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Caritas Nepal

Kaski
District Assessment Report

This publication contains the results of a village level assessment carried out by Caritas Nepal in 10 SAF-BIN project villages in Kaski district, Nepal.
The base for this report was literature review conducted by the Caritas Nepal team. Additionally interactions with the involved communities were used to conduct Participatory Rural Appraisal, household surveys, focus group discussions and in depth interviews.

Front matter: Farmers of Kaski, Nepal preparing their paddy research field in Kaski District © SAF-BIN/Caritas Nepal

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Building Resilience to Climate Change through Strengthening Adaptive Small Scale Farming System in Rain-Fed Areas in Bangladesh, India and Nepal (SAF-BIN)

A summary report of ten SAF-BIN clusters from KASKI district of Nepal

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ACRONYMS

BLM	Broad Leaf Mustard
E	East
EU	European Union
Ha	Hectares
HH	Households
IPM	Integrated Pest Management
INM	Integrated Nutrient Management
masl	meters above sea level
N	North
PRA	Participatory Rural Appraisal
VDC	Village Development Committee

1 BACKGROUND

1.1 CLIMATE CHANGE AND ITS IMPACT

In Nepal, temperature has increased more significantly (Shrestha et al., 1999, cited in Chaulagain, 2006) owing to the changing climate. The temperature increased at higher rates in mountainous areas than in plain areas. The uncertainty in weather patterns especially due to late onset of monsoon rain, intense rainfall during harvesting time and lack of rainfall during winter due to rapid climate change has induced lots of natural disasters. This has increased the incidence of crop failure, flash floods, and drought. Besides changing climate, unique geophysical situation triggered natural disasters such as flash floods, drought, and landslides and intensity of their damages. These turn of events are especially disastrous to small farm families. Especially crop failure due to change in weather pattern have profound negative impacts – from food security situation to health and livelihoods situation especially in case of subsistence farmers. In future also, potential change in climates will have dire consequences on livelihood of locals, natural resources situation and ecological situation as Nepal has very low adaptive capacities.

1.2 CLIMATE CHANGE AND AGRICULTURAL LIVELIHOOD

Nepalese farmers rely upon natural weather conditions for agriculture and traditional farming practices. Hence, changing climate observed as change in timings of monsoon rain and increasing temperature negatively affect crop yields. The long spell of drought due to shift or delay in monsoon rain or lack of rainfall during winter season owing to climate change has decreased the yield of the agriculture commodities such as rice, wheat, maize and millet. This has profound negative effect in the food security situation of Nepal especially the small farm holders. The impact of climate change is worse in countries like Nepal, where still majority of agricultural land are rain-fed. Many reported increase in pest and disease infestation due to lack of rainfall during monsoon period for crops like paddy. In many areas, wheat has been replaced by other crops that require less water due to lack of winter rainfall during critical root initiation stage of wheat plant.

The woes of small farmers are added by the fact they have inadequate understanding of climate change issue. In addition, they are ill equipped to adapt and cope climate change through technological innovation. For example, in eastern terai during 2005/2006, rainfall deficit led to

decline in yield of crops by 12.5% on national basis (Malla, 2008; cited in Karki and Gurung, 2012, p. 22) whereas due to incessant rainfall in Midwestern region in the year 2005/06, crop production slumped by 30% (Malla, 2008; Regmi, 2007; cited in Karki and Gurung, 2012, p. 20). Extreme climatic situations observed frequently have affected agricultural sector decreasing productivity and increasing vulnerability of poor which in turn stimulate out-migration misbalancing the local economy as economically active population migrates (Khanal, 2009; cited in Karki and Gurung, 2012, p. 20).

Changing climate induced natural disasters in the form of flash floods, drought, hailstorm, late/early precipitation, mass movement, soil erosion, glacial lake outburst floods (GLOFs) caused physical damage. Likewise, climate change increased the pest or disease infestation in the crops, reducing the crop yield by 30% to 70% in far western regions of Nepal (World Food Programme, 2010**).** Around 60% farm households are food insecure in hilly and mountainous areas, due to effect of disasters, lack of productive land and lack of technological advancement such as irrigation facility, good quality seed etc.

1.3 CLIMATE CHANGE ADAPTATION MEASURES IN AGRICULTURE

It is important to reduce the harmful impacts of climate change in agriculture especially to poor vulnerable farm households by developing adaptive measures. Adaptive measures should be introduced at strategic level and local level involving farmers. At local level, adaptive measures can be introduced with the help of developmental agencies in co-ordination with local communities. Adaption at local level will help to lessen the probability of households to move into poverty but will certainly not help the households to be non-poor (Joshi, 2011). The adaptive measures for reducing the vulnerability situation of farmers from crop failure can be done by incorporating climate change with technical intervention with good extension activities that interlinks research, extension and capacity building of the small farm holders. These adaptive measures such as choosing suitable drought tolerant or stress tolerant variety, integrated pest management activities, crop diversification and diversifying the source of incomes through off-farm or on-farm activities can build resilience and adaptive capacity against climate change.

1.4 ON-FARM ACTION RESEARCH AS AN ADAPTATION MEASURE

In Nepal and its South Asian counterparts, the activities involving active participation of farmers to adapt against climate change is very few. Realizing this, Caritas with the help of European

Union is launching action research based project activities on major crops of particular project location for selecting suitable seed variety and cultivation practices to help small holder farm families to mitigate and adapt against climate change in Nepal, Bangladesh and India under SAF-BIN project. As a part of that program, Caritas Nepal, through EU funded SAF-BIN project intervened in 30 farm clusters of Nawalparasi, Bardiya, Kaski and Surkhet districts of Nepal for building resilience of small farm households to climate change issues.

2 METHODOLOGY

2.1 SITE AND BENEFICIARY SELECTION

The project locations of Kaski district were selected after interactions with District Development Committee and District Agriculture Development Officers. The suitability of location was evaluated by performing exploratory visits to the sites. The project team held interactions with District Agriculture Development Officers, District Development Officers, other local stakeholders including agricultural scientists and locals while selecting the potential project sites. 10 clusters from Kaski were chosen as a site of project intervention. While choosing the sites, agro-ecological diversity was considered. Hence, sites belonging to plains as well as hills were chosen. Within each cluster, three hamlets were formed. Each of the hamlets consists of 15 farmers following rain-fed agriculture with small farm holdings. In general, following aspects have been considered during the selection of Small Household Farmers (SHF) collectives:

- Diversity in climatic zones: Tropical & Sub tropical
- Geographical setting which includes: Inner terai, mid-hill and high hill and also the type of land such as flat land and sloping land
- Diversity in Rainfall Patterns: High, moderate and low rainfall area
- Cropping diversities which include: Maize, millet, rice etc with other crops
- Existence of rain-fed situation
- Ethnic diversity of target groups
- Socio-economic set up – inclusion of marginalized groups

2.2 SOURCES OF DATA

For the preparation of this report, both qualitative and quantitative data were collected using tools such as Participatory Rural Appraisal, Household survey for baseline data collection and

village screening workshop to identify and find past and present trends of farming practices of key crops, and rate the most important problem, helping research team choose proper theme of research. Before conducting these activities, orientation about SAF-BIN project and its activities were given to local stakeholders including potential beneficiaries, research scientists and government officers.

PRA tools used for collecting baseline information included Village Landscape Transect Map, Resource Map, Social Map, Agro-ecology & Foodscape Map, Venn Diagram, Time Trend, Technology Adoption Map, Food In and Food Out (FIFO), Agro & Food Seasonality, Bio Resource Flow Diagram, Wealth Ranking and Problem Matrix, tree & Analysis) and a structured village level data collection questionnaires, mainly around food security of small holder farmers in the context of climate change.

2.3 DATA COMPILATION AND ANALYSIS

The data collected through different tools and techniques were fed in Excel spread sheet and a general statistical tool such as frequency tabulation was used whenever needed. Separate thematic worksheets were prepared for in-depth analysis such as for preparing information derived from screening workshop in presentable form, Food in and food out information etc. Detailed information of these is presented in the village level reports. In this report, we will focus on whole Kaski district.

2.4 PREPARATION OF REPORTS

Based upon the information collected, reviewing secondary literatures about climate change issues in Nepal and triangulating the field information repeatedly when needed, reports were prepared. We have tried to maintain uniformity in all the report formats. However, there are differences in the format of the report or table of contents as data for each project cluster has more or less some variability.

2.5 CONTENT OF THE REPORT

This report is the compilation of information generated from 10 clusters belonging to Kaski district. The collective insights of Kaski district based upon data collected from the 10 clusters are given in this report, and wherever possible comparative insights will also be given. The collective insights will be based upon -

1. Information on demographic, socio-economic and educational situation, asset situation (natural, physical, social, human & financial) in general and in the context of food security of small holder farmers with respect to climate change issues.
2. Food insecurity situation of the locality and practices of food handling and management
3. Agriculture and livestock situation in terms of production system, production, consumption and productivity patterns
4. Key problems while following traditional cropping practices

Nevertheless, the detailed information of particular cluster are discussed and presented in village level reports.

3 RESULTS

3.1 BRIEF COMPARATIVE OVERVIEW OF THE PROJECT CLUSTERS

Kaski district lies in the Western region of Nepal under Dhaulagiri zone. In Kaski district, SAF-BIN has been intervened in 10 project clusters namely, Nirmalpokhari, Begnas, Hemja, Bharatpokhari, Kaskikot, Lumle, Macchapuchhre, Dhikurpokhari, Puranchaur, and Rupakot. All the clusters belong to hilly or slopy region with sub-tropical climate except Machhapuchhre cluster which lies in temperate climatic zone. The details of project clusters in the Kaski district are given in table 1.

