effective for soil holding capacity	Distribute seedlings and saplings through cooperatives, seek some support from district irrigation office
13	<i>Invest to improve low cost irrigation facilities</i>	Local resource mobilization and management, rehabilitation of traditional irrigation system	Difficult to invest, loan to install treadle pumps, etc	Provide easy loan and others external supports in subsidy approach, seek some support from district irrigation office
14	<i>Improve the seed and grain storage systems</i>	Improvement in <i>daheri</i> , <i>bhakari</i> and raise homestead and <i>aataiyas</i>	Majority of the people have <i>deheri</i> due to scarcity of wood and amount	Provide easy loan and subsidy to construct wooden <i>bhakari</i>

4.3 Potential barriers, constraints and solutions to adapt livelihood

Having discussed with short and long adaptation practices, still women farmers perceives number of obstacles and barriers associated with improvement of agriculture livelihood. Some possible solution to minimise the effects of these barriers and constraints were also recoded on the basis of following quotations of women from both FHHs and MHHs.

i. Improve Knowledge, information and skills development

"We are illiterate and have poor access to information and knowledge. Therefore, we need to be equipped with appropriate knowledge and information on how our life can be easily dealt during the times of flood or in other flood related problems. We are ignorant because we have poor exposures. Like me, other affected women should be brought together in a social unity by involving in different groups such as women's group, mother's groups, farmer's group, etc", said Ms Kamala Basnyet, 40, Matehiya.

"May be talim help us to acquire more skills? But we are unable to go Nepalgunj for the purpose of talim. Short duration talim within the village may help us to increase our knowledge. We would be more benefited if the talims are confined to increase our skills so that we could get off-farm labour and other opportunities within the village. I heard that NGO have cattle and goat rearing programs with matching fund. If we could

have such program here all poor women like me would improved their livelihood. Its because to depend entirely on agriculture is risky these days”, said Ms Tayera Begum, 52, Matehiya.

“We are far behind in terms of acquiring additional skills. In my opinion, we also need information, training and exposure. We want to know how women in other villages are leading their livelihoods. Unless the information and additional skills are imparted to us, how can we improve our jibika (livelihood)? When flood comes, there are several threats to our cropland, our house, our livestock and to our lives. We hope that the trainings and additional knowledge could show us in seeking alternative income generation activities. If our skills are enhanced, we could do small enterprises by our own, “said Ms Muna Mukeri, 55, FHH, Matehiya.

“Some of our neighbours are using Bikashee Biew (hybrid seed). It is very expensive in comparison to what we use but ubjani (productivity) is higher, but if we use that seed we can’t make Bieu of it, we have to buy it every time. People are benefited if there is seed storage scheme (seed bank)”, said Ms Ramabati Mauriya, 35, Matehiya. “We feel increase in types and number of insects in the crops than before. If we have enough money to buy ‘Uria Mal’ (chemical fertiliser), the production would go high. We don’t know which pesticides and insecticides harms us less and kill insects. Our friends in Sano shree said she has done Integrated Pest Management (IPM) farming through which she had much production; I want to learn that system”, said Ms Laxmi Chaudhary, 45, Suryapatuwa. “Irrigation system should be improved as majority of us depending upon rainfed. We can change our cropping practices if we could improve irrigation facilities in the area”, said Ms Bishnu Adhikari, 32, MHH, Suryapatuwa. Further, “There is a need of improving irrigation efficiency through installation of boring, treadle pumps, renovation of traditional irrigation systems so to carry out winter cash crops and off-season farming in larger scale. For instance if things happen like I say we would be able to improve our livelihood, “said Ms Bishnu Adhikari, MHH, 32, Suryapatuwa.

“We use local variety of crops. Now a days people are using hybrid one. We have more responsibilities on household chores as well as agriculture and have less time to know about new things from bazaar (market). For new variety, we need to know about its various characteristics (how to prepare seedbed, transplants, irrigation and other inputs). We have less time to gain additional knowledge and skills. Hand to mouth problem is major for us. We are depending upon whatever foods we can grow. We loss hope of living with rain fed crop. That is why I diverted my efforts and investment whatever I could do in winter crops, mostly vegetables”, said Ms Harichayeni Chaudhary, 45, FHH, Suryapatuwa.

“We knew about new options of cash crops (like banana and fishery) from nearby village. We think it is bit risky to start farming these crops without knowing it know-how in details. I think, before introducing new crops, we need talim and other support”, said Ms Pooja Tharu, 33, MHH, Suryapatuwa. “We have seen some of our neighbour starting with new crops but we are in doubt whether it is more effective or not. And we even lack knowledge where we can get those seeds and the methods of cultivation. Sometimes it rains heavily and sometimes we are praying to god for rains. So, we need to know if it is favourable in such unpredictable climatic conditions or not”, said Ms Prema Tiwari, 55, FHH, Matehiya.

