Bale Eco-Region Watersheds:

Socio-economic Profile

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FARM AFRICA

SOS SAHEL ETHIOPIA

FRANKFURT ZOOLOGICAL SOCIETY

IWMI International Water Management Institute

PHE Ethiopia Consortium "Healthy Families - Healthy Environment"

ABOUT THE SHARE BALE ECO-REGION PROJECT

Conservation of Biodiversity and Ecosystems Functions and Improved Well-being of Highland and Lowland Communities within the Bale Eco-Region (BER) is one of the European Union (EU) funded projects that stands for Supporting Horn of Africa Resilience (SHARE). In Ethiopia, the project covers 16 districts (Districts) in West Arsi and Bale Zones of Oromia Regional State, around 22,000 km^2, with a population of about 3.3 million. The project life span is 42 months starting July 2014 and ending in November 2017. Five partners are implementing the project: Farm Africa, SOS Sahel, International Water Management Institute (IWMI), Frankfurt Zoological Society (FZS) and Population Health and Environment (PHE).

Location of the Bale Eco Region (BER) in Ethiopia

Acknowledgements

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1 INTRODUCTION

1.1 Background and justification of the study

In the highlands of the country, most of the farmland had been cultivated for a long period under the traditional mode of cultivation. Land degradation, the unwise crop and livestock husbandry accompanied by the rugged topography has left most part of the land mass devoid of soil and natural vegetation which increasingly left much of the cultivated land out of production. Currently, land degradation in general and soil erosion in particular together with poverty is the most serious problem threatening Ethiopia. Since the well-being of the population is highly interrelated to natural land, particularly soil, it has to be managed properly and economically in a sustainable way.

Bale Eco-region (BER) is known to have a national, regional, and global importance mainly in biodiversity conservation and as source of diverse ecosystem services. Over 40 streams and springs originate from the mountains in the BER that drain into five major rivers namely; Wabe-Shebelle, Web, Welmel, Genale, and Dumal, on which an estimated 12 million people in the downstream areas depend for livelihoods. These rivers drain into the Indian Ocean after crossing through the lowlands areas. The rivers are the major sources of water for domestic use, irrigation and hydropower generation. The rivers are also key to link the highland-lowland systems through a flow of ecosystem services and support to biodiversity conservation.

This indicates that improving the management and restoration of degraded landscapes in the BER through harmonized and inclusive way is key to maintain ecosystem services and improve livelihoods of people living in the lowlands and highlands. The major challenges in BER include degradation of the natural resource base due to deforestation, expansion of agricultural lands and settlement; agricultural encroachment; overgrazing; and forest fire. The forest cover in the BER is declining fast and the eco- system hydrology is negatively affected. Some of the visible impacts include more frequent flash floods downstream, conversion of perennial rivers into ephemeral springs and streams and water shortage for extended period of the year. Hence, there are ongoing efforts to conserve the Bale Eco-region. Much of the effort has been focusing on protecting the Bale National Park and the Forest through the through Participatory Forest Management (PFM) projects. The new SHARE Bale Eco-Region project has been designed to pilot and model an integrated approach to natural resource management in Bale, across the various eco-systems of the Wabi-Shebele and Genale Dawa river watersheds and includes major

research and livelihood components for small holder farmers, pastoralists and forest communities while to increase the sustainability of the natural resources. This includes encouraging people to take responsibility for their local environments and to manage and using these and their assets for lasting and better productivity. Moreover, for the purpose of demonstrating the contribution of integrated watershed development and management approach to the promoting sustainable land and water management, IWMI and WLRC along with all the project partners have established three learning hydro-sedimentology observatory learning watersheds each representing the three ago-ecologies; Hora Soba watershed(highland), Kumbi watershed (mid-altitude) and Bekaye watershed (low land).Moreover, many development interventions are planned to implement integrated watershed management.

1.2 Objective of the study

The main objective of the study was to characterize the socioeconomic condition of three intervention watersheds in Bale eco-region and generate the baseline information that could help to assess impact of upcoming interventions in the future.

1.3 General description of the watersheds

Three study watersheds are located in Bale Zone of Oromia regional state with the geographical location (Table 1). Bale Eco-region (BER) (N6º 29', E39º 28' and N7' 10' - E39º 57') is known to have a national, regional, and global importance mainly in biodiversity conservation and as source of diverse ecosystem services. Importantly, over 40 streams and springs originate from the mountains in the BER that drain into five major rivers namely: Wabe-Shebelle, Web, Welmel, Genale, and Dumal, on which an estimated 12 million people in the downstream areas depend for livelihoods.

