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ASSESSMENT OF SMALL-SCALE AGRICULTURE IN LIVELIHOOD ENHANCEMENT IN BALIKUMBAT, NORTH WEST CAMEROON

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ABSTRACT: The rural poor depend primarily on small-scale agriculture and related activities to enhance livelihoods. They wrest a living through agriculture, though with many challenges. The study investigates the contribution of small-scale agriculture to livelihood improvement and the challenges faced by small farmers in Balikumbat Sub-Division (North-West Region, Cameroon). The hypothetic-deductive approach was used to test the hypotheses obtained via a systematic and a random sampling technique, with 97 respondents from 5 villages in the Sub-division. Supplementary primary data were obtained from questionnaire respondents, interviewees and from focus group discussion participants. The questionnaire administered focused on small-scale agriculture vis-à-vis livelihood improvement. Field data was processed and analyzed using inferential statistical tool (chi-square) with the aid of Statistical Package for Social Science. The calculated chi-square results revealed that physical and human challenges affect, to a greater extent, small-scale agriculture. Small-scale agriculture being the primary source of income in Balikumbat Sub-Division, contributes extensively in enhancing livelihood. However, findings suggest that 84.9% respondents attested that physical setbacks dominate challenges wrecking small-scale agriculture despite its importance in providing households basic needs. 65% of crop producers confirmed to the lucrativeness of small-scale farming. A second-guess of sensitization for this activity should be envisaged in order for it to have a tremendous positive visible result in the area.

Keywords: Assessment, small-scale agriculture, livelihood enhancement and Balikumbat Sub-Division.

1. INTRODUCTION

Small-scale agriculture[1] according to [1] implies agriculture in small parcels of land mainly for home consumption to improve and sustain lives. As this form of agriculture is extensively practiced in Cameroon, its stakeholders cannot to the fullest extent be contented for their interest in it because of challenges encountered. [2] confirmed, that about 80 percent of Cameroonians depend on small-scale agriculture as a source of food requirements. This implies that progress in reducing poverty, malnutrition and food insecurity depends significantly on the performance of the small-scale agricultural sector. Improving agriculture to increase productivity has been given due weight and attention in Cameroon. A large proportion of Cameroon's population live in rural areas deriving part of their incomes from small-scale agricultural activities [3]. This explains why international development agencies (World Bank, Development Fund, World Food Program and IFAD), have recently shown an increasing interest in agricultural development in the rural communities as a means to achieving widespread poverty alleviation. They have provided financial, material and technical incentive to the rural populace in view of enhancing living conditions. Amongst the numerous challenges ravaging small-scale agriculture [4], established that, due to low levels of input and government subsidies (quality seeds, fertilizers and herbicides), per capita food production, declined from 22.9% to 12.8% as a result of population growth in Cameroon. With contemporary hindrances, Balikumbat Sub-Division peasants attest to the predictions of the third and fourth Assessment Reports of the Inter-Governmental Panel on Climate Change (IPCC) cited by [5] that foresaw devastating effects on agriculture due to climate change scenarios. The notion of agriculture has generally been looked upon by many [6-8] with a large degree of positivity because of its significant role in poverty alleviation and live sustainability, justifying why it was the alternative to cash crop production after the economic crisis of 1980s. Thus, this finding considers whether the social necessities of enhancing livelihood and attaining desirable development could be accomplished after investment in agriculture. The research is propounded to determine and valorize small-scale agriculture and map out future sustainable ways that focus on improving livelihood via poverty alleviation in Balikumbat Sub-Division.

2. METHODS

This study focused on small-scale agriculture and livelihood enhancement in Balikumbat Sub-Division. It involved the use of mixed methods to complement each other consisting of primary and secondary data. Secondary qualitative data was obtained based on a systematic exploration of documents on small-scale agriculture such as articles, dissertations and websites. Primary quantitative data were generated from small-scale farm holders through a random administration of questionnaires at their households' level. A total of ninety-seven surveys were carried out. Besides questionnaires, ten focus group discussions were conducted and interviews granted with women and men of adjacent communities involved in farming. These discussions were granted to agricultural resource personnel to help get an insight into small-scale agriculture and the extent to which the activity is a source of livelihood enhancement. Descriptive data were treated using data coding (*Straus method*), whereby categories of responses were identified, assigned, classified and then recorded on a prepared sheet as per research questions or objectives of the

[1] Agriculture, the art or science of cultivating the ground, including the harvesting of crops, rearing and management of livestock

study. With regards to quantitative data, chi square was used to test hypothesis, while the Statistical Package for Social Sciences (SPSS) helped in data analyses.

2.1 Location of the study area

Balikumbat Sub-Division is one of the three Sub-Division in Ngoketunjia Division. It was created by Decree N^0 92/187 of 01/09/1992 as one of the youngest Sub-divisions within the Ngoketunjia Division (Balikumbat council). It lies between longitude 5° 53' 0" and 5° 58' 30" East of the Greenwich meridian and latitude 10° 18' 0" and 10° 23' 30" North of the Equator (Figure 1). The Sub-division has a surface area of about 434.5KM^2. According to the 2005 population and household census, its population stood at 68537 inhabitants. It is territorially boarded to the south by the Bamboutos division in the west Region, to the west by the Mezam division, in the north by Ndop Sub-division and to the east by the Noun division (Figure 1)

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Figure 1: *Location of study area*

Source: NIC and fieldwork, 2022

3. RESULT AND DISCUSSION

Most scholars have given preference to agriculture as the back born to the economy of most less economically developed countries [9]. Given this world perception, practically in Balikumbat Sub-Division, an inverse relationship exists between the efforts put in agriculture and its actual real impact on the life of farmers. This work brings to lamplight ills hindering small-scale agriculture, contributions of small-scale farming to household needs and perspectives to constraints, which will serve as manual in improving livelihood to different land users, Government and communities of the study area. The curiosity of this researcher was driven by the inability of farmers to substantially and sustainably obtain a high-quality life-style out of their day-to-day agricultural dependency.

