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THE UNIVERSITY OF YAOUNDÉ I
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POST GRADUATE SCHOOL FOR THE SOCIAL AND EUDCATIONAL SCIENCES
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CLIMATE CHANGE AND CRISES IN MAIZE PRODUCTION IN MAYO-FOUROU AND TOUKOUROUA IN THE ADAMAWA REGION: CASE OF MAYO-BANYO DIVISION

A thesis submitted in partial fulfillment of the requirements for the award of a Master's Degree in Population and Development and a professional masters in Developmental Project Management

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September 2023

To our parents Mr. Stephen EBAN AKOM and Mrs. Agnes LEGEN OBI.

SUMMARY

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LISTS OF ABBREVIATIONS AND ACRONYMS

1. ABBREVIATIONS

°C	:	Degrees Celsius
CGIA	:	Consultative Group for International Agricultural Research
CIG	:	Common Initiative Group
CO2	:	Carbon Dioxide
COP26	:	*26th conference of the party*
CPF	:	Country Programming Framework
FAO	:	Food and Agriculture Organization
GDP	:	Gross Domestic Product
GHG	:	Green House Gas
GPHC	:	General Population and Housing Census
IPCC	:	International Panel for climate change
NAEP	:	National Agricultural Extension
NCCAP	:	National Climate Change Adaptation Plan
NGO	:	Non Governmental Organization
NPPS	:	National Policy for Plant and Seeds
NPS	:	National Development Strategy
P	:	Page
PCD	:	*Plan Communal de Dèveloppement*
PNACC	:	National Plan for Climate Change Adaptation
PNAFM	:	*Programme national de la filière* maïs
PNEB	:	*projet Nort-Est Benoue*
PNSV	:	P*olitiques National des semances vegetales*
PNVRA	:	*programme national de vulgarisation agricole*
PO'S	:	Peasant Organization
R4D	:	Research for Development
RSDS	:	Rural Sector Development Strategy
SDG	:	Sustainable Development Goals
SND	:	Stratégie *National de* Développement

SSA : Sub-Saharan Africa

U.N : United Nations

UGV : *Union des greniers Villageois*

UNISDR : United Nations International Strategy for Disaster Reduction Secretariat

UNSDCF : United Nation's Sustainable Development Cooperation Framework

2. ACRONYMS

CIG	:	Common Initiative Group
COOP-CASOCAMAD	:	sociètè coopèrative des producteurs de mais de Djamboutou-Gouna
COSOP	:	country strategic opportunities program.
FIDA	:	Fond International de développement agricole
FIT	:	*front inter tropical*
GEF	:	Global Environmental Factory
ICRAF	:	International Center for Research in Agroforestry
IRAD	:	*Institut de recherche agricole pour le developpement*
MFINADER	:	Ministry of Agriculture and Rural Development
MINEF	:	Ministry of Environment and Forests
MINEPAT	:	Ministry of Economy, Planning and Regional Development
NEPAD	:	New Partnership for Africa's Development
PADFA	:	*Projet d'appui au Développement des Filière Agricole*
PADMIR	:	*Projet D'appui au Developpement de la Micro finance Rural*
PAM	:	*Programme alimentaire mondial*
SOWEDA	:	South West Development Authority