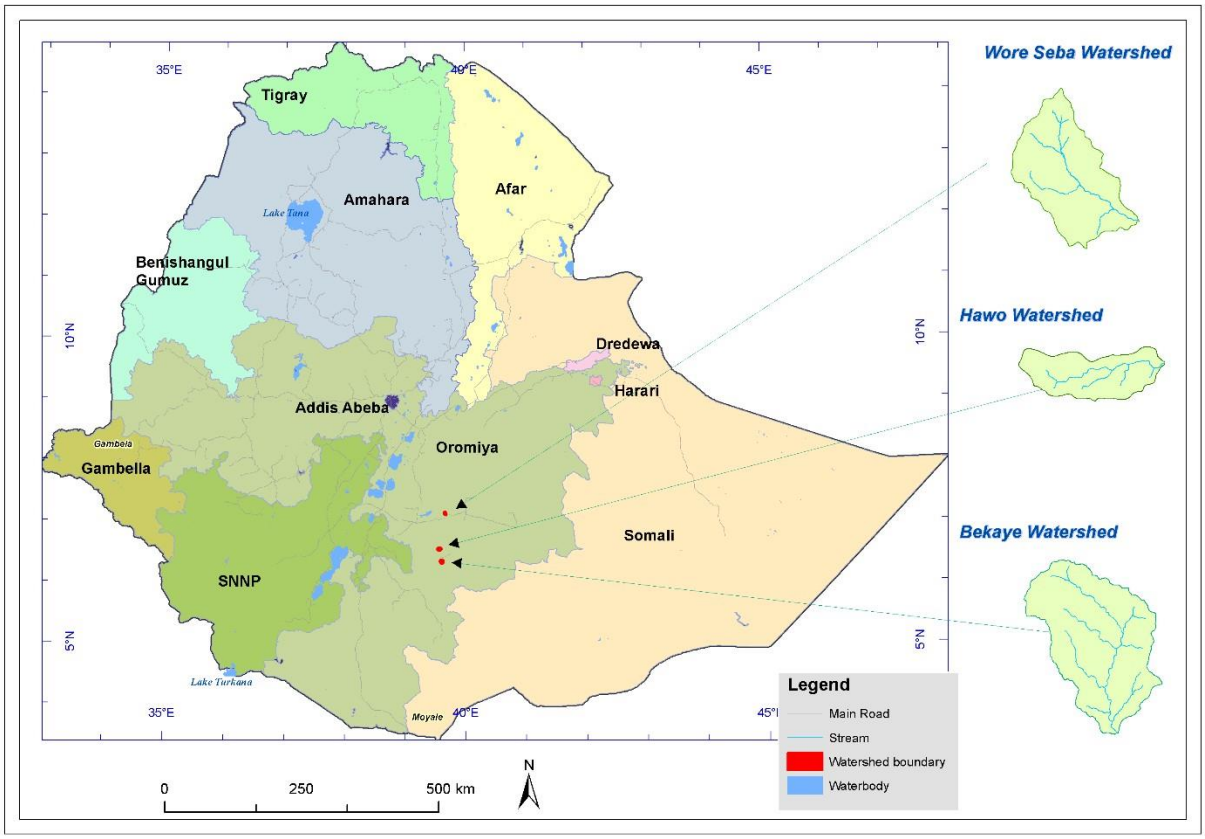

Figure 1. Location Map of the study area

Table 1. Watershed name and location of Woredas

Watershed	Woreda	Kebele	Altitude (masl)	
			Min	Max
Hora Soba	Dinsho	Hora Soba	3224	3701
Hawo	Arena Buluk	Hawo	1642	2169
Bekaye	Arena Buluk	Bekaye	1220	1434

2 METHODOLOGY

This part of the report briefly discussed the research methodology used in the study. It provides a detail description of the sampling procedure, data sources and method of data collection. Subsequently, it outlines the methods of data analysis techniques employed in the study.

2.1 Sampling procedure

This baseline study focused on three watersheds located in Bale eco-region. During the selection of watershed different criteria were considered. We have used list of households in the watershed from each watershed that is used as a sampling frame. More than a 30 percent households were selected randomly from the sample frame in close collaboration with watershed technician and developing agents. Moreover, replacement was made for those who are not present due to migration and other similar reasons. Accordingly, we have interviewed a total of 180 respondents- Hoba Sora (40), Kumbi (80) and Bekaye (60).

2.2 Type and Source of data

In this study, we have collected both primary and secondary. Primary data was collected from sample households through a structured questionnaire. Moreover, secondary data was collected from respective offices (published and unpublished documents) to supplement the primary information.

2.3 Method of data Analysis

Following the completion of the data collection, the data obtained from the questionnaire were properly coded and entered into SPSS version 20 data analysis computer software. For documentation and analytical purposes descriptive statistics (mean, percentage, totals and frequencies) and cross tabulation techniques were used.

3 RESULTS AND DISCUSSION

3.1 Demographic characteristic of the household

Demographic characteristics of the household include sex, age, education status and marital status of the household. Accordingly, out of the total sample farm households interviewed in the survey about 87% were male headed while 12% were female headed households (Table 1). In terms of marital status, 94% of the household heads were married. However, about 1%, 3% and 2% of the household heads were divorced, widowed and never married, respectively.