3.1 Small-scale agriculture and food self-sufficiency

None can criticize the role of small-scale agriculture in livelihood enhancement in less economically developed countries. Knowing that agriculture is often referred to as the back born of the economy of Africa, several scholars have pondered over it in different ways at particular instances, circumstances, and dynamics [10-12]. Paucity in works dealing with agriculture and livelihood improvement demonstrates that it is an indispensable source of living within and out of Balikumbat Sub-Division. Traditionally, farming has always been and still remains the primary source on which Balikumbat farmers depend on for livelihood improvement. Food crops farming is the most common practice in which land has been effectively put into use in the Sub-division. In this case, the land use directly relates to the soil potential of the area. Farming activities predominate the western section of the study area due to its rich soils (figure 2). The 156.42km^2 surface area of land used for farming is limited compared to the number of farmers in need of farming land. The population of the area has increased tremendously over the years and are dependent upon farming for their livelihood. This has led to pressure on farming land which wasn't the case in the past where agricultural land was available for few farmers who by then practiced shifting cultivation. Areas around houses are usually used to grow food crops to facilitate access to food for consumption. Farmers put together many crops on the same pieces of land and exploit any available small space between resident for cultivation. Farms in the area generally range from 0.2 ha to 2ha in size.

Table 1: Main agricultural products in Balikumbat Sub-Division from 2000-2022

Crops	The area under cultivation (HA)		Quantity produce (in tons)		Estimated % consumed	Estimated % sold
	2000	2022	2000	2022		
Maize	2725	3150	8175	9450	60	40
Groundnuts	650	788	820	993	33	67
Okro	415	415	1245	1250	20	80
Cassava	65	65	390	380	20	80
Beans	45	45	53	20	20	80
Tomatoes	75	124	225	372	25	75
Watermelon	42	65	210	325	10	90

Pepper	47	57	165	200	10	90
Soya beans	4	4	8	8	60	40
Plantain	263	480	2575	4698	20	80
Rice	82	115	287	402	20	80
Arabica coffee	60	60	45	0	0	100
Robusta coffee	850	850	650	653	0	100
TOTAL 16	5323	6316	14848	18751	298	1002

Source: Sub-Divisional Delegation of Agriculture Balikumbat 2000, field work 2022.

Table 1 shows that food crops like maize, groundnut, okro and cash crops like plantains and coffee are more predominant in the study area. This is because the land favors its cultivation thanks to its fertile soils. Different crops are cultivated in specific areas in the Sub-Division and according to field respondents, this is because such environment possessed soil quality and environmental factors which favors their growth. Some are cultivated around water points to ease irrigation (rice); others do well in highland areas (beans). Focus group discussion participants revealed that; "*we cultivate many crops to cover up should in case they are failures from one, and also to have at least a small quantity of all crops to avoid begging from neighbors during harvest.* Most of these crops are used for household consumption while surpluses are sold in order to earn revenue which can be use to purchase other complements for livelihood sustenance.

3.2 Small-scale agriculture: a dominant land use activity in Balikumbat Sub-Division

The available land in Balikumbat Sub-Division (147.73km^2) is used for small-scale agriculture, residential, degraded forest, gallery forest, grazing, montane forest, swamp and water body as shown on the land use map (figure 4). Small-scale agriculture dominates as the primary land use in Balikumbat Sub-Division. Montane Forest occupied most of the western part of the area which is the highlands in BS and is mainly affected by climate. For instance, such a forest in Bafanji was observed during field work at "*Hongwa*" in *Njatang* quarter. The gallery forest was closer to water courses like streams, rivers and wetlands. These areas were voids of forest but supported mostly scrub and grasslands. Some of the gallery forests were observed to be degrading due to the advancement of small-scale agriculture. Water bodies identified at the extreme east of the map are used for fishing and irrigation of farms around these rivers. Swamps cover a significant portion of the map, and during field findings, it was observed that raffia do well besides the swamps, which was well put to use by the wine tappers. Grazing land is spotted at different instances on the area very closed to agricultural lands. During field survey, farmers in an interview explained that; cattle are reared in ranches during farming season and transhumance mostly take effect after farming season; which to them; the relationship was symbiosis because cattle dung act as manure to their farms while they feed on the farms, but farmer grazer conflict can't be avoided entirely. Build up areas are gradually increasing to compete with other land uses; this also incorporates bare surfaces and areas for government developmental projects and

infrastructures. Degraded forest covered an essential section of the locality. It was discovered during field study that it is rapidly losing ground to small-scale agriculture, and there is fear for its disappearance in the far future. Figure 2 propound the cultural significance of the study area as an agricultural workshop where culturally, all the lands are favorable for small-scale farming. The map indicates areas of intensive small-scale farming in the study area while other small parcels of cultivable lands are found everywhere in the Sub-division. The principal roads link the villages and other adjacent communities. Secondary roads and footpaths lead to the farms and inter-connect quarters.