LISTS OF ILLUSTRATIONS

1. MAPS

2. PHOTOS

3. TABLES

RESUME

Le changement climatique est devenu une réalité partout dans le monde et le Cameroun n'est pas épargné. Tous les pays mettent en place des mesures pour accroître leur productivité agricole, malgré les effets liés au changement climatique pour sauver leur population de la faim, l'État à mis en œuvre les techniques de production de maïs. Notre problème de recherche «la faible adaptation des producteurs de maïs aux nouvelles techniques de production de maïs dans le Mayo Banyo». Notre objectif principal est «d'expliquer et comprendre les causes du faible processus d'adaptation des producteurs de maïs aux nouvelles techniques de production dans le departement Mayo Banyo». En même temps, notre hypothèse principale est : «expliquer le faible processus d'adaptation des producteurs aux nouvelles techniques de production de maïs par manque de capital matériel et financier ». Nous avons utiliser trois théories: la représentation sociale de Serge Moscovici , la théorie diffusion stratégique d'Everett Mitchell Rogers et de la théorie dynamique de George Balandier. Ces théories nous ont aidées à comprendre les perceptions des agriculteurs sur les nouvelles techniques de production de maïs. L'utilisation de la théorie dynamiste par Georges Balandier a permis de mettre en évidence les différents facteurs internes et externes liés au faible processus d'adaptation des producteurs de maïs aux nouvelles techniques de production. Ces facteurs sont liées à sa « dynamique du dedans et dehors » responsable des changement. De plus, l'utilisation des représentations sociales de Serge Moscovici nous a permis de comprendre pourquoi la plupart des producteurs de maïs sont réticents à adopter de nouvelles techniques de production parce qu'ils ne veulent pas être vu différemment du reste des producteurs de maïs du Mayo-Banyo.Pour S'adapter au changement en tant qu'individu sera considéré comme une forme de manque de respect des normes et valeurs de la communauté entières puisque la conscience individuelle n'est prise en considération que si l'ensemble de la société accepte ces changements. Le fait de ne pas tenir compte de l'acceptation collective dans la décision de changer conduira à un traitement différent du reste de la population agricole de la localité et enfin, la théorie du diffusionnisme stratégique d'Everett Michel Roger a également permis d'analyser les différentes phases nécessaires pour q'une adaptation traverse, pour qu'elle soit complète et acceptable par tous. Dans notre quête d'informations, la méthode de recherche qualitative a été adoptée et des données ont été recueillies par des entretiens avec des producteurs de maïs de la localité de Mayo-Banyo. Au total, vingt-deux personnes ont été interrogées, deux photos ont été prises et un total de cinquante-huit documents consultés. Les résultats ont révélé que malgré les initiatives prises par l'État et d'autres organisations pour mettre à la disposition des agriculteurs de nouvelles techniques de production de maïs, plusieurs défis sont tenus pour responsables de la faible adaptation de ces producteurs de maïs aux nouvelles techniques de production.

Mots clés: Banyo (Adamawa), producteurs, changement climatique, crises de production et maïs

ABSTRACT

Climate change has become a reality all around the world and Cameroon is not exempted. All countries are putting in place measures to increase their agricultural productivity, despite the odds that come with the changing climate to save their population from hunger and starvation, this has prompted the state to improve on techniques of maize production. Our research problem is "*low adaptation of maize producers towards new techniques of maize production in Mayo Banyo*". Our main objective is "*to explain and understand the causes of the low process of adaptation of maize producers to new production techniques in Mayo Banyo Division"* At the same time our main hypothesis is "*we can explain the low adaptation process of producers to new maize production techniques through the lack of material and financial capital".* We went further to use the theories .of Social Representation by Serge Moscovici, Strategic Diffusion by Everett Mitchell Rogers, and The Dynamist Theory of George Balandier. These theories helped us understand farmers' perceptions of new techniques in maize production. The use of the dynamist theory by Georges Balandier made it possible to highlight the different internal and external factors linked to the low adaptation process of maize producers towards new maize production techniques. These factors could be linked to his "*internal and external dynamics*" responsible for change In addition, we made use of Serge Moscovici's social representations. This theory made it possible for us to understand why most maize producers are reluctant to adopt their maize to new production techniques because they do not want to be seen differently from the rest of the maize producers in Mayo-Banyo. Adapting to change as an individual will be regarded as a form of disrespect to the norms and values of that society since individual consciousness is not taken into consideration unless the entire society accepts and adopt these changes. Failure to consider collective acceptance in the decision to change will lead to a different treatment from the rest of the farmers' population in the locality finally, the strategic diffusionism theory by Everett Michel Roger also made it possible to analyze the different phases needed for an adaptation to pass through so that it becomes complete and acceptable to all. In our quest to obtain information, a qualitative research method was adopted and data was collected through interviews with maize producers in the Division, as a result, a total of twenty-two individuals were interviewed, two pictures were taken and a total of fifty-eight documents were consulted. Findings revealed that despite the initiatives taken by the state and other organizations to make available new techniques of maize production to farmers, several challenges are held responsible for the low adaptation of these maize producers to new techniques of production. More so through our fieldwork, we could observe that the people of Mayo-fourou ad Toukouroua are very conservative regarding the norms and values of their community for example from their culture women are not allowed to speak to strangers in the absence of their husbands and this was shown in their reaction as they ran into their houses as we approached them for questioning in regards to our research.

