

Indigenous Agricultural Knowledge and the Sustenance of Local Livelihood Strategies in Buabua and Kimbi – the Lake Nyos Gas Disaster Resettlement Camps, NWR of Cameroon

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Abstract— Natural disasters in most parts of the world have resorted to many fatalities, forced migration and involuntary resettlement of the affected population. Lake Nyos Gas Disaster of 1986 which killed about 1,746 people and led to forced migration of over 15,000 affected people and the subsequent resettlement of survivors in resettlement camps in near by administrative sub-divisions in the North West Region of Cameroon is one of such natural catastrophies. The paper evaluates the use of Indigenous Agricultural Knowledge (IAK) in agriculture and how it has helped to sustain the livelihood of this environmentally traumatized resettled population. The study sampled two of these resettlement villages (Buabua and Kimbi) to access Indigenous Agricultural Knowledge (IAK) and the sustenance of local livelihood strategies. Field campaigns including the administration of semi-structured questionnaires and focus group discussions (FGDs) facilitated the collection of data on IAK practices and how this knowledge helps in sustaining local livelihoods. A total of 24 Indigenous Agricultural Knowledge (IAK) were identified, with 54.16% of them used in crop cultivation, and 45.83% in livestock farming including the raising of small ruminants, poultry and piggery production. IAK shows successful results after being applied as there is increased crop and livestock yields. The use of IAK in agriculture has led to sustainable and efficient land use within the study area. Despite the rising use of IAK and potential benefits in agriculture and the sustenance of local livelihoods in Buabua and Kimbi, survivors still express a strong desire to return to the former disaster zone. The underlying reasons behind this phobia is mainly small land sizes ranging from 30-50 square metres that were allocated to households for both crop cultivation and grazing, and the fact that the limits between grazing and crop land are not clearly demarcated. Prospects for agricultural expansion within the area are therefore slim and need to be addressed.

Keywords—Lake Nyos Gas Disaster, IAK, Sustenance, Local livelihood strategies, resettlement Camps

I. INTRODUCTION

The devastating Lake Nyos Gas Disaster of August 21, 1986 that took a dead toll left a deserted Nyos, Chahand

Subum villages as the survivors were consequently resettled in camps of Buabua and Kimbi villages amongst others. According to [1] the Lake Nyos Gas Disaster of 1986 was the worst natural disaster ever to be inflicted on West Africa by a single catastrophic event. In August 1986, this Lake released a toxic aerosol of water and carbon dioxide which killed more than 1,250 people (Freeth & Kay, 1987; Kling et al., 1987; cited in [1]). The number of those killed vary by sources; [2] estimated over 1,700 deaths, Freeth & Kay, 1987; Kling et al., 1987; cited in [1] reported more than 1,250 deaths, [3] reported approximately 1,800 loss of lives, 3,000 cattle, and countless wild animals, birds and insects, and the Cameroon postline (in press) [4] reported 1,746 deaths (Nyos (about 1,200 deaths), Subum (about 300 deaths) and Chah (200 deaths)). The toxic gas spread and engulfed surrounding areas of the lake, seriously affecting four main villages (Chah, Kam, Subum and Nyos). About 15,000 inhabitants fled the area, as many of them developed respiratory problems, lesions and paralysis as a result of gases they inhaled [3]. The economic losses of the disaster were enormous. Fotabong & Fossung (1986; cited in [3]) revealed that 3,909 cows and 3,324 fowls died. A total of 364 sheep and 561 goats ceased breathing due to the inhalation of the toxic gas [3]. [1] revealed that the Lake Nyos is approximately 208 million cubic metres covering an area of 1501 square metres with an estimated carbon dioxide (CO₂) concentration of 270 (m). Before the occurrences of the Lake Nyos Gas Disaster in 1986, the inhabitants of Buabua and Kimbi resettlement villages were at Subum; a disaster affected village, located some 8km away from the Lake Nyos [5].

This environmentally traumatized population stays within the resettlement camps and practice asemi-subsistent agriculture based on crop production and livestock farming using locally acquired knowledge. There is increasing importance today on the role played by indigenous people in the society. The phrase “indigenous knowledge”, is still in search of a standard definition. According to Rajasekaran

of 103 structured and semi-structured questionnaire administered to a randomly chosen sample from 4185 inhabitants (census results by [11]) in the area. The sample size (103) was expressed as a proportion of 1: 41 inhabitants/persons of the total population (4185)of the study area. It was statistically applied as $4185 \div 41 = 103$ questionnaires. The retained and analyzed questionnaires gave a proportion of 54.4% men and 45.6% women. Further inquiries were acquired through focus group discussions (FGDs) and key informant interviews with village chiefs and agricultural extension workers. Indigenous knowledge is self-acquired and inherited experiences of indigenes which are transferred to successive generations. As such, focus group participants were meticulously chosen among men and women with ages ranging from 25-60 years and above to come out with the required information. Statistical data analysis was done with the help Excel spreadsheets. IAK was graphically presented as a proportion of observed frequency of IAK per respondent and not as a percentage of an IAK per the sample size. Cartographic techniques were used in QGIS 2.14 to spatialise IAK and agricultural production in the study area.