Table 2. Sex of the respondents across watershed

Watershed	Categories	Frequency	Percentage
Kumbi	Male	80	98.8
	Female	1	1.2
Bekaye	Male	43	72.9
	Female	16	27.1
Hores Sora	Male	34	85.0
	Female	5	12.5
Total	Male	159	87.3
	Female	21	11.7

Source: survey data (2017)

About 19% of the sampled households were don't complete any schooling (illiterate) while 29%, 28% and 7% of the respondents have completed 1-4, 5-8 and 9-10 grades respectively. As presented in table 2, illiteracy rate in Bekaye watershed is relatively higher, 32.2%, compared to other two watersheds. However, the figure in study watersheds is still better compared to national average rural illiteracy rate (38.2%) (CSA, 2013). However, this doesn't mean that efforts have to be made to strengthen the existing informal education through increasing the number of informal schools in rural areas of the country to improve the literacy level of the household head.

Table 3. Education status of the respondents across watershed

Watersheds	Category	Freq.	Percentage	Watershed	Category	Freq.	%
Kumbi	illiterate	9	11.1	Hores Soba	Illiterate	7	17.5
	Spiritual	2	2.5		Spiritual	4	10.0
	Grade 1-4	28	34.6		Grade 1-4	12	30.0
	Grade 5-8	31	38.3		Grade 5-8	8	20.0
	Grade 9-10	9	11.1		Grade 9-10	4	10.0
Bekaye	Illiterate	19	32.2		Adult literacy	4	10.0
	Spiritual	3	5.1	**Total**	Illiterate	35	19.4
	Grade 1-4	13	22.0		Spiritual	9	5.0
	Grade 5-8	12	20.3		Grade 1-4	53	29.4
	Adult literacy	9	15.3		Grade 5-8	51	28.3
					Grade 9-10	13	7.2

Source: Survey data (2017)

The mean age of the sampled households in all watersheds was 36.52 years. The mean age in Hores Soba watershed was 43 years which is relatively higher compared to other two (Table 3). The survey result also shows that the mean family size was 7.91 persons with standard deviation 4.28 while among the three watersheds mean family size in Bekaye was higher (8.27 with SD=3.82). Which is higher compared to regional and national rural family size, 5.5 and 5.1 persons respectively. There is higher birth and fertility rate in the study watersheds. Moreover, the higher age category with in the family is less than 10 which was 1.96(SD=1.52) and 1.89(SD=1.51) respectively (Table 4). This category is economically inactive with less economically contribute food security and livelihood efforts at household level.

Table 4. Age of the respondents across watershed

Watersheds	N	Min.	Max.	Mean	SD
Kumbi	80	18.00	66.00	31.94	8.69
Bekaye	50	17.00	65.00	34.51	10.57
Hores Soba	40	21.00	90.00	43.13	13.24
Total	180	19	74	36.52	10.83

Source: Survey data (2017)

Table 5. Average family size and number of family in different age categories

Watersheds	Number of family aged[..] years	Max.	Mean(SD)	Watershed	Number of family aged[..] years	Max	Mean(SD)
Kumbi	Total family size	18	7.67(4.37)	Hores Soba	Total family size	17	7.88(4.78)
	Male <10	9	1.89(1.58)		Male <10	5	2.25(1.40)
	Female <10	5	1.92(1.38)		Female <10	7	1.74(1.48)
	Male 10-13	4	0.71(0.86)		Male 10-13	4	0.76(0.94)
	Female 10-13	2	0.49(0.64)		Female 10-13	2	0.74(0.62)
	Male 14-16	2	0.44(0.62)		Male 14-16	2	0.39(0.61)
	Female 14-16	1	0.27(0.45)		Female 14-16	4	1.00(0.95)
	Male 17-50	7	1.40(0.95)		Male 17-50	6	1.73(1.30)
	Female 17-50	3	1.49(0.69)		Female 17-50	5	1.70(0.95)
	Male >50	1	0.05(0.22)		Male >50	1	0.60(0.50)
	Female >50	1	0.15(0.36)		Female >50	1	0.35(0.49)
Bekaye	Total family size	16	8.27(3.82)	**Total**	Total family size	18	7.91(4.28)
	Male <10	6	1.89(1.51)		Male <10	9	1.96(1.52)
	Female <10	7	1.95(1.68)		Female <10	7	1.89(1.51)
	Male 10-13	5	0.93(1.10)		Male 10-13	5	0.81(0.97)
	Female 10-13	2	0.63(0.61)		Female 10-13	2	0.59(0.62)
	Male 14-16	3	0.42(0.66)		Male 14-16	3	0.42(0.63)
	Female 14-16	3	0.39(0.65)		Female 14-16	4	0.45(0.69)
	Male 17-50	4	1.24(0.68)		Male 17-50	7	1.42(0.97)
	Female 17-50	4	1.44(0.76)		Female 17-50	5	1.51(0.77)
	Male >50	1	0.10(0.30)		Male >50	1	0.18(0.39)
	Female >50	1	0.03(0.16)		Female >50	1	0.13(0.34)

