

Urban Agriculture and Landscape Challenges in African Cities: An Illustration of the Bamenda City Council, Cameroon

Bongajum Simplicie Ngoran

Department of Geography, Faculty of Arts, Letters and Social Sciences, University of Yaoundé I

Suinyuy Derrick Ngoran (Corresponding Author)

Department of Environmental Sciences and Environmental Engineering, College of the Environment and Ecology, Xiamen University, 361102, Xiamen, Fujian Province, China

Abstract

As population continue to surge in number, the challenges of urban agriculture and landscape dynamics in African cities is becoming increasingly important. Bamenda, a city known to be one of Cameroon's breadbaskets is not only threatened by urbanization and poor agricultural practices, but the negative ramifications are felt by-and-large. Food production in Bamenda in many cases is a response of the urban poor to insufficient, unreliable and irregular access to food, health, income, well-being and the low purchasing power. Urban agriculture improves access to a cheap source of protein and the quality of the food in the households is improved as poor families get to eat more fresh vegetables produced by them. Though it is reckoned that the practice of urban agriculture provides an alternative solution and complementary strategy to cope with the problems of rapid population growth, reduces urban unemployment, poverty and food insecurity, it is also accompanied by negative consequences on the landscape. Soil degradation due rampant poor techniques of production, places the population at risk and thus, engenders out-migration. This study, therefore, addresses population quest for food security within the urban landscape and how this interplay influences each other. More-so, the role of stakeholders and types of agricultural practices within the Bamenda urban landscape are examined.

Both past international and domestic measures to ensure sustainable food production and to curtail adverse anthropogenic impacts on the urban landscape have proven counter-productive. Therefore, a re-awakening of positive mindsets, especially on the sides of Cameroonians as concerns best agricultural practices and state-of-the-art landscape management is needed. Considering the current economic setbacks, it is recommended that the acquisition of novel approaches in addressing poor urban agriculture strategies and its nefarious impacts on the landscape should be carefully studied and adapted such that it is at the reach of many.

Keywords: Urban Agriculture, Landscape Challenges, Environment, Bamenda City Council, Cameroon

1 Introduction

The developing countries of Africa, Latin America and Asia will accommodate 75% of urban and peri-urban dwellers of the world by 2020. Projections show that by 2020, 85% of the poor in Latin America and 45% in Africa will be concentrated in urban areas [1]. Cameroon is not an exception to this fast urban growth as 52% of her population lives in towns and cities [2]. According to the National Institute of Statistics [3], 12.3% of the poor in Cameroon are concentrated in urban settings. The Bamenda city has great difficulties to cope with this rapid urbanization as it faces major challenges in creating sufficient employment opportunities for the poor and the rapidly growing population which is estimated at 322889 inhabitants. Out of which, the urban population constitutes 269530 while the suburban population is estimated at 53359 inhabitants [2].

The practice of agriculture in the city of Bamenda provides an alternative solution and complementary strategy to cope with the problems of rapid population growth. Urban agriculture reduces urban unemployment, poverty and food insecurity. Urban agriculture also plays an essential role in enhancing urban food security. This is because the costs of supplying and distributing food to metropolitan areas are based on rural production and imports continue to escalate and do not satisfy the demand, especially of the poorer sectors of the population [3]. The contribution of urban agriculture to food security and healthy nutrition is undoubtedly its most important asset [4]. Food production in Bamenda is in many cases is a response of the urban poor to insufficient, unreliable and irregular access to food, health, income, well-being and the low purchasing power in the city. Urban agriculture also improves access to a cheap source of protein and the quality of the food in the households is improved as poor families involved in farming eat more fresh vegetables produced by themselves in gardens [5].

This urban agricultural practice is accompanied by negative consequences on the landscape. Soil degradation in Bamenda is rampant due to the poor techniques of production which places the population at risk. Risk zones (steep slopes, wetlands, inland valleys, and escarpment) have been occupied for agriculture and settlement by urban farmers. This activity is thus preoccupying and needs to be redressed.

The rest of the paper is structured as follows; section 2 demarcates the study area, section 3 and 4 addresses the factors shaping urban agriculture and tackles the dynamics of the Bamenda Urban landscape respectively. Section 5 tallies on the impacts and mitigation measures, section 6 looks at the way forward,

whereas section 7 draws a logical conclusion.

2 Location of Study Area

Bamenda city is located between latitude 5°56'0'' and 5.933°N and longitude 10° 10' 0'' and 10.167°E (Figure 1) [6]. The town is situated in the western highlands of Cameroon at an altitude of 1230m-1510m. Bamenda city regroups three sub divisions namely; Bamenda I (Bamendankwe), Bamenda II (Mankon) and Bamenda III (Nkwen). It has a surface area of 22.9 Km² [7].

3 Factors Accelerating Urban Agriculture in the Bamenda City Council

The practice of urban agriculture in Bamenda is fostered by diverse factors. These factors can be grouped under the economic, social and political context. The economic factors include devaluation of the FCFA, civil service reforms and crisis in the cocoa and coffee sector. The political factors include multi-partism and the social factor is link to rapid population growth. These factors are diagnosed in the subsequent sections

3.1 The Social Context

The social context in Bamenda is characterized by rapid Urbanization typical of towns in developing countries. The rate of urbanization in Bamenda like in other towns of the south is alarming [8]. According to Mougeot [9], urbanization in developing countries is occurring at an unprecedented rate. This rapid increase results from rural exodus and natural increase of the population. This rapid population growth in Bamenda is causing problems of unemployment, poverty, food insecurity and hunger leading to adoption of urban agriculture with its consequences on landscape.

3.1.1 Population Growth

Cameroon is not an exception to rapid population growth and its problems witnessed by many developing nations. Its urban population was 18% in 1967, 22% in 1976, and 40.1% in 1991 and presently it is estimated at 51.5% [2]. As one of the major urban centers in Cameroon, Bamenda has experience spectacular increase in its population. The national census on population and housing of 1976-1987 in Cameroon revealed that Bamenda was ranked 4th with a 7.8% average annual growth rate among towns of more than 10000 inhabitants and 5th between 1987-2005 with an average annual growth rate of 4.9% among towns of more than 50000 inhabitants.

Bamenda urban space has a population of 269530 people and a surface area of 22.5km² giving a population density of 718p/km². This high population pressure is attributed to a number of factors among which is high fertility. Early marriage is common among teenage (17-18years) who start child bearing at the age of 19years [10]. Family planning, education and the use of contraceptive is low. The culture, custom and tradition of nursing children for wealth and reduction in infant mortality due to improve medical facilities explain this increase in population growth. Table 1 shows trends of population growth in Bamenda since 1976. It is noticed that the population of the town has more than double from 1976 to 2005. This rapid increase in population is in disequilibrium with available resources. Population growth stresses the carrying capacity of the land, increase food shortage and hunger necessitating urban agriculture and improved farming to supply the needs of the population (Figure 2). In Bamenda, population pressure has led to the occupation of marginal lands such as the steep slopes of the Sisia quarter in Nkwen, swampy areas along the banks of River Mezam and its affluence, inland valleys of Mankon for agricultural purposes.

Table 1: Evolution of Population of Bamenda Urban Space by Sub Division between 1976- 2005

Area	1976	1987	2005
Bamenda I	3368	7710	18468
Bamenda II	28385	64984	159210
Bamenda III	16358	37448	91852
Total	48111	110142	269530

Source: Regional service of statistics N.W.R [11]