“It is better if we had skill development training on suitable crop cultivation even in baadh and sukkha conditions, the available temperature conditions to raise income generation activities through the coordination of agriculture and livestock technicians (JT/JTA). I am interested to go with fisheries, banana, menthol etc but have no ideas, knowledge and skills on how to cultivate these new crops”, said Ms Hiutee Chaudhari, 65, MHH, Suryapatuwa.

ii. Mobilise service centres and service providers

“We are not receiving appropriate services from service providers like agriculture and livestock service centres. The JT and JTA never visited in the farmers groups. We could hardly see them in this area. New

income opportunities are far behind us and we think off-farm activities will help to enhance our jibika. If we ask about our problem to JTA when we meet them, they can hardly answer. We are in doubts whether they are also informed about agriculture practices or not”, said Mr. Munshi Yadav, 48, KI, Mr. Arischan Tiwari, 43, KI, Matehiya.

“Local level government is inactive and there is no presence of agriculture and livestock technicians (JTA/JT) in the village. We are not aware about the assistance of such technicians for improved agricultural systems and technicians as they never come in the village to support us, “said Ms Sawari Tharu, MHH, 30, Suryapatuwa.

“We don’t know who JT/JTA is and have not seen or met till now. We heard from others and thought FM radio that they have good knowledge on various cropping patterns, about diseases and its prevention, on irrigation and market management. We don’t have time to go to service centres and district headquarters to meet them and talk about advanced agricultural processes. They never come to us. Had they visited our village we would have progressed from our crops?” said Ms Chandrawati Tiwari, 60, FHH, Matehiya.

“Once my crop was badly affected by unidentified diseases last year, I visited the service centre along with insect and discussed with JT/JTA. They could not answer me and promised to support me after consultation with other higher technicians. But, after that I could not meet them. I am particularly interested from them that which crops are grown in the even flooding and sukkha situation”, said Ms Prem Kumari Gupta, 50, MHH, Matehiya.

iii. Reconciliation for post-conflict situations

“Conflict has severely affected us in the past. We were not in situation to trust one another in village. Many of us lost our beloved ones. Unidentified people abducted my son during conflicts and years have passed I have not seen, met him or heard of my son. This trauma has leaded my family into fear which was doubled when flood washed my paddy land. None of the policemen and responsible government officers has come to discuss with us. We are victimised my both natural and social phenomenon”, said Ms Rajkumari Paashi, 50, MHH, Matehiya.

“Due to fear of conflicts, my husband and son went to Punjab (India) for seasonal labour. In their absence, I feel additional burden to my domestic and agricultural life. The residue of the conflicts is still seen in the village. I still feel scare to move around in late evening. This has also hampered in the agriculture activities. I was not able to cultivate half of the land because we could not manage the work till late evening and also have house & kids to look after”, said Ms Chandrawati Tiwari, 60, FHH, Matehiya.

“I am already burdened with household and agricultural works, Earlier the role of agricultural tasks were confined with men. This is the reason that I could not spare much time for increasing my knowledge. I am suffering from the absence of my husband as he is working in India and my kids are small. Due to prevailing conflict in the past, we were unable to stay at home. I feel much uncomfortable when I have to make decision on behalf of my husband. Though there is not much understanding so far regarding the additional investment to improve the crop yield, but I always reluctant to do so. I think less risk bearing capacity of women like me is the constraints for adopting new tools and technologies for improving the agriculture. So in order to rise build the confidence of women like me, men also encourage us to do right decision in right time. May be exposure would help me, “said Ms Setu Budhathoki, FHH, 35, Matehiya.

“Conflict has severely affected us and its post effects are in front of us. It is necessary to have one program to demonstrate that there are no risks for outsider sanstha to come and work with us. I hope, it will help to encourage service providers to sustain our livelihood”, Mr Sher Bahadur Chaudhari, 52, KI (Headmaster), Suryapatuwa.

“Due to fear of past conflicts in the field area, the willingness of organisations working in this area is still minimal. People are still scared of interacting with outsiders. Therefore, the GOs and NGOs services in the area have not fully resumed. It is therefore we are basically deprived from the services related to upliftment of poor people which we could have received from NGOs,” said Ms Anita Rokaya, MHH, 22, Matehiya.

iv. Access to cash and credit and facilities of easy loan

“For new variety of seeds, we need money but we don’t have cash in our hand. We have to lend it from moneylender with high interest rate. We fear on taking loan whether we will be able to return it back with interest or not”, said Ms Anuwara Mukeri, 52, MHH, Matehiya.

“Moneylender hardly trusts us. My husband is not with us so they think I could not return their money back on time. Our income is limited which is insufficient to fulfil our daily needs. We don’t have cash in our hand for investment. So, we could not try for new things and new income opportunities as well. Flood always swept away seeds which we store for next year, and we have no options except buying new seeds. If we get easy loan, we could solve many of our many problems”, said Ms Setu Budathoki, 35, FHH, Matehiya.

v. Introduction of rural friendly labour intensive technologies and homestead rising

“Our neighbour who frequently goes to market came to know that we can use solar panel for lightening purpose. I also heard about it from FM radio. We don’t have electricity and we could not search for options like poultry farming which needs lights for daily feeding. It would be easier if we get such facilities in our village. Gobar gas (Biogas) is also beneficial for us. I have to invest much time to fetch fire wood from forest. I heard that to install solar pan and bio-gas, some subsidy is also available from sarkar. Homestead rising is our priority too. With adoption of all above I could have saved time”, said Mr Thaneshwor Tharu, KI, 56, Suryapatuwa.