Table 1: Details on project intervention clusters of Kaski

Project clusters VDC	**Latitude**	**Longitude**	**Altitude in masl**	**Total cluster area in ha**	**Agri & horticultural land in ha (% of total land occupied for agriculture)**
Nirmalpokhari	N 28°07′51"- 28°0′27"	E 83°57'46"--84°01'30"	580 - 750	179.6	57.2 (31.85%)
Begnas	N 28°10'814"-28°12"	E 084°06'838"	844	322.7	100 (30.99%)
Hemja	N28˚17'792"	083°55'274"	1240	73.75	40 (54.24%)
Bharatpokhari	N 28°07'708"	E 084°03′927"	649	342.9	185 (53.95%)
Kaskikot	N 28°15'562"	E083°53'438"	1170	139.2	77.16 (55.43%)
Lumle	N 28°17'967"	E 083°47'880"	1509	370.5	47.5 (12.82%)
Machhapuchhre	N 28°32'-28°58'	E 083°91'-84°08'	1350	134.8	85 (63.06%)
Dhikurpokhari	N 28°16'977"	E083°51'312"	1508	254.05	235 (92.5%)

Puranchaur	N 28°18'518	E 083°57'503	1226	1163	31.5 (57.8%)
Rupakot	N 28°09'311"	E 84°08'943	1207	115.72	36.84 (31.84%)
Total of Kaski cluster				**3096.22**	**895.2 (28.91%)**

SAF-BIN clusters of Kaski occupy 3096.22ha area of which 28.91% is used for agriculture. Map 1 provides the geographic position of the project VDCs within the Kaski district.

MAP 1: Location of SAF-BIN cluster VDCs in Kaski District

3.2 DEMOGRAPHIC INFORMATION

Socio-demographic characteristics such as educational, household characteristics (gender and caste wise) of the clusters of Kaski district are presented in the demographic information.

3.2.1 Population and household characteristics

The Table 2 below shows the general overview on population. The total population size is **5358** within 1024 HHs of 10 Kaski clusters. The average household size is 5.29. Begnas, Lumle, Rupakot and Kaskikot are more populated as compared to other clusters.

Table 2: Population and household characteristics of the Kaski clusters

SAF-BIN clusters	**Population characteristics**			**Household (HH) characteristics**			
	Male	Female	**Total**	Total HH size	Average HH size	Women headed HH	HH with differently able
Nirmalpokhari	247	252	***499***	101	4.94	10	1
Begnas	442	392	***834***	154	5.41	7	1
Hemja	149	160	***309***	64	4.83	12	2
Bharatpokhari	223	170	***393***	79	4.97	7	2
Kaskikot	363	344	***707***	154	4.58	11	2
Lumle	392	418	***810***	89	9.1	No data	1
Machhapuchhre	249	211	***460***	92	5	9	3
Dhikurpokhari	131	113	***244***	52	4.69	10	4
Puranchaur	187	184	***371***	77	4.82	13	0
Rupakot	339	392	***731***	162	4.51	8	1
Summary of KASKI cluster	***2722 (50.8%)***	***2636 (49.2%)***	***5358 (100%)***	***1024***	***5.29***	***87***	***17***

Figures in parentheses are in percentage

Source: Village data sheet 2011/2012 and PRA 2012, SAF-BIN

3.2.2 Ethnic characteristics of the Kaski cluster

The ethnic diversity of the Kaski cluster is presented in table 3. The data reveals that the clusters chosen for SAF-BIN contained majority of households from advantaged caste groups followed by dalits and janajati.

Table 3: Ethnic diversity in Kaski clusters

SAF-BIN clusters	**Ethnic characteristics of the HHs**			
	Ethnic groups/ Janajati	Advantaged caste groups	Dalits/Disadvantaged caste groups	Total HH
Nirmalpokhari	6 (5.94%)	82 (81.19%)	13 (12.87%)	101 (100%)
Begnas	2 (1.3%)	117 (75.97%)	35 (22.73%)	154 (100%)
Hemja	0	62 (96.88%)	2 (3.12%)	64 (100%)
Bharatpokhari	65 (82.28%)	10 (12.66%)	4 (5.06%)	79 (100%)
Kaskikot	5 (3.25%)	87 (56.49%)	62 (40.26%)	154 (100%)
Lumle	18 (20.22%)	56 (62.92%)	15 (16.85%)	89 (100%)
Machhapuchhre	46 (50%)	0	46 (50%)	92 (100%)
Dhikurpokhari	2 (3.85%)	12 (23.08%)	38 (73.08%)	52 (100%)
Puranchaur	14 (18.18%)	50 (64.94%)	13 (16.88%)	77 (100%)
Rupakot	44 (27.16%)	108 (66.67%)	10 (6.17%)	162 (100%)
Summary of Kaski cluster	***202 (19.73%)***	***584 (57.03%)***	***238 (23.24%)***	***1024 (100%)***

Figures in parentheses are in percentage

Source: Village data sheet 2011/2012 and PRA 2012, SAF-BIN

In Nepal, Hill Brahmin and Chhetris belonging to advantageous caste groups are put into advantageous group. They are termed as advantageous groups as they occupy dominant position in power structure of the country (K. Hachhethu, 2003). Meanwhile, rest of the groups – *Janajati (ethnic and indigenous groups), and disadvantaged caste groups/Dalit*, who occupy marginalized space in country's social, economic and political are termed as minority or disadvantaged groups.

Advantaged caste groups – includes Brahmin and Chhetri communities, having Nepali as mother tongue and Hinduism as a main religion

Janajati/Ethnic or Indigenous communities - includes people originally following different religion than Hinduism and speaking different language than Nepali e.g. Newars, Gurung, Tharu, Magar, Tamang, Bote, Chepang etc.

Disadvantaged caste groups - includes people having Nepali as mother tongue and Hinduism as a main religion, but belonging to lower caste groups.

Source: K. Hachhethu, 2003

As per social justice point of view, Caritas Nepal advocates the right of marginalized people of Nepal and other South Asian countries for international support to adapt to climate change. Hence, while choosing the group members, Caritas has been inclusive to marginalized groups to adapt against climate change.

3.2.3 Gender wise educational status

The frequency tabulation of the educational status of the available six clusters population showed that percentage of literates in Bharatpokhari cluster is reasonably higher as compared to the other clusters. Dhikurpokhari seems to have less percentage of literates as compared to others. The details are on table 4.

Table 4: Educational status of the locals of ten SAF-BIN clusters from Kaski

SAF-BIN clusters	**Literacy of the cluster population in %**								
	Male			**Female**			***Total***		
	Illiterate	Literate	Higher education	Illiterate	Literate	Higher education	*Illiterate*	*Literate*	*Higher education*
Nirmalpokhari	115	96	36	125	102	25	*240 (48.1)*	*198 (39.7)*	*61 (12.2)*
Begnas	196	210	36	172	205	15	*368 (44.12)*	*415 (49.76)*	*51 (6.12)*
Hemja	No data								
Bharatpokhari	1	177	45	41	103	26	*42 (10.7)*	*280 (71.25)*	*71 (18.06)*
Kaskikot	218	119	26	213	115	16	*431 (60.91)*	*234 (33.14)*	*42 (5.95)*
Lumle	24	281	150	17	226	112	*41(5.06)*	*507 (62.59)*	*262 (32.35)*
Machhapuchhre	42	148	59	29	142	40	*71 (15.43)*	*290 (63.04)*	*99 (21.52)*
Dhikurpokhari	118	8	5	109	3	1	*227 (93.03)*	*11 (4.51)*	*6 (2.46)*
Puranchaur	27	142	18	42	130	12	*69 (18.6)*	*272 (73.32)*	*30 (8.08)*

Rupakot	173	123	43	249	109	34	*422 (57.73)*	*232 (31.74)*	*77 (10.53)*
Summary of KASKI cluster	*914*	*1304*	*418*	*997*	*1135*	*281*	*1911 (50.76)*	*2674 (40.2)*	*699 (9.04)*
Excluding Hemja, Lumle, Machhapuchhre and Puranchaur									

Figures in parentheses are in percentage

Source: Village data sheet 2011/2012, SAF-BIN

3.3 LAND HOLDING PATTERN

In Nepal, farmers having land holding size of 0.5 ha and less are considered as small farmers. However, the location of farm land and its fertility is important determining factor of farm land's production and productivity than the size of farm. Having 0.5 ha in slopy terrain of hills is surely not same as having 0.5 ha of land in plain fertile areas for Nepal. Table 5 shows the land holding pattern of Kaski cluster.

Table 5: Land holding pattern in clusters of Kaski district in %

SAF-BIN clusters of KASKI	% of landless (absolute agriculture landless)	% with 0-0.25ha	% with 0.26-0.5 ha	% with 0.51- 1 ha	% with 1.1-2 ha	% with > 2ha	Total in %
Nirmalpokhari	8	17.33	42.67	20	12	0	100
Begnas	100	0	0	0	0	0	100
Hemja	6.67	0	60	33.33	0	0	100
Bharatpokhari	8.05	57.47	28.74	4.6	1.15	0	100
Kaskikot	12.1	28.03	15.92	43.95	0	0	100
Lumle	1.32	16.45	18.42	12.83	23.68	27.3	100
Machhapuchhre	23.21	74.11	2.68	0	0	0	100
Dhikurpokhari	23.81	21.09	19.27	23.81	12.02	0.00	100
Puranchaur	7.14	42.86	42.86	7.14	0	0	100
Rupakot	2.52	28.57	33.61	23.53	11.76	0	100

Source: Village data sheet 2011/2012, SAF-BIN

Considering the village level report data, it is revealed that majority of the farm households are small with 0.5 ha and less lands.

3.4 LAND USE PATTERN

The area occupied by 10 clusters of Kaski district is **1987.76 ha** of which **899.7 ha** (45.27%) of land is used for agricultural and horticultural purposes. The details of land use pattern of the cluster are shown in the table 6 below.