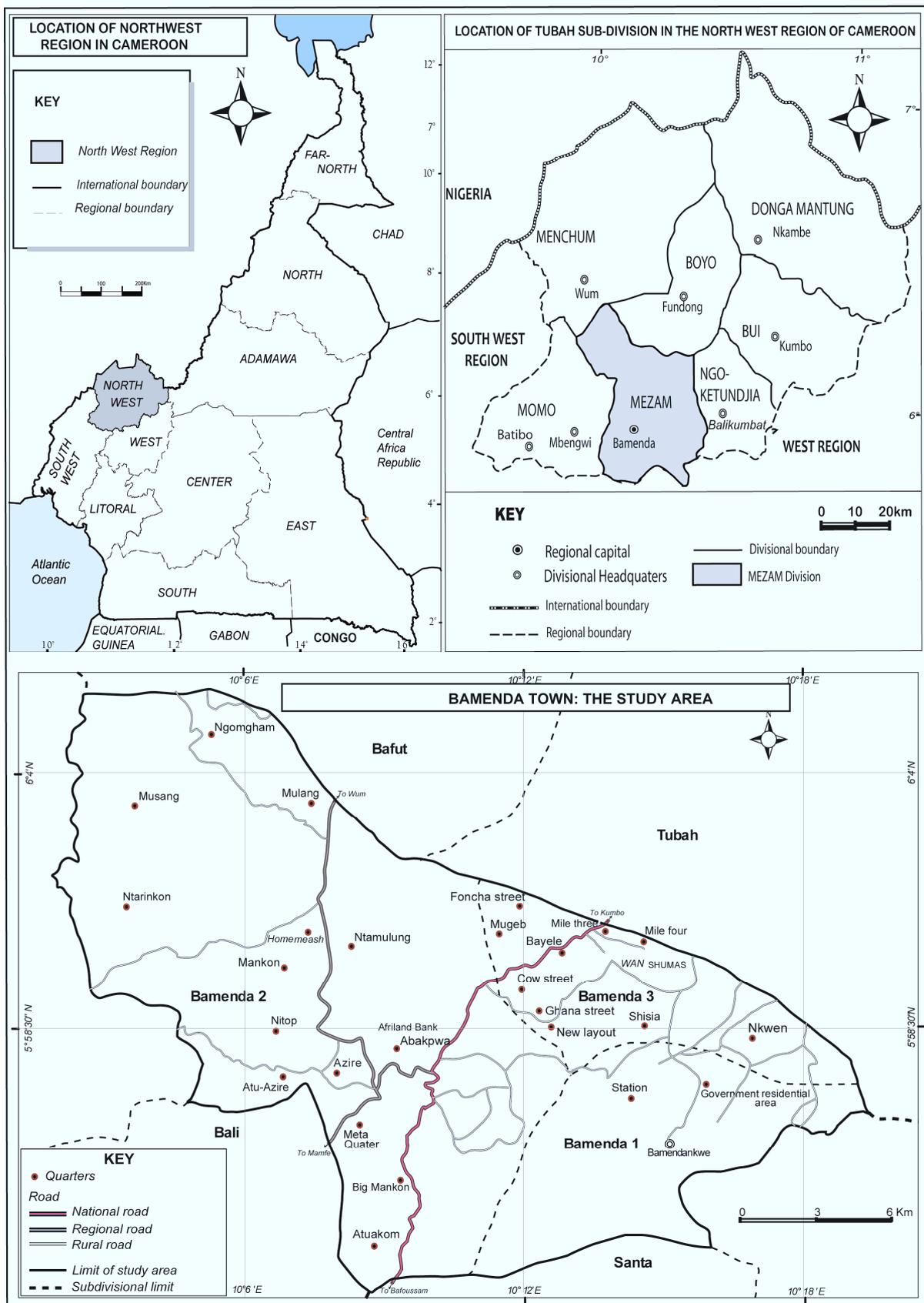


Figure 1: Location of Bamenda Urban Lay Out

Source: INC, Données GPS 2012

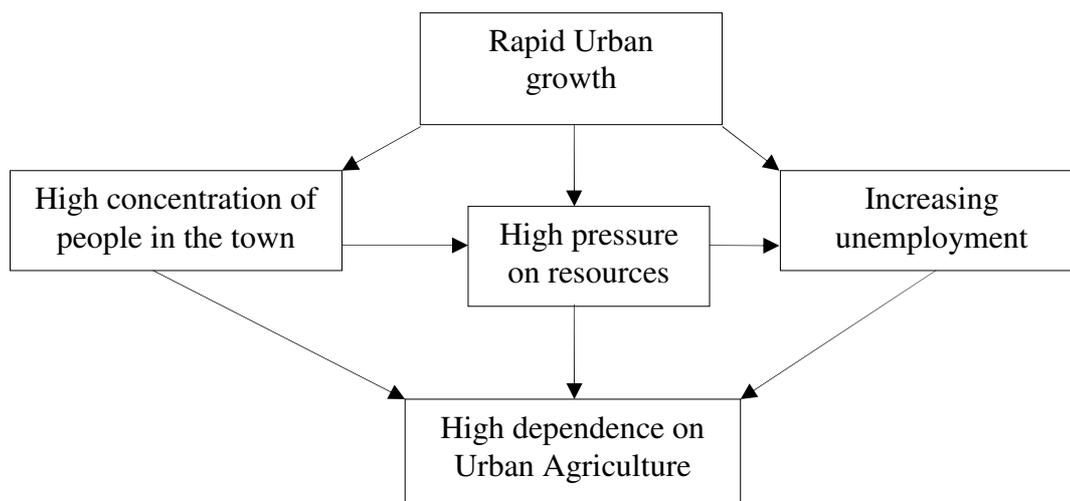


Figure 2: The nexus between rapid population increase and urban agriculture.

3.2 The Political Context

Cameroon witnessed the democratic wind of change that blew across African nations in the early 1990's. Under internal and external pressure, the government introduced multi-partism and democracy in Cameroon in December 1990. In the advent of multi-partism, laws favouring freedom of association paved the way for political liberty, freedom of expression and association.

In 1990, the Social Democratic Front (SDF) was formed in Bamenda as a consequence of multi-partism. The birth of this party in May 26, 1990 opened way for political competition and transformation of Bamenda as an opposition strong hold. This event transformed the political and socioeconomic life of the town till present. Bamenda is also the mother of the Southern Cameroons National Council (SCNC), a group that has been fighting for the cessation of Anglophones from the republic of Cameroon on grounds of francophone domination.

According to the district chairman of the Social Democratic Front (SDF) Bamenda II, Mr Che Napoleon, the appointment of a government delegate to the Bamenda city council and other parts of Cameroon were measures to counteract the influence of the opposition party. He further notes that the government delegate of Bamenda hinders actions of SDF mayors geared towards helping the urban population. Bamenda according to him has the smallest number of roads, poorly designed, very narrow and hardly exceeding 6m large, characterized by pot holes, very dusty in the dry season and muddy in the rainy season. The investment budget allocated for Bamenda each year is hardly exhausted despite the multitude of problems the town faces. This, therefore, shapes the Bamenda agricultural sector in many ways.

3.3 The Economic Context

Cameroon enjoyed economic stability from 1960-1985. Between 1970 and 1985, its economy grew at 8% per annum. The exportation of cash crops was the principal response to this fast economic growth [11]. In 1977, cash crops made up 72 percent (71.9 percent) of exports while oil was 1.4 percent. This situation changed in the 1980s as a result of oil exploration. In 1985 oil made up 65.4 percent and cash crops 21.4 percent of exports, with government getting high royalties from international oil companies developing the field [12]. This period was characterized by heavy wages paid to public and para-public sector employees. However, this era of economic boom was short lived as trade and oil revenue started to decline. External borrowing and reserves held abroad permitted the government to push back any reforms until 1987 and President Paul Biya announced some budget cuts [13]. However, this measure failed to remedy the situation as deficits continued to rise, and by 1989, the government had no option but to enter into a structural adjustment agreement [14].

The economic environment that resulted to hardship in Bamenda City Council (BCC) was characterize by devaluation of the CFA francs, crisis in the cocoa and coffee sector, the retrenchment of civil servants from civil services and salary slides [15]. The BCC being an integral part of Cameroon could only succumb to these reforms as any other locality in Cameroon. This eventually obliged urban dwellers to uptake agriculture as an adaptive and coping strategy in the BCC.

3.3.1 Devaluation

Some authors hold the point that devaluation is a fiscal policy that increases the export potentials of a country whose currency is devalued. Instead of devaluation acting as a problem solving policy, it worsened the livelihood of people in Cameroon in general and Bamenda in particular. The CFA was devalued by 50%,

which consequently meant that the prices of imported goods doubled immediately after devaluation. The devaluation of the currency in January 1994 virtually paralyzed all segments of Cameroun's economy and population. Implicitly, the strategies adopted by producers, businessmen and consumers were unfortunately neutralized by the negative effects of devaluation [16]. Moreover, inflationary price increases, loss of competitiveness of traditional export crops on the world market, excessive taxation, government's withdrawal of subsidies from the agricultural sector, inefficiency in the production system were the results.

It is realized from Figure 3 that, the prices of farm input increase after the franc CFA was devalued. There is a great difference between prices of input in 1993 and those in 1995. This had a lot of repercussions on the population in that the increase in prices of goods were not counteracted by a substantial increase in the purchasing power of the people in Bamenda. This policy aggravated the already existing low purchasing power of the people. Several urban residents opted for urban agriculture as a means to palliate the increasing food bills [17].

3.3.2 The Civil Service Reforms of 1990's

With the adverse conditions of the economic crisis, the World Bank imposed the compression of public agents to the Cameroon government. It was necessary for purposes of efficiency and better management of the public affairs, the production and distribution of public goods, utilities and services, the definition and application of economic policy and the management of public expenditure at optimum levels. The civil service reforms therefore had an extended objective which was the creation of a public service whose dimension, qualifications, motivations, behavior and the sense of responsibility would allow it to assure a better service corresponding to the expected role of the State. According to Nunberg [18], the inability of the Cameroonian government to manage and finance their civil services stem from the fact that the civil services itself was too large, too expensive and insufficiently productive.