II. RESULTS AND DISCUSSIONS

2.1. Cultivated and reared animal species

Crop and livestock species adopted in the area are many and varied as shown in Tables 01 and 02. Three categories of crops are grown in the study area namely food crops such as vegetables, fruits/agro-forestry and cash crops.

Table 1: Types of Crops grown in the area.

Category	Common names	Scientific names
Food crops	Cassava	<i>Manih esculenta</i>
	Coco yams	<i>Xanthosoma sp</i>
	Peanuts	<i>Apios tuberosa</i>
	Groundnuts	<i>Arachis hypogaea</i>
	Maize	<i>Zea mays</i>
	White yams	<i>Dioscorea alata</i>
	Sweet potatoes	<i>Ipomoea batata</i>
Vegetables	Beans	<i>Phaseolus vulgaris</i>
	Soya beans	<i>Glycine max</i>
	Bananas	<i>Musa spp</i>
	Cowpea	<i>Gaylussacia/solanum nigrum</i>
	Huckleberry	<i>Pyrus</i>
	Okra	<i>Ablmoschus esculentus</i>
Fruits/cash crops	Pumpkins	<i>Cucurbita maxima</i>
	Fluellen	<i>Kickxia spuria</i>
	Mangoes	<i>Mangifera indica</i>
	Plums	<i>Prunus domestica</i>
	Oranges	<i>Citrus sinensis</i>
	Cocoa	<i>Theobroma cacao</i>

Palms	<i>Areccaceae</i>
Sugar cane	<i>Saccharum officinarum</i>
Robuster Coffee	<i>Coffea robusta</i>
Pears	<i>Vigna unguiculata</i>

Source.[12] and field survey (2016).

Table 2: Domestic animal species in Buabua and Kimbi

Species	Common names	Scientific names
Cattle	Zebu Goudali	
	White Fulani (Aku)	<i>Bos Taurus</i>
	Red Zebu/Fulani	
Ruminants	Sheep	<i>Ovis aries</i>
	Goats	<i>Capra hircus</i>
	Guinea pigs	<i>Cavia porcellus</i>
	Pigs	<i>Sus domesticus</i>
Others	Ducks	<i>Anas platyrhynchos</i>
	Fowls	<i>galloanserae</i>

Source. Fieldwork (2016).

These many crop species are cultivated alongside livestock farming using acquired local knowledge (IAK) in the area for local livelihood sustenance.

2.2. IAK in agriculture

The technique adopted for agricultural practices in Kimbi and Buabua integrates locally acquired knowledge accumulated from past experiences, inherited and passed on to successive generations along the succession line.

2.2.1. IAK in food crop production: Several technologies are being adopted for food crop production in the case of this study IAK is the main one. Among the IAK we have the following: the relay and mixed cropping; the application of household residues and animal dung; crop molding; Ankara system; human bird/invasers scarer and many others.

2.2.2. Relay and mixed cropping: Relay cropping refers to alternate planting of crops in roles on the same piece of land with varying gestation periods. Commonly observed relay crop system in the area is maize, cassava, okra, cocoyam, cowpea and vegetable (Plate 1, Fig. 2). Maize is planted on the same plot with cocoyam and okra. The maize which gets mature faster than cocoyam and okra, is harvested in July and the stalks are streamed to allow air and sunlight penetrate underneath in order to enhance the growth of the shaded crops. Also, maize is planted in April and during weeding period in July, the ridges are molded and intercropped with cassava in such a way that as maize is being harvested, it is gradually replaced by cassava. This technique encourages the maximum use of farm plots, as it equally improves soil fertility and protects the soil against erosion. As[13], asserts indigenous relay intercropping in Northeast Thailand, where peanut or mungbean are planted with maize under rain fed conditions.

Plate 1. Relay (B) and mixed cropping (A).



A: Maize, pineapple and plantain B: Maize, okra vegetable and cassava

With mixed cropping (which is the planting of many crops on the same field), the indigenes believe that in case of the prevalence of disease or wind destructions, not all the crops are destroyed at once and if the price of one crop falls, they would benefit from the other and thus, their livelihood is sustained. As a consequence, mixed cropping is a very common IAK used by farmers to maximize land use (Fig. 2) and enhance the sustenance of local livelihood. Mixed cropping of maize, cassava (Plate 1) and potatoes is common and widespread in the area as potatoes which as cover crop provides a protective cover to the soil while providing a major surviving food source during the season of food scarcity. [7] perceived that mixed and inter cropping is an advantageous

system whereby leguminous plants are inter-cropped with other crops. Mixed cropping is reported to be practiced by 88.35% of the actors (Fig. 2).