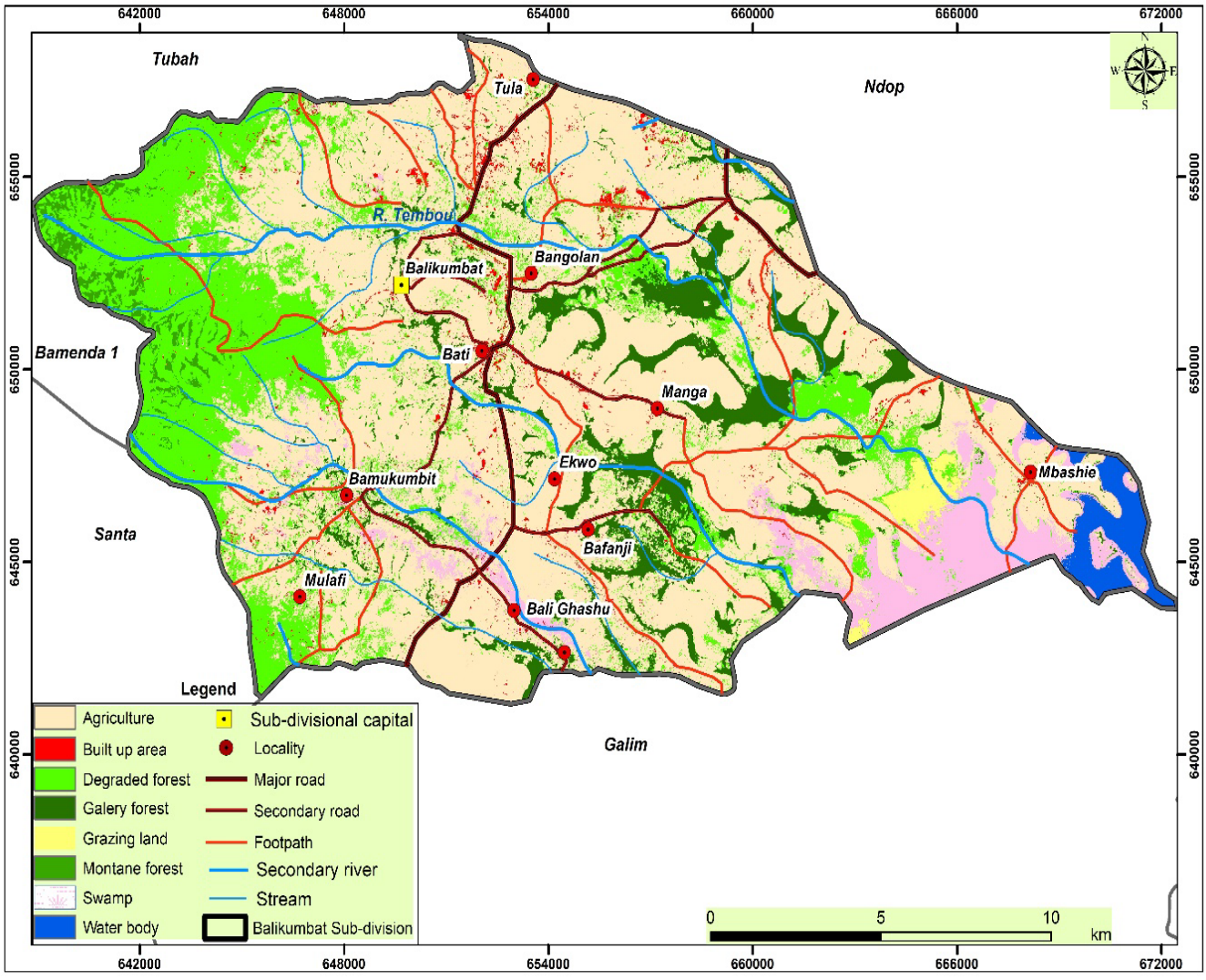

Figure 2: Land use in Balikumbat Sub-Division

Source: NIC and field work, 2022.

The dominance of small-scale agriculture as the primary land use activity is not by chance but revealed that natural and artificial factors had favored Balikumbat Sub-Division to be named the chamber of agriculture. This assertion is equally illustrated statistically as 61% of the land is

occupied with farming activities. Montane forest, grazing and build up areas respectively cover the smallest surface area with 1% (table 4). This is due to the fact that they are being transformed gradually into small-scale agricultural surfaces as population growth demand more lands. The above data shows how the evolution of predominant land-use types conflicts against each other and how these impact livelihood improvements. Field investigation revealed that; the most needed and demanded land are land for agricultural purpose. Even though lands for farming is becoming limited, the sphere of influence of small-scale agriculture and the need to supply and meet up demand every week has brought about a significant increase to farmers' commitment to intensify agriculture for better livelihood enhancement.

Table 2: Land use statistics in Balikumbat Sub-Division

Land use	Area(meters)	Area (Hectares)	Percentage Cover
Agriculture	204528039	20453	61
Built-up Area	4457347	446	1
Degraded Forest	66366957	6637	20
Gallery Forest	26574387	2657	8
Grazing	3086478	309	1
Montane Forest	4011331	401	1
Swamp	20311830	2031	6
Water Body	5589752	559	2
Total Surface	**334926121**	**33493**	**100**

Source: NIC and field work 2022.

3.3 ***Agricultural land zoning model relative to the study environment***

The first concentric ring closest to the village comprises cultivated farms carried out by women and children. The crops in these nearby farms are intensively cultivated with household waste, cow dung (natural manure), and regularly watered. Most of these farms near settlements are protected with fence to prevent destruction by domestic animals. Just beyond this nearby cultivated area (figure 3), extensive uncultivated grazing land is found for herds of cattle belonging to the villagers. The grazing land may have relics of giant trees such as baobab, acacia, and karate that provide shade and fatty material to the animals. Far-off in the savanna, peasants practice the *"Ankara"* system of crop cultivation where the small farmers gather the cleared vegetation and cover it with soil in the form of ridges. The vegetation in the ridges at times, is burnt for the ashes to serve as manure. Clearing and burning equally referred to as the *slash-and-burn* technique makes the soil that is poor in its natural state to become fertilized by the ash and hence, contribute to high yields per unit area of the cultivated surface [13] Peasants work on the land using rudimentary tools such as hoes, cutlasses, dig axes and axes. After 2-3 years of working on the piece of land, the soil becomes exhausted, and the piece of land is abandoned to undergo follow while a new portion is cleared. The process continues until the

current farms are too far from the village community and the villagers build farmhouses around the farms. This type of agricultural practice is known as slash-and-burn shifting cultivation.