It appeared rather glaringly clear that for a long time, state employment in Cameroon received a large pay packet (Table 2). The civil service was too expensive because public sector wage bills constituted too high a percentage of total government revenues and accounted for too high a percentage of GDP [18]. Most civil servants that were retrenched had to venture in urban agriculture to continue living in towns.

Table 2: Situation of Civil Service and Wage Package in Cameroon 1990-1995

Year	No. of civil servants	Annual wage packet(CFA)
1990	188200	300,000,000,000
1995	155210	190,000,000,000

Source: Commis d'état OS NOV-DEC 1999

3.3.3 Crisis in the Cocoa and Coffee Sector

In an attempt to curb or reduce the effects of the economic crisis in Cameroon, the government agreed on the proposition of the Bretton Woods Institution to liberalize the cocoa and coffee sector. With the hope that in privatizing the activities of the agricultural sector, economic stability will be attained, the époque of an omnipresent State happened to be a nostalgic affair. In this optic, State enterprises in charge of regulating the agricultural sector were either closed down; their budget reduced enabling the functioning of only the managerial staff or liquidated [15]. One of them was ONCPB¹ which was in charge of stabilization of prices of agricultural produce, distribution of fertilizers and allocation of credits to farmers. The liberalization of the agricultural sector led to its closure. Prior to 1986, this structure employed more than 10000 people [18]. By 1992 it had less than 1800 employees due to a reduction of its activities during liberalization. Other structures that faced similar setbacks were SODECAO² and FONADER³.

The liberalization of the coffee sector which was the principal income producer of the North West Region in which Bamenda is found had drastic consequences on the farmers. For a long time, they had been acquainted to the intervention of the state in price stabilization and input subvention. The policy of liberalization worsened the precarious state of many coffee producers and middle men that depended on this activity for a living. Many farmers could not support the drastic fall in coffee prices in the world market because agricultural inputs were on a constant increase making cost of production high [19].

Most rural dwellers around Bamenda had to look up to this urban area as their last recourse. Many in-migrants, shortly after arriving in town will notice that it is not a bed of roses as people of the countryside think. Faced with such circumstances most of them were obliged to indulge in agriculture to keep life moving.

3.4 Cultural Heritage

Cultural heritage is another factor that explains the cultivation of crop in the BCC. Many informants testified during field investigation that they were born in agricultural setting and cannot live without farming. Most of

¹ Office national de commercialisation des produits de base

² Société de Développement du Cacao

³ The National Fund for Rural Development

such informants were found in sub-urban areas of the BCC and those that had migrated from the countryside.

4 Dynamics of Agriculture in Bamenda Urban Space

As postulated by Sinclairs' theory on agricultural land use, the density of agricultural activities increase as we move from the city center to the sub-urban areas. The case of Bamenda urban space is not different for areas around the city centre are occupied by small gardens. Away from the central business district, the farm sizes become larger.

4.1 Urban Agricultural Land Use

Crop production in Bamenda is done in four geographic spaces namely wetlands, densely settled zones, sloppy areas and sub urban locations. The techniques of cultivation utilized in each of these areas are specific. There are factors that determine the techniques of each of these geographic spaces which are both human and physical. There are human factors such as the high concentration of buildings, council laws regulating urban agricultural activities, culture and tradition of the people. Physical factors include the nature of the terrain, humidity of the soil and land availability.

4.1.1 Wetland Exploitation

Market gardening in Bamenda is practice in wetlands. In Bamenda, these areas include corridors of rivers such as those of River Nki Nelia and streams such as Nki Nshewu, Machu, Nkyi Ashega. Marshy lands below the Foncha Street, those behind the G.R.A in Up-station and others are equally wetlands. It should be noted that most inland valleys in Bamenda are wet valleys which in most cases are wetlands. These wetlands have gone a long way to foster market gardening and increase the income of gardeners. The wetlands in Bamenda are peculiar in that they are humid throughout the year. The precipitation receive within the town is about 2500mm in the high lava plateau (Bamenda I) and 2300mm in the intermediate plateau which incorporates Bamenda II and III (Region delegation of transport) [6]. This high precipitation rates ensures the continuous humidity of these area throughout the year.

The humidity of these areas favours the cultivation of market gardening throughout the year except for wetlands which are usually flooded at the peak of the rainy season. This constant cultivation has improved on the living conditions of market gardeners in Bamenda. The crops produce in wetlands in are mostly vegetables such as huckleberry, cabbage and green spices which are highly demanded and consume on daily basis by most families.

Water availability is also an important factor that favours the location of poultry farms, piggery and animal tethering. Water spaces are used by livestock breeders as areas for the discharge of animal waste and cleaning of animals. These lands are prohibited from construction of habitats and other form of real estate businesses following the risk involve. It is for this reason that crop cultivation and livestock breeding is carried out here.

Some farmers practice irrigation and these are mostly urban farmers growing vegetables during the dry season. These farmers undertake this activity in wet inland valleys, swampy areas and low lying areas such as part of Foncha Street, corridors of River Mezam and its tributaries. Farmers used watering cans or water cannons to pump water into their gardens. Others, practice furrow irrigation whereby they divert water from streams into their gardens during the months of November, December and January.



Figure 3: Farming Techniques used during the Dry Season

A: Intensive Farming in Wetlands at Nkwen. Channel Irrigation is used to Cultivate Vegetables. Note water in

furrows (A1) and huckleberry on ridges (B2).

B: Market gardening in marshy areas. Borehole irrigation (B1) is used in the dry season to grow crops

C: In densely settled areas, spaces around home surrounding are exploited for crop cultivation. Note (C1) drums used for irrigation, multi crops on ridges (C2). **D:** Market gardening along the River Mezam corridor. Note stream (D1).

4.1.2 Densely Settled Areas and Gardening

Rapid population growth in Bamenda has led to a dense concentration of habitat. The dense concentration of habitat decreases as one move from Commercial Avenue (the central business district) to peripheral quarters. The quarters that surround the central business district (Ntarinkon, Musang, Ntamulung, Nitop and Azire) are those with the highest concentration of gardens. Vegetables, plantains and bananas are planted on cleared spaces in the compounds. With increasing population, the demand for agricultural products has increase and consequently these products have known considerable hikes in prices. Against this back drop, urban dwellers have been showing interest in cultivating crops and rearing animals around compounds in order to reduce the cost of living. The cultivation of crops around compounds can be seen near houses in GRA (Up-station).

Mix cropping is the strategy used by farmers who cultivate crops around compounds. Faced with land scarcity in the highly densely populated quarters, mix cropping is economical, efficient in soil nutrients exploitation. Land use is also maximized as a ridge carries a high plant population. There is effective use of available plant nutrients as the different crops obtain nutrients at different soils depth. It also reduces crop failure which may result from pest and diseases attack leading to food insecurity.

Gardening around homes in Bamenda helps families to produce some food for subsistence with reduce dependence on markets. This is a coping strategy that has reduced the effects of the economic crisis since the 1980's in most urban households in Bamenda.

4.1.3 Cultivation on Sloppy Areas

Hardship brought to Bamenda by the adverse effects of the economic crisis coupled with rapid population growth has accelerated space consumption. Inadequate vertical construction also explains this rapid space consumption. Inadequate land for agricultural activities has caused urban dwellers to solicit sloppy areas which are areas forbidden by law for the construction of houses. Farmers have taken advantage of this law to perch agricultural activities on hill side, rocky slopes and the Bamenda escarpment (see Figure 5).

The Bamenda escarpment covers a large surface area in the three sub division. The difficulty in constructing houses on the escarpment due to its steeply and rocky nature at certain spots pushes crop cultivators to such areas. Despite the risks involve in practicing agriculture in such areas, some dwellers are compel because they utilize urban agriculture as a livelihood strategy.

4.1.4 Cultivation in Sub-urban Areas

According to Sinclair's theory on land value, land values are low as we move from the city center to the periphery. Moving from Commercial Avenue in Bamenda towards Santa, Mankon Fondom, Naaka, Banja, Bafut and Bambui, land becomes available and less expensive. The advantages offered by these peripheral zones give room for agricultural techniques necessitating large surfaces to be practice. In the sub urban areas of Bamenda the "slash and burn" techniques is widely used.