Source: Survey data (2017)

3.2 Farm characteristics of the households

In this part of the report, we present characteristics of farm land and sustainable land management practices. In economic terms, land is the basic factors of production together with capital, labor and management ability. Hence, land is a very useful and critical resource for the farmers. In three study watersheds, the mean farm size of the cultivated land was around 1.93 hectares (ha) and the maximum size reaches up to 15.5 ha (Kumbi watershed). Among the three watersheds the mean farm size in Kumbi and Bekaye is relatively larger, with 2.12 and 2.14 respectively, compared with Hores Soba watershed (Table 5).

Table 6. Farm land Characteristics

Watershed names		Max	Mean	SD
Plot distance from residence (min)	Kumbi	45.00	10.26	10.09
	Bekaye	32.00	9.23	8.66
	Hores Hoba	70.00	16.48	11.07
	Total	70.00	11.33	10.28
Farm size (ha)	Kumbi	15.50	2.12	2.01
	Bekaye	11.25	2.14	2.08
	Hores Hoba	5.50	1.13	1.10
	Total	15.50	1.93	1.12
Number of plots	Kumbi	13.00	3.07	2.05
	Bekaye	6.00	2.31	1.19
	Hores Hoba	7.00	2.28	1.48
	Total	13.00	2.64	1.73

Source: Survey data (2017)

In this study, we tried to categorize the fertility status of farm plots into five scales categories- very poor, poor, medium, good and very good. The survey result indicates that about 32.4% 4.1% and 23.8% of the plots Kumbi, Bekaye and Hores Soba watersheds are categorized as having good fertility status. About 50% and 26% of the plots in Bekaye have medium and poor fertility respectively. This calls a need for fertility improvement intervention particularly in this watershed in Bekaye and Hores Soba.

Table 7. Plot level characteristics

Plot ownership	Watersheds	Plot ownership	Freq.	%
	Kumbi	Owned	222	71.8
		Shared in	6	1.9
		Shared out	4	1.3
	Bekaye	Sheared in	13	8.8
		Shared out	5	6.5
		Owned	133	90.5
	Hores Hoba	Owned	83	79.0
		Shared in	1	1.0
		Shared out	7	6.7
Fertility Status	Kumbi	Very poor	3	1.0
		Poor	17	5.5
		Medium	62	20.1
		Good	100	32.4
		Very good	48	15.5
	Bekaye	Very poor	15	10.2
		Poor	38	25.9
		Medium	74	50.3
		Good	6	4.1
		Very good	1	.7
	Hores Soba	Very poor	8	7.6
		Poor	11	10.5
		Medium	42	40.0
		Good	25	23.8
		Very good	5	4.8

Source: Survey result (2017)

3.3 Crop Production

The major farming system in the watersheds is mixed farming i.e. crop cultivation and livestock production. Of the total areas of the study watersheds, about 39%, 22% and 8% of the area is allocated for homestead development in Kumbi, Hores Soba and Bekaye watershed respectively. Specifically, there is better practices homestead development in Kumbi watershed integrating crop production with Enset, coffee and sugar cane. But there is limitation on using water potential for irrigation.

Table 8. Primary purpose of land

Watershed names	Area allocation for [...]	Freq.	Percent
Kumbi	Homestead development (vegetable, coffee, fruit, chat etc)	118	39.4
	crop production rain fed	23	7.4
	grazing land	12	3.9
	forest wood lot	4	1.3
	mixed land	10	3.2
	Home stead and rainfed	30	9.7
Bekaye	Homestead(vegetable, coffee, fruit etc)	11	7.5
	crop production rain fed	95	64.6
	grazing land	19	12.9
Hores Soba	Homestead (vegetable,coffee, fruit etc)	23	21.9
	crop production rain fed	55	52.4
	grazing land	6	5.7
	mixed land	1	1.0

Source: Survey data (2017)

In the study watersheds, many types of crops are produced. For instance, in Kumbi watershed more than 10 crop types includes cereals, pulses, pulse, fruit, vegetable. However, coverage of coffee and enset is larger with 30% and 36% respectively. Teff, sorghum and maize in Bekaye, coffee, enset and maize in Kumbi, and potato, wheat and onion in Hores Soba are major crops according their coverage (Table 8). The crop production system in Bekaye is dominated by cereal crops like teff, sorghum and maize.