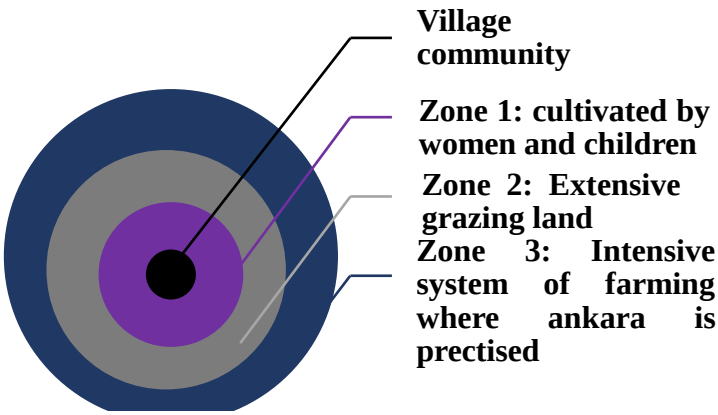

Figure 3: Village concentric land use model

Source: Adapted from Von Thunen, Fieldwork 2022

3.4 Contributions of small-scale agriculture to livelihood enhancement

3.4.1 *Contributions to socio-economic development*

Small-scale agriculture provides employment opportunity, revenue and food security to a vast majority of uneducated and unskilled laborers in Balikumbat Sub-Division and adjacent communities. It is a source of improving social welfare and also is a source of raw material to stakeholders who transformed and processed agricultural crops such as groundnuts, corn, palm nuts, Irish and cassava to by-products such as oil, drinks, flour and garri. The surpluses raised from the sale of produce are saved in "Njangi" groups and part is used to pay taxes. Farmers perception on returns from small-scale agriculture and livelihood enhancement is represented in table 5.

Table 3: Respondent's opinion on lucrativeness of agriculture

Villages	Respondents (No)	Opinion on agricultural returns		
		Profitable	Not lucrative	Uncertain
Bafanji	43	30	8	5
Bamunkumbit	20	13	5	2
Balikumbat	20	14	4	2
Baligansin	10	6	3	1
Baligashu	4	1	3	0
TOTAL	97	64	23	10
%	100	65	24	10

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Source: Field work 2022

Table 5 shows that 65% of crop producers have had positive returns from small-scale agriculture because it is their main source of income. Money raised from agriculture is used to sponsor their offspring and provide household needs which are assets for social welfare. Farmers food security need is equally assured thanks to farming. On the contrary, 24% of the farmers sampled were of the opinion that the agricultural business is not profitable because of high cost of farm inputs, high pressure on farmers resulting from family dependence, and losses incurred due to climate change influences (prolong droughts, destruction of crops by wind and periodic floods). Capital inadequacy limits the increase in farm sizes, forcing farmers to practice agriculture only in small-scale which minimizes the profitability margin of the sector in improving their standard of living. However, 10% of the sample population were uncertain about returns from small-scale farming and outcomes on their livelihood. Their uncertainty was justified with reasons such as that; they cultivated for family consumption and only a small proportion is sold. They sell only on the weekly market day and spend immediately without reserve.

3.4.2 *Behavioral pattern of prices of agricultural produce and impact on livelihood*

Farmers in an inclusive interview propounded their views in line with the price situation of small-scale agricultural products.

Table 4: Respondents' views on the price situation of agricultural products

Villages	Respondents (No)	Opinion on price situation of agricultural produce			
		Increasing	Reducing	Fluctuating	No idea
Bafanji	43	7	3	28	5
Bamunkumbit	20	1	4	12	3
Balikumbat	20	2	5	10	3
Baligansin	10	1	1	6	2
Baligashu	4	0	1	3	0
TOTAL	97	11	14	59	13
%	100	11	14	59	13

Source: Fieldwork, 2022

Table 4 shows that 59% of respondents confirmed their income have been fluctuating. This according to them was as a result of many factor affecting demand and supply. Prices increase when crops are scarce due to bad harvest or limited cultivators. The situation is however reversed with decreasing prices probably caused by increased in output. Eleven percent of farmers were certained on an increase in their incomes, saying the price of a bag of groundnut rouse from 20.000francs FCA to 35.000francs CFA in the past harvest season. These farmers had invested much capital in their farms and had well-structured measures like increase in farm sizes, application of manure and fertilizer and the creation of artificial scarcity so as to sell when prices are high. These measures enabled them to derived profit from the sale of their farm products. 14% of respondents attested to a reduction in the prices of agricultural crops which negatively

impact social welfare since basic needs cannot be guaranteed. Thirteen percent of interviewed persons, primarily those partially into small-scale farming, got no idea of price situation of agricultural crops.

3.4.3 *Small-scale agriculture as a source of employment in Balikumbat Sub-Division*

[14] stated that 92% of rural households engaged in small-scale agriculture to assure food security, thereby creating employment opportunities for almost four million of the country's population. Based on data and information obtained from the field as presented in table 5[2], Small-scale agriculture has proven to be the primary source of employment to close to 72 % of the rural peasants. Ten percent respondents ranked trade as the second employer. The least source of employment in the study site was building, art and craft with 5% respectively. The availability of employment opportunities for farmers in small-scale agriculture could determine the sustainable income generation for the rural populace.

Table 5: Respondent's views on the primary source of employment

Villages	Number of Respondents	The primary source of employment in Balikumbat Sub-Division				
		Agriculture	Architect	Civil service	Art and craft	Trade
Bafanji	43	37	1	2	1	2
Bamunkumbit	20	13	1	1	2	3
Balikumbat	20	13	2	2	1	2
Baligansin	10	5	1	1	1	2
Baligashu	4	2	0	1	0	1
TOTAL	97	70	5	7	5	10
%	100	72	5	7	5	10

Source: Field work, 2022

Acknowledging that small-scale agriculture has made a significant contribution in generating income for rural households, we, however, noted that the socio-economic context of Balikumbat Sub-Division during the realization of this study was not the best. This sociopolitical and economic challenges plaguing the study site could make us wrongly assume that small-scale agriculture is not contributing to livelihood enhancement as a main source of employment for its populace. But, this is not true as despite these other challenges, agriculture remain the main employer. The contribution of small-scale agriculture in household income is low compared to food per household. From the information gathered in the field, it was discovered that those who had agriculture as their primary activity were still involved in other economic activities such as teaching, carpentry and business, mainly to complement their source of revenue. On the field, it

[2] Respondent's views on the primary source of employment in Balikumbat Sub-Division

was observed that disdainful of the instigations slowing down farmer's source of living; they were much more satisfied and hopeful in considering small-scale farming as a fountainhead in livelihood improvement.