Table 6: Land use pattern in clusters of Kaski district in hectares (ha)

*26**SAF-BIN clusters of Kaski***	***Agricultural and horticultural land***	***Pasture land***	***Dense forest***	***Area under open forest***	***Shrub land***	***Cultivable waste fallow land***	***Uncultivable waste fallow land***	***Area under water***	***Others***	***Total in ha***
Nirmalpokhari	57.2 (31.83%)	60 (31.83%)	53.5 (29.8%)	2.34 (1.3%)	6.6 (3.67%)	-	-	-	-	*179.6 (100%)*
Begnas	100 (30.99%)	170 (52.69%)	50 (15.49%)	-	-	1.5 (0.46%)	1 (0.31%)	0.2 (0.06%)		*322.7 (100%)*
Hemja	40 (54.24%)	-	13 (17.62%)	-	-	-	20 (27.12%)	-	0.75 (1.02%)	*73.75 (100%)*
Bharatpokhari	189.5 (55.26%)	-	144 (42%)	-	9.4 (2.74%)		-	-	-	*342.9 (100%)*
Kaskikot	77.16 (55.42%)	1(0.72%)	60 (43.10%)	-		0.55 (0.4%)	0.49 (0.36%)		-	*139.2 (100%)*
Lumle	47.5 (12.82%)	7 (%)	181 (5.54%)	-	135 (0.65%)	-			-	*370.5 (100%)*
Machhapuchhre	85 (63.06%)	25 (18.54%)	24.8 (18.4%)	-		-	-		-	*134.8 (100%)*
Dhikurpokhari	235 (92.5%)	-	14.05 (5.54%)	3.35 (1.31%)	1.65 (0.65%)	-	-		-	*254.05 (100%)*
Puranchaur	31.5 (57.8%)	-	20 (36.7%)	-	-	2 (3.67%)	-	1 (1.83%)	-	*54.5 (100%)*
Rupakot	36.84 (31.83%)	38.65 (33.40%)	34.48 (29.8%)	-	-	1.5 (1.3%)	4.25 (3.67%)	-	-	*115.72 (100%)*
Total	899.7 (45.27%)	301.65 (15.18%)	594.83 (29.92%)	5.69 (0.29%)	152.65 (7.68%)	5.55 (0.28%)	25.74 (1.29%)	1.2 (0.06%)	0.75 (0.04%)	**1987.2 (100%)**

Figures in parentheses are in percentage

Source: Village data sheet 2011/2012, SAF-BIN

3.5 SOIL AND LAND TYPE

3.5.1 Soil Characteristics

The soil types vary depending upon the land characteristics within the Kaski cluster. The area consists of different kinds of soil that includes black, red, yellow, sandy, clayey, loamy and silty soils. The soil characteristics presented here consider only registered land. The details of soil characteristics of the clusters are given in table 7.

Table 7: Soil characteristics in clusters of Kaski district

SAF-BIN clusters of KASKI	**Types of soil and their characteristics**							
	Loamy	***Sandy***	***Clayey***	***Red***	***Pebbles mix coarse soil (Phusro mato)***	***Silty***	***Yellow***	***Black***
Nirmalpokhari	Plain land, fertile with good water holding capacity	Plain (khet) land, , easy to till but with poor water holding	Slopy land with red colored soil with low water holding capacity used to grow citrus, sticky when wet and difficult to till during dry season	-	-	-	-	-
Begnas	Plain land, fertile with good water holding capacity	Red colored	Red colored, sticky when wet and difficult to till during dry season	-	-	-	-	Fertile
Hemja	Fertile and easy to plough soil	Low water holding capacity	Sticky and difficult to plough	-	-	-	-	-
Bharatpokhari	Fertile and easy to plough soil; found in plain area nearby forest	-	Red colored, difficult to plough, found at higher altitude	-	Young soil formed from broken soft stone, have very low fertility and found in higher altitude	-	-	-

Kaskikot	Fertile and easy for agricultural operation	-	Red colored, sticky	Difficult to plough at higher altitude	-	-	-	-
Lumle	Fertile, black colored	-	-	-	New soil made from broken soft stones	-	-	-
Machhapuchhre	Black colored fertile soil with high organic matter	-	-	-	-	Soil debris heaped by flood; loose and fertile	-	-
Dhikurpokhari	Fertile, black with good water holding capacity	-	Red colored, sticky when wet and difficult to till during dry season	-	-	-	-	-
Puranchaur	Plain land, fertile	-	-	Difficult to plough at higher altitude	-	-	Water holding capacity less and less fertile	-
Rupakot	Fertile with high organic matter content and black in color	Sandy on plain (khet) land, with poor water holding	Red colored and difficult to plough with high water holding capacity	-	-	-	-	-
Summary of Kaski cluster according to soil type	*Nirmalpokhari, Begnas, Hemja, Bharatpokhari, Kaskikot, Lumle, Machhapuchhre, Dhikurpokhari, Puranchaur, Rupakot*	*Nirmalpokhari, Begnas, Hemja, Rupakot*	*Nirmalpokhari, Begnas, Hemja, Bharatpokhari, Kaskikot, Dhikurpokhari, Rupakot*	Kaskikot, Puranchaur	Bharatpokhari, Lumle	*Machhapuchhre*	*Puranchaur*	Begnas

Source: Village data sheet 2011/2012, SAF-BIN

3.5.2 Land Characteristics

The land characteristics vary depending upon topography, elevation, soil properties and even weather conditions. The land characteristics presented here consider only registered agricultural land. The plain areas are more fertile as compared to slopy land. Likewise, area with perennial source of irrigation yields more than dry areas. The details of land type are given in table 8.

Table 8: Land characteristics in clusters of Kaski district

SAF-BIN clusters of Kaski	***Land type***				
	Type I (Abbal)[1]	*Type II (Doyam)*[2]	*Type III (Sim)*[3]	*Type IV (Chahar)*[4]	*Total agricultural land in ha*
Nirmalpokhari	6 (9.09%)	26 (39.41%)	21 (31. 8%)	4.2 (19.7%)	*57.2 (100%)*
Begnas	2.63 (2.63%)	63.16 (63.16%)	31.58 (31.58%)	2.63 (2.63%)	*100 (100%)*
Hemja	0	0	20 (50%)	20 (50%)	*40 (100%)*
Bharatpokhari	15.64 (8.25%)	46.91 (24.75%)	93.8 (49.50%)	33.15 (17.5)%	*189.5 (100%)*
Kaskikot	7.75 (10%)	10 (13%)	32.56 (42.20%)	26.85 (34.80%)	*77.16 (100%)*
Lumle	19.75 (41.58%)	6.22 (13.1%)	19.75 (41.58%)	1.78 (3.74%)	*47.5 (100%)*
Machhapuchhre	0	21.6 (25.41%)	63.4 (74.59%)	-	*85 (100%)*
Dhikurpokhari	66.27 (28.20%)	94.96 (40.41%)	45.05 (19.17%)	28.72 (12.22%)	*235 (100%)*
Puranchaur	10.2 (32.26%)	17.8 (56.45%)	3.5 (11.29%)	0	*31. 5(100%)*
Rupakot	4.6 (12.5%)	23.02 (62.5%)	6 (16.25%)	3.22 (8.75%)	*36.84 (100%)*

Figures in parentheses are in percentage

Source: Village data sheet 2011/2012, SAF-BIN

The land belonging to type III and type IV have less fertility as compared to Type I and Type II.

3.6 METEOROLOGICAL INFORMATION

Since, the weather trend data for particular cluster is not available, we chose nearby weather station of Dumkauli from Kaski district as a representation of meteorological information of many of the clusters from Kaski. Based upon the data provided by Department of Hydrology and Meteorology, average maximum temperature, average minimum temperature and average

[1] Best quality soil for agricultural purposes
[2] Good soil for agricultural purposes
[3] Not good for agricultural purposes
[4] Unsuitable for agricultural purposes

monthly rainfall are calculated (Table 9). In addition, the weather attributes are subjected to trend analysis (figure 1, 2 and 3).

Table 9: Meteorological information of the Kaski district

	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**
Average monthly rainfall measured in mm (1976-2011)												
Average maximum temperature in °C over the last 30 years (1980-2011)												
Minimum temperature in °C over the last 30 years (1980-2011)												

Source:

Figure 1: Trend analysis of the maximum temperature in Kaski District

(Source: Department of Hydrology and Meteorology data,)

Figure 2: Analysis of the change in minimum temperature in Kaski District

(Source: Department of Hydrology and Meteorology data)

Figure 3: Analysis of the change in the rainfall in Kaski District

(Source: Department of Hydrology and Meteorology data)

Weather data to be analyzed

3.7 CAPITAL ASSETS SITUATION

The local people's ability to deal and cope with shocks and vulnerable situation depends on their assets situation (physical, financial, social, human and natural capital). The population who are rich in these assets can develop survival strategy and have higher resilience capacity if exposed with riskier situation than their asset poor counterparts. In this section, focus is on the presentation of the assets situation of the clusters.

3.7.1 Physical assets

This section will give an overview of the situation of physical infrastructure such as road connectivity, electricity services, telecom facilities, schools, health centers, veterinary service centres, VDC office, market, etc. Surely, availability of these assets can have good impact on the local people such as road connectivity can increase access to market. Table 10 shows the availability and types of physical assets in various clusters of Kaski.

Table 10: Physical assets in the clusters of Kaski

Physical assets	**Kaski clusters**									
	Nirmalpokhari	*Begnas*	*Hemja*	*Bharatpokhari*	*Kaskikot*	*Lumle*	*Machhapuchhre*	*Dhikurpokhari*	*Puranchaur*	*Rupakot*
All weathered road connectivity	No	No	No	Yes	No	Yes	Yes	Yes	Yes	No
Electricity facility	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Mobile network coverage	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Access to internet	No	No	No	No	No	Yes	Yes	Yes	No	No
Primary school	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Secondary school	No	Yes	No	No	Yes	Yes	Yes	Yes	No	No
Community meeting place	Yes	No	No	No	No	No	Yes	Yes	No	Yes
Health centre	No	Yes	No	No	Yes	No	No	Yes	Yes	Yes

Veterinary service centre	No	No	No	No	No	Yes	No	Yes	No	No
Cottage industries/Agro-enterprises	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
VDC/GP/Union Office	No	No	No	No	Yes	Yes	Yes	Yes	No	No
Concrete drains	No	No	No	No	No	No	No	No	No	No
Markets for farm produce	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Grocery and other shops	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Remarks	Veterinary Service Centre/VDC - 5km, Market, Health Post: 11-15km away	Facilities 10km far	Services 4-6km far	Health post/Market-15km far, Veterinary Service Centre/VDC: 4-7km far	Services 3-4km, except market-16km	Services 3-4km far, market -20km away	Veterinary Service Centre - 4km away, Health Post/ market-10-15km far	Services 1-3km far	Veterinary Service Centre & market-15km far, VDC-4km far	Health Post/ Veterinary Service Centre -2km away, Market-10km far

Source: Village data sheet 2011/2012, SAF-BIN

All weathered roads are not available in the following clusters of Kaski – Nirmalpokhari, Begnas, Hemja, Kaskikot and Rupakot making it difficult for villagers to access market and other facilities especially during monsoon season. Other clusters are well connected with all weathered roads, which give them privilege to access various services all year round offered in the nearby city centers of Kaski district. Hence, though they might not have facilities within the area, the people of clusters with good road networks have faster access to other services. Lumle, Machhapuchhre and Dhikurpokhari are well connected with internet.