Table 9. Major crops grown across watersheds

Watershed names	Type of crops grown	Freq.	%	Watershed names	Type of crops grown	Freq.	%
Kumbi	Teff	4	1.3		Mung bean	7	4.8
	haricot bean	3	1.0		Faba bean	5	3.4
	sesame	1	0.3		Sorghum	4	18.8
	cabbage	2	0.6		Haricot Bean	1	0.7
	sugar cane	11	3.6		Chat	2	1.4
	mung bean	3	1.0		Wheat	1	0.7
	Enset	94	30.4		Maize	38	25.9
	Coffee	112	36.2	Hores Soba	potato	30	28.6
	sorghum	2	0.6		cabbage	2	1.9
	Haricot Bean	1	0.3		Onion	4	3.8
	Spice	5	1.6		sugar cane	1	1.0
	Telba	2	0.6		grazing	2	1.9
	Chat	4	1.3		Sorghum	2	1.9
	Tobacco	2	0.6		Onion	2	1.9
	Banana	7	2.3		Telba	1	1.0
	Avocado	7	2.3		Wheat	5	4.8
	Wheat	1	0.3		Barley	47	44.8
	Barley	3	1.0				
	Maize	25	8.1				
	Chick pea	1	.3				
Bekaye	Teff	34	23.1				
	haricot bean	3	2.0				
	sesame	10	6.8				

Source: Survey data (2017)

3.4 Input utilization

Agricultural input utilization is one way of increasing crop productivity. Despite the challenges to afford cost of fertilizers, there is an increasing demand of fertilizer by smallholder farmers as land is severely degrading. Fertilizer application was promoted by the extension system outside the watershed program at household level. Though farmers traditionally apply compost and manure to improve soil fertility, watershed management intervention did contribute to the expansion of compost and manure use by increasing the production of biomass used for preparation of the same. As presented in table 9, the mean Di- ammonium Phosphate (DAP) and Urea fertilizers applied per hectare is 1.02 and 0.52 quintal per hectare respectively.

Table 10. Amount of DAP and Urea applied to major crops

Watersheds		Max.	Mean	SD
Kumbi	DAP	1.60	0.11	0.38
	Urea	1.33	0.70	0.03
Bekaye	DAP	1.45	0.07	0.24
	Urea	0	0	0
Hores Soba	Urea	0.50	0.11	0.21
	DAP	5.33	0.04	0.11
Total	DAP	5.53	1.02	0.77
	Urea	1.33	0.52	0.03

Source: Survey data (2017)

3.5 Productivity of Major crops

The current level of crop productivity is low and greatly varies across watersheds. The overall average productivity three watersheds were 4.88 quintals per hectare which is too small compared to the national average 15.6 quintals per hectare (CSA, 2015). Separately, the mean productivity for major crops in Kumbi, Bekaye and Hores Soba watershed is 8.4, 3.19, 3.07 quintal per hectare respectively. The most likely reasons for low productivity were low input utilization and level of soil degradation that is apparent in most of the watersheds.

Table 11. Average crop productivity of major crops

Watershed	Number of plots	Max.	Mean	SD
Kumbi	92	12	8.40	2.49
Bekaye	130	5	3.19	1.07
Hores Soba	72	40	3.07	2.30
Total	294	40	4.88	4.51

Source: Survey data (2017)

3.6 Farm income from crop production

According to the survey result, crop production was the major income source at household level. The mean gross income from major crop production was 1200 Ethiopian Birr (Eth Birr). The maximum mean on farm gross income obtained from crop production was 30000 Eth Birr in Kumbi watershed and the lowest mean on farm income was about 260 Eth Birr in Bekaye watershed (Table 12).

Table 12. Average on farm income from major crops

Watershed names	Max. (Eth. Birr)	Mean (Eth. Birr)	SD
Kumbi	30000	1806.05	6667.47
Bekaye	9400	259.94	1394.85
Hores Soba	10040	2616.85	3691.29
Total income	30000	1200.56	3881.14

Source: Survey data (2017)

3.7 Sustainable watershed management

In the present assessment, one of the criteria for evaluating the sustainability status or prospects of the selected watersheds was coverage of SLM technologies. We have tried to extent of SLM technologies at the plot from perspectives like mechanical Measures, vegetative/biological techniques and agroforestry Practices. Accordingly, from the plot evaluated about 17%, 32% and 18% of plots in Kumbi, Bekaye and Hores Soba respectively have covered by soil and water physical structures.