3.4.4 Food Security and nutrition

During the field survey, it was observed that small scale agricultural products contribute substantially to local communities' food security and nutrition. A majority of products cultivated and harvested are used in supplementing a household diet. The respondent's food sources include maize, cocoyam, plantains, beans, rice, vegetables, okro, groundnuts, tomatoes, yam, irish-potatoes, cassava and much more. These products are collected and harvested by men, women and children of every household in the area. It was noticed that vegetable and other food crops like yam, cocoyam and cassava are prominent in nourishing and stabilizing farmers' growth and maintenance through their nutritional values. Some crops like maize, legume, sweet potatoes, rice soybeans and so on, are highly nutritious rich in proteins, calcium, minerals and amino acids and are all good sources of starch, [15]. According to most informants, tomatoes, watermelon and groundnuts can be eaten raw or cooked. In the North West region in general and BS area in particular, dishes made with cocoyam and maize such as achu and fufu corn are highly valued as traditional meals. It should be noted that these varieties of meals are cooked and eaten with either meat or fish, gotten respectively from nearby forest and rivers. It is worth acknowledging that making a complete dish requires crops cultivated on their lands and those manufactured out of their milieu such as other complementary food ingredient for instance spices and onions. The above phenomenon indirectly indicate that part of crops produced are sold in order to use the money to purchase other items produce out of their domain of competence. It was equally observed on the field that almost all the crops grown are of remarkable nutritive valuable to the inhabitance of Balikumbat Sub-Division and its adjacent communities as almost all the crops produced are consumed by their population (figure 4).

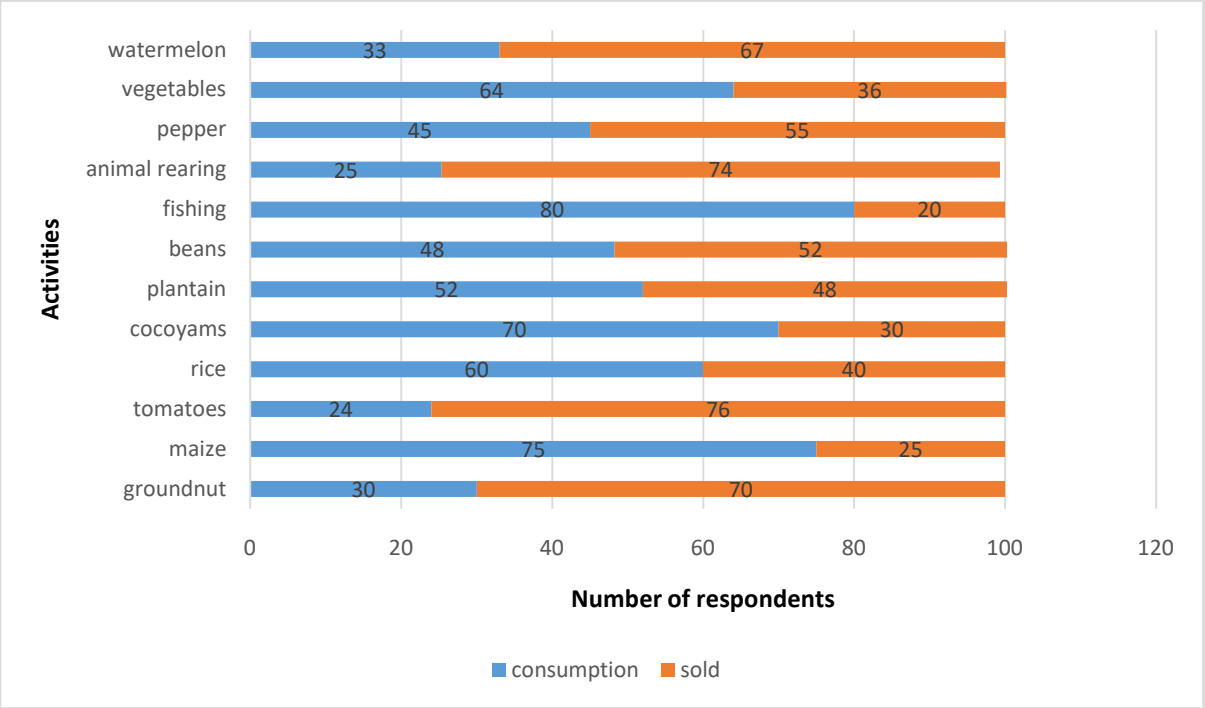

Figure 4: Percentage of crops and other agricultural outputs consumed and sold

Source: Field work, 2022

It can be seen from figure 4 that apart from vegetables, fishing, cocoyam and maize, more than 50% of all the other crops are destined for sales. This table also attests that food security in the Sub-Division is why many crops are sold. The above analyses assure that there is food security.

3.4.5 Small-scale agriculture and household's social welfare

Farmers used agricultural income on diverse set of households needs (figure 5).