[Being connected with power grid through electric poles do not ensure availability of electricity in Nepal, as in the winter time due to low production and ever increasing demand of electricity, load shedding can go up to 16 hours per day.]

3.7.2 Social, human and financial assets

Besides physical assets that provide services, social, human and financial capitals are equally important to reduce vulnerability against any disasters. In table 11, we note on these assets – social, human and financial assets present in the Kaski clusters.

Table 11: Status of social, human and financial assets in Kaski clusters

Assets situation in ten Kaski clusters	Nirmalpokhari	Begnas	Hemja	Bharatpokhari	Kaskikot	Lumle	Machhapuchhre	Dhikurpokhari	Puranchaur	Rupakot
Financial Assets										
Self-help groups Microfinance	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cooperative (credit/marketing)	No	No	No	No	No	No	No	No	No	No
Branch of Rural/Cooperative Bank	No	No	Yes	No	No	No	No	Yes	No	No
Branch of Commercial Bank	No	No	No	No	No	No	No	No	No	No
Money lender	No	No	Yes	No	No	Yes	No	No	No	No
Social Assets										
Local self governance units/VDC	No	No	No	No	No	No	No	No	No	No
Farmers' organizations	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No
Community Forest User Groups	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Water users' group	Yes	Yes	No	No	Yes	No	Yes	Yes	Yes	Yes
Communal/Ethnic institution	Yes	Yes	No	Yes	No	Yes	Yes	Yes	Yes	No
Community based organization	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	No

Youth club	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Religious/festival committee	No	Yes	No	No	Yes	Yes	No	Yes	No	No
Grain/food bank	No	No	No	No	No	No	No	No	No	No
Emergency response	Yes	No	No	Yes	No	No	No	Yes	No	No
Human Assets										
Organic farming	Yes	Yes	No	No	Yes	No	No	Yes	No	No
Resource/leader farmer	Yes	Yes	No	No	Yes	No	No	Yes	No	Yes
Gardner/nursery raiser	No	Yes	No	No	No	No	No	Yes	No	No
Agricultural degree	-	-	-	-	-	-	-	-	-	Yes

Source: Village data sheet 2011/2012, SAF-BIN

In all the clusters except in Hemja, farmers or local communities are in one or other way aligned with particular groups or organizations. This is surely important as being in a group can make their voices heard in public and social domain. However, in-depth analyses of group dynamics are necessary to find whether the groups are functioning well or not.

3.8 MAJOR CROPS AND CROPPING PATTERNS

In Kaski, rice is a major crop followed by potato, maize, wheat and millet. Rice and potato are widely grown in Kaski district. Table12 shows some key crops and their yield in tonnes/hectares (t/ha), major cropping system and food scape. Rice is a dominant food in Kaski food scape. If not grown in sufficient amount, demand of rice and other crops is fulfilled by importing. Besides cereals, vegetables are preferred including potato. Cole crops and cucurbits species are widely grown.

Table 12: Major crops, cropping system and food scape of the Kaski clusters

KASKI SAF-BIN clusters	*1st crop*	*2nd crop*		*3rd crop*		*4th crop*		*Cropping pattern*		*Food scape in order of priority*	*Important vegetables with yield in t/ha*
	Rice yield	*Crops*	*yield (t/ha)*	*Name*	*yield (t/ha)*	*Crops*	*yield (t/ha)*	*Past*	*Present*		

	(t/ha)									
Nirmalpokhari	2.2-2.5	Maize	1.5					Rice - Maize/Millet	Rice – Maize (dominant), Rice – Maize/Millet	Rice>Pulses>Wheat	cucumber-12, cauli-6, potato-3, bitter gourd and orange- 4 t each
Begnas	2	Maize	1	Millet	0.5			-	Rice-Maize/Millet (dominant cropping pattern), in abbal and doyam land: rice-maize (20ha), in doyam and sim land: maize-millet (70 ha)	Rice>Pulses>Wheat	radish-8, cucumber 15-20, gourds-12, cabbage-15, kitchen garden radish & BLM-0.7
Hemja	1	Maize	1	Wheat	1			Rice-Mustard	Rice-Maize/Millet (dominant cropping pattern), in 10 ha doyam and chahar land: maize - millet, in 10ha doyam land: Rice-Wheat-Fallow	Rice>Pulses>Wheat	cucumber-8, cauli-7, radish-6, potato-10, cabbage, cucurbits, niguro (fern wild)-6
Bharatpokhari	2	Maize	1	Millet	0.5	Lentil	1.3	Rice – Maize/ vegetables	Rice-Maize/Millet (dominant cropping pattern), Rice-Maize/vegetables	Rice>Pulses>Wheat	ginger, radish, broccoli-1, yam-11, soybean-0.9
Kaskikot	2	Millet	1	Potato	10	Wheat, Mustard	2 & 0.6	Rice – Maize/ Millet	Rice+soybean-Maize/millet, in abbal land: Rice-Wheat-Maize (7.5ha), in doyam land: Rice-Fallow-Maize (10ha)	Rice>Pulses>Wheat	tomato, cucumber, ginger - 1, wild (niguro-0.6, asparagus-0.3, bamboo shoots – 0.5

Lumle	3	Maize	1	Millet	1	Wheat	2	Rice – Maize/ Millet	Rice - Maize/Millet/Mustard (dominant cropping pattern), Rice -Maize/Millet	Rice>Pulses>Wheat	tomato-10, cucumber-8, banana-5, cauli-12, gourds-10
Machhapuchhre	1.5	Maize	1	Millet	1			Rice – Maize/ Millet	Rice-Maize/Millet (dominant cropping pattern)	Rice>Pulses>Wheat	tomato-5, BLM-2, cabbage-12, potato-10, radish-6, colocasia-10, cucumber, bittergourd
Dhikurpokhari	2-2.4	Millet	1	Wheat	2			Rice – Maize/ Millet	Rice-Maize/Millet (dominant cropping pattern)	Rice>Pulses>Wheat	cauli-5, potato-5
Puranchaur	2.4-2.5	Maize	1.5	Millet	1.1	Wheat	1.8	Rice – Maize/ Millet (maize & millet intercropped)	Rice-maize/millet, Rice-wheat (double cropping), rice-wheat-maize	Rice>Maize>Wheat	Radish, ginger, colocasia, yam, banana, turmeric, mango
Rupakot	1.8	Maize	1.3	maize	1	millet	0.5	Rice – Maize/ Millet	Rice-Maize (abbal/doyam), maize-millet in 45 ha doyam land	Rice>Maize>Millet	potato-7, jackfruits-12

BLM = Broad leaf mustard

Source: Village data sheet 2011/2012, SAF-BIN

3.9 ADVERSITIES PERCEIVED BY LOCALS

Due to changing climate, farmers face problems such as drought, lack of timely rainfall during monsoon and critical plant growth stages leading to crop failure and increasing food insecurity. Table 13 presents the information about adverse conditions contributing to crop failure and locals' perception on weather patterns of the Kaski clusters. Food security data is not available for Kaski clusters.

Table 13: Adversities and perception on weather patter

SAF-BIN clusters	*Nirmalpokhari*	*Begnas*	*Hemja*	*Bharatpokhari*	*Kaskikot*	*Lumle*	*Machhapuchhre*	*Dhikurpokhari*	*Puranchaur*	*Rupakot*
Occurrence of drought over past 5 years					1			1		
Perception on weather pattern										
Fluctuating	Temperature, rainfall, disease outbreak, food production, nutritional status, dietary diversity	Temperature, rainfall, disease outbreak, food production, nutritional status	Rainfall, disease outbreak, food production	Rainfall, nutritional status, food expenditure, food production	Rainfall, disease outbreak, food production and expenditure, nutritional status	Rainfall, disease outbreak, food production, health expenditure	Temperature, nutritional status, snow fall	Temperature, rainfall, disease outbreak, food production, nutritional status		Temperature, rainfall, disease outbreak, food production, nutritional status,
Increasing	Food expenditure, food vulnerability, health expenditure	Food expenditure, dietary diversity, food vulnerability, health expenditure	Temperature, Food expenditure, dietary diversity, food vulnerability, health expenditure	Temperature, dietary diversity, food vulnerability, health expenditure, disease outbreak	Temperature, dietary diversity, food vulnerability, health expenditure	Temperature, food expenditure, dietary diversity, food vulnerability, nutritional status	Food expenditure, dietary diversity, food vulnerability, health expenditure, disease outbreak	Food expenditure, dietary diversity, food vulnerability, health expenditure		Food expenditure, food vulnerability, health expenditure, dietary diversity
Decreasing							Rainfall, food production, hailstones			

Figures in parentheses are in percentage

Source: Village data sheet 2011/2012, SAF-BIN

3.10 FOOD HANDLING AND MANAGEMENT

Food handling and post harvest management of food are important. Good practices undertaken during harvesting, processing, storage ensures food loss is less after production. Hence, more food is available for consumption by the households. Table 14 below presents the post harvest handling and management practices followed by the cluster population. It also notes what is the learning or innovations pursued by small farmers to reduce food loss during these stages.