In the "slash and burn" technique, some farmers use fire as a clearing tool preferably in the dry season when most of the vegetation is dried up. Trees of small and medium sizes and grasses are cut down, allowed to dry and subsequently fire is set on it. Fire is perceived as labour serving in the cutting and clearing of the undergrowth. According to Boerner [20] the amount of phosphorus, magnesium, potassium, and calcium released by burning are high in relation to both totals and quantities of these elements available in the soil. This added advantage of soil fertility is however short lived as the output for the first years are usually high then the output reduces as years go by.

The "slash and burn" technique is locality known as "Ankara". With this technique grass is cut down and pile in heaps and few weeks before the rainy season starts, ridges are formed on the heaps and shortly, fire is set on the grasses beneath the ridges (Figure 4). This grass is burnt by the fire resulting to production of a powder ash which fertilizes the soil. Figure 6 depicts the urban land use of Bamenda



Figure 4: The “Ankara” technique in Up-station

A: shows grass that has been cleared, piled and arrange in ridges (A1). **B** shows how soil has been used to cover the grass and fire set on it

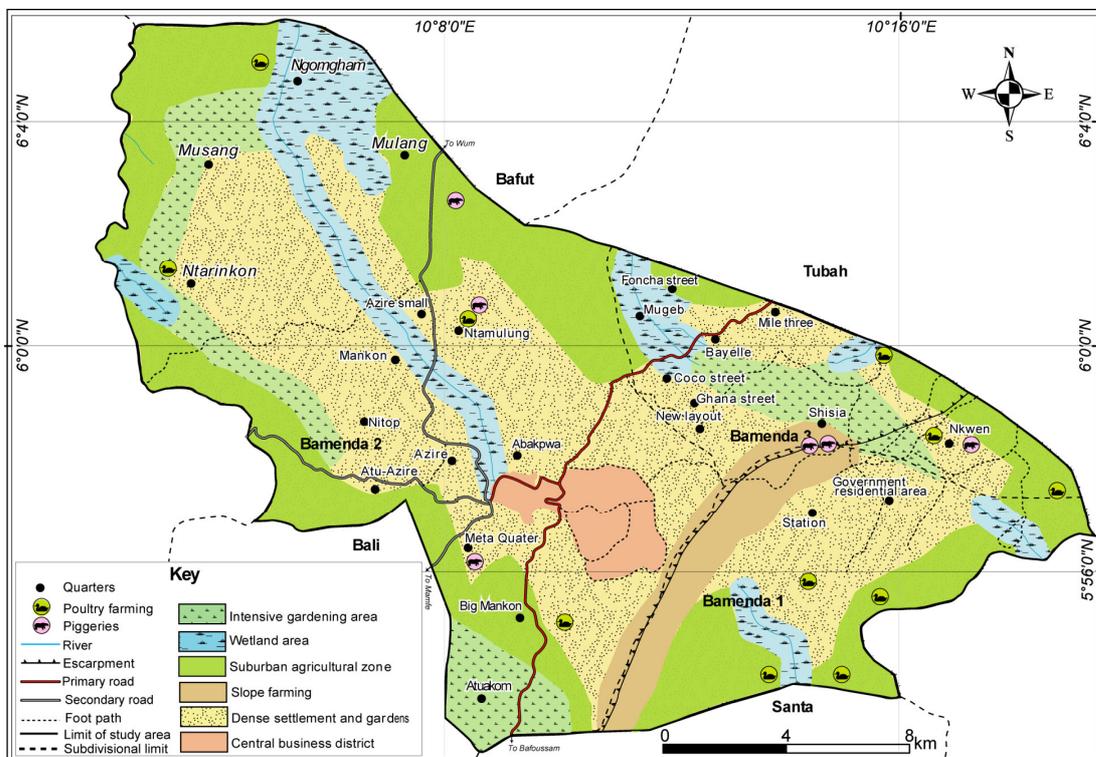


Figure 5: Urban Agricultural Land Use in the Bamenda Urban Space

5 Impact of Urban Agriculture on the Landscape, Mitigation Methods and Suggestions to Ameliorate Urban Agriculture in Bamenda

Urban agriculture in Bamenda has changed the landscape. The occupation of wet lands for agricultural purposes leads to pollution and reduction of water bodies. Intensive cultivation of slopes especially on the Bamenda escarpment has greatly reduced the vegetation cover and accelerated erosion. The massive cutting down of trees in areas where land is abundant such as in the sub-urban areas has increase biodiversity degradation and soil pollution through the use of chemical fertilizers. The perching of livestock activities behind houses, near water courses and around areas where waste is dump in densely populated areas has occasioned water and land pollution. In this section each of these impacts on the landscape will be examined in detailed.

5.1 Landscape Degradation

Rapid population growth in Bamenda is a recurrent issue of the day. This problem can be appreciated when it is considered that the world witnesses an additional one billion people to its population every eleven years [21].

The population of Bamenda is obliged to grapple with the frightening population pressure which has experienced an astronomical and galloping growth rate. This astronomical increase signals a greater disaster for an already crisis ridden area whose landscape has been exploited and plundered for a long time. The life support systems of our planet are beginning to buckle under the pressure of ever increasing human members consuming ever increasing amount of resources.

Presently, monumental landscape changes in Bamenda are the order of the day. The landscape trilogy; man, landscape and resources gives a synopsis of a complex inter-relationship between them [21]. Man's evolutionary dominance in Bamenda through the elaboration of his needs has forced the hands of nature and has introduced significant landscape changes. In this respect, the population of Bamenda by their extensive and irrational alterations in farming has become a threat to their own survival. Agricultural activities are rapidly transforming the landscape into other land uses, thereby inflicting irreversible mutations to their ecological character that might completely destabilize the system. The natural feedback of the creation of new farmlands in marginal areas of Bamenda which should have been left under natural vegetation cover is accelerated erosion whose rate depends on the methods of ploughing, time of planting, nature of crop on farm.

5. 1.1 Decline in Biodiversity

5.1.1.1 Destruction of Vegetation

Agriculture is one of the pioneer factors responsible for vegetation change in Bamenda. Poor agricultural techniques accelerate vegetal destruction. Vegetation destruction has been augmented to an unbelievable level due to the ever increasing demographic push making the population of Bamenda to increase their desire to maintain a measure of control on the supply of food [6]. At the initial stage, the damage was transient as there was always enough time for cleared vegetation to recuperate. However, as population increase, it became difficult to allow enough time for the land to regenerate its original plant cover and degradation gradually sets in [22]. The high demand for foodstuff in Bamenda obliges the farmers to intensify land use. Slopes, wetlands and sub-urban areas have been stripped of their vegetation cover for agricultural activities.

Agricultural techniques in Bamenda involve the use of rudimentary farming tools such as hoes, digging mattock, sickle, pig axe and knives. The use of these farm tools for agriculture has led to accelerated vegetal destruction especially in pockets of forest reserves in Nkwen, Mankon, Mendakwe. The major species fell include *Albizia gummifera* for fabrication of hoe handles. Some other species are used on farm for fencing and for the construction of pig fences. Such species include *Ficus oreodryandum*, *Dracaena deisteliana*, *datura candida* (antolong in Mankon). Some trees are used for staking of crops such as tomatoes and beans. Examples here include *Raphia* (*Reclinata* and *Vinicifera*) and *Arundinaria alpia*. However bamboos from the raphia bush serving as gallery forest are not only use for staking, their barks are stripped and woven into farm baskets, used by almost every house hold for transportation and storing of crops. Younger Bamboos serve as tying ropes. In combination with *Allopylhlus ballatus*, *Lasiosiophon glaucus*, *Seda rhombifolia* and *Arundinaria alpine* also serve as alternatives where they are found. Other utensils serving as complements to agricultural products are provided by carvers. These include wooden bowls, baskets mortar and pistles which are derived from both the trees and their branches. Such species include *Tabernae Montana pachysiphon* (nibemibi in Mankon), *Polyscias fulva* and *Croton macrostachyus* (tsah in Mankon). The above situation is exacerbated by the ceaseless quest for farmers in Bamenda to increase output. This quest obliges farmers to colonize additional farmlands in the area with obvious devastating effects on the landscape. The increase use of trees in the building of poultry houses, pig houses increases vegetation destruction. It should be noted that most pig houses are built using bamboos and planks obtain from certain forest trees, eucalyptus and cypress as seen in Figure 6.



Figure 6: Use of bamboo and trees for various practices in agriculture in Bamenda

A; shows Bamboos used to build a poultry house in Nkwen. Note (AI) bamboos.

B; plank made out of eucalyptus is used in constructing a pig fence in Shisia quarter.

C; exposes the use of forest trees in making handles of hoes(c1) and bamboos for drying of corn in Mulang.

D; a young lady is carrying a basket weaved with raphia bamboos for transportation in Mankon.