“I have deheri, I couldn’t make bakhari because I am alone and there is no one to support me. All grain have damaged with inundation by flood. If I had a good bakhari, I could save my grains from damage. If sarkar would support me to raise my house, it would be more beneficial”, said Ms Harichayeni Chaudhari, 45, FHH, Suryapatuwa. *“I couldn’t raise foundation of my home because I am alone. It needs money to raise house. My neighbour raises the foundation of their home this year, and it causes additional inundation to my house”,* said Ms Mintu Tiwari, 36, MHH, Matehiya.

“Collection of fuel wood from forest is time consuming job. This is the reason for delay in agricultural tasks. This also puts barrier in my chances for seeking knowledge and takes part in other productive activities. If I got access on these renewable energy means, the forest resources will be conserved and I can be able to spare much time for improving agriculture activities. I heard many times about gobar gas from FM radio and sometimes while visiting district headquarter too. But alone we cannot go for it. It would have been much easier for us, if some GOs, NGOs or CBOs could sensitise us in this matter,” said Ms Rama Neupaney, MHH, 40, Suryapatuwa.

vi. Development of local haat bazaar within the village

“Nepalgunj, district headquarter, is very far from here. So, we have to rely on markets at nearly Indian border. We face lots of hassles while we travel to the Indian market. We had weekly haat bazaar in the past but later were closed due to conflicts and frequent flooding. No body is serious to resume the local haat, if so, we could produce and sale market-led commodities”, said Ms Lily Budathoki, 60, FHH, Matehiya. *“If the local haat are organised for two days in a week we could sale our product immediately after harvesting. The continuous rain sometimes damages the green vegetables otherwise, in several instances, large amount of vegetables was damaged as I could not sale because of the haat was closed due to inundated. It is therefore, the*

haat should be improved so that it could be even operated during rainy season”, said Ms Bishnu Adhikari, 32, MHH, Suryapatuwa.

vii. Construction of Evacuation centres and essential infrastructures

“We need one safe place where we could stay during flooding. Floods are now becoming a way of life. Therefore, we need emergency shelter (evacuation) within this village. Some needed materials also kept within the centre along with drinking water and toilet facilities. We heard from Rajapur people that communication also the effective means. If we have telephone facilities, we could inform districts officials in Guleriya for immediate help”, said Mr. Bir Bahadur Tharu, 54, KI, Suryapatuwa.

“In order to reduce the adverse effects of flooding and several days inundation problem, there is a need of improving village canal, traditional ponds and making small dams to harvest and divert the water easily. We need only technical ideas. We are ready to mobilise local labour for the improvements these canals and ponds, “said Mr. Taranath Neupaney, 56, Headmaster, Mahendra Secondary School, Matehiya.

3.4 Women willingness for livelihood adaptation

On the basis of expressions of women discussed above, some inferences are drawn that shows that women want to adapt following things as priorities for their better livelihood.

1. Exposure and skill development training to link additional income generation: goat raising, poultry farming, etc to supplement the loss made by flood in monsoon crops
2. Sharpen the knowledge on various aspects of agriculture and livestock: flood and droughts resistance crops, suitable crop (local and hybrid) in given climatic condition, short duration varieties, way of cultivating different crops, proper use of inputs like: manure, pesticides, irrigation, post harvesting technologies, improved animal husbandry, etc.
3. Practice of multiple cropping and intercropping to reduce the risk of crop failure
4. Adoption of market-led cash crops like banana, fishery, off-seasonal vegetables, Mentha and peppermint, etc, to replace the monsoon cereal crops by cash crops.
5. Homestead raising to reduce the effects of flooding and inundation
6. Increase the performance of irrigation through DTW, shallow tube well, treadle pumps, rehabilitation of traditional irrigation system and ponds, etc to increase production and reduce flooding and inundation

Chapter Four Recommendations

4.1 Women's Key livelihood adaptation priorities

The following are the key women's livelihood adaptation priorities in summary form. This table also describes the perceived barriers expressed by the women, potential solution and study team's recommendation on the basis of discussion with women and other key informants.