Table 14: Food storage and processing technologies used in ten clusters of Kaski

Storage techniques	**Clusters using the techniques**
Plastic drums for wheat	Nirmalpokhari, Begnas, Hemja, Bharatpokhari, Kaskikot, Lumle, Machhapuchhre, Dhikurpokhari
Plastic sacs	Nirmalpokhari, Begnas, Hemja, Bharatpokhari, Kaskikot, Lumle, Machhapuchhre, Dhikurpokhari, Puranchaur, Rupakot
Mudbins(Deheri)*	Bharatpokhari, Rupakot
Bamboo bins	Nirmalpokhari, Begnas, Kaskikot, Lumle, Machhapuchhre, Puranchaur
Jute sacs	Nirmalpokhari, Begnas, Hemja, Bharatpokhari, Kaskikot, Lumle, Machhapuchhre, Dhikurpokhari, Puranchaur, Rupakot
Suli (raised str. with thatched roof for maize storage)	Puranchaur
Potato tuber storage by spreading in the floor of dark room	Nirmalpokhari, Begnas, Kaskikot
Harvesting techniques	
Manual	Nirmalpokhari, Begnas, Hemja, Bharatpokhari, Kaskikot, Lumle, Machhapuchhre, Dhikurpokhari, Puranchaur, Rupakot
Processing	
In mills	Nirmalpokhari, Begnas, Hemja, Bharatpokhari, Kaskikot, Lumle, Machhapuchhre, Dhikurpokhari, Puranchaur, Rupakot
In shelling machine	Begnas, Bharatpokhari, Kaskikot, Lumle, Dhikurpokhari
Mortar and pestle, cereal pounder	Puranchaur

Source: Village data sheet 2011/2012, SAF-BIN

Bamboo bins, mud bins, jute and plastic sacs/drums are commonly used for storage. Though might be expensive, use of closed mouth metal bins are recommended for maintaining better quality during storage of seed. However, metal bins are not used. Harvesting is done manually in all the clusters. In 5 clusters namely - Begnas, Bharatpokhari, Kaskikot, Lumle, and Dhikurpokhari, shelling machine has been used. Both traditional and contemporary processing methods are followed to process key cereal crops.

3.11 MAJOR CROP VARIETIES AND SEED SOURCE

Rice is the major crop with farmers followed by potato. Farmers used both improved and local varieties of the crops in 7 clusters expect for Hemja, Lumle and Rupakot where only local varieties are cultivated. Table 15 below provides varietal information of seed of major crops used in the clusters.

Table 15: Major crops varieties grown in Kaski clusters

SAF-BIN clusters Kaski	***Varieties cultivated in the clusters (L=local, I=improved, H=hybrid)***			
	Rice	***Wheat***	***Maize***	***Others***
Nirmalpokhari	L: Jethobudho, Ekle, Ramani		L: Seto (white), I: Rampur yellow, Manakamana	
Begnas	L: Ekle, Gurdi, Anadi, I: Radha-7, Radha-9		L: yellow, white	Millet: L: Dalle/jhabre; Tomato: L+I: Srijana, Manisha, BL4110
Hemja	L: Adhere, Gurde, Juwari, Jhinuwa, Darmari		L: yellow	No data
Bharatpokhari	L: Anadi, Madhesi, Urdi, Jethobudho		L: yellow, white; I: Manakamana-1, Manakamana-2	Millet: L: Dalle, Jhyape, brown; (I: Chickpea-Tara, Cowpea/bodi-Surya)
Kaskikot	L: Adhere, Panhele, Marsi, Silain, Golain , Jethobudo; I: Khumal 4, Bhatte	L: Kathe	L: yellow, I: Khumal yellow	tomato- local; I: Srijana, Manisha, BL 4110
Lumle	L: Kathe ?? wheat, Kalapatle		L: yellow, white	Millet: L: Dalle, Aapchaure
Machhapuchhre	L: Marshi, Jarneli, Gauri; I: Bhatte, Radha-7, Khumal-4		L: yellow, white; I: Manakamana-1, Manakamana-2	Millet: L: Dalle, Jhyape
Dhikurpokhari	L: Yellow/kalo marshi, Kalo patle, marshi juwari; I: Bhatte, Radha-7, Khumal-4		L: yellow, white, red I: Manakamana-1, Manakamana-2	Local; (Potato: red and white varieties)
Puranchaur	L: Jhinuwa/Marshi/Gauri; I: CH-45	L: white/ brown	L: White/local pahenlo (yellow)	Local
Rupakot	L: Madhese, gudula, siramphul, I - Sabitri		L: White/local pahenlo (yellow)	Millet: L: Dalle, Laffe, pahenle (yellow)

Source: Village data sheet 2011/2012, SAF-BIN

3.12 SEED SOURCE

In every cluster, farmers perceived low yield of crops as one of the key problems. Among the causes attributed to low yield, key cause has been termed as lack of quality seed. Table 17 below provides information about the source of seed farmers depends upon.

Table 16: Major crops varieties grown in Kaski clusters

SAF-BIN clusters KASKI	***Seed Source (L=local source, E=external source)***				
	Rice	**Wheat**	**Maize**	**Millet**	***Major crops***
Nirmalpokhari	L: 100		L: 80, E: 20		Past: Rice, Wheat, Maize; Present: Rice, Wheat, Maize
Begnas	L: 80, I: 20		L: 100	L: 100	Past: Maize, Millet, Rice; Present: Rice, Maize, Wheat
Hemja	L: 100	L: 100	L: 100	L: 100	Past: Maize, Rice, Wheat; Present: Maize, Rice, Millet
Bharatpokhari	L: 90, E: 10		L: 90, E: 10	L: 100	Past: Maize, Wheat, Millet; Present: Maize, Wheat, Rice
Kaskikot	L: 95, E: 5	L: 100	L: 90, E: 10	L: 100	Past: Millet, Maize, Rice; Present: Rice, Maize, Wheat
Lumle	L: 100		L: 100	L: 100	Past: Millet, Maize, Rice; Present: Maize, Rice, Wheat
Machhapuchhre	L: 100		L: 100	L: 100	Past: Millet, Maize, Rice; Present: Maize, Rice, Wheat
Dhikurpokhari	L: 95, E: 5		L: 95, E: 5	L: 100	Past: Maize, Millet, Rice; Present: Rice, Maize, Wheat
Puranchaur	L: 100	L: 100	L: 90, E: 10	L: 100	Past: Maize, Wheat, Rice; Present: Rice, Wheat, Maize
Rupakot	L: 90, E: 10		L: 80, E: 20	L: 100	Past: Millet, Maize, Rice; Present: Maize, Rice, Millet

Source: Village data sheet 2011/2012, SAF-BIN

It has been observed that Nepal's seed replacement rate is nominal and not at all, leading to degradation in quality and production of crops. The table above confirms the same that farmers' do not replace their old seeds with fresh ones. Lack of seed replacement can also be the reason for low yield of the crops.

3.13 FARMING PRACTICES

A farm's agriculture productivity and sustainability depends on seeds, soil, climate as well as the capacity of farmers to pursue suitable farming practices. Table 17 gives information on farming practices followed in the clusters of Kaski.

Table 17: Farming practices followed in the Kaski SAF-BIN clusters

Cultivation practices	Clusters following	No. of followers	Area in ha	Crops/system
Organic farming	Begnas, Bharatpokhari, Kaskikot, Dhikurpokhari	45 +20 +11 +20=96	3 +2 +no data +2=7	Rice And Vegetables, In Kaskikot, no data
Integrated Pest Management (IPM)	Nirmalpokhari, Bharatpokhari, Kaskikot, Dhikurpokhari, Puranchaur	25 +20 +30 +70 +60=205	0.6 +0.5 +1.5 +14 +15=31.6	Rice and vegetables +Cucumber +Rice + Rice and vegetables +Vegetables
Integrated Nutrient Management (INM)	Bharatpokhari	20	0.5	Cucumber
Recommendations	Beside the farming practices followed, it would be better to compile GAP (good agricultural practices) information			
In Hemja, Lumle, Machhapuchhre, and Rupakot none of the above mentioned innovative farm practices followed.				

Source: Village data sheet 2011/2012, SAF-BIN

In Kaski - organic farming, Integrated Pest Management (IPM) and Integrated Nutrient Management are three cultivation practices worth mentioning. However, these practices are followed in paddy and wheat in the limited area. It seems more and more farmers are embracing IPM activities in their farm.

3.14 LIVESTOCK INFORMATION

Livestock are an important part of small integrated farming systems present in Nepal. Small and large livestock are raised for income generation. Milk and milk products, egg and meat are consumed and also sold by the small farmer households to raise much needed cash. At times of household emergency such as illness of family member, small or large livestock may be sold to raise the funds needed for medication. In addition to this, animal waste are used as farm yard manure, compost, and for preparing organic concoctions used in farming such as bio-spray. There are various levels of mechanization in the rural areas; however, significant numbers of the

households are still noted to keep large animals for use as draught force. The following table 18 is the status of different types of local and improved livestock per household in the location.