Shrinking vegetation cover therefore lessens the lands capacity to intercept, retain and transpire precipitation. Instead of trapping rain percolated to ground water systems, deforested areas become a source of surface water run-off. Quick transport of surface water translates into flash flooding and more localized flooding will occur.

The vegetation community has considerable influence on the micro-climate. They control the rates of evapotranspiration, wind speed, and ambient temperature. Because plants, especially woody plants require a lot of Carbon-dioxide for their metabolic activities, the plant communities are important carbondioxide sink [23]. They thus play significant role in the dynamics of the phenomenon of global warming which is presently gaining worldwide attention. The vegetal destruction of Bamenda has contributed to the dynamics of it micro climate as temperature are becoming more and more high.

Another effect of vegetation destruction is its impact on soil water conservation. The opening up of the land usually results in total runoff of water which comes from precipitation. In the natural ecological system, the plant also serves to prolong the time the rain water would reach the soil, so that when it eventually reaches, it sinks down the soil profile and or produces only light overland flows. Thus rain water which would otherwise drain off from the area is retained locally through the effects of the standing biomass. The significance of biomass in this respect has been well demonstrated by researchers in tropical towns [24]. Due to this vegetation destruction, most sloppy areas in Bamenda are witnessing erosion during rainy periods. Again, when rain falls on bare land, a large volume of sediments is produced and eventually emptied into water bodies within Bamenda. The deposition of silt in water bodies causes them to silt-up and eventually make them useless for water storage. Most of the water causes in the town of Bamenda are becoming shallower. This shrinking can be explained by erosive activities aggravated by vegetation destruction.

Naturally, inland valleys, watershed and marshy areas have their vegetation that is capable of conserving and preserving water for a long time as long as they are not put in a state of disequilibrium. The natural vegetation that is embedded in these natural spaces in Bamenda has partially or completely been removed in certain areas due to over cultivation [25]. Agricultural activities such as tilling, dredging and leveling of land distort the normal drainage of this water reserves and hitherto expose their soils to dry conditions. This therefore, results to water shortages especially during dry periods. The exploitation of wet lands in Bamenda has increase with the rapid demographic push of the area. This population pressure imposes constant cultivation without any fallow periods so as to meet up with the high demand for agricultural produce express by the population of Bamenda. Most crops are now cultivated 2-3 times a year which has made wetlands to be highly demanded especially during the dry season when cultivation is almost impossible on dry lands. Water shortages resulting from the irrational exploitation of wet lands has called for the use of watering techniques which also generate

other problems. The use of water pumps in watering entails the deviation of water channel into the farms. Some areas in Bamenda getting water downstream are at times deprived of water at the peak of the dry season because such water courses have been deviated into gardens up stream.

The implication of vegetation destruction is also considerable with respect to wild life. Plants cover also provides habitats and food for wildlife. Degradation of plant communities therefore means destruction of wildlife. Many animals in Bamenda are now confined to a few inaccessible locations or are extinct due to deforestation. The main sanctuaries for many of this wildlife are forest reserves such as that in Mendankwe. Field work revealed that earth worms no more exist in some farms. This can be attributed to the intensive use of fertilizers and pesticides which greatly affects the pH value of the soil rendering it acidic or alkaline which is not conducive for the stay of these little animals.

Encroachment of farmers into forest reserves of Bamenda is a call for concern (Table 3). This is because land available for agriculture in Bamenda is decreasing prior to the rate at which its population increases. Efforts are deployed by the government through the ministry of environment and nature protection and the ministry of fauna and flora to stop the population from degrading these forests reserves. However, farmers develop strategies every day to farm in the forests. The encroachment of farmers into the Mendankwe forest reserve has resulted to the reduction of the forested area. This encroachment of urban farmers has increase farmland and reduces wetlands in the Mendankwe forest area.

Table 3: The rate of Farmers' Encroachment on to Forest Reserve in Bamenda

Forest reserve	Locality	Number and date of classification	Total area (ha)	Rate of encroachment	Encroachment of farmers to a lesser extent and grazers to a greater extend
Bafut-Ngemba	Between Santa and Mendankwe	ER public notice no 10 of 1953	3238	45%	Farmers encroach less than grazers
Local Council Reserve for Fuel					
Mankon fuel plantation	Mankon Ntamulung	SCLN No 35 of 1961	62	-	Towards extinction
Mendankwe fuel plantation	Mendankwe	ER order of 1954	127	-	Massive felling almost nonexistent with the remission of land to the chief

Source: ONADEF, cited by Nkwemoh 1999

Moreover, forested land represented 70% in 1978 but by 2006 this percentage has fallen to 33% representing a 37% decrease in terms of surface area (Table 4). This reduction went to the benefit of farmland which rose from 22% to 50% [26]. The increase in grassland is explained by the savanization process which involves the gradual conversion of forest to grass. Wetlands have equally been losing their potentials.

Table 4: Evolution of Forest and Land Cover from 1978-2006 in the Mendankwe Forest Reserve (Bamenda I)

Land cover class	Area 1978 (ha)	% area 1978	Area 2006 (ha)	% area 2006	% Change 1978-2006	% annual change
Forest	2946	70	1373	33	37	1.3
Farmland	936	22	2106	50	28	1
Grass/shrub	163	4	613	14	10	0.3
Water/Wetlands	173	4	126	3	1	0.03
Total	4218	100	4218	100		

Source: Land Cover Change by Vincent, 2009

5.2 Urban Pollution

Pollution is one of the major problems that agricultural activities have brought in the Bamenda urban milieu. Both crop cultivation and animal breeding are sources of pollution in Bamenda. Water courses in Bamenda are contaminated by refuse resulting from pig farming. Some of the pig fences are located near water courses. Such pig breeders dump unwanted waste in water courses. Grass that results from clearing of land in the urban milieu is at times dump into the water courses. Farmers who dump cleared grass in water courses are those that utilize high quantity of chemical fertilizer, since vegetation takes some time to decay. The dumping of agricultural waste in these waters contaminates and narrows their channels. The water courses easily overflow their banks during rainy periods. The contamination of streams in Bamenda has negative consequences. Some urban dwellers utilize water gotten from these streams in household chaws. Such contaminated water leads to disease infections. Farmers working in and around polluted surfaces water supply risk their health. The pollution of these

water bodies also come from waste dump by hotels, restaurants, educational institutions, garages and motor repairs. This therefore becomes very dangerous for Bamenda urban farmers who mostly exploit the borders of water bodies for crop cultivation. A study carried out in Yaoundé shows that effluents from breweries contain 2080mg/l chemical oxygen demand, 259mg/l metal sulphide, 1650mg/l biochemical oxygen demand, 41.5mg/l phosphate and 71.5mg/l Ammonium along with colony forming units (CFU) fecal coliforms and 50 CFU 100ml fecal streptococci [27]. When such dangerous substances are found in water, it puts the farmers' health at risk and the crops cultivated might not be adequate for consumption.

Vicinities in Bamenda where pigs and fowls are reared are disgusting. Waste resulting from pig fences and poultries pollute the air of the environment. The construction of pig fences and poultry farms has drawn the attention of the BCC. The council is discouraging the practice of animal breeding in the city center because of the odour they produce which inconveniences the city dwellers. The BCC also discourages this activity because it dirties the town. Most of the pig fences and poultries observed are built with provisory materials. These provisory materials include barks of trees, raffia bamboos, sticks which dirty rather than beautify the town. Contaminated air in some quarters of Bamenda is said to be the origin of respiratory diseases.



Figure 7: Pollution of Urban Environment by Waste from Food Market

A: Gabbage from crops (A1) thrown into a stream (A11). **B** shows cabbage leaves dump into water (B1) and used basket thrown into water (B11).

5.1.3 Soil Degradation

Soils in Bamenda have lost their natural potentials due to the annual routine of cultivation which does not offer any opportunity for fertility regaining [28]. The constant exposure of wetlands through vegetal destruction for farming has made them to lose their quality as water reserve. The soils in this area rarely have natural characteristic. According to the Chief of Agriculture for Mezam Mss. Christina, it is because some of the soils have been exhausted and others are close to exhaustion. This low fertility of the soils has led to application of chemical fertilizers and manure. Chemical fertilizers have a short term reaction. Despite their temporal reactions farmers have a preference for their utilization in Bamenda. The implications of chemical fertilizers stems from the fact that it changes the pH of the soil by either rendering it more acidic or alkaline depending on the type of fertilizer used which becomes poisonous to soil organism.

4.1.3.1 Soil Erosion

Vegetation degradation has led to erosion in Bamenda. One of the functions of vegetation is the maintenance and stabilization of soils in the ecosystem. When biomass is removed, protection is withdrawn and the soils become vulnerable to erosion. In and around the farmlands of Bamenda, erosion is a consequence of agricultural land use methods which do not encourage adequate soil cover [29].