Table 13. Plot level sustainable land management practices across watersheds

Have you made soil and water conservation structures in last 3-5 years	**Watershed**	**Answer**	**Frequency**	**Percent**
	Kumbi	No	169	54.7
		Yes	52	16.8
	Bekaye	No	85	57.8
		Yes	47	32.0
	Hores Soba	No	70	66.7
		Yes	19	18.1
Have you planted perineal grass/shrubs	Kumbi	No	152	49.2
		Yes	57	18.4
	Bekaye	No	107	72.8
		Yes	25	17.0
	Hores Soba	No	44	41.9
		Yes	8	7.6
Have you practiced agroforesry practicies?	Kumbi	No	112	36.2
		Yes	98	31.7
	Bekaye	No	112	76.2
		Yes	22	15.0
	Hores Soba	No	74	70.5
		Yes	31	29.5

Source: Survey data (2017)

3.8 Livestock holding

Common livestock types in the study watersheds include cattle, sheep, goat, equines and chickens. Cattle are kept for draft power, meat, milk and milk products and as a store of wealth. Equines play beneficial roles for households as they are used to transport humans, farm products, farm inputs and other services. Similarly, sheep, goat and chickens are reared for the sake of meat and as a source of monetary income by selling live animals and eggs.

The average numbers of livestock owned in the watersheds were 7.25 in Tropical Livestock Units (TLU[1]) per household. The maximum average livestock owned were in Hores Soba which is 12.75 followed by Bekaye in 7.17 (Table 13).

Table 14. Livestock number in TLU across watersheds

Watersheds	Minimum	Maximum	Mean	Std. Deviation
Kumbi	0.08	27.24	6.29	5.18
Bekaye	0.22	19.45	7.17	4.71
Hores Soba	5.84	28.45	12.75	6.44
Total	0.08	28.45	7.25	5.39

Source: Survey data (2017)

With regard to livestock production, free grazing is the dominant type of livestock management practice, representing 81.6% Hores Soba, 67.2% Bekaye and 55.1% Kumbi watersheds of the respondent. While 74.1% Kumbi, 42.4% Bekaye and only 13.5% Hores Soba watersheds use, cut and carry system. On the other hand, zero-grazing is less significant. On the other hand, there is lack of improved and alternative forage sources. According to the household survey result, 18.5%, 17.5% and 5.3% households in *Kumbi*, *Hores Soba* and Bekaye are used improved forage (feed and fodder plants) which is produced on farm land, marginal land and area closure.

Table 15. Livestock feeding system

Watersheds		Have you practiced zero grazing?		Have you practiced cut and carry?		Have you practiced rotational grazing?	
		Frequency	Percent	Frequency	Percent	Frequency	Percent
Kumbi	No	43	55.1	21	25.9	48	60.0
	Yes	35	44.9	60	74.1	32	40.0
	Total	78	100.0	81	100.0	80	100.0
Bekaye	No	39	67.2	34	57.6	22	37.3
	Yes	19	32.8	25	42.4	37	62.7
	Total	58	100.0	59	100.0	59	100.0
Hores Soba	No	31	81.6	32	86.5	22	56.4
	Yes	7	18.4	5	13.5	17	43.6
	Total	38	100.0	37	100.0	39	100.0

Source: Survey data (2017)

3.9 Alternative income sources

In the watershed, livestock production is a reliable occupation, and of course, an integral part of the economy. For smallholder farmers, livestock is the source of their livelihoods and source of self- reliance during income shocks. In this study household make livestock as a source of income such as Cattle, Sheep, Goat and Donkey which are common in the watershed. The result indicates that livestock production was an important source of cash to enhance the income of farming households compared to income from crop production. The total mean annual gross income from livestock production is 1917

Eth Birr per household and the average maximum gross income is 18,168 Eth birr. In Kumbi watershed annual gross income from livestock production is 3210 Eth Birr and the average maximum gross income is 18168 Eth Birr. In Bekaye watershed annual gross income from livestock production is 968 Eth Birr and the average maximum gross income is 18,000 Eth Birr respectively.

Moreover, the total average gross income from the sale of live animal is 7559 Eth birr, 8204 Eth Birr in Kumbi, and 6810 Eth birr in Bekaye watershed. Like other rural communities in Ethiopia, beekeeping and poultry production are an integral agricultural activity practiced in the area and contribute as a source of income for the household.

In the watershed, with regard to apicultural development, only 1.7% of the households were used beekeeping as a source of income. However, it could serve as a tool to combat the problem of food insecurity since it is less affected by drought than other agricultural activities. It could also create means of income and job opportunities to the landless youngsters due to shortage of farmland. Therefore, by providing intensive training in beekeeping with intensive supervision, it would be possible to increase honey production and to increase income of the poor farmer community. The survey result indicate that the total annual income from sealing traditional bee hive is 377 birr, in Kumbi watershed the annual income from sealing beehive is 583 birr and 183 birr in Bekaye watershed.

Regarding poultry production, 20% of the sample households used poultry production as a source of income. The average annual income from poultry 479 Eth Birr on average. Thus, livestock production source of income but as source of food and manure for soil fertility management practices. On the other hand, in the watersheds, the major challenges related to livestock include shortage of fodder, expansion of farm land (shortage of grazing land), and shortage of water and lack of adequate veterinary service.