Key Words: Banyo Banyo, Producers, Climate Change, Crises in Production, and maize.

GENERAL INTRODUCTION

I. CONTEXT AND JUSTIFICATION OF THE CHOICE OF QUESTION

The purpose for providing a context and justification in our research paper is to establish the relevance and significant of our study. It helps other readers understand the purpose of our research and why it should be taken seriously. The following paragraphs will be broken into context and justification

I.1. CONTEXT OF THE STUDY

The choice of our research paper came about from two distinct situations that piqued our curiosity, Firstly, after watching the news on television where children in the north suffered from malnutrition caused by destruction of crops, this piqued our interest and pushed our curiosity to know more about impacts of climate change on crops and the lives of those living in those areas, so we looked for oriented documents, articles, and websites that could guide our ideas on the topic, while in those documents and websites, we searched questions on how the key words of climate change and agriculture could be used to form a good research topic. After having a clear idea of what we wanted to work on, we coined a research topic. Also, after witnessing the rapid increase in the prices of maize when we returned to Ngaoundere, in 2015, where we had lived for about 5 year and a bowl of maize was sold for 150frs, we ate and enjoyed maize in all its forms. Things were different in that the prices had increased rapidly to the point where a bowl of maize flower was sold for 500, in our quest to understand why such an increase in prices most sellers complained that their crops did not do well and that they were destroyed by heavy rains, apart from that the little crops that survived were quickly bought by those that exported to Nigeria leading to the shortage we had in the market.

We chose this research area after living and carrying out participant observation on farming in the area and also after we watched on Cameroon Radio and Television(CRTV) news how plants had been destroyed because of heavy rains causing the scarcity of maize in the division which had far-reaching consequences on both the young and old

I.2 JUSTIFICATION OF THE CHOICE OF SUBJECT

The problem of climate change and food production has always been a pull factor for us. As we like to specialize in environmental sociology generally and in the domain of climate change.

Environmental sociology can be defined as the study of interactions between societies and their natural environment. This field emphasizes social factors that influence environmental resource management and cause environmental issues. This topic deals with issues such as; deforestation, biodiversity loss, natural resource degradation, air and water pollution, and ecosystem collapse. This study will contribute to enhancing farmers' responses to climate change and enhancing food production in other to achieve economic autonomy and development.

We chose this research area because of the following reasons;

To begin with, Mayo-Banyo sub-division was chosen because after a brief stay in Banyo sub-division precisely in the villages of Mayo-Fourou and Toukouroua, we observed that many farmers did not produce maize in large quantities although it is their staple meal and despite the efforts put in place by the state and other stake holders to get farmers to increase their production. This pushed our curiosity to understand the courses behind these low production in the sub-division.

- **Finances**; we will be provided with the necessary finances needed to carry out the research with ease.
- **Accessibility**; the area is quite accessible there by making movements from one area to another easy.
- There are not many specialists in the domain of climate change and agriculture at the University of Yaounde I. The research will grant us the ability to be called a specialist in the domain, thereby increasing the number of personnel in the area of expertise.
- This research will also serve as a point of reference for other students seeking to specialize in the domain.