2.2.3. *Application of household residues and animal dung:* In the place of chemical fertilizer, indigenes apply household residues and animal wastes such cow, goat dung and fowl droppings on farm plot to enhance crop growth and yields. Household residues are applied on home gardens (Plate 2, B) and nearby plots while cow, goat dung and fowl droppings are transported to distant plots. They are mainly applied on vegetable farm plots along river valleys during the dry farming season. This is one of the most used IAK practiced by 81% of the actors (Fig. 2).

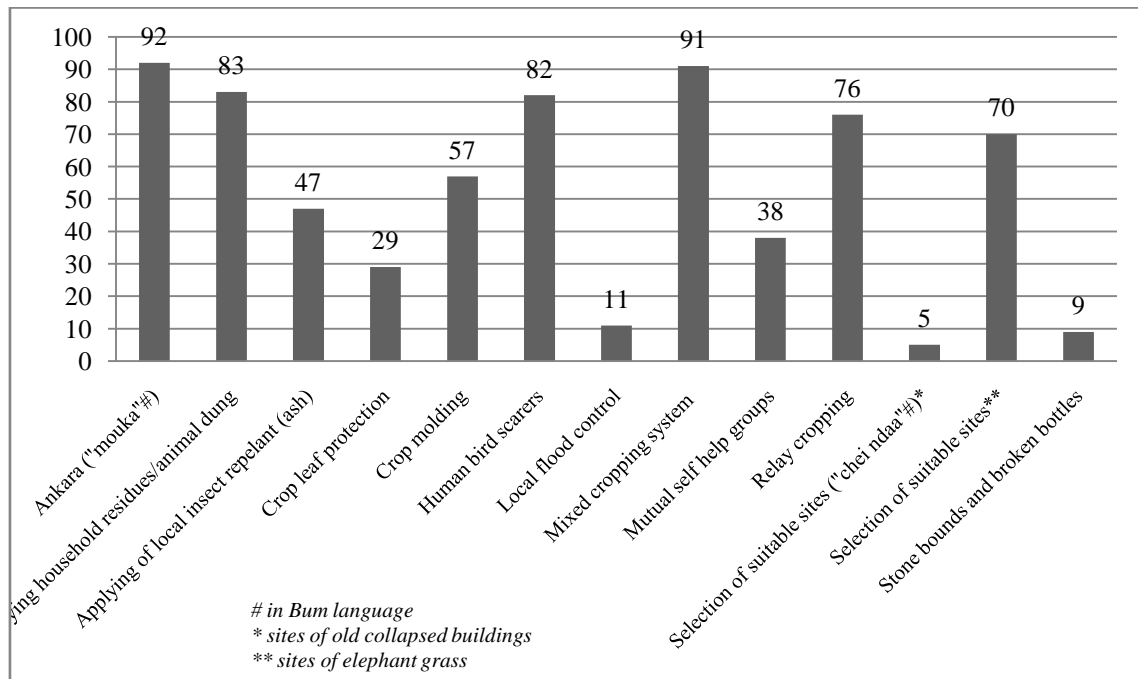


Fig. 2: IAK in crop production in Buabua and Kimbi.

[14] pointed out that in Selected Kebeles of Gimbi Woreda, West Wollega Zone of Oromia Regional State, animal dung, ash and households trash are used on homestead gardens or backyards in order to improve soil fertility.

2.2.4. Crop molding: This IAK is commonly applied on tuber crops like cassava, potatoes, cocoyam, and other crops like banana and groundnuts (Plate 2, Fig. 2). In doing this, farmers' heap soils with the use of rudimentary flat hoes around the crops. Farmers believe that heaping of soil around plantain stems enhance nutrient status, reduce pest attack,

maintain stem stability against destructive winds, facilitate the generation of new roots and enhance the growth of micro-organisms needed for the decomposition of organic matter. Better still; indigenes believe that molding tuber crops during weeding period helps control soil erosion. Molding also reduces rodents attack on cultivated crops and improves crop yields as it is locally perceived that rodents would henceforth spend longer time to bore the earth in order to meet a grain of groundnut and or cassava tuber, thereby reducing their chances of consuming and reducing yields before harvest.

Plate 1: Crop molding and the application of household residue on home gardens.