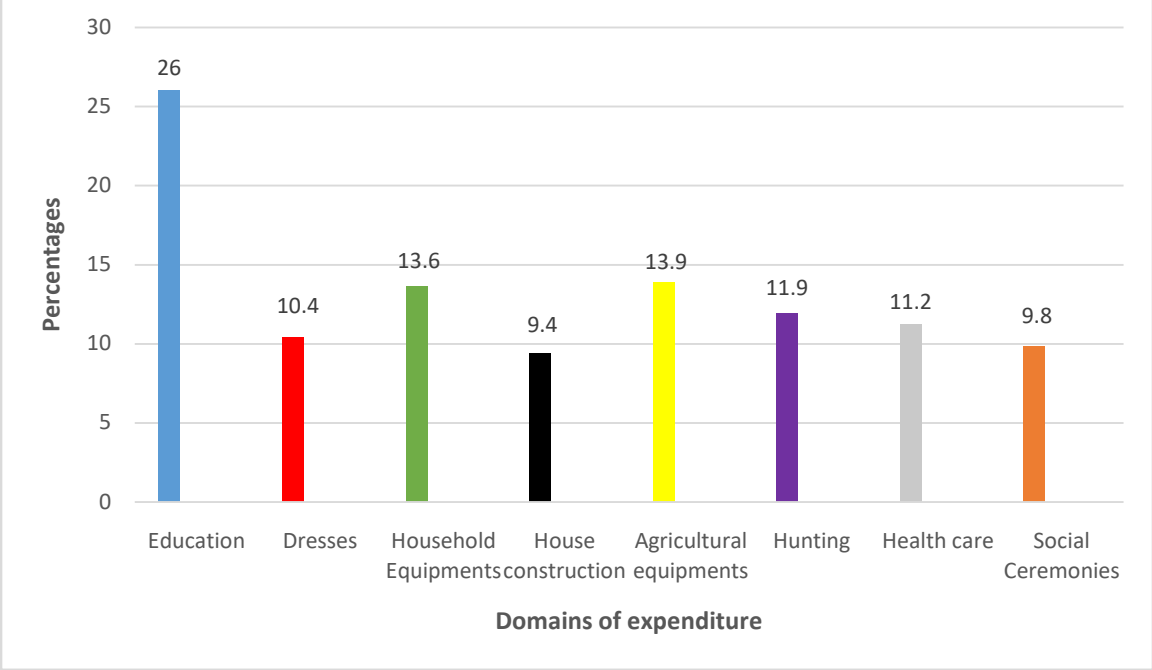

Figure 5: Distribution of income raised from agricultural activities
Source: Fieldwork, 2022.

Figure 5 illustrate that income from agriculture contributes significantly to improve access to school for children, reason why (26%) of respondent's income is spend on education. Parents attested using this money to pay school fees, provide students allowances and other school's needs. The present globalization has created more awareness in the minds of parents who have it as a pride to send their offspring to higher levels of studies. Farmers acknowledged that, one of the shortcomings in small-scale agriculture is because of their illiteracy. In order not to make the same mistakes, the most priority of the farmers is to use income from their activities to send their kids to school. It is worth noting that adult education has been gaining ground in recent years, and everyone desires to attend at least an ordinary level.

Furthermore, about 13.9% of farmer's income is used to purchase agricultural equipment in preparation for the next farming season. To better prepare for the next farming season, farmers have to plough back profit in the farms by investing part of their income on farm inputs to be hopeful and well-armed while anticipating favorable physical inputs that will be amalgamated with humans to enhance productivity. Most households are furnished with bamboo made items and equally of modern ones such as chairs, cupboards and tables. Noting the broad and diffused nature of housing equipment amongst which are kitchen utensils and electricity bills, 13.6% of respondent's income is used to purchase household equipment. Considering how stressful farming is, it's conventional that 11.2% of their income is spent on health care. Ironically, farmers go for a medical checkup only when diseases are at their peak and is ready to do away with their lives. The issue will be to make them understand the crucial value of health to human life, so medical checkups should be unbendable and not an option. Typical of most farmers is the shabby and dirty nature of clothes they put on. Field investigation revealed that 10% of their income is use to buy dresses. Judging from farmers' dressing, it will look like their source of income is meaningless, but assessing them in details revealed they are richer than they appeared. Inspire of their obscene nature, it is a tradition that new dresses are bought for households during festive seasons. Another demesne of expenditure of farmer's revenue from the sale of agricultural produce is on house construction and maintenance which consumed 9.4% of their income. It is a priority for farmers to have a good shelter where they can relax and have some rest after the tedious farming work that is energy consuming. In the past, traditional houses were not too costly like today. It used to be made of bamboo sticks, plastered with mud and roofed with glass thatches. These models are gradually dematerialized and swapped with mud-brick walls and aluminium roofing sheets.

Small-scale agriculture has enormous positive attributes for the wellbeing of farmers and their environmental development [16]. Figure 5 further shows that 9.8% of income generated from the sale of agricultural produce is spent on social ceremonies. These contributions will be looked upon in different mannerisms. Primarily, as mentioned earlier, the population of the Sub-division is growing ahead of its resources, posing a problem of insufficiency. After the 1990 economic crisis, the government's efforts towards providing basic needs to the population were reduced [17]. This brought up the policy of self-development embarked by most communities in Cameroon. In that light, local development was encouraging, and farmers had to contribute to the growth of their localities. Community projects such as roads, bridges, schools, community hall,

water and electricity are part of livelihood goals that are realized in the study area thanks to income from agricultural activities. Through its numerous sub-organs, Fanji Development and Cultural Association (FADCA) received funds from farmers to provide development projects to advance their locality. During funerals, marriage and feasts, food is made available, and contribution is made for its successful realization. In matters relative to cultural development, everyone is entitled to an obligatory contribution no matter the amount you earn after a farming season. In this line, field finding revealed that from an average perspective, men contribute 15000 francs CFA and women provide 5000 francs CFA as annual dues for village developmental projects. Away from cash contribution, there is physical community labor to arrange farm to market roads manually, which is their interest. These are all areas of farmer's expenditure, which is part and parcel of livelihood aspiration and is peculiar to our study. Their primary source of income relies on agriculture. The interviewee provided helpful knowledge on how revenues from small-scale agriculture are distributed to livelihood attributes for their welfare (figure 5).