Table 18: Livestock status in ten Kaski clusters

Status of the local livestock and birds

SAF-BIN clusters Kaski	Cow	Buffalo	Bullocks	Goat	Sheep	Pig	Poultry/ birds	Others
Nirmalpokhari	12	76	41	35	0	0	100	-
Begnas	20	200	70	700	0	0	350	-
Hemja	2	100	14	200	0	0	0	-
Bharatpokhari	30	65	40	50	0	7	100	-
Kaskikot	4	90	30	205	40	0	28	32 beehives
Lumle	5	100	50	130	0	no data (ND)	ND	-
Machhapuchhre	25	122	122	132	76	0	150	700 Giriraj poultry
Dhikurpokhari	35	279	180	315	36	0	200	9
Puranchaur	28	69	32	30	4	14	0	-
Rupakot	58	188	41	443	0	ND	ND	-
Total	***219***	***1289***	***620***	***2240***	***156***	***21***	***928***	

Status of the improved livestock and birds

SAF-BIN clusters Kaski	Cow	Buffalo	Bullocks	Goat	Sheep	Pig	Poultry/ birds	Others
Nirmalpokhari	10	-	-	-	-	-	-	-
Begnas	3	40	-	40	-	-	200	-
Hemja	5	-	-	-	-	-	no data (ND)	-
Bharatpokhari	15	13	-	120	-	17	1000	-
Kaskikot	5	35	5	105	-	-	-	30 bee hives
Lumle	-	-	-	-	-	ND	-	-
Machhapuchhre	2	-	-	-	-	-	ND	-
Dhikurpokhari	1	6	-	3	-	-	-	-
Puranchaur	69	28	-	9	-	-	-	-
Rupakot	-	-	-	-	-	-	-	-
Total	***110***	***122***	***5***	***277***	***-***	***17***	***1200***	***-***

Status of Local and improved livestock and poultry combined

SAF-BIN clusters Kaski	Cow	Buffalo	Bullocks	Goat	Sheep	Pig	Poultry/birds
Nirmalpokhari	22	76	41	35	0	0	100
Begnas	23	240	70	740	0	0	550
Hemja	7	100	14	200	0	0	0
Bharatpokhari	45	78	40	170	0	24	1100
Kaskikot	9	125	35	310	40	0	28
Lumle	5	100	50	130	0	ND	ND
Machhapuchhre	27	122	122	132	76	0	150
Dhikurpokhari	36	285	180	318	36	0	200
Puranchaur	97	97	32	39	4	14	0
Rupakot	58	188	41	443	0	0	0
Total	***329***	***1411***	***625***	***2517***	***156***	***38***	***2128***

Average livestock per HH

SAF-BIN clusters Kaski	Total HH size	*Cow*	*Buffalo*	*Bullocks*	*Goat*	*Sheep*	*Pig*
Nirmalpokhari	101	0.22	0.75	0.41	0.35	0.00	0.00
Begnas	154	0.15	1.56	0.45	4.81	0.00	0.00
Hemja	64	0.11	1.56	0.22	3.13	0.00	0.00
Bharatpokhari	79	0.57	0.99	0.51	2.15	0.00	0.30
Kaskikot	154	0.06	0.81	0.23	2.01	0.26	0.00
Lumle	89	0.06	1.12	0.56	1.46	0.00	0.00
Machhapuchhre	92	0.29	1.33	1.33	1.43	0.83	0.00
Dhikurpokhari	52	0.69	5.48	3.46	6.12	0.69	0.00
Puranchaur	77	1.26	1.26	0.42	0.51	0.05	0.18
Rupakot	162	0.36	1.16	0.25	2.73	0.00	0.00
Summary	*1024*	*0.32*	*1.38*	*0.61*	*2.46*	*0.15*	*0.04*

(N.B.: While collecting information on poultry, the poultries reared for commercial purpose was left out from data because of which average poultry per HH has not been calculated.)

Source: Village data sheet 2011/2012, SAF-BIN

Among the large milch breeds, buffalo is preferred more than cow as buffaloes produce more milk with higher fat percentage fetching better price in dairy market. The data showed that improved breeds are rarely common which may be due to the lack of knowledge and lack of

financial resources owing to meager production of crops and livestock; and lack of good income source. In case of small livestock, goats are most preferred as they can generate fast cash in case of emergency. Only in Bharatpokhari cluster, swine are in significant number

3.15 CLIMATE CHANGE PERCEPTION, IMPACTS, AND ADAPTATION

United Nations Panel on Climate Change has reported how humans are contributing to bringing about significant change in climate with their deposition of green house gases in the atmosphere starting with the onset of the industrial age. The change in climate is noted mostly in terms of change in temperature (of soil, water and air) and rainfall pattern (time and period, intensity, frequency, amount). The small farm holders from South Asia had been highly vulnerable to and affected by adverse changing climate scenario such as drought, no rainfall during critical growth stages especially of winter crops and high rainfall during harvesting and vegetative growth stages. Caritas Nepal undertook research using participatory research tools that includes Participatory Rural Appraisal, Screening workshops, stakeholder meetings to name few in the potential project clusters to find out small farmers' understanding of climate change and its impacts in general, its impact on agriculture, and adaptations pursued in agriculture by them. Following are the findings.

3.16 FARMER'S PERCEPTION ON CLIMATE CHANGE TREND IN KASKI CLUSTERS

According to the farmers of the cluster,

- *Changes perceived during monsoon:*

  Kaski is highest precipitation zone among the districts of Nepal. It still receives highest amount of rainfall in monsoon and rest of the period. However, there is a fluctuation in monsoon rainfall pattern in recent years, with more rainfall towards the latter half of the monsoon season. Within monsoon, there are periods of high and low rainfall over the period of time. There are times when onset of monsoon is delayed where as there are periods or years of timely start of monsoon. In some years, there has been high rainfall in latter part of monsoon. The irregular pattern of rainfall has made it difficult for farmers to predict monsoon and carry on smoothly timely cropping practices.

- *Changes perceived in precipitation during winter*

  Winter rainfall is important for the major crops including wheat. However, farmers perceived that the amount of rainfall and duration of rainfall has declined negatively affecting the yields of major crops especially of wheat. There are times when there is late rainfall in winter or no rainfall at all. Due to this, wheat could not receive necessary moisture for triggering its growth in its critical growth stages. Nonetheless, lack of quality seed can also trigger the low yield. Hence, unpredictable rainfall and lack of quality seed are problems due to which, wheat could not maintain its smooth growth leading to low yield or crop failure. The low yield due to lack of adequate and timely rainfall as well as lack of innovative agricultural practices in cultivating wheat led to cessation of wheat cultivation in many areas of Kaski. Though being the area of one of the highest precipitation in Nepal, the number of rainy days and spread of rain is being decreased especially in winter.
- Outbreak of diseases and pests on plants has been increased. According to the local people, yield of crops such as millet, wheat, orange, mustard has decreased where as pest, disease and weed infestation problem has increased due to drought. Though study should be done to find whether the problems is a climatic event or effect of anthropogenic activities
- Production of traditional crops such as rice, wheat, orange, and mustard is declining.
- Summer and spring seasons are getting warmer.
- Hailstones are more frequent causing damage to the standing crops

(Details about innovative coping and adaptation measures against adversities in Annex 2)

3.17 PROBLEMS FACED BY SMALL FARMERS AND THEIR CROPS DUE TO CLIMATE CHANGE AND OTHER FACTORS

Various sources observed that climate change has profound negative impacts to the small holder farmers of South Asian region. Even farmers concur that they have experienced the change in terms of change in rainfall time, duration, temperature and change in other weather patterns. This section covers the problems perceived by farmers blaming climate change. According to the yield of crops has decreased where as pest and disease infestation problem has increased.

Reservoirs and rivers' water level has decreased in due course of time. Due to out-migration owing to food insecurity, human resources working in agricultural land have decreased.

Besides general problem, crop specific problems (Rice, Potato, Wheat, Rapeseed and Cole crops) owing to climate change as perceived by farmers will be discussed below, using problem matrix. The result of problem matrixes done on the abovementioned crops is presented in table 19 and table 21 (details of problem matrix calculation in Annex 3).

Problems on rice cultivation in Kaski

The compiled problem matrix of rice in Kaski cluster (table 19) showed ageing of seedlings due to late onset of monsoon as the biggest problem. Drought and lack of water especially in winter emerged as 2nd biggest problem though being ranked as number one problem in six out of ten clusters. Pests-borer problem is ranked third score wise. Hence, though being the highest rainfall receiving zone, farmers perceived changing monsoon trend as a key problem for rice.

Table 19: Problems on rice cultivation in Kaski

Kaski- problems on rice	Weighted score	Score wise problem ranking	Remarks
Unable to transplant seedling on time causing ageing of seedlings due to late onset of monsoon	40	1st	No. 1 problem in Nirmalpokhari, Hemja, Kaskikot, Lumle, Rupakot
Drought and lack of water	38	2nd	No. 1 problem in Begnas, Bharatpokhari, Machhapuchhre, Dhikurpokhari, Puranchaur
Pests- borer	21	3rd	
Lack of technical know how	11	4th	
Pests- whitefly	10	5th	
Lack of quality seed	6	6th	
Disease - rust	6	6th	
Diseases - blight	5	7th	
Drying and burning out of seedlings in nursery	4	8th	
Weed	3	9th	
Pest - red ant	2	10th	
Pest - leaf miner	2	10th	
Hailstones	1	11th	

Source: Village Screening Workshop 2012, SAF-BIN

Problems on potato cultivation in Kaski

In Kaski cluster (table 20), red ant and termite are the biggest problem, followed by late blight and lack of technical know-how. Farmers perceived drought as the 5th biggest problem. Problems related to management practices of crop including diseases and pests, lack of technical knowledge and inputs are perceived to effect potato production.

Table 20: Problems on potato cultivation in Kaski

Kaski - problems on potato	Weighted score	Score wise problem ranking	Remarks
Red ant/termite	42	1st	no. 1 problem in 3 clusters, no. 2 problem in 6 clusters
Late blight	35	2nd	no. 1 problem in 2 clusters
Lack of technical know-how	15	3rd	no. 1 problem in 3 clusters
Lack of quality seed/good variety	14	4th	
Drought	8	5th	no. 1 problem in 1 cluster
Porcupine (Dumsi)	7	6th	no. 1 problem in 1 cluster
Potato tuber moth	4	7th	
Kage insect	4	7th	
Tuber rot	3	8th	
Poor seed formation	2	9th	
Small tuber size	1	10th	
Leaf yellowing	1	10th	
Lack of irrigation	1	10th	

Source: Village Screening Workshop 2012, SAF-BIN

Problems on rapeseed cultivation in Kaski

The compiled problem matrix done for rapeseed in Kaski cluster (table 21) showed drought as the biggest problem perceived by farmers followed by aphids, lack of water, hailstones and so on.