II. RESEARCH PROBLEM

The agricultural sector is important in the Cameroon economy, not only because it brings in foreign income through exports but because it greatly contributes to the state budget and employs a great number of its active population. In a report published by the ministry of environment and forestry it says MINEF (2001:34)

> *Agriculture remains the backbone of the Cameroonian economy and the agricultural sector employs nearly 68% of the active population. At the beginning of the year the*

1980s, the agricultural sector contributed nearly 30% of the Gross Domestic Product (GDP), generating more than a third of foreign exchange earnings and approximately 15% of the budgetary resources. It ensured food security and played a driving role in the national economy with a knock-on effect on other economic sectors.

However, the production process in the agricultural sector has seen a fall since the 80s (MINEF 2001) with the increase in climatic changes caused by human activities. This devastating situation has been felt by local farmers of May-Banyo who could produce more maize than present leading to huger in the locality. Therefor to ameliorate the productive conditions of these farmers, cooperatives such as (COOP-CA SOCOMAD)[1] have been working with farmers, carrying out sensitization on the impacts of climate change and also donating working equipment to the local farmers to encourage them to boost their production.

On the national level, the Cameroonian government has implemented programs and projects such as (COSOP[2], IRAD[3], PNACC[4], and ICRAF[5]). These programs and projects helped in the amelioration of farming conditions and seedlings used as Cameroon established a seed law in 2001 related to seed production and marketing and 2005, the country established the National seed Council (NSC) through a decree which sought to promote and stimulate the development of a dependable seed industry.

In addition to national organizations in charge of improving food availability, the government has partnered with some international organizations such as (FAO[6], WFP[7], and IFAD[8]) whose aim is to accompany local farmers in achieving food security. And also, the government has taken part in projects that have increased maize production over the national territory these projects include the *Program National de la Filière maïs* (PNAFM)[9]. This program trained about 280 maize producers and also financed 268 micro projects in seedlings in 2010. Apart from this project, the government had a variety of other projects such as GRASS FIELD and

[1](COOP-CA SOCOMAD) Sociètè cooperative des producteurs de mais e Djamboutou-Gouna.
[2] (COSOP) Country Strategic opportunities Program.
[3] (IRAD) Institute for Agricultural Research for Development.
[4] (PNACC)) National Adaptation Plan for Climate Change.
[5] (ICRAF) World Agroforestry Center.
[6] (FAO)Food and Agriculture Organization.
[7] (WFP) World Food Program.
[8] (IFAD) International Fund for Agricultural Development.
[9] (PNAFM) Program national de la filiere mais

SOWEDA[10] which distributed about 45 tons of seedlings. Without forgetting the ministry of Agriculture and Rural Development distributed 12 tons of maize seedlings and 503 liters of insecticides.

However, despite the adoption and ratification of these texts and government initiatives, the problem of maize production in Mayo-Banyo division persists because the farmers are unable to adapt to these government initiatives. The latter do not integrate the strategies of production of maize as recommended by the state in their daily life. Maize cultivation in Mayo Banyo division which was usually done from May to April has witnessed a shift in the calendar as there has been an upheaval in the agricultural calendar which affects cultivation, caused by unstable weather conditions. Coupled with the fact that most of the seeds used by farmers are seeds from the previous harvest which are kept for the new planting season. However now, there exist improved seedlings proposed by the Ministry of Agriculture and Rural Development through the initiatives and programs listed above. This situation causes a continued fall in the production of maize in the area. We expect to see changes in the techniques of production after all the steps taken by the Cameroonian government to help local farmers adapt their production to the changes caused by climate change, to ameliorate their productive capacity and life style, but yet local Famers of Mayo-Banyo still have difficulties adapting to these new techniques of maize production.

This work, therefore, possess the problem of low adaptation of maize producers towards new techniques of maize production in Mayo Banyo.