Most crops cultivated in the study area have a short vegetative cycle from planting through weeding to harvest. The cultivation of such crops has a higher propensity to accelerate vegetal degradation and consequently soil erosion. This is especially the case as the duration of crops on the farm does not exceed 3-6 months. The constant tilling and weeding of the farms makes the soils to be loose such that most of the soil particles liberated are rapidly transported downstream. This situation is worsen as most of these crops are cultivated 2-3 times a year meaning the soil for a greater part of the year is usually free of consistent vegetation to bind its particles together. The heavy rains experienced in Bamenda during the rainy season leads to the loss of the top soils

through erosion.

Another reason for erosion in the farming area of Bamenda is the technique of cultivation. The topography of Bamenda is very undulating. Most farms are perched in sloppy areas. Some farmers in Bamenda do not practice contour ploughing which is the best way to minimize effects of erosion on steep slopes. The farmers lay furrows downward instead of against the slope. The establishment of furrows across the slope permits rain water to replenish below. Rain drops are blocked by ridges and given enough time and possibility to infiltrate. Cultivating along the slope as is the case in some areas of the Bamenda escarpment does not only wash away crops but also create conditions for the loss of valuable top soils. As soil conditions continue to impoverish, the resultant effect has be outward movement of the population (Figure 8).

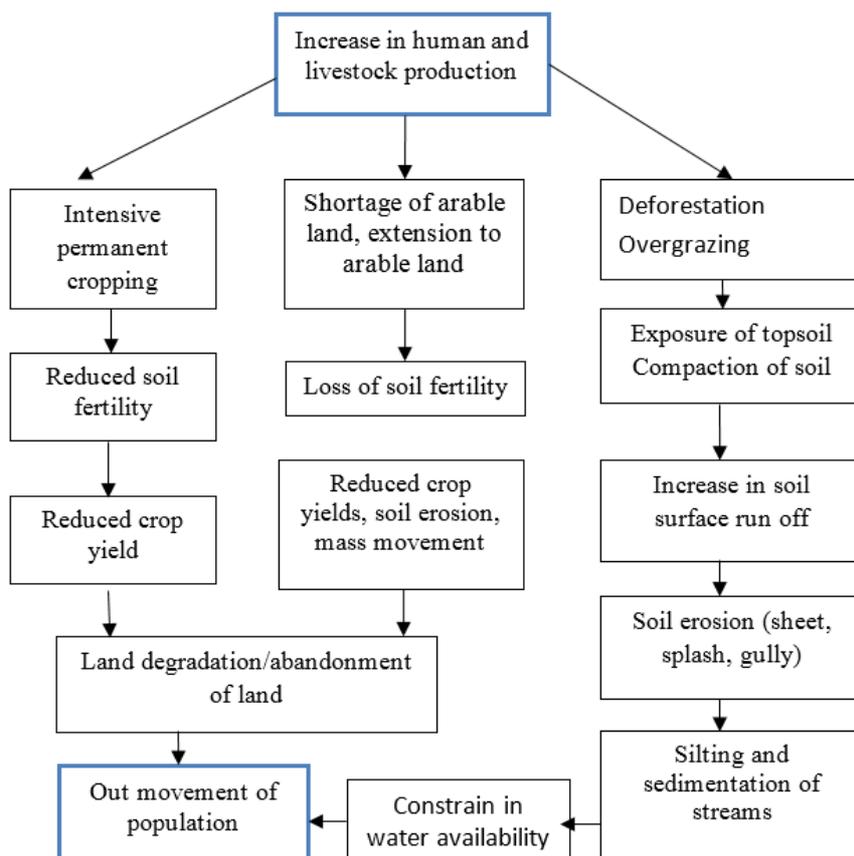


Figure 8: The Vicious Cycle of Land Degradation

6 Actors, Initiatives and the Way Forward

Man has developed a unique capacity to intervene in nature. But by setting himself apart he has tended to ignore his responsibility to understand the consequences of such interventions, not only for himself but for all other organisms with which he shares the planet. Faced with this environmental degradation, a number of actors are involved in environmental protection in Bamenda. These actors NGO's, common initiative groups (CIG's) the Cameroon government through ministerial departments. A series of strategies deployed by the different actors to reduce landscape deterioration are examined in the section that follows.

6.1 Role of NGO's and Common Initiative Groups in Reducing Landscape Degradation

An agency that is involved in fostering sustainable environmental exploitation is SIRDEP. This NGO was officially recognize in Cameroon by 1993. This institution is composed of a multi-disciplinary team of agronomist, forest extension workers, agro-economist and environmentalist who work hand in gloves to reduce the effects of landscape degradation. Their activities have played an important role in re-greening Bamenda. This re-greening is geared towards reducing erosion that is mostly observed on hilly and sloppy areas of Bamenda. Table 5 indicates SIRDEP efforts in fighting against landscape degradation through re-greening. This institution has other objectives other than environmental protection which makes its implication in this domain a bit limited.

Table 5: Number of Seedlings Planted in Mendankwe by SIRDEP

Type of trees	Mendankwe (Bamenda I)
Pygeum Africanus	1176
Maesopsis	876
Mahogany	2765
Calliandra	9000
Acassia	-

Source: SIRDEP 1997 cited in Nkwemoh 1999

The next institution that is also concern with environmental protection is HELVETAS was established in Cameroon in 1961 [30]. The focal point of this institution is the protection of catchment areas. It is worth while noting that the missions of this organization are becoming increasingly difficult with the recent population pressure that is pushing farmers in Bamenda to colonize marginal lands especially during the dry season when wet areas become a rare resource. Nevertheless HELVETAS has contributed a lot in preserving many wet lands in Mendankwe and Mankon.

Furthermore, Sustainable Agriculture and Self-help (SASH) is an N.G.O that was created in 1989 whose main objective is to adjust development. The organization pleads for sustainable exploitation of resources. SASH also encourages permanent farms, curb deforestation and soil erosion as well as improve on the life style of farmers. There is also the sustainable livestock foundation (SLF) founded in 1991. Its objective includes the assistance of farmers to improve on their life style through the implementation of regenerative and sustainable agricultural techniques that are environmentally compatible. The NGO also promotes agro-forestry amongst farmers in Bamenda.

Sustainable Agro-forestry Promoters (SAP) was created in 1994 also exist. The main objective of this NGO is to fight against environmental degradation through the implementation of permanent farming system and agro-forestry. Its agro-forestry program has been very successful. Respondents in Mankon revealed that when this organization started sensitizing and mobilizing them, they were very reluctant to adopt agro-forestry. However as time went on, many farmers discovered that it was the best technique for soils protection.

6.2 The Role of Government Agencies in Environmental Protection

Apart from NGO's and CIG's, the government is also fighting against unsustainable agricultural practices. The regional and divisional delegation of environment and nature protection and L'Agence nationale d'appui au développement forestier (ANAFOR) are government institutions involve in reducing the consequences of landscape degradation in Bamenda.

6.2.1 The Regional Delegation of Environment and Nature Protection and Sustainable Development (ENP)

The delegation is fighting without relenting efforts to maintain the existing forest reserves especially the Bafut-Ngamba forest reserve (Mendankwe) which has witness massive degradation from urban farmers, carvers, charcoal marketers in Bamenda. It is in this optic that the forest guards leave no stone unturned to see that defaulters are brought to law. Beside the protection of forest reserves, the Cameroon government through the delegation financed and afforestation program of 16000 trees for the year 2010-2011 and 8000 for the year 2012 to reduce and fight the effects of erosion and climate variability caused by the joint effects of farming and urbanization. Some of such trees can be seen on the Bamenda escarpment and behind the Ayaba hotel.

The Cameroon government through the delegation of environment and nature protection sign a convention that ran for three years with the three councils of Bamenda (Bamenda I, II, and III). A sum of 5 million FCFA was given each year beginning 2008-2010 to reinforce the ongoing afforestation program. The delegation has also been heavily involved in the distribution of bio-fertilizing seeds such as those of Calliandra which is rich in nitrogen and suitable to be used in agro-forestry. The ENP have also develop a nursery to permit them easily carry out their mission of re-greening. With their nurseries, it becomes more reliable to distribute young plants to farmers in Bamenda than giving money or seedlings which might be mismanaged as has been the case in the past.



Figure 9: Bio-fertilizing Plant Species in the Nursery of the Regional Delegation of ENP in Up-station

A shows leucenna and B represents Calliandra which is the most important bio-fertilizing species in Bamenda due to it high nitrogen content.