SN	Women's livelihood adaptation priorities	Perceived barriers expressed by the women	Potential solution prescribed by the women	Study team's recommendation
1	<i>Exposure and skill development training to link additional income generation through goat raising, poultry farming, etc to supplement the loss made by flood in monsoon crops</i>	<ul style="list-style-type: none"> • Inadequate skills and knowledge for off-farm activities • Women roles are confined within the household activities, i.e. poor exposure • Resources (cash, materials) constraints to organize trainings and exposure 	<ul style="list-style-type: none"> • Impart skill development training suitable to local context, based on women proven knowledge and experiences in the coordination with local agriculture and livestock service centres • Organize exposure visits to other area what other women are doing for additional income in the flood prone area • Coordination with <i>sarkari sanstha</i> to get required resources 	<ul style="list-style-type: none"> • Proper vaccination and de-worming schemes for livestock • Fodder, litter and feed management especially in the monsoon • Initiate horticulture and apiculture as the area is potential for both • Lobbying for animal insurance schemes from government
2	<i>Sharpen the knowledge on various aspects of agriculture and livestock: flood and droughts resistance crops, suitable crop (local and hybrid) in given climatic condition, short duration varieties, way of cultivating different crops, proper use of inputs like: easy loan, manure, pesticides, irrigation, post harvesting technologies, etc.</i>	<ul style="list-style-type: none"> • Poor exposure and training • Poor risk bearing capacity especially of FHHs. • High price of seeds so unable to buy from market. • Do not able to get technical support in agriculture and livestock from technician due to inactive farmers group in the village 	<ul style="list-style-type: none"> • Organise short duration training within the village to increase the knowledge and skills on agriculture and livestock • Build the capacity of women by sharing the additional benefits if go with improved agriculture practices, form saving and credit (S/C) groups, provision of regular saving • Establish agriculture cooperatives from S/C group to manage inputs both for agriculture and livestock. • First aware the roles and 	<ul style="list-style-type: none"> • Coordinate with district agriculture development office to get free of minikit, organize establish demonstration plot for varietals test to convince farmers, • Register women saving and credit group with district cooperative office and link with financial institution to get more technical support • Lobbying for crop insurance schemes from government • Establish seed bank through

			responsibilities of farmers group then with the help of these groups, organize meeting with JT/JTA to share what they are expecting from these technicians	cooperatives and distribute to farmers in subsidy rate
3	<i>Practice of multiple cropping and intercropping to reduce the risk of crop failure</i>	<ul style="list-style-type: none"> Poor risk bearing capacity, reluctance whether the investment is return or not Inadequate knowledge on the way of multiple cropping, intercropping, crop rotation etc 	<ul style="list-style-type: none"> Exposure visit to other area to see how women are doing these practices Demonstration to see additional net benefits Impart suitable training to women with practical exercise, what crops can be intercropped, multiple cropping etc, 	<ul style="list-style-type: none"> Need cost-benefit analysis to attract women in to these new practices
4	<i>Adoption of market-led cash crops like banana, fishery, off-seasonal vegetables, Mentha and peppermint, etc, to replace the monsoon cereal crops by cash crops</i>	<ul style="list-style-type: none"> Inadequate knowledge and skill Not ensured markets for agriculture commodities Much investment 	<ul style="list-style-type: none"> Impart knowledge and skills to initiate cash crops Organise study visit to appropriate areas to learn, how women from other area are benefited from cash crops in flood affected area Explore market linkage within and outside the village, initiate weekly haat bazaar within the village 	<ul style="list-style-type: none"> Initiate water melon, cucumber, peanuts, etc in the sandy soil along the river bank to reap maximum benefits Link with herbal companies for the selling of Mentha and Peppermint
5	<i>Homestead raising to reduce the effects of flooding and inundation</i>	<ul style="list-style-type: none"> Living in <i>aailani</i> land Dense settlements Unable to invest for homestead raising 	<ul style="list-style-type: none"> Exposure visit to other area to learn more how even in the dense cluster homestead raising is possible Mobilization of local resources: collection of soil, sand and boulders, get easy loan from saving group in minimal interest rate 	<ul style="list-style-type: none"> Promotion bamboo in private land Establish community nurseries to provide seedlings, saplings Installation of big hume pipe to improve the drainage system
6	<i>Increase the performance of irrigation through DTW, shallow tube well, treadle pumps, rehabilitation of</i>	<ul style="list-style-type: none"> Much investment, difficult to get easy loan Sedimentation form small torrents 	<ul style="list-style-type: none"> Installation of tube wells in the group approach Plantation in the community forest area 	<ul style="list-style-type: none"> Could get support from DADO and Irrigation Offices Installation in the group approach, investment in equitable and share

	<i>traditional irrigation system and ponds, etc to increase production and reduce flooding and inundation</i>	<ul style="list-style-type: none"> • Covers small portion of land • Ponds are often encroached for the personal benefits 	<ul style="list-style-type: none"> • Build awareness among the people that ponds are community's assets 	basis (who have more land have to raise more money)
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Annexes

Annex 1: Climate Change in the Global, South Asia and Nepal's Context

1.1 The global context

Earth's climate is changing continuously. Global climate change (CC) is the phenomena of changes in the earth's climate due to the human induced interfere to the natural systems of the earth. CC is forcing the world to acknowledge that there are ecological limits to economic growth, production and consumption.