A: Molding banana plant B: Application of household residue

2.2.5. Ankara system ("mouka"): The use of Ankara as an IAK is widespread in the study area as shown in Figure 02 accounting for 89.32%. This practice entails the burning of grass and other farm residues after being buried in the worked soil to produce ash that enhances soil fertility. The science of agronomy contradicts this practice as it only increases crop yields in the first years but yields decline with time. In other words, it is not environmentally friendly as soil micro-organism (soil biota) needed for organic matter decomposition and the distribution of soil organic matter within different soil horizons are killed. Ankara is often used in the cultivation of tubers (cocoyam), vegetables like pumpkins and cowpea and grain crops like maize in the study area. In applying this IAK, farmers clear farm plots in the dry season and allow the grasses to get dry. The dried grasses are then arranged in the laying out matrix in the form of semi-round or square ridges

partially covered with soil and allowing some sections to set fire on. This practice has proven to enhance yields on farm plots owned by local rural farmers.

2.2.6. Human bird/invaders scarers ("awii" in Bum): The human bird or scarecrows unique post-harvest social measure used by farmers in the area the farm sty constructed for farmers to temporarily live in with domestic to guard against cattle and wild animals such as monkeys which destroy the cultivated crops (Fig. 2, Photo 1). It is the most appreciable way of guarding crops before harvest as it is used by 79% of the actors (Fig. 2). As a repulsive measure, gun powder which is resistive and odoriferous is kept at the extremes of farm plots with believe that the odour which will give the impression of the presence of a gun will scare wild animals from farms.

Photo1: Farm sty in Subum use as a resting site to guard against crop invader



This local practice is a method used to improve upon crop yields and it is also a symbol of socialization as it fosters the spirit of oneness amongst the settled people. The relative location and closeness of the Kimbi game reserve and grazing lands to farm plots with frequent off-track of game and reared animals or cattle makes the practice of this local crop protection method indispensable in the area.

2.2.7. Selection of suitable sites: old collapsed roofs (“chei ndaa”) in Bum) and the site with elephantgrass (*Pennisetum purpureum*): This is a crop selective IAK well acquired and used by the rural inhabitants in the cultivation of garden eggs and pepper on home gardens. They believe that “chei ndaa” offers natural manure which is decomposed from the vegetal components of the roofs (predominantly grass houses) releasing nutrients needed by the crops. There is a belief that elephant stalks have numerous minute fibrous roots that are easily decomposed when cultivated to form soil nutrients. Also asite with elephant grasses is believed to contain a certain species of micro-organisms locally called “*tani*” in Bum, which constantly feed on its roots, producing a very dark humus soil which is good for the cultivation of cocoyams, yams, okra, vegetables and maize. This is a widely held native believe and IAK in the study area (Fig. 2).

2.2.8. Application of local insect repellants: Ash from chickens is used as local insect repellent on farm plots (Fig. 2). It is sprinkled on the leaves of garden eggs, vegetables and okra to prevent caterpillars from destroying them. This can also control the rate of black ant invasion. When banana suckers are removed for transplanting, the stools are clean and ash applied directly on them in order to prevent diseases such as panama which attack plantain and banana. Ash is equally sprinkled round palm trees if they are not producing cones with the believe that ash is gotten from diverse sources of plants burnt together and which contain acid which when absorbed by plants or palm tree, will reactivate or neutralize the enzymes and cause them to be productive. As his also sprinkled on orange trees to control the rate of thorny branches, the stems and on maize buds to control stem borers. [10] stated that farmers in the Idemili South Local Government Area of Anambra State, Nigeria, uses ash for seed treatment.

2.2.9. Mutual support groups (“lini vuo” in Bum): Mutual support groups provide a forum for the acquisition of new IAK and the transferred of the already acquired indigenous farming methods. The acquisition of this knowledge is enhanced the social interaction of the indigenous groups, the size of the households and the type of crops grown. In this practice, individual households arrange themselves into small mutual groups where they help to cultivate their farms through the use of wage earning strategies sometimes using a migratory labour. **This participative approach consists** of the movement of individuals from one farm to another. Wage earning mutual support groups equally carry out such rotatory

farming activities for individual members who express the need. This IAK is applied in three different forms notably during farm preparation, weeding (photo 2) and harvesting.

Photo2. Mutual self-help group during weeding.



This also provides a forum for the acquisition of new IAK and transfer of already acquired indigenous farming methods. This is greatly determined by the social interaction of the indigenous groups, the size of the households and the type of crops grown. In its practice, individual households arranged themselves into small mutual groups where they help each other in the form of migratory labour on rotatory bases from one individual’s farm to the other. Paid mutual self-help groups also carried out paid labour farming activities. This IAK is applied in three different stages of farming such as land preparation, weeding(Photo 2)and harvesting.