III. PROBLEMATIC

A literature review is defined as a summary of books, articles, theses, and other relevant sources to a particular issue and area of research. By so doing provides a descriptive, summary, and critical evaluation of these works concerning the research topic. Given that one is not the first to have worked on a topic, it becomes imperative to understand what has been said by others in other to bring out its strengths and identify its weaknesses to feel in the gap and contribute to the stock of knowledge. According to Raymond QUIVY and LUC VAN CAMPENHOUDT affirm: that problematic is an approach or the theoretical perspective that one decides to bring to deal with the problem posed by the research question, it is a way of questioning the phenomena studied, to

[10] (SOWEDA) South West Development Authority

build a problematic, and answering the question of how the researcher is going to approach this phenomenon (1995, pp85-86).

Studies carried out on the impacts of climate change and agricultural production would b be classified under two main themes in our research, authors whose focus points constitute the courses and resilience of climate change and those whose focal points are the effect of climate change on crop production.

III.1. COURSES AND RESILIENCE OF CLIMATE CHANGE

Firstly Clodine, Lotsmart and Ambe (2021) present an environmental approach to climate change on food security not only in Cameroon but in all Sub-Saharan African (SSA) countries. As they depend on rain fall and precipitation to produce food that is mainly for immediate consumption or basically for the local market. The limited adaptability of small farmers turns to affect the level of food security" *Small-scale farmers who depend on rain-fed agriculture are central to Agriculture and food security (....) yet these farmers may be well equipped to respond to climate shocks* (9-10)". Although Cameroun is regarded as a resource-rich country, it faces the problem of food insecurity because little is being done in the agricultural domain to improve the situation of Farmers. As the government support to farmers is either grossly inadequate or in some contexts monopolized by a corrupt government representative. This condition has seen a detrimental situation in Cameroon as about (3.9 million or 16%) of the population is facing moderate to sincere food insecurity. This paper aims to examine how the climate change vulnerability of this important group impacts food security. Most SSA counties including Cameroon are faced with the vicious cycle of poverty, low productivity, and vulnerability and have the responsibility to feed the increasing population. Therefore, the ability to achieve food security in SSA counties largely depends on the ability to solve present and future challenges. From the above literature, it is observed that most SSA countries are the most affected by Climate change, this condition should push government authorities to provide adequate conditions for small-scale farmers to increase productivity. This can be done through effective follow-up of Agricultural projects making sure resources reach the people in need.

Furthermore Kumar Arora (2019). presents a geographical approach to climate change on plants and animals, where she emphasizes that these changes are due to anthropogenic activities

(agriculture and industrial activities) this has gone a long way to reshape the ecosystem an is still coursing so much damage around the globe. With regards to the topic under study," Agricultural production of maize and climate change" she advocates that anthropogenic activities have led to a rise in temperature for the past one hundred years to 0.9℃ and an increase in greenhouse gas emission (G.H.G)will lead to a rapid increase by 1.5℃ by 2050 or even more. Arora lays emphasize that this temperature rise is coursed by deforestation which goes a long way to affect the soil, water bodies, air, and human being in general. Concerning these changes in the climatic condition, there will be a prevalence of droughts, floods, irregular patterns of precipitation, heat waves, and other extreme happenings round the globe. The World Food Program 2018 (W.F.P) in Arora 2019 reveals that the increase in crop yield per hectare has significantly dropped as compared to the rate of increase in population "*as per food and agricultural organization (FAO) data published in 2016 if the current situation of GHG emissions and climate change continue, then by 20100, there will be a decline in cereal crops 20-45% in maize yield, 5-50% in wheat and 20-30% in rise*" The rise in world hunger is constantly increasing since 2014 and an increment in the number of undernourished people which has been observed. Over 804 million in 2016 to 824 million in 2017, hence climate change and agriculture are strongly co-related Arora goes father to explain that the demand for food will increase due to the growing population. While lands will lose their fertility due to excess exploitation and causing an increase in deforestation as a result of increased farming land. This deforestation will cause an increase in CO2 because the trees which served as protection have been destroyed "climate *change is resulting into a very high rate of land degradation enhancing desertification and nutrient efficient soils (page 1)"*. She goes further to produce ample evidence from the global assessment of land degradation and improvement. *(GALDI) "A quarter of land area around the world can now be marked degraded. Land degradation is supposed to influence the lives of 1.5 million people and 15 billion tons of fertile land is lost every year due to anthropogenic activities and climate change***.** Page 1**".** Arora limits herself to the disadvantages of an increase in population. Nonetheless, an increase in population means an increase in the labor force which is a catalyst for development. And with technological advancement, infertile lands can gain rapid fertility and be able to produce good crops which take a shorter time to mature. The crops have witnessed technological improvements where seedlings do not take much time to grow and process the ability to grow throughout various seasons (hot and cold