6.3.1 National Forestry Development Agency (ANAFOR)

This agency works in collaboration with other actors notably NGO's. Their main aim is to redress the bareness of the soils of Bamenda that has resulted from massive tree felling for diverse uses. They also work in collaboration with the local councils. ANAFOR has financed the planting of trees covering 2 hectares in Bamenda I and II councils and three hectares in Bamenda III from 2010-2012. Species mostly involve *eucalyptus*, *pygeum*, *mahogany*, *cypress*, *myesobsis* and *gmellina*. Below is a list of NGO's and hectares of trees they have planted in Bamenda under the financial ship of ANAFOR.

Table 6: Trees Planted by some NGO's in Bamenda under the Financing of ANAFOR

Organisation	Area (hectares)	Tree species
SHUMAS	5	Proneus
Living land	5	Proneus/Eucalyptus
MENTH	2	Eucalyptus
Nkwen multi-purpose	2	Eucalyptus

Source: ANAFOR 2012

6.4 Simple Agronomic Measures against Soil Degradation

Methods of farming that should take place in Bamenda should consider the triggering force of tilling and plant nutrient requirement [30] because of the high value of ferric oxide, aluminum oxide and pH values of potentially risky eroded areas in Bamenda. In this light, the measures propose here are adaptive farming technique (contour ploughing) and terracing of the slopping surfaces of Bamenda. These methods are of low cost and have a multi-dimensional role in soil erosion control [31].

6.4.1 Adaptive Farming System

The principal objective of making ridges by the farmers in Bamenda is to aerate the soil by making it loose and improve water infiltration .Unfortunately for diverse reasons, farmers who farm on sloppy areas in Bamenda cut the furrows down the slope than across the slope which goes a long way to create and increase channels that facilitates movement of surface water and the load it carries. Although the different environmental actors are trying very hard to discourage this technique, it still persists. According to a study carried out in the mezam area by Nkwemoh [31], the results showed that contour farming reduces soil erosion by 50-80% and increase crop yield by 6-66%. Doolette and Smyle [32] brought forth the thesis that contour ploughing is more effective in reducing erosion by 40-74% than grass contour hedges. The study in Bamenda therefore seeks to encourage the propagation of contour ploughing as it goes a long way to improve the pedogenetic crisis through a number of ways. With the loose soil from the furrows, surface roughness is increased, runoff is reduced and hence soil erosion is controlled.

6.4.2 Progressive Terracing

Considering the fact that runoff and soil erosion have a direct relationship on slope, the establishment of terraces will go a long way to reduce soil erosion on sloping surfaces. Terracing advocated here presupposes the stepping of sloping surfaces of Bamenda to provide slots of level surfaces. The level slots would reduce runoff and consequently the material that is eroded facilitates infiltration and permits a good reconstitution of soil nutrient that would result in increased yields.

In order to ensure the success of this method, the progressive ridge terracing in permanent cultivation system should be adopted because other system realize with the use of stones to erect embankments like in the Tingo area are very costly, painstaking, and difficult to be widely adapted.

The bonds between the low and high terraces should be reinforced with hedgerow species such as *Calliandra*, *Podocarpus*, *Polyscias* through potted seedlings, *Crassocephalum*, *Tephrosia* and *Crotolaria* propagated through casting. On each developing stair-case that would be well developed, the farmer will then cultivate crops. The farmer should till the soil into the ridges and furrows depending on seasons. This would facilitate infiltration and permit gradual percolation of water to the water table. The main bonds would capture sediments while acting as speed break to run off. The base of each segment is raised and this will stabilize the soil.

6.4.3 Vegetative Methods to Curb Soil Erosion

Vegetative methods entail the inclusion of trees, shrubs and herbs in the agricultural systems of Bamenda. The tree species propose by the agricultural and environmental delegations are *Calliandra*, *Trepheosia*, *Leuceunna* and *Sesbania*. They are considered as bio-fertilizing species because the litter resulting from them is rich in nitrogen. This nitrogen is an important element in plant growth. According to an informant, this technique derives its merit from the point of view that it is ecologically important, economically viable, socially just, and adapted in nature. This soil improvement technology used is known as agro-forestry.

Agro-forestry is a practice of cultivating crops and integrating trees at the same time on the same plot. It was only in 1970 that this practice gained scientific recognition (*Kammogne 1995*). For agro-forestry to be an effective method of curbing soil erosion and at the same time increasing the fertility of the soil, the area and its characteristic should be known and the tree species characteristic needs to be mastered. The farmer's need, preferences, taste and farming habits should be taken into consideration.

Including tree culture into farms would be of importance in many dimensions to the degraded land of Bamenda. The integrated trees would help protect the soil surface and check the removal of the soil surface particles in many ways. This includes the provision of leaves cover which takes the brunt of heavy rainfall thereby checking its capacity to loosen and remove soil particles. Vegetation also helps to prevent the soil surface from becoming battered and clogged by heavy rain through its roots and stems that penetrate the soil. Vegetation carries surface moisture into the ground and allows it to percolate gradually but deeply. More so the wide spreading and deeply penetrating nature of plant roots help to bind the soil particles together and hold the soil in place.

Soil fertility improvement trees are planted in farms to increase crop yields in Bamenda. They include *Tephrosia*, *Calliandra* and *Scrotin*. *Tephrosia* enriches the soil with nitrogen needed by crops and leaves of *Scrotin* trees are very rich in soil nutrients and enrich the soil when they fall off from the trees. The *Scrotin* trees in the farm can also be used as wind breaks thereby protecting crops.

6.5 Environmental Conservation Education, Campaign and Awareness Raising

6.5.1 The Use of the Print Media

The techniques of using newspapers and tracts in educating farmers and the general public is an adequate one. The landscape conservation bodies educate the people through newspapers such as the "Farmers voice" (which is becoming more and more popular in the area), the chronicles, Cameroon tribune, the post, the herald which are highly appreciated in the area.

The printing and distribution of pamphlets, charts, and which carry information on environmental conservation is also suggested. It is true that the "farmers voice" operate almost as propose above but their objective is purely commercial, which makes it difficult for a poor farmer to sacrifice his little finances to purchase regularly the different journals they produce. It would have been preferable for different actors to subsidize this newspaper which is capturing without relentless the attention of farmers in Bamenda. By so doing poor agricultural practices that are not compatible with the environment can gradually be reduced.

6.5.2 Education of Farmers through the Radio and Television

TFF & Foundation Radio (100 FM) is a radio station in Bamenda. With its slogan "Giving Voice to the Voiceless" through their famous program Foundation for Environment and Development. The programs motto is "Accessible and Affordable Justice for Man and Nature". The program has changed the agricultural practices of some farmers in Bamenda. The added impetus of the program is the use of Pidgin English in the diffusion of information which is understood by more than 70% of the dwellers of Bamenda.

As concerns television stations, the local "Afrique novel" has environmental educative programs which are complemented by those of the CRTV. But many dwellers in Bamenda are hardly interested in such programs as they prefer films and series.

6.5.3 Capacity Building

In an attempt to render landscape mitigation practices more serious and sustainable, diffusion of such knowledge should start from primary schools. In the same line, it should be acknowledge that the ministry of basic

education has included environmental studies in their program for some years now but the only problem lies in the fact that it is not taught with the same zeal like other subjects or again there are certain schools especially the private schools who have not yet integrated such subjects in their programs. If this strategy introduced by the ministry is well managed, the next generation of farmers will be very conscious of landscape degradation.

Seminars, workshops and fora should be multiplied in Bamenda as this will raise awareness and permit a careful assessment or evaluation of the state of environmental crisis and possible action plan to be pursued. In such seminars, emphasis should be laid on the collaboration between government, NGO's, and farmers as their interplay would sort lasting solutions. Preference should equally be given to women since it is realized that they form a majority of the farming population. According to Adhikari et al [33] women typically make a wider use of products than men and thus have a greater interest in sustaining the diversity of forest.

An example of the above recommendation is the regional consultation and planning seminar on environment for the North West which took place in Bamenda from April 25-30th 1994. This seminar was jointly organized by the UNDP, GTZ and the then MINEF. The seminar was attended by representative of local farmers, delegation of ministries concern, university lecturers as well as free participants within and outside the country. At the end of the seminar, some strategies were proposed. Such seminars should be multiplied even at the quarter level to permit the message to touch every farmer.