2.2.10. Local flood control and Land management: As most of the crop cultivation is limited along river Buabua, the occurrence of floods ravaging crops and stream bank erosion is eminent. Having a good mastery of river behavior during the wetter season will mean that the indigenes do a careful ploughing and the arrangement of ridges along river banks. In order to control the likelihood of floods or erosion, farmers plough ridges far away from the river banks. This will generally lead to land protection and soil fertility to conserve plant growth.

2.3. IAK in agroforestry

The agroforestry sector in the area also uses IAK in the practice. The main IAK are selective pruning, stone bounds and broken bottles, sprinkling of goat or cow dung on leaves to prevent attacks by animals. This is variably applied on fruit tree species such as pear, mango, orange and plume.

2.3.1. Selective pruning, stone and broken bottle bunds: In this strategy stone and broken bottles are placed around orange tree to prevent fowls or table birds from constantly removing the soil beneath as they search for nematodes and other insects (Plate 3, A). Selective pruning which is commonly carried out on pear trees consist of either plucking off parasitic plants or a selective removal of branches to improve fruit quality and taste during fruiting (Plate 3, B).

Plate 3: IAK in agroforestry.



A: Stone bounds and broken bottles (orange tree) B: Selective pruning of pear tree

2.3.2. *Leaf protection:* In order to protect plant leaves from animal destruction, dry goat or cow dung is grinded and mixed with water, then sprinkle on the leaves of cassava, pear and cocoa stems. It is thought that animal dung when mixed with water and sprinkled on leaves will produce an odour of urine and/or animal defecation. This gives an unpleasant smell to the crop leaves and prevent its eating by domestic animals. This helps to maintain crop yields and boost the final harvest.

2.4. *IAK in Livestock production*

Indigenous knowledge is used at various levels of the agricultural enterprise including livestock. It is used in both small and large scale animal production.

2.4.1. *IAK in cattle rearing and small ruminant production:* The ruminant production sector in the study area also registers a significant number of IAK (Fig. 3). These IAK are generally used to boost animal production, growth, meat quality and animal health care.

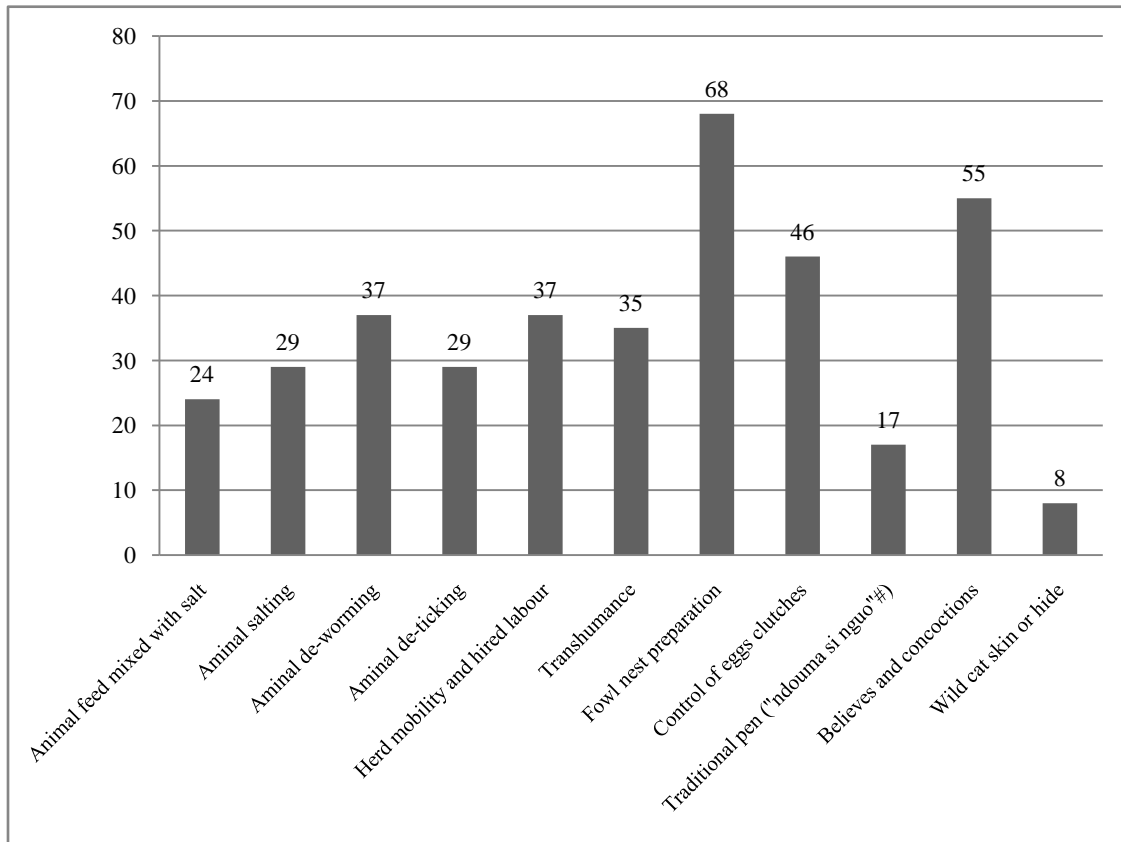


Fig. 3. IAK of livestock production in the study area.