3.10 Alternative Livelihood Options

In the watershed, farm households diversified their income source by engaged in farm and non- agricultural income generating activities. The most common agricultural sources of income are sales of crops, vegetables, livestock products, land rent, etc. The non-agricultural sources include income from non/off-farm income activities, and other such as gift and remittance. Thus, the annual income of the sample farm households has been estimated using the cash income of the households received. The survey result indicated that, in Kumbi watershed about 77.6%, 17.3% and 16.3% of the households reported that they have generated off farm income from Selling coffee, trading livestock and selling of honey whereas in Bekaye watershed the household earn their additional income from trading livestock

13.3%, sealing honey 11.5% and fattening cattle 10.3%. In Hores Soba watershed the household perceived that they get their additional income from fattening livestock which is 22.2% and from remittance 12.5%. Moreover, households were asked whether their annual income is improved or not. In this regard about 61.9%, 36.8% and 27.8% of the household in Kumbi watershed reported that their annual income from sealing coffee, honey and by fattening cattle has improved, 33.3% of the household in Hores Soba watershed agreed that their annual income has increase by sealing poultry and poultry product. However, the survey result indicated that most of the income generated activity in the tree watersheds agreed that their annual income has not improved.

3.11 Access to infrastructure and services

The success of either micro or macro watershed development is highly dependent on the availability, accessibility and functionality of the institutions, infrastructure and services at the village level. They play a significant role in the proper implementation and sustainability of the watersheds at village level.

Moreover, access to infrastructure and services play a key role in the effort to combat poverty. Here we assess the basic infrastructure and social services such as access extension services, health services, access to markets, access to credit and access to transport and access to water. The study is assessed by asking the farmers about the availability and access to the essential services and infrastructures of the watershed, the survey result indicate that the watershed has poor social services and infrastructural facilities.

Table 16. How do you evaluate access to infrastructure in your watershed

Answer	Frequency	Percent
Very poor	47	28.3
Poor	60	36.1
Good	49	29.5
Very good	7	4.2
Excellent	3	1.8
Total	166	100.0

3.12 Access to extension services

The effectiveness of the different agricultural inputs, soil and water conservation activities and other production improvement technologies are highly dependent on the availability of sound agricultural extension services in the watershed. Agricultural extension service played a vital role in assisting farmers to identify and analyze their production problems and make them aware of opportunities for improvement. In this regard, farmers were asked about the service they have received from agricultural development agents (DA). About 26.8% of the sampled households responded that they have got very low agricultural extension services. In Kumbi (48%), Bekaye (54.7%) and Hores Soba(40%) of respondents responded they get medium agricultural extension services. Moreover, the agricultural extension services located at the average distance of 1.58 hour, 0.26 hour and 30min in Kumbi, Bekaye and Hores Soba watersheds respectively.

3.13 Access to Health Services

Farmers are also asked to rate the quality of the health services which they have access, and the result indicate that out of the total sample farm households 33.8% of the households have access to medium health service for human. In Kumbi, 42.3% of the HHs responded that they get poor health services, however, about 44.4% (Bekaye) and 40% (Hores Soba) responded that they get good health services. With regard to livestock heath service, 37.1% of the household responded that livestock health service is poor. For instance, 47.9% of the HHs in Kumbi ranked the access to livestock health services as poor (Table 16). This result indirectly indicated that the level of satisfaction of the farm households about the availability of health service is poor. Generally, there is a need to improve these services.

Table 17. Access to infrastructure

How do you evaluate the access to agricultural extension services?				**How do you evaluate the access to livestock health service?**				**How do you rate the service from human health centers?**			
Watershed		Freq.	Percent	Watershed		Freq.	Percent	Watershed		Frequency	Percent
Kumbi	Very poor	24	48	Kumbi	Very poor	23	47.9	Kumbi	Very poor	22	42.3
	Poor	15	30		Poor	20	41.7		Poor	19	36.5
	Good	8	16		Good	3	6.3		Good	9	17.3
	Very good	2	4		Very good	1	2.1		Very good	1	1.9
	excellent	1	2		excellent	1	2.1		excellent	1	1.9
Bekaye	Very poor	6	11.3	Bekaye	Very poor	10	19.2	Bekaye	Very poor	12	22.2
	Poor	8	15.1		Poor	19	36.5		Poor	13	24.1
	Good	29	54.7		Good	19	36.5		Good	24	44.4
	Very good	10	18.9		Very good	4	7.7		Very good	5	9.3
Hores Soba	Very poor	7	20	Hores Soba	Very poor	1	2.5	Hores Soba	Very poor	3	7.7
	Poor	10	28.6		Poor	13	32.5		Poor	15	38.5
	Good	14	40		Good	15	37.5		Good	16	41
	Very good	2	5.7		Very good	7	17.5		Very good	2	5.1
	excellent	2	5.7		excellent	4	10		excellent	3	7.7

Source: Survey data (2017)

3.14 Access to road and transport services

Access to roads and transport is an important service for the economic development of rural areas. It helps for distribution and dissemination of technology, selling and purchasing of farm inputs and products. On the other hand, poor access to road and transport networks impede the efforts of individuals, governmental and non-governmental organization to participate in the development process. The average distance to the main road is about 1.3 hours with the maximum distance up to 5 hours in Kumbi while having lack of weather road. However, the mean distance is 0.31 hours and 0.35 hours in Bekaye and Hores Soba respectively. The average travel time to the market place is about 4.5hours and 2.7hours for Kumbi and Bekaye watersheds respectively. For Hores Soba watershed, the main market is located in Dinsho town with the average distance of 2.3 hours.