4. Challenges of small-scale agriculture in Balikumbat Sub-Division

Small-scale agriculture has not substantially enhanced livelihood in most rural households in sub-Saharan Africa. Peasant farmers in this region still use outdated means of production like rudimentary tools, insufficient agricultural knowledge, dependency upon the natural environment and poor-quality seeds [2]. These challenges limit the positive impacts of agriculture on the livelihood of farmers as their effort at best is still at the subsistence level. Small-scale agricultural stakeholders in Sub-Saharan Africa are highly dependent upon the natural environment, which today is being threatened by climate change scenarios and environmental degradation, reducing farmers' output due to their inability to predict growing climate variability. [18]. Human factors affect small-scale farmers in Balikumbat Sub-Division as they have low returns on agricultural produce due to price fluctuation caused by the absence of an organ to regularize agricultural production. Figure 6 shows natural challenges of small-scale agriculture in the study area.

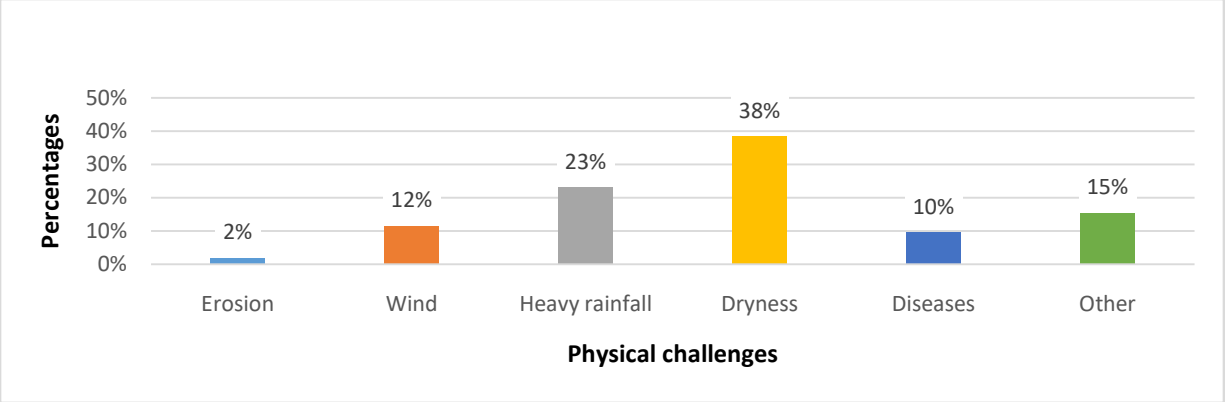

Figure 6: Respondent's perception of physical challenges

Source: Field work, 2022

Considering that most of the physical obstacles procreate from climate change adverse conditions, its effects are widely envisaged in the area, such that livestock rearers were not in

better condition as grazing field decreased dramatically because of little or no pasture due to harsh dry conditions that diminished pastures. Farmers' demands to reclaim new lands in order to reduce risk that emanate from adverse climatic conditions. If climate and economic conditions do not change, farmers risk being liable to future food deficiency [19]. Eventually, farmers demanded reconsideration of fertilizers to help increase production since they could not depend more on the natural conditions for achieving food security and preserving the agricultural sector.

Table 6: elucidate which problems significantly reduce agricultural output

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Physical	45	84.9	100.0	100.0
Missing	System	8	15.1		
Total		53	100.0		

Source: Fieldwork, 2022.

Table 6 shows that; physical factors significantly affect the agricultural output. Farmers asserted that natural treats could easily be combated if they had enough capital. However, field findings, as shown in table 1, physical challenges due to their complex and unpredicted nature are the most dominant of the challenges of small-scale agriculture in the study area, with a frequency of 45, which is equivalent to 84.9% amidst others.

Apart from physical challenges, farmers also faced other constraints such as inadequate capital which remain a significant trait to Balikumbat farmers [20]. Field inquiries proves that; over 65% of respondents attested to inadequate capital as the leading amongst the artificial challenges. Nonetheless, 15% of respondents indicated large family sizes (resulting from polygamy), theft and tribal discrimination as significant reasons for the inability of small-scale farming to enhance peasant's livelihood. Youth deviation from the agricultural sector in search of greener pasture in other activities such as motorbike venture and white collar jobs in towns was approved by 20% of respondents as an important setback to small-scale agriculture (Figure 7).

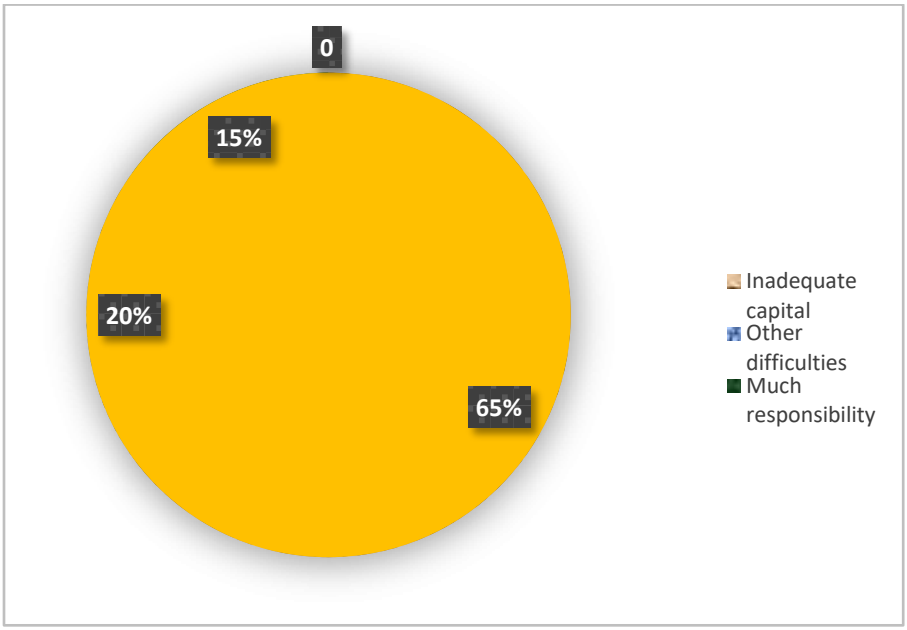

Figure 7: Human challenges faced by farmers

Source: Fieldwork, 2022

Table 7 shows harmful pest and diseases that inconvenience crops productivity. These challenges are rapidly infesting farms with new emerging ones that are all cephalalgia to farmers. Crop producers in a focus group discussion stated that agricultural yields have been dropping as a result of the prevailing of pest and diseases in this locality, disrupting farms productivity which consequently affect negatively farmer's livelihood. Some of these pest and disease are presented on table 2.