IPCC estimates that the composite global temperature has risen between 0.3-0.6°C, and in the period between 1980 and 2000, average temperature rise was 0.06°C. Dhakal () also estimate that global climate change is the phenomena of changes in the earth's climate due to the human induced interfere to the natural systems of the earth. Scientists have predicted that the global mean temperature in 2100 might increase by 2°C from that of 1990. CC threatens to unravel the development gains of recent decades against poverty, hunger and disease, and will make future gains more difficult. It reflects and reinforces inequalities, and is an issue of injustice: the poorest countries have done least to contribute to resolve the problem and have the fewest means to respond, yet will also be most affected. As the major current and historical polluters, rich countries have an obligation to cut their own emissions and to fund the adaptation needs of the developing world, as part of a comprehensive multilateral response to a collective problem. Therefore, the current and drastic changes in the earth's climate, caused chiefly by human activity, are hitting the world's poorest women to worst conditions.

Further, scientific researches have identified numerous problems in the ecosystem along with CC. Among such are the excessive precipitation - more evaporation like to increase in some areas and decline in others making hydrological cycle extremely complex. As a result, changing precipitation patterns would increase floods and runoff while reducing the ability of water to infiltrate the soil. Changes in seasonal patterns may affect the regional distribution of both ground and surface water supplies. The drier the climate, the more sensitive is the local hydrology. So, relatively small changes in temperature and precipitation could cause relatively large changes in runoff. Likewise, different climate models produce different results for the future intensity and distribution of tropical rainfall.

The global concerns on CC are that changes at the surface would influence the recharging of groundwater supplies and in the longer run affects the aquifers. Water quality may also respond to changes in the amount and timing of precipitation. New patterns of runoff and evaporation will affect natural ecosystems. Freshwater ecosystems will respond to altered flood regimes and water levels. Rising sea level could invade coastal freshwater supplies. Reduced water supplies would lay additional stress on people, agriculture, and the environment. Exploitation of natural resources, conflicts of interests and poverty dynamics could be sparked by the additional pressures as the complicated linkage between CC, water availability, food production, population growth and economic growth reach to momentum. So, CC is likely to add to economic and political tensions, particularly in regions that already have scarce water resources. Glacier retreat is likely to continue, and many small glaciers may disappear. Flood magnitude and frequency are likely to increase in most regions, and low flows are likely to decrease in many regions.

1.2 The South-Asian context

Several evidences revealed that among the regions of the world, South Asia is most sensitive to CC. It depends very heavily on the precipitation of the variable regional monsoon as well as water derived from the glacier melts in the Himalayas; both of these affected by CC. Flood disasters are the most frequent and devastating natural disasters in this region.

For the past thirty years, the number of flood disasters have increased compared to other forms of disaster (Dutta & Herath, 2005). CC compounds the existing challenges of managing floods. In addition to these, the frequency or intensity of extreme precipitation events exacerbate risks of disastrous flooding both in upland watersheds where such events can trigger landslides, and in lower floodplains which are often densely settled (IPCC 2001; Kundzewicz & Schellnhuber, 2004).

This region has also been suffering from many of the climate related adversities viz. frequent storm events, increased events of drought, and other adverse climatic situations that are attributed to the global CC. The development of the human civilization in the past in this region is based on the intense exploitation of the natural resources.

The impacts of increasing temperatures, more variable precipitation, more extreme weather events, and sea level rise are felt in this region and will continue to intensify. These changes are already having major impacts on the economic performance of South Asian countries and on the lives and livelihoods of millions of poor people. The impacts result not only from gradual changes in temperature and in sea level but also, in particular, from increased climate variability and extremes, including more intense floods, droughts and storms (IPCC, 2006)

The immediate future impacts of these changes include pressures on natural resources and the environment due to rapid urbanization, industrialization, and economic development. Crop yields could decrease up to 30% by the mid-21st century, mortality due to diarrhoea primarily associated with floods and droughts will rise. Decreased water availability and water quality in many arid and semiarid regions, an increased risk of floods and droughts in many regions, reduction in water regulation in mountain habitats, increased incidence of waterborne diseases such as malaria, dengue, and cholera, increased damages and deaths caused by extreme weather events, decreased agricultural productivity, adverse impacts on fisheries, adverse effects on many ecological systems and increased migration within and across national borders will result environmental refugees and initiate direct impact on poor women. Therefore, CC is not just an environmental issue but one of such with severe socio-economic implications in South Asia (ibid).

1.3 Nepal's context

At present, Nepal is responsible for about 0.025% of annual greenhouse gas emissions. Unfortunately, we are among those at the highest risk from its negative impact due to our fragile mountain ecosystem and nature based subsistence livelihood. The impact of CC is severe in Nepal because of its landscape and varied climatic conditions, high dependence on natural resources for livelihood and inadequate resources to cope with the CC. These factors collectively contribute for the vulnerable situation of the rural poor especially women's lives and livelihood.

Broader climate risks, including natural hazards such as landslides, floods and droughts affects the women's subsistence agriculture livelihood. The ultimate end-point of all climate induced water hazards in Nepal is the communities that are vulnerable to such impacts, primarily in mountain regions but also downstream in low-lying areas that suffer the consequences of flooding.