7 Conclusion

This study has addressed the population quest for food security within the urban landscape of Bamenda and how the interplay influences each other. Furthermore, the role of stakeholders and types of agricultural practices within the Bamenda urban landscape has been examined. As can be seen from previous section, agriculture in Bamenda provides an alternative solution and complementary strategy to cope with the problems of rapid population growth, reduces urban unemployment, poverty and food insecurity. Food production in Bamenda is in many cases a response of the urban poor to insufficient, unreliable and irregular access to food, health, income, wellbeing and the low purchasing power in the city. Urban agriculture also improves access to a cheap source of protein and the quality of the food in the households is improved as poor families involved in farming, eat more fresh vegetables produced by themselves in gardens. Although there are positive sites of urban agriculture to reckon with, it could be deduced that if urgent measures are not employed to arrest the continuous surge of Bamenda city population, landscape deterioration will continue to an unprecedented rate and will further constrain agricultural output.

Both past international and domestic measures to ensure sustainable food production and to curtail adverse anthropogenic impacts on the urban landscape, have proven counter-productive. Therefore, a re-awakening of positive mindsets, especially on the sides of Cameroonians as concerns best agricultural practices and state-of-the-art landscape management is needed. Taking in consideration the current economic setbacks, it is recommended that the acquisition of novel approaches in addressing poor urban agriculture strategies and its nefarious impacts on the landscape should be carefully studied and adapted such that it could be reachable to many.

References

- [1] Tinker, I. (1997). *Street foods: Urban food and employment in developing countries*. Oxford University Press.
- [2] BUCREP (Bureau Central des Recensements et des Etudes de Population), (2005). Rapport De Presentation Des Resultats Definitifs - Cameroun. http://www.statistics-cameroon.org/downloads/Rapport_de_presentation_3_RGPH.pdf. (retrieved ; 04/01/2015).
- [3] Lee-Smith, D. (2010). Cities feeding people: an update on urban agriculture in equatorial Africa. *Environment and Urbanization*, 22(2), 483-499.
- [4] Elong P., S0UA Mbo'o N., Gockowski J. (2008) *Agricultures urbaines et périurbaines à Yaoundé : Contribution socio-économique dans les ménages*, IITA-CAMEROUN, B.P. 2008 Messsa-Yaoundé.
- [5] Egziabher, A. G. (1994). *Cities feeding people: an examination of urban agriculture in East Africa*. IDRC.
- [6] Kometa, S. S., & Akoh, N. R. (2012). The Hydro-geomorphological implications of urbanisation in Bamenda, Cameroon. *Journal of Sustainable Development*, 5(6), p64.
- [7] Nyambod, E. M. (2010). Environmental consequences of rapid urbanisation: Bamenda City, Cameroon. *Journal of Environmental Protection*, 1(01), 15.
- [8] Fodouop, K., & Mougoué, B. (1997). Acteurs locaux et gestion politique de l'environnement à Yaoundé (Cameroun). *Pratiques de gestion de l'environnement dans les pays tropicaux*. Bordeaux, DYMSET-CRET, 529-535.
- [9] Mougeot, L. J. (2000). Urban agriculture: definition, presence, potentials and risks. *Growing cities, growing food: Urban agriculture on the policy agenda*, 1-42.
- [10] Nkwemoh, C. (1999). *The impact of agro-pastoral activities in the Mezam-Ngoketunja area*. Ph.d thesis

University of Yaoundé 1, 278p.

- [11] Groening, G. (1996, September). Politics of community gardening in Germany. In *Branching Out: Linking Communities Through Gardening, annual conference of the American Community Gardening Association (ACGA)* (pp. 26-29).
- [12] Ojong, N. (2011). Livelihood strategies in African cities: The case of residents in Bamenda, Cameroon. *African Review of Economics and Finance*, 3(1), 8-25.
- [13] Page, B. (2002). Urban agriculture in Cameroon: an anti-politics machine in the making?. *Geoforum*, 33(1), 41-54.
- [14] Gladwin, C. H. (1992). Gendered impacts of fertilizer subsidy removal programs in Malawi and Cameroon. *Agricultural Economics*, 7(2), 141-153.
- [15] Ngoran, S. D., & XiongZhi, X. (2014). *The Socioeconomic and Environmental Implications of Urban Sprawl on the Coastline of Douala-Cameroon. Options for Integrated Coastal Management*. GRIN Verlag.
- [16] Sunderlin, W. D., & Pokam, J. (2002). Economic Crisis and Forest Cover Change in Cameroon: The Roles of Migration, Crop Diversification, and Gender Division of Labor*. *Economic Development and Cultural Change*, 50(3), 581-606.
- [17] Ojong, N. (2011). Livelihood strategies in African cities: The case of residents in Bamenda, Cameroon. *African Review of Economics and Finance*, 3(1), 8-25.
- [18] Nunberg, B. and Lindauer, D. (1994). "The political economy of civil service pay and employment reform", in Lindauer, D. and Nunberg, B., eds., *Rehabilitating Government*, World Bank, Washington.
- [19] Sunderlin, W. D., Ndoeye, O., Bikié, H., Laporte, N., Mertens, B., & Pokam, J. (2000). Economic crisis, small-scale agriculture, and forest cover change in southern Cameroon. *Environmental Conservation*, 27(03), 284-290.
- [20] Boerner, R. E. (1982). Fire and nutrient cycling in temperate ecosystems. *BioScience*, 32(3), 187-192.
- [21] Lambi, C. M., & Eze, E. B. (2001). *Environmental issues: problems and prospects*. Unique Printers.
- [22] Adesina, F. A. (1989). Plant species characteristics and vegetation dynamics in the tropics. *International Journal of Environmental Studies*, 33(1-2), 67-78.
- [23] Luysaert, S., Schulze, E. D., Börner, A., Knohl, A., Hessenmöller, D., Law, B. E., ... & Grace, J. (2008). Old-growth forests as global carbon sinks. *Nature*, 455(7210), 213-215.
- [24] Jeje, L. K., & Agu, A. N. (1990). Runoff from bounded plots in Alakowe in southwestern Nigeria. *Applied Geography*, 10(1), 63-74.
- [25] Kometa, S. S. (2013). Wetlands Exploitation along the Bafoussam- Bamenda Road Axis of the Western Highlands of Cameroon. *Journal of Human Ecology*, 41(1), 25-32.
- [26] Ndenecho, E. N. (2006). Savannization of tropical Montane cloud forests in the Bamenda Highlands, Cameroon. *Journal of the Cameroon Academy of Sciences*, 5(1), 3-10.
- [27] Bopda, A., Brummett, R., Dury, S., Elong, P., Foto-Menbohan, S., Gockowski, J., ... & Temple, L. (2010). Urban farming systems in Yaoundé—building a mosaic. In *African Urban Harvest* (pp. 39-59). Springer New York.
- [28] Abbot, J. I., Thomas, D. H., Gardner, A. A., Neba, S. E., & Khen, M. W. (2001). Understanding the links between conservation and development in the Bamenda Highlands, Cameroon. *World Development*, 29(7), 1115-1136.
- [29] Lambi, C. M., & Ndenecho, E. N. (2010). *Ecology and natural resource development in the western highlands of Cameroon: issues in natural resource management*. African Books Collective.
- [30] Njoh, A. J. (2011). Municipal councils, international NGOs and citizen participation in public infrastructure development in rural settlements in Cameroon. *Habitat International*, 35(1), 101-110.
- [31] Nkwemoh, C. A. (1999). The Impact of Agro-pastoral Activities on the physical Environment of the Mezam Ngoketunjia Area. *Doctorat de 3eme Cycle thesis in Geography. University of Yaounde I*.
- [32] Doolette, J. B., & Smyle, J. W. (1990). Soil and moisture conservation technologies: review of literature. *World Bank Technical Paper*, (127), 35-69.
- [33] Adhikari, B., Di Falco, S., & Lovett, J. C. (2004). Household characteristics and forest dependency: evidence from common property forest management in Nepal. *Ecological economics*, 48(2), 245-257.

The IISTE is a pioneer in the Open-Access hosting service and academic event management. The aim of the firm is Accelerating Global Knowledge Sharing.

More information about the firm can be found on the homepage:

<http://www.iiste.org>

CALL FOR JOURNAL PAPERS

There are more than 30 peer-reviewed academic journals hosted under the hosting platform.

Prospective authors of journals can find the submission instruction on the following page: <http://www.iiste.org/journals/> All the journals articles are available online to the readers all over the world without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. Paper version of the journals is also available upon request of readers and authors.

MORE RESOURCES

Book publication information: <http://www.iiste.org/book/>

Academic conference: <http://www.iiste.org/conference/upcoming-conferences-call-for-paper/>

IISTE Knowledge Sharing Partners

EBSCO, Index Copernicus, Ulrich's Periodicals Directory, JournalTOCS, PKP Open Archives Harvester, Bielefeld Academic Search Engine, Elektronische Zeitschriftenbibliothek EZB, Open J-Gate, OCLC WorldCat, Universe Digital Library, NewJour, Google Scholar