Rob D. Vanden Berg (*2*017) provides an environmental approach to climate change and Agriculture. In the first instance, Vanden Berg brings out the difference that exists between the adaptation and mitigation approaches. Adaptation concerns how the social and economic domains are "ready" for change. Ready in the sense that both the economic and social spheres of life are there to adjust to suit the environmental aspect through a series of actions. On the other hand, he considers mitigation as focusing on one society and the economy using natural resources to make the environment sustainable. Most of the time, societies turn to focus more on mitigation with the hope that it will curve the rapid climate change. None the less, all approaches "ultimately require actions that transform the interaction between the social, economic and environmental domain" (Vanden Berg 2017. P. 24). Vanden Berg calls for a widespread agreement where there is a transfer of technological knowledge in the domain of the production previews of the private sector to the government sector. This will help counties attain their developmental objective through the use of renewable energy or transforming current equipment or technologies into something cleaner and more climate-smart. Since 1991 the GEF (Global Environmental Facility) has been at work through the process of "facilitating technology transfer to support developing countries through know-how, goods, and services, equipment as week as organizational and managerial procedures" (Vanden Berg 2017.p.27). Also, there are two types of variables that are used to measure land productivity and they include water availability and the dummy for acids. That is in areas where there are abundant available water certain crops might do well, on the other hand, there is increased acidity in the soil usually because of dryness then even certain crops such as soybeans that don't need so much water to do well will be affected. From the above literature, Vanden Berg calls for an adoption policy instead of a mitigation policy. This work is bringing a new means where farmers can effectively adapt their crops through subsided technological transfer from the government to local farmers to help them effectively fight the adverse effects of climate change and also through the knowledge gotten from the technical improvement and adaptation the various soil types can be studied in-depth to determine the types of crops that can be planted on a particular soil, and if the crops planted will be able to resist different whether conditions

More, Gabrielle Roech-McNally (2016*)* presents an Anthropological approach to climate on Agriculture. That is the relationship that exists between food security and social stability. This paper aims to answer the question of how farmers accept the management of soil resources to sustain their farming operations and adapt to weather-related risks. McNally tells us

that climate change is not limited to a particular country as even the U.S. is greatly affected by these changes, particularly in the Corn Belt which experiences soil loss through wind and water erosion and other environmental externalities. Further McNally talks about the level of research on how farmers will respond to climate and how adaptive measures can be done. According to him if more research is done on this trivial matter, there will be a steady increase in production on the other hand if nothing is done then the existing conditions will be worsened. The corn Belt in the U.S. is an important productive agro ecosystem" *which produces over a third of the global supply of corn commodities primarily used for life stock feed. (Page2*)". After evaluating the impacts of climate change on crop production in the Corn Belt, he calls on farmers to adapt their farm systems to the effects of climate change as a means of building greater resistance. McNally proposed means by which this adoption can be made possible that managing healthy soil often requires the adaptation of best management practices that farmers could change their production practices to respond to the changing climate which includes no-till farming, cover crops, and sub-surface tile drainage. Firstly, no-till farming crops and cover crops could greatly ameliorate water quantity and prevent erosion by mitigating nutrients leaching and reducing wing and water erosion while sub-surface tile is an effective way to drain excess water and boost productivity. Ad statistics show that in 2012, only 30% of crop land in the U.S. Corn Belt was making use of no-till farming and 3% of cover crops. This cropping method could be