3.15 Credit service

In terms of access to rural credit services, about 57.8 % of the HHs received loans in the past years. Out of the credit beneficiaries, 70.4 % of the total household received loan from neighbors, Moreover, 8.5 % received loan from relatives or friends and local money lenders. The type of credit the communities often receive is in the form of cash, without any collateral obligation. The stated problems related to access to loan is the higher interest rate and group members' failure to pay their credit. Moreover, traditional saving (*iqub*), *idir* (burial association), and *debo* and *mahber* have key roles among the community. Only 7% of the total household receive a loan from government.

Table 18. Access to credit across watersheds

Watersheds		Frequency	Percent
Kumbi	Neighbor farmers	22	71.0
	NGO	1	3.2
	Government	5	16.1
	Relatives	1	3.2
	Cooperatives	2	6.5
Bekaye	Local money lender	6	37.5
	Neighbor farmers	8	50.0
	Relatives	2	12.5
Hores Soba	Neighbor farmers	20	83.3
	Relatives	3	12.5
	Cooperatives	1	4.2

Source: Survey data (2017)

3.16 Food security and shocks

The study watersheds are located in one of the food secure kebeles of the woreda. The total numbers of households who experienced food shortage in the last 12 month was about 56%. Moreover, the survey result indicates that the stated reason for such food problem is drought (62.2%), unreliable income (9.9%), and poor harvest (8.1%). The major coping strategies used by families include borrowed money, relied on neighbors, relied on family to send money, government support and selling livestock.

Table 19. Food shortage and shocks

Watersheds of the respondents		Freq.	Percent
Kumbi	No	35	43.8
	Yes	45	56.3
Bekaye	No	26	44.1
	Yes		55.9
Hores Soba	No	17	42.5
	Yes	23	57.5

Source: Survey data (2017)

Respondents were also asked about their livelihood status at the moment and majority of the HHs answered that their livelihood as average (41.3%) and about only 1.9% of the households categorized their livelihood status as best in the watershed.

Table 20. Livelihood status of households across study watersheds

Watershed		Freq.	Percent
Kumbi	worst	9	14.1
	somewhat bad	25	39.1
	average	24	37.5
	fine	6	9.4
Bekaye	worst	3	5.5
	somewhat bad	15	27.3
	average	30	54.5
	fine	6	10.9
	best	1	1.8
Hores Soba	worst	7	17.9
	somewhat bad	11	28.2
	average	12	30.8
	fine	7	17.9
	best	2	5.1

Source: Survey data (2017)

4 CONCLUSIONS

In Ethiopia, land degradation together with poverty is the most serious problem. Since the well- being of the population is highly interrelated to land, particularly soil, it has to be managed properly and economically in a sustainable way. Hence, watershed based interventions have been undertaken to improve the management and restoration of degraded landscapes in the BER through harmonized and inclusive way is key to maintain ecosystem services and improve livelihoods of people living in the lowlands and highlands. The main objective of the study was to characterize the socioeconomic condition of three intervention watersheds in Bale eco-region and generate the baseline information that could help to assess impact of upcoming interventions in the future.

The current level of crop productivity is low and greatly varies across watersheds so as the income generated from crop production. Therefore, there is a need to raise awareness, improving the input supply, providing technical support, and giving due consideration to the affordability of inputs to majority of the smallholders will be crucial to maximize production efficiency and improve agricultural intensification and diversification.

Livestock development was not strategically planned and integrated in the study watersheds. Farming system based livestock development and the target of production whether it is for subsistence or market is not well designed. Apparently, these interventions are not well supported with adequate fodder development and grazing management strategies and plans. Strengthening implementation of livestock breed improvement with adequate input supply and fodder development is other option to increase adaptive capacity and enhance future livestock production system.

Apart from crop and livestock production interventions, creating local level alternative livelihood options need to be integrated in the watersheds. Generally, there is low level of support to diversify alternative livelihood options that are able to generate viable source of income for the growing landless households and unemployed rural youths. The available off farm income generating options are limited and incomparable with the growing population. It does not generate large size of income to meet family food requirements. The non-farm options are also competitive with the urban youths and unaffordable. Moreover, there is insufficient credit supply and financial flows as well as technical

support that enable to develop the available options into viable business enterprises to ensure rural youth employment and livelihoods.

Literature

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