2.4.2. Animal feeds mixed with salt and animal salting: In order to improve feeding taste for cattle and small ruminants, corn peelings and/or maize mixed with salt is kept in dishes or held in the hand for goats and sheep to feed on in the morning before grazing on the grassland. Indigenes believe that this is a medium for reared animals to become familiar with their owners and homes. It also serves as a means of dissuasion for goats. Through this practices, goats and sheep are persuaded not to take a particular course of action such as invading

neighbor's yard and moving further away from kraals in order to feed on pasture. This IAK permit the farmer to remain in close friendship with his animals. To improve meat quality, salt is kept in dug-out canoes (Photo 3) most often beside riverbanks for cattle to feed on at least once a week. It is widely believe that beef from cattle the beef of a cattle constantly feed with salt is very tasteful. Salt is also said to increase cattle taste and demand for hay especially in dry periods with scarcity of fresh grasses.

Photo 3: A dugout canoe for keeping cattle salt.



2.4.3. Cattle de-worming and de-ticking: Worm infection in cattle is treated with the help of *kaii* (mahogany) with the following specific measures; the barks are removed, dried, grinded and mixed with salt, then dished out in dugout canoes for cattle to leak. These dug-out canoes are usually placed beside river banks or water points such that immediately after feeding on *kaii*, cattle could move directly to the stream and drink water which they believe would facilitate the digestion of these concoctions. Also, calves of less than three months are tied around the kraals or paddocks. It was explained that this method is also used in order to dissuade the animals still breast feeding from feeding further away and also to prevent them from mechanical injuries while in the flock. Following the same reasoning, cattle infectious insects/parasites (ticks) are removed from cattle skin on daily basis using bare hands or razor blade. At the end of the grazing season (that is the dry season), accumulated cow dung is gathered and burn as it is assume that this could be the breeding grounds for ticks.

2.3.5. Herds mobility, hired labour and transhumance: In the livestock sub-sector, herders periodically mingle between mobility within the area for grazing using hired labour "*ladde*

or wadde, which in Fulfulde mean herder and transhumance. The mobility of herds during the dry season season is between the wetter valleys of Buabua and the Dumbu Ranch. This movement to humid valleys by the Aku is known in the Fulfulde language as "*fadama*". Grazers affirm that this movement to wetter parts helps to maintain herds during the harsh dry season. The settled Aku are sedentary grazers in majority; practicing grazing alongside seasonal crop cultivation. Sedentary grazing forms an important component in the sustenance of nomadic herders' livelihoods. [15] Demonstrates the periodic displacement and transhumant character of settled Mbororo grazers of the Tubah Uplands in the North West Region of Cameroon. [15] Revealed that there are two types of pastoralists in the area; semi-nomads, who practice agriculture and transhumance and fully settled Fulani (real sedentary nomads).

2.3.6. Rotatory feeding of pigs: To improve the local pig yields, kitchen left-overs, banana leaves, and stalks are given to pigs alongside the regular interchanging of the pigs between the pig sty and tethering outside the pig sty to restrict movements (Plate 4).

Plate 4: IAK in piggery.



A: Pig tethering

B: Local pig sty

Results from this study reveal that the giving of banana stalks to pigs during periods of intensive sunshine helps to regulate their body temperatures. The indigenes believe that with these methods, even during the dry season, the health of pigs reared is not jeopardized. Also, pigs are not allowed to roam about for fear that they may destroy crops grown and consequently reduce yields.

2.4. IAK in poultry farming

2.4.1. Nest preparation, control of eggs and enhancing security: To enable the safety of hens at brooding stage, the indigenes construct thatched baskets from bamboo and ropes and place them on the walls of house for the hen to lay its eggs. These baskets are either lined with old dresses or dry banana leaves. The need is to preserve the constant removal of

eggs for human consumption and consumption by dogs (Plate 5). As a native believe, the indigenes constantly reduce/remove the laid eggs with hopes of encouraging the hen to lay more. This is a similar finding by [8] in Uganda, where Farmers do not only prepare and place a small bottomless basket to encourage hens to lay more eggs and hatch many chicks, but also regularly remove laid eggs to encourage the hen to lay more. The baskets are placed in a small round hole lined with dry banana leaves [8]. Added to this, in order to further preserve the egg and the hen, some households construct a traditional pen (“*ndouma si nguo*” in Bum) of about 1m tall with capacity to contain 3-4 hens at a time. Reproductive hens are then channeled to lay their eggs as well as incubate and hatch them here in order to prevent dogs or wild animals from invading (Plate 5).