Analysis of existing temperature records already shows an increasing trend in Nepal. This warming has been more pronounced in the middle mountain and the high Himalayas than in the lower Terai¹⁶ and Siwalik¹⁷. But its effects are seen in the low lying area, i.e. the Terai. The analysis of climate data from four recording stations representing inner Terai, mid mountains for the periods of early 1970s to 2000 and one for High Mountain for the period 1988 to 2000 has shown that there has been a clear warming trend in Nepal (Chaulagain, 2006). A number of possible climate change-related impacts on human health, agriculture and water resources related impacts are expected to affect women, their livelihoods and the environment. With warming of higher altitudes, it has been predicted that there may be an increased spread of lower altitude disease vectors such as mosquitoes and consequent spread of malaria, Kala-azar and Japanese encephalitis in such regions (Alam and Regmi, 2004).

As Nepal is under the considerable environmental stress, CC exerts additional stress to the ecological and the social systems. CC threatens not only hydrology and water resources, food and fiber productions, fragile mountain ecosystem and the human settlements but also menaced women lives and livelihood. Keeping all these facts, discussed above, into consideration, Nepal has started some of the initiatives at national level to adapt the effects of CC (*see box 1*).

Box 1: Initiatives undertaken for CC adaptation in Nepal (In chronological order)

1992: Nepal signed the UNFCCC and ratified it on 1994

1997: Kyoto Protocol (KP) text adopted

1999: Implementation strategy on environment related conventions formulated

2000: Potential linkage between UNCCD, CBD and UNFCCC identified

2000: Workshop on "UNFCCC and institutional design of the cooperation implementation mechanism of KP" organised in collaboration with UNEP/ROAP and ADB

2000: Two meetings of the IPCC working group organised to finalize Special Report on emission scenarios, and technology transfer.

2002: Nepal's National Assessment Report for the World Summit on Sustainable Development recognizes the links between climatic circumstances and land degradation, erosion and landslides.

2004: First Initial National Communication (INC) report prepared and shared with concerned parties.

2004: First INC report prepared covering some sector-based adaptation strategies like agriculture, water resources, bio-diversity, and health.

2005: Kyoto Protocol entry into force in Nepal.

2005: MoEST designated as DNA and DNA steering committee was in place.

¹⁶ It is marshy ground or meadow. It is the flat area lying to the south of the Churia range and extending to the Indian boarder. Geology and soil composition consists of recent alluvial plain, boulders, gravel sands, clay and fine loamy deep soils.

¹⁷ The first range arising north of the Indo-gangetic plain, up to 1000 m, geology and soil composition consists of clay stone, sandstone, conglomerate and loamy skeletal. The term Siwaliks is used throughout the Himalayan region. Churia (or chure) is a Nepali word for Siwalik range. Locally, the word chure is used to describe a single hill crest, and Churia to describe a group or a range of hill crests

2006: Workshop on capacity building on CDM.
2006: Workshop on building capacity to respond to CC.
2006: Consultation on CC organized by Care Nepal.
2006: National dialogue initiative on environment by International Centre for Indigenous Nationalities Development, Nepal

Other initiatives:

- Assigned Ministry of Population and Environment (MoPE) as the principle focal point of GoN.
- Implemented some of the projects like Renewable Energy, Energy Efficiency and Green house Abatement (PREGA) project by Winrock International Nepal and Capacity Self-assessment Project.
- Carbon trade for resource management and poverty reduction provisioned in Tenth Five-year plan.
- Signature campaigns on CC by WWF Nepal and Clean Energy Nepal (CEN) in the presence of 13 different private and government agencies.
- Initiatives to formulate National Adaptation Programme in Action (NAPA).
- Form CC Network Nepal involving UNDP, IUCN, WWF, JICA, CEN, ICIMOD, Nepal Trust for Nature Conservation, Winrock and Practical Action.
- Establishment of Alternative Energy Promotion Centre (AEPC).
- Formation of National Strategy for Sustainable Development (NSSD) under the name of the Sustainable Development Agenda for Nepal (SDAN).

Among many, flood hazards, as an impact of CC, damages the infrastructures, erodes the valuable agriculture land and losses of thousands of lives and livestock. Women claimed that heavy deforestation, clean cultivation practice at upper catchments and encroachment of flood plains are some of the immediate reasons of flood hazards. It is observed that flood propagates unmanaged migration, starvation, deaths, disability and illness. In addition to these, it also causes noteworthy economic losses, erosion in sustainable livelihood, and psychological dislocation. Hence, Nepal's continuing vulnerability to CC through natural disasters and environmental degradation, agriculture, irrigation and biodiversity are some of the constraints among many to sustainable development.

1.4 The study context

CC is now one of the greatest obstacles to ending poverty and realizing rights. It urgently requires international action to mitigate its causes and to enable the poorest countries to adapt to its effects. Therefore, ActionAid (AA) is calling for a comprehensive, multilateral response to CC. This must recognise that individual countries have differing levels of responsibility, based on their contribution to the problem and their capacity to deal with its effects. The developing world needs to acknowledge the dangers of CC and address them squarely. Yet, the developed world must take a lead in limiting its own consumption of the world's resources, and in recognising its historical and current responsibility.