Table 21: Problems on rapeseed cultivation in Kaski

KASKI - problems on rapeseed	Weighted score	Score wise problem ranking	Remarks
Drought	23	1st	no. 1 problem in 5 clusters

Aphids	15	2nd	
Lack of water	8	3rd	no. 1 problem in 2 clusters
Hailstones	7	4th	no. 1 problem in 1 cluster,
Lack of quality seed and variety	6	5th	
No siliqua formation	6	5th	
Dry soil	4	6th	no. 1 problem in 1 cluster
Poor seed formation	4	6th	
Sete	3	7th	
Lack of seed replacement	3	8th	
Drying of leaves	3	8th	
Weed	2	9th	
Pests (green colored leaf eating insect)	2	9th	
Dying of plant	1	10th	
Disease (torigada)	1	10th	
Compilation from Nirmalpokhari, Begnas, Hemja, Bharatpokhari, Lumle, Machhapuchhre, Kaskikot, Dhikurpokhari and Puranchaur clusters			

Source: Village Screening Workshop 2012, SAF-BIN

Problems on Cole crops cultivation in Kaski

The compiled problem matrix done for rapeseed in Kaski cluster (table 22) showed diseases and pest as the biggest problem of farmers.

Table 22: Problems of cole crops in Kaski

KASKI - problems on cole crops	Weighted score	Score wise problem ranking	Remarks
Damping off	7	1st	no. 1 problem in 1 cluster
Pests (Red ant/termite/potato tuber moth)	4	2nd	no. 1 problem in 1 cluster
Red ant	4	3rd	no. 1 problem in 1 cluster
Lack of suitable variety	4	4th	
Cabbage butterfly	4	5th	
Stem cutting insects	4	5th	no. 1 problem in 1 cluster
Porcupine (Dumsi) and rabbit	3	6th	
Lack of appropriate technology and technical knowhow	3	6th	

White grub	2	7th
Stem rot	1	8th
Rotting of curd	1	8th
Lack of suitable variety	7	10th
Compilation of problems from Nirmalpokhari, Begnas, Hemja, Bharatpokhari clusters		

Source: Village Screening Workshop 2012, SAF-BIN

Problems on wheat cultivation in Kaski

The compiled problem matrix done for rapeseed in Kaski cluster (table 23) showed lack of quality seed, diseases and hailstones consecutively as the biggest problem of farmers. Dry soil, lack of irrigation and drought are the 5th and 6th big problems by the ranking score.

Table 23: Problems of wheat in Kaski

KASKI - problems on wheat	Weighted score	Score wise problem ranking	Remarks
Lack of seed replacement and lack of quality seed	23	1st	
Diseases	15	2nd	no. 1 problem in 1 cluster
Hailstones	8	3rd	
White spike	7	4th	no. 1 problem in 1 cluster
Dry soil	6	5th	no. 1 problem in 1 cluster
Lack of irrigation	6	5th	no. 1 problem in 1 clusters
Rust	4	6th	
Drought	4	6th	
Dying of spike	3	7th	
Weeds	3	8th	
Loose smut	3	8th	
Poor germination	2	9th	
Lack of technical knowhow	2	9th	
Weeds	1	10th	
Insects	1	10th	
Compilation of problems from Hemja, Dhikurpokhari, Kaskikot, and Puranchaur			

Source: Village Screening Workshop 2012, SAF-BIN

Problems on Onion in Rupakot

Rupakot farmers felt drought as a major problem affecting yield of onion

- Drought = 2 points
- Bolting = 1 point
- No bulb formation = 0 point

Farmers of Kaski cluster perceived drought as the biggest problem in rice and rapeseed cultivation. Drought and lack of water could be associated with climate change in a sense that rainfall pattern change has been observed affecting traditional agricultural practices. In addition to the problems pertaining to climate change issues, farmers' management practices, such as use of old seeds and lack of technical knowledge is also responsible for low yield, which in itself is a problem. In conclusion, detailed study is needed to identify the causes of the problems - climate related and crop management related problems so as to provide effective solution. Meanwhile, problem analyses show that major crops such rice, wheat and potato are highly affected by erratic weather patterns, such as delayed onset of monsoon, drought during winter, recurrent hailstones, dry soil etc.

Adaptation and coping strategy for climate change followed (Present and Possible)

- Adjustment in sowing and harvesting time according to availability of rainfall (done by farmers at many places)
- Selection of robust seeds at local level
- Selection of appropriate seed variety such as choosing drought tolerant variety
- Crop replacement: wheat replaced with other crops as winter rainfall become sparse
- Out-migration increased owing to food insecurity because of low productivity.

4 CONCLUSION

Caritas Nepal has used this base line information to form small farmer groups. In Kaski, from 10 clusters, 30 groups are formed. From each clusters, three hamlets are formed. About 15 farmers interested to work on the issue of climate change and agriculture adaptation have been organized to form a group in each hamlet.

Based on this base line information and pursuing workshops held in the villages, Caritas Nepal is identifying areas for further research. The research will be "small farmer group led action

research". It will examine agriculture adaptations in farming to improve productivity of food grain crops (rice/wheat/maize) and other nutritious crops. The research will further examine the strengths found in this base line survey and screening outcomes regarding the small farming systems in the face of changing climate.

In this way, this baseline information has been useful to Caritas Nepal to understand the real context of climate change and its impacts in the cluster. We hope this information will be useful to other actors who want to contribute to the sector of climate change research and agriculture adaptation in Nepal and South Asia as a whole.

5 RECOMMENDATION

Local farmers need to follow innovative and alternative strategy rather than following only traditional practices so as to increase the adaptive capacity against climate change. Such as following integrated farming approach, integrated pest and nutrient management approach can increase their ability to fight against the adversities due to climate change. Generally, farmers do not replace old seeds with new ones, affecting yield potential, so awareness and action in this aspect might help them to prevent crop failure. Likewise, farmers should have access to innovative ideas and alternative technologies so that they are able to solve or deal with problems due to climate and pest infestations in effective manner. Meanwhile, innovative ideas used by local farmers should be disseminated to other local farmers.

6 REFERENCES

Hachhethu, K. 2003. Democracy and Nationalism Interface between State and Ethnicity in Nepal. Contributions to Nepalese Studies, Vol. 30, No. 2 (July 2003), 217-252. CNAS/TU

Joshi, N. P. 2011. Poverty and climate change in Nepal: Poverty analysis in far-western rural hills. PhD Thesis. Graduate school for International Development and Cooperation, Hiroshima University, Japan.

Khanal, R.C. 2009. Climate change and organic agriculture. Journal of Agriculture and Environment, 10(1),100-110.

Malla, G., 2008, Climate change and its impact on Nepalese agriculture. Journal of Agriculture and Environment, 9(1),62-71.

Regmi, H.R., 2007, Effect of unusual weather on cereal crop production and household food security. Journal of Agriculture and Environment, 8(1), 20-9.

Schneider, S. H. 1989. The greenhouse effect: Science and policy. Science 243: 771-781

Shrestha, A.B.; C.P.Wake, J.E. Dibb and P.A. Mayewski, 1999: Maximum Temperature Trends in the Himalaya and Its Vicinity: An Analysis Based on Temperature Records from Nepal for the Period 1971-94. In: Journal of Climate Vol. 12, American Meteorological Society, pp. 2775-2786

Steinfled, H., P. Gerber, T. Wassenaar, V. Castel, M. Rosales and C. De Haan. 2006. Livestock's long shadow – environmental issues and options. Published by LEAD and FAO: 79

World Food Programme. 2010. Nepal food security bulletin (Issue 26, October-December 2009), Kathmandu, World Food Programme.

ANNEXES

Annex 1: Climatic data of Meteorological Station, Kaski

Latitude (deg/min): 27.41

Longitude (deg/min): 84.13

Elevation (m): 0154 masl

Maximum temperature recorded in °C over the last 30 years (1980-2011) in Meteorological Station, Kaski

Year (AD) /Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1980												
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1982												
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1984												
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2003
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2006
2007
2008
2009
2010
2011

Minimum temperature recorded in °C over the last 30 years (1980-2011) in Meteorological Station, Kaski

Year (AD) /Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1980												
1981												
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2009

2010

2011

Annual monthly rainfall measured in mm over last 34 years (1976-2011) in Meteorological Station, Kaski

Year(AD) /Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1976												
1977												
1978												
1979												
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Annex 2: Farmers' innovative practices, coping and adaptation strategies to deal with adversities

SAF-BIN KASKI clusters	Farmers' innovative practices, coping and adaptive strategies
Nirmalpokhari	Currently, late variety of millet with short growth period planted, where as in past early variety planted. Due to late sowing and bit late harvesting of millet, rapeseed and potato seems to be planted late.
	Plastic house used to cultivate tomato since 2061 B. S.
	In past, land used to be plowed for winter crop. At present, rape seeds sown in zero tillage or minimum tillage condition to capture the moisture. Few farmers sow rapeseed after the harvest of paddy. It is planted in bari land after the harvest of millet (kodo) during Oct-Nov. Siliqua (fruits) good in bari land than those of planted in Khet land.
	Farmers try to harvest rapeseed as early as possible so that they can plant summer maize in their *bari* land.
	Since 2067, due to IPM intervention in crops such as rice, nursery well managed & crop spacing being maintained
	Weeding used to be done only once, at present done for about three times.
Begnas	In past, land used to be plowed for winter crop. At present, rape seeds sown in zero tillage or minimum tillage condition to capture the moisture.
	Use of ash on standing crops to protect from frost damage
	Goat refuse mixed with rice husk when applied to potato, incidence of red ant is believed to be reduced.
	White fly managed by physical method, using thorns of ginderi
	Production of traditional variety is good. Ekle is best and has a good taste, so resorting to traditional varieties in case of Paddy.
Hemja	Delay in planting time of paddy because of late onset of monsoon, leading to late harvesting.
	Early variety of millet namely Kalo Bhachuwa preferred which is harvested in Ashwin after which wheat is sown in Bari in Ashwin
Bharatpokhari	Hybrid and improved varieties of paddy started to cultivate since 2065 to get high yield.
	Crop spacing maintained since 2067 to reduce competition of space and nutrients of plants that led to fast growth of plants
	Urine of livestock have been collected and sprayed on farm since 2067, which saved the expenses used for buying urea. Yield increased without use of urea
	Integrated Pest Management techniques such as use of pheromone trap, botanical pesticides introduced since 2067 providing effective control against pests. At past, no disease and pest control mechanism
Kaskikot	Potato and rapeseed seeds mixed with ash while storing to protect from diseases & pests
	Pheromone trap, botanical pesticides which are eco-friendly are used to control diseases and pests
Lumle	Cattle urine diluted with water (1:6) and sprayed in crop. Few farmers sprayed liquid fertilizers (home made)e.g. titepati (Artemisia vulgaris) +Banmara + Ashuro (Adhatoda vasica) + Tobacco leaves + cattle urine , fermented for more than 20 days and the solution was diluted with water (1:5 to 1:10) and sprayed to the crops to control diseases and pests in broad leaf mustard