Plate 5: Eggs and chicken security measures



A: Traditional pen B: Panther's skin at the door



C: Weaved basket hanged on the wall for hens to lay eggs

To enhance hen and chicken security, some households who allow their brooding hens to lay and hatch in the house use a wild cat skin (Panther's skin) to scare the hen from going out of the house when they are not in doors (Plate 5). This creates fear to the hen as well as to the angry and predatory sparrow hawk ready to devour the young chickens. In this same light, well dried carcasses of killed hawks are tied on tall bamboos or trees at one end using a long twine permitting them to swing from one angle to the other following the wind. This helps to scare life hawks from coming closer to attack the chicken and thus ensuring greater survival rate as one of the respondents rightly puts it, “ *with these our local methods dem, hawk were yi dey for sky no fit prevent we for di keep fowls*”.

2.4.2. Believes and concoctions and ensuring animal health: To prevent diseases common to fowls, the indigenes grind ground and wild pepper and mix with water for fowls to drink. This is thought to cure gastritis and prevents bird flu (avian flu) from attacking the fowls reared. *Acacia fortilis*, a medicinal plant in the area is used to prepare fowls medication. The seeds are harvested and soaked in water to produce a concoction called “*Bulle*”, a unique concoction in Bum, for fowls to drink. In Uganda, the indigenes use similar

concoctions to those of Buabua and Kimbi to cure their chicken as demonstrated by [8]. Chicken infected with *coccidiosis* are injected with or given mixture of ash, ground pepper and water to drink; pawpaw seeds also are given to chicken as de-wormers [8]. Common pest that attack chicken are mites. Mites are a common problem during incubation periods and may cause the affected hen to leave its nest. The indigenes in order to address this problem regularly remove and sun the materials that make up the fowl nest. In some cases, the intensity of mites may cause the brooding hen to abandon its eggs. [8] revealed that farmers of Uganda faced with such situations put dry banana leaves in a mortar and position it near a fireplace to aid the eggs brooding process, then eggs are regularly turned and eventually the chicks hatch.

2.4.3. Spatial distribution of IAK and Sustenance of local livelihoods: Living in resettlement camps and applying their local knowledge in agriculture, the indigenes of Buabua and Kimbi villages sustain their daily life from the application of variety of self-acquired, life and inherited experiences in agriculture. Though the agriculture at large is still at a small scale, crop yields from the use of IAK in the area are sustaining (Table 3).

Table 3: Estimated yearly crop yields from the application of IAK

Crop type	Quantity in buckets (15litres)	Quantity in bags (100Kg)*	Quantity in bags (100Kg)	Quantity in US tons (t)**
Maize	2200	275	27500	30.25
Cassava	753	94.13	9413	10.35
Beans	193	24.13	2413	2.65
Groundnuts	286	35.75	3575	3.93
Soya beans	66	8.25	825	0.91
Total	3498	437.26	43726	48.09

*8buckets=1 bag of 100Kg, **1Kg = 0.0011 US ton

By applying IAK in food crop farming, households register an increasing yearly yield especially in maize and cassava (30.25 and 10.35 tons respectively). These are the main staple food stuffs and partly commercial crops of the area. Dried maize is sold on weekly market days to middle men or “*bayem sellams*” coming from nearby towns and cassava is transformed in to gari for local consumption and sale. Maize

is locally consumed in form of corn fufou with locally grown huckleberry and garden eggs or corn fufou and roasted chicken *katikati*. Corn fufou and roasted chicken is a traditional dish of honour and respect commonly prepared during dead celebrations, marriages or the reception of in-laws. There is a close relationship between the use of IAK and the distribution of agricultural activities in the area (Fig. 4).