The Working Group on CC and Development, of which AA is a member, has produced a series of 'Up in Smoke' reports that highlight the impacts of CC on women in poverty. In the UK, AA is a member of the 'Stop Climate Chaos' campaign. AA is currently conducting a study to document concerns and priorities of poor women on what the Adaptation Fund (AF) should be spent on to enable their livelihood to adapt to climate change. The overall aim of the study is to contribute to the debate on how the AF should be spent to benefit poor

women at COP 13 (Bali, December 2007) and subsequent meetings on the subject. This will highlight how women livelihoods, in particular when they depend on agriculture, are impacted by the CC and how the AF can support the adaptation of their livelihoods. In advocacy terms, it seeks to include specific references of adaptation of women livelihoods as one of the eligibility criteria and priority areas of the adaptation projects to be funded by AF.

Annex 2: Hazards trend of of Matehiya VDC

Date (BS)	Disaster	Effects
2038	Landslide	Culturally important pond was washed away
2039/ 2063	Flood	Land erosion, destroyed the crops completely/one people was died, destruction of crops of 109 HHs
2042	Drought	Outburst of epidemic, production reduced by 70%
2044/ 52/53	Windstorm	Roof of school buildings were blown away.
2048	Dacoit	People were protested with the group of dacoit, youth were mobilised for security at night
2050, 2061	Fire	20 houses were destroyed completely/80 houses were brunt and people were displaced
2058	Cold wave	2 children were died, elderly people were in difficult situation
2062	Problem of wild animal	2 people were seriously injured, destruction of crops
2063	Epidemic	5 people were died by encephalitis, about 200 people were admitted in the hospital
Every year	Diarrhea	Locals had to invest for medicines. So they had economic burdens.

Annex 3: Hazards trend of of Suryapatuwa VDC

Date (BS)	Disaster	Effects
2041	Flood	Casualties, crops land long the Aaurahi and Karnali River was eroded, several settlements were forced to displaced, helicopter rescued people from both bank of Karnali River.
2046	Flood	Destroyed the paddy massively. The production was reduced by 40%.
2052	Flood	Paddy crop destroyed by flood, 7 cases of were reported from out broke of epidemic.
2062	Flood	Damage of crop land, flood entered in to the village for the first time.
2063	Flood	Destruction of crops.
2063	Drought	Outburst of epidemic, crop failure by 40%.
2063	Cold wave	Elderly people were in difficult situation, 12 livestock died.
2064	Flood	Damage of paddy crops, flood entered in to the village, damage of banana crops, fishing ponds etc.

Annex 4: Checklist used during fieldwork

Livelihoods Analysis

- Kind of occupation involved for livelihoods
 - agriculture or non-agriculture and others
 - types of seed used in the crop land either local or hybrid

- population size of family
- land size, livestock size and their numbers
- Nature and trend of floods/droughts and unpredictable rain in past (some 8-10 years back)
 - magnitude, coverage, duration
 - impacts on agricultural livelihood
 - crop land largely
 - cultivating, weeding, harvesting
 - seed collection, storage
 - shelters for livestock, milk production
 - fodder/fuel wood collection
 - diseases
 - market access
 - impacts on household livelihood
 - impacts on women's lives
 - damage to house, animal shed
 - daily household chores (food preparation, washing, cleaning)
 - schooling of children
 - daily survival pattern
- Patterns of seasons (summer, winter, rainy) and temperature variation

Coping Analysis

- Coping with the floods
 - traditional coping patterns
 - constraints/barriers associated with the coping
 - learning from the coping

Future Scenario

- Community's perception on flood' trend and its impacts on livelihoods?
 - difference between past & present context
 - impact on income options largely
 - impact on individual's livelihoods (men, women, children)
 - other likely impacts
 - its future scenario

Adaptation Analysis

- Adapting mechanisms with the changing nature of flooding
 - priorities they followed to adapt with the floods
 - constraints/barriers associated with options
 - learning from the adapting options
 - what they want further
- What women want to be done to support their livelihood adaptation? What are their views on how adaptation fund can be used?
 - how the AF can benefit their lives & of their family during floods
 - their key priorities related to AF
 - kind of resources/facilities they need to overcome the effects of floods
 - any necessity of capacity building to build resilience against floods/droughts
 - constraints/barriers associated with implementation of AF