	Seed bed of Broad Leaf Mustard covered with plastic shed to protect from heavy rain
	Seed of rapeseed sown immediately after finger millet harvesting to capture moisture.
	Previously, rapeseed was harvested in late January till early February but due to late sowing now harvested in March. Sometimes early harvested done to evade possible hailstone damage.
	Now a days, late finger millet sown as it has relatively good grain and straw yield than early variety. However, damage of millet by hailstone less, if sown early
Machhapuchhre	In potato, turmeric and ash mixed with soil during planting to manage the red ant. American aloe (Agave americana/ketuki) extracts do not control the red ant
	To manage aphid in Broad Leaf Mustard, cattle urine or liquid fertilizers are sprayed. . If white spots are seen on leaves, then whole leaves are removed.
Dhikurpokhari	For red ant control – crytaps +ash or Malathion+ash during plantation time of potato
	Selection of robust seeds at local level
	Number of tillage done during wheat plantation reduced to conserve moisture.
	Old varieties of paddy replaced in favor of early maturing high yielding improved varieties though taste of improved varieties were not preferred.
	Local varieties of millet replaced by early maturing varieties with more crop and straw yield though incidence of weed (Banmasa) high
	Integrated Pest Management techniques introduced since 2065 providing effective control against pests giving high production
Puranchaur	Hybrid and improved seed adopted as hybrid and improved seeds have short growth period and higher yield where as traditional variety needs lot of time to mature and yields less.
	Cultivation of tomato in tunnel house is done
	Plough replaced by tractor
	IPM practices adopted to control insect pest management.
	Bamboo bins replaced by wooden bins.
	Adoption of chemical fertilizer, compost and biological control.
Rupakot	Improved plough replaced wooden plough since 2054 BS so as to increase the efficiency of work
	Selection of robust seeds at local level,
	Adoption of improved variety in maize and rice. Local varieties of rice perceived to give higher yield.
In general, farmers opted for dry nursery beds of paddy as onset of monsoon is delayed most of the time.	

Source: Compiled from Village Screening Report 2012, SAF-BIN

Annex 3: Problem matrix calculation of rice crops

Problem matrix calculation of rice compiled for Kaski clusters

KASKI - problems on rice	Ranking score =(no. of times problem occurred*Score according to the ranking in respective problem matrix), Problem ranked 1st was given score of 5 and problem of least importance was given score of 1					Combined score
	1	2	3	4	5	
Unable to transplant seedling on time causing ageing of seedlings due to late onset of monsoon	5*5=25	3*4=12	1*3=3	-	-	40
Drought and lack of water	5*5=25	2*4=8	-	-	-	33
Pests- borer	-	2*4=8	3*3=9	2*2=4		21
Lack of technical know how	-	2*4=8	1*3=3	-	-	11
Pests- whitefly	-	-	2*3=6	2*2=4	-	10
Lack of quality seed	-	-	2*3=6	-	-	6
Disease - rust	-	1*4	-	1*2	-	6
Diseases - blight	-	-	1*3=3	1*2=2	-	5
Drying and burning out of seedlings in nursery	-	-	-	2*2=4	-	4
Weed	-	-	1*3=3	-	-	3
Pest - red ant	-	-	-	1*2=2	-	2
Pest - leaf miner	-	-	-	1*2=2	-	2
Hailstones	-	-	-	-	1*1=1	1

Source: Village Screening Report 2012, SAF-BIN

Problem matrix calculation of potato cultivation compiled for Kaski clusters

KASKI - problems on potato	Ranking score =(no. of times problem occurred*Score according to the ranking in respective problem matrix), Problem ranked 1st was given score of 5 and problem of least importance was given score of 1					Combined score	Remarks
	1	2	3	4	5		
Red ant/termite	3*5=15	6*4=24	1*3=3			42	No. 1 problem in Begnas, Kaskikot, Puranchaur
Late blight	2*5=10	2*4=8	5*3=15	1*2=2		35	No. 1 problem in Bharatipokhari, Machhapuchhre,
Lack of technical know-how	3*5=15					15	No. 1 problem in Dhikurpokhari, Rupakot, Hemja

Lack of quality seed/good variety		1*4=4	2*3=6	2*2=4	14	
Drought	1*5=5		1*3=3		8	No. 1 problem in Lumle
Porcupine (Dumsi)	1*5=5			1*2=2	7	No. 1 problem in Nirmalpokhari
Potato tuber moth				2*2=4	4	
Kage insect		1*4=4			4	
Tuber rot			1*3=3		3	
Poor seed formation				1*2=2	2	
Small tuber size				1*1=1	1	
Leaf yellowing				1*1=1	1	
Lack of irrigation				1*1=1	1	

Source: Village Screening Report 2012, SAF-BIN

Problems on rapeseed in Kaski

KASKI - problems on rapeseed	**Ranking score =(no. of times problem occurred*Score according to the ranking in respective problem matrix), Problem ranked 1st was given score of 5 and problem of least importance was given score of 1**				**Combined score**	**Remarks**
	1	2	3	4		
Drought	5*4=20	1*3=3			23	No. 1 problem in Nirmalpokhari, Begnas, Bharatpokhari, Lumle, Dhikurpokhari
Aphids		3*3=9	3*2=6		15	
Lack of irrigation	2*4=8				8	No. 1 problem in Puranchuar, Kaskikot
Hailstones	1*4=4	1*3=3			7	No. 1 problem in Machhapuchhre
Lack of quality seed and variety			3*2=6		6	
No siliqua formation			3*2=6		6	
Dry soil	1*4=4				4	No. 1 problem in Hemja
Poor seed formation		1*3=3		1*1=1	4	
Sete		1*3=3			3	
Lack of seed replacement		1*3=3			3	
Drying of leaves		1*3=3			3	

Weed		1*2=2		2	
Pests (green colored leaf eating insect)		1*2=2		2	
Dying of plant			1*1=1	1	
Disease (torigada)			1*1=1	1	
Problem matrix based upon Nirmalpokhari, Begnas, Hemja, Bharatpokhari, Lumle, Machhapuchhre, Kaskikot, Dhikurpokhari and Puranchaur clusters					

Source: Village Screening Report 2012, SAF-BIN

Problems on Wheat in Kaski

KASKI - problems on Wheat	**Ranking score =(no. of times problem occurred*Score according to the ranking in respective problem matrix), Problem ranked 1st was given score of 5 and problem of least importance was given score of 1**					**Combined score**	**Remarks**
	1	2	3	4	5		
Lack of seed replacement and lack of quality seed		2*4=8	1*3=3			11	
Diseases			2*3=6	1*2=2		8	
Hailstones	1*5=5			1*2=2		7	Major problem in Dhikurpokhari
White spike			2*3=6			6	
Dry soil	1*5=5					5	Hemja
Lack of irrigation	1*5=5					5	Kaskikot
Rust	1*5=5					5	Puranchaur
Drought		1*4=4				4	
Dying of spike		1*4=4				4	
Weeds				1*2=2		2	
Loose smut				1*2=2		2	
Poor germination					1*1=1	1	
Lack of technical knowhow					1*1=1	1	
Weeds					1*1=1	1	
Insects					1*1=1	1	
Compiled problem matrix based upon Hemja, Dhikurpokhari, Kaskikot, and Puranchaur cluster							

Source: Village Screening Report 2012, SAF-BIN

Problems on Cole crops in Kaski

KASKI - problems on rapeseed	**Ranking score =(no. of times problem occurred*Score according to the ranking in respective problem matrix), Problem ranked 1st was given score of 5 and problem of least importance was given score of 1**				**Combined score**	**Remarks**
	1	2	3	4		
Damping off	1*4=4	1*3=3			7	Nirmalpokhari
Pests (Red ant/termite/potato tuber moth)	1*4=4				4	Begnas
Red ant	1*4=4				4	Hemja
Lack of suitable variety			2*2=4		4	
Cabbage butterfly		1*3=3		1*1=1	4	
stem cutting insects	1*4=4				4	Bharatpokhari
Porcupine (Dumsi) and rabbit		1*3=3			3	
Lack of appropriate technology and technical knowhow		1*3=3			3	
White grub			1*2=2		2	
Stem rot				1*1=1	1	
Rotting of curd				1*1=1	1	
Compiled problem matrix based upon Nirmalpokhari, Begnas, Hemja, Bharatpokhari						

Source: Village Screening Report 2012, SAF-BIN

Strengthening Adaptive Farming in Bangladesh, India and Nepal (SAF-BIN) is an action research programme under the European Union Global programme on Agriculture Research for Development (ARD). It is a multi-dimensional research that address the agricultural development challenges of developing and emerging countries. It is an initiative to promote local food and nutritional security through adaptive small scale farming in four rainfed Agro Ecosystems (AES) in South Asia. The programme is implemented by the Caritas Organisations in Bangladesh, India & Nepal in partnership with University of Natural Resources and Applied Life Sciences (BOKU), Austria and in association with Action for Food Production (AFPRO), India; Sam Higginbotom Institute of Agriculture, Technology & Sciences (SHIATS), India; Bangladesh Rice Research Institute (BRRI), Bangladesh and Local Initiatives for Biodiversity, Research and Development (LI-BIRD) to address the Food Security and Climate Change Challenges of the Smallholder Farmers living in rainfed areas in South Asia.