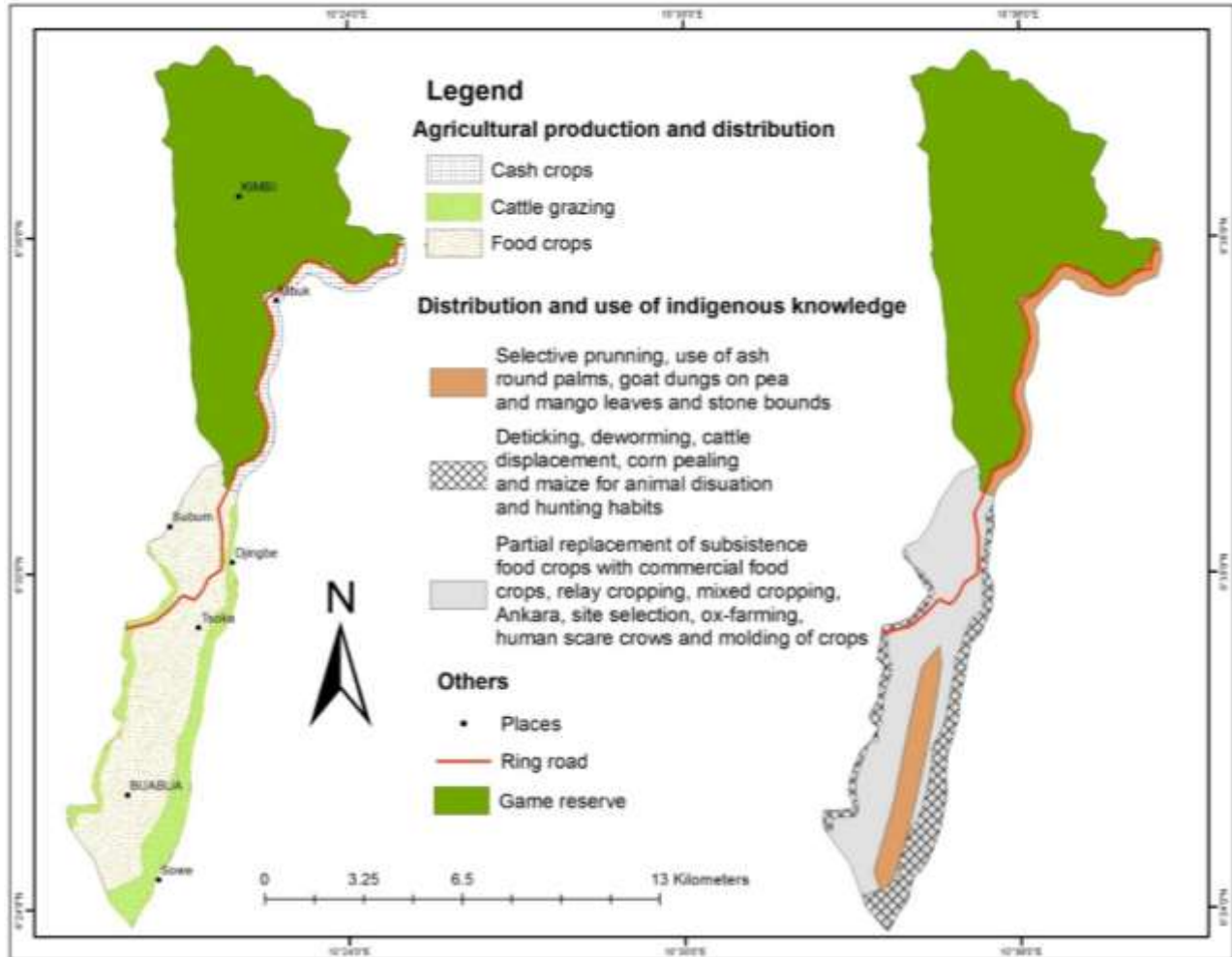


Fig. 4: Spatial distribution of agricultural production and IAK in Buabua and Kimbi.

Three main agricultural practices were recognized in the area; cash crop farming (cocoa) along the ring road beside the Kimbi game reserve, food crop farming mostly in the river valley where soils are relatively fertile and cattle grazing on steep slopes at both sides of the river valley. Pig keeping and poultry were also limited to inhabited areas of the river valley.

III. CONCLUSIONS AND RECOMMENDATIONS

IAK has proven successful in agriculture and the sustenance of local livelihoods. These IAK are applied to food crop cultivation and livestock farming (cattle grazing, poultry and piggery). This notwithstanding, many upheavals arising from social and economic standpoint strengthens the future of

the survivors resettled in Buabua and Kimbi. Agricultural land is small (30-50 square metres per household). Farmer-grazers conflicts are now the norm rather than the exception in these resettlement camps. Small land sizes are a major hindrance to free grazing and periodic displacement of herds by the settled Mbororo. Possibility of expanding food and cash crop production is also very slim. Sources complained of the lack of land for agricultural development and expansion. Faced with such upheavals, the survivors of the Lake Nyos Gas Disaster in Buabua and Kimbi villages now express the dyeing need to return to the former disaster area.[16] Revealed that the resettlement of disaster survivors has created social conditions that have led to their relocation back to the disaster zone. Analysis of relocation decisions shows that motivations

for relocation are caused mainly by social, economic and cultural factors, which arise from resettlement [16]. Expanding the land area of these resettlement camps can be a motive to halt back survivors, expand agriculture and sustain local livelihoods.

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