Annex 5: Profile of the women and other key informants

SN	NAME	AGE	OCCUPATION	MHH/FHH	LIVING IN AREA FOR ...YEARS	ADDRESS
Matehiya, Banke						
GROUP 1						
1	Parvati Yadav	59	Agriculture	FHH	40	Matehiya
2	Prem Kumari Gupta	50	Agriculture and shop	MHH	30	Matehiya
3	Tayara Begam	52	Agriculture/Service	MHH	25	Matehiya
4	Rajkumari Paasi	50	Agriculture	MHH	50	Matehiya
5	Muna Mukeri	55	Health worker and agriculture	FHH	55	Matehiya
6	Rama Bati Mauriya	35	Agriculture	MHH	35	Matehiya
7	Prema Tiwari	55	Agriculture	FHH	50	Matehiya
8	Manaki Tiwari	40	Agriculture	MHH	40	Matehiya
9	Chandrawati Tiwari	60	Agriculture and seasonal labour	FHH	60	Matehiya
10	Darshan Chaudary	35	Daily wage labor and livestock	MHH	14	Matehiya
11	Birma Budhathoki	36	Shop and Agriculture	MHH	21	Matehiya
12	Laxmi Bohora	24	Agriculture	MHH	21	Matehiya
Matehiya, Banke						
GROUP 2						
1	Lily Budhathoki	60	Agriculture	FHH	21	Matehiya
2	Gumi Buda	58	Agriculture	MHH	21	Matehiya
3	Satwanta Yadav	40	Agriculture and Milk Production	MHH	40	Matehiya
4	Sandhya Devi Sharma	55	Health worker and Agriculture	MHH	55	Matehiya
5	Parbata Kandhu	45	Agriculture and Seasonal labour	MHH	45	Matehiya
6	Setu Budhathoki	35	Agriculture, Daily Labor	FHH	22	Matehiya
7	Anuwara Mukeri	52	Daily wage Labor	MHH	52	Matehiya
8	Anita Rokaya	22	Agriculture and Service	MHH	15	Matehiya
9	Tika Budathoki	26	Agriculture	MHH	22	Matehiya
10	Mintu Tiwari	36	Seasonal Labor	FHH	36	Matehiya
11	Sunita Tiwari	30	Daily wage labor	MHH	30	Matehiya
12	Nirmala Tiwari	35	Agriculture, Priest	MHH	35	Matehiya
Suryapatuwa, Bardiya						
GROUP 1						
1	Bishnu Adhikari	32	Agriculture and daily Labor	MHH	15	Suryapatuwa
2	Laxmi Chaudary	45	Agriculture and livestock	FHH	15	Suryapatuwa
3	Hiutee Chaudary	65	Agriculture	MHH	50	Suryapatuwa
4	Pooja Tharu	33	Agriculture and Vegetable	MHH	23	Suryapatuwa
5	Harichayeni Tharu	45	Agriculture	FHH	40	Suryapatuwa
6	Bir Bahadur Tharu	53	Agriculture	MHH	40	Suryapatuwa

7	Thaneshwor Tharu	55	Agriculture	MHH	40	Suryapatuwa
8	Thaggu Tharu	75	Agriculture	MHH	70	Suryapatuwa
9	Chidda Tharu	35	Fisheries	MHH	12	Suryapatuwa
10	Sawari Tharu	30	Fisheries and livestock	MHH	12	Suryapatuwa
Suryapatuwa, Bardiya						
GROUP 2						
1	Santu Chaudary	55	Agriculture	FHH	70	Suryapatwa
2	Sakunti Tharu	45	Agriculture	MHH	45	Suryapatwa
3	Parwati Tharu	39	Agriculture	FHH	39	Suryapatwa
4	Bina Adhikari	25	Agriculture	MHH	15	Suryapatwa
5	Ramiya Tharu	36	Agriculture	MHH	30	Suryapatwa
6	Rama Neupane	40	Agriculture and seasonal labour	MHH	20	Suryapatwa
7	Sita Gnyawali	50	Agriculture, Livestock and seasonal labour	FHH	25	Suryapatwa
8	Radha Basyal	34	Agriculture	MHH	30	Suryapatwa
9	Pooja Sonaha	40	Agriculture	MHH	32	Suryapatwa
10	Lal Devi Sonar	55	Agriculture	FHH	34	Suryapatwa

Key Informants of Matehiya and Suryapatuwa

SN	NAME	AGE	DESIGNATION	ADDRESS
Matehiya				
1	Taranath Neupaney	56	Headmaster	Matehiya
2	Munshi Yadav	45	Lead farmers	Matehiya
3	Harischan Tiwari	44	Lead Farmers	Matehiya
4	Ram Chandra Tiwari	51	Science teacher	Matehiya
5	Nirmala Khatri	18	Chairperson, Youth Club	Matehiya
6	Dima Kumari Chaudhari	16	Student	Matehiya
7	Birma BK	15	Student	Matehiya
8	Ganga Bhandari	16	Student	Matehiya
9	Laxmi Bohara	36	CFUG Member	Matehiya
10	Shashi Budathoki	32	Teacher	Matehiya
Suryapatuwa				
1	Ishwor Basyal	42	Social worker	Suryapatuwa
2	Bhupal Neupaney	36	Lead farmer, Banana cultivator	Suryapatuwa
3	Raju Gyawali	42	Teacher	Suryapatuwa
4	Sher Bahadur Tharu	48	Headmaster	Suryapatuwa
5	Surendra Gautam	46	Member, Khata Community Forest Users Group	Suryapatuwa
6	Mukunda Gyawali	57	Secretary, Khata Community Forest Users Group	Suryapatuwa
7	Meena Chaudhary	58	Member, Aaurahi Farmer Managed Irrigation system	Suryapatuwa
8	Sanju Tharu	28	Member, Vegetable farmers group	Suryapatuwa
9	Deepika Gautam	43	Member, Vegetable farmers group	Suryapatuwa
10	Geeta Sonaha	49	Member, Vegetable farmers group	Suryapatuwa