Table 7: Pest and diseases prevalent in the Balikumbat Sub-Division

CROPS	PEST	DISEASES
Maize	Steam bores, red ants, weevils and birds	Com smut, rust anthrarose steak
Beans	Caterpillar and weevils	Blight anthrarose
Potatoes	Rodents, ants	Late and early blight
Plantain	Nematode, banana, roof, weevils	Panama, banana leaf spot
Tomatoes	Ants, weevils and weed	Attack and mondany

Source: Annual report 2010 Delegation of Agriculture and Rural Development BS

5 Perspectives

Agriculture strongly depends now on how much you understand climate change [18]. It's one factor that determines the success of every project in agriculture and crop production specifically because its elements such as rainfall and sunshine are determinant factors responsible for crop germination and growth. Climate change has altered the agricultural calendar, requiring experts who understand this change for every project as expressed in Climate Change Adaptation Strategy Technical Report [21]. Every project's success depends on the planning, taking the short-term and long-term objectives into account. When the short-term objectives are reviewed repeatedly, thereby implementing the best, the long-term objective

becomes successful, and the project becomes sustainable. So, consulting the right experts at the right time is one of the determinants of the future of our agricultural projects. It's for the good of peasant farmers to contact or visit agricultural experts or institutions to apprehend better modern measures of combatting physical setbacks (climate change) to agriculture. In combating pests and diseases, farmers should use pesticides and insecticide spraying.

5.1 Environmental adaptation strategy

One of such approaches is conservation agriculture (CA). For a long time, farmers should intensify CA practices based on no-tillage and retention of soil cover through cover crops and mulch [22]. [23] stated that such practices had shown positive outcomes for farmers and the environment in Sub-Saharan Africa and Latin America. So, it is recommended to BS small-scale agricultural experts that in the course of exploring the environment for survival, care should be taken to prevent environmental degradation through techniques such as biological control agents that involve the use of nontoxic chemicals as farm input, for instance the use of parasites and predators to fight against farm pests like aphids and insect pest.

Agroforestry systems such as the fertilizer tree system (FTS) are designed to improve soil nutrient balances. FTS involves the planting or regeneration of fast-growing nitrogen-fixing trees or woody shrubs *(Gliricidia or Sesbania spp),* that produce high-quality leaf biomass and are adapted to local climatic and soil conditions. The integration of trees into the farming system also commonly reduces erosion and enhances soil fertility, water quality, biodiversity and carbon sequestration. However, benefits depend on regional factors such as climate and soil, as cited by [24].

5.2 Perspectives to artificial challenges

"Poverty is manmade and can be eradicated by man's actions" (Nelson Mandela 2005)[3] . It is believed generally that problems caused by human beings can be resolved personally and through collective efforts from the same people who initiated the challenges. It is recommended that public or private sectors intervene to implement formal financial institutions that will significantly expand banking services favoring rural communities. Moreover, the Government should develop interventions for the small-scale agricultural sector to construct rural-based markets that would be the center of connection between rural farmers and traders. Decentralization policies should be implemented to encourage local development, such as road construction, to ease the evacuation of crops from farm to market.

5.3 Modernization of small-scale agriculture

As elaborated by [25], the modernization of agricultural activities includes a full range of changes and transformations that all agricultural stakeholders must follow to be able to meet up with world's population food security need. The use of tractors for tilling, chemicals to increase

[3] Nelson Mandela sorted speech title: Africa standing tall against poverty, Newtown Johannesburg South Africa, 2005

production and machine for harvesting are recommended to small-scale agricultural practitioners in Balikumbat Sub-Division. The modernization of small-scale agriculture encompasses guidance and motivation for farmers to start using new production techniques, new crops and try new marketing skills. [26], propose that the modernization of the agricultural sector induced the diversification of farming systems, utilization of chemical fertilizer, and the adoption of different scientific knowledge to replace traditional agricultural methods. The stated recommendations added to the practice of the ancient organic agriculture is here by being suggested to be applied by small-scale farmers in Balikumbat Sub-Division to ensure a sophisticated return of the agriculture they dependent on for livelihood enhancement.

5.4 Summary of findings

Balikumbat farmers dream of overcoming the challenges of small-scale agriculture in order to enjoy their output sustainably. As revealed by field findings, the challenges of small-scale agriculture drained greater parts of farmer's income as they struggle to overcome them. Therefore, from such a notion, it is a call for all parties concerned to work endlessly to bring long-lasting remedies to small-scale farmers' problems in the world and Balikmabat Sub-Division precisely. This study to assess small-scale agriculture in enhancing the rural livelihood of Balikumbat farmers whilst pondering the challenges in doing so have proven that despite the undeniable role of small-scale agriculture to poverty alleviation, Balikumbat farmers during the time of this study attested witnessing a fast drop in the contributions of small-scale agriculture to livelihood improvement.

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Authors Contributions

Ngwogeh Valery designed the study, analyzed the data and prepared the manuscript with contributions from the co-authors who took part in the conceptualization of ideas and the review of manuscript.

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Conflicts of interest

The authors declare that they have no competing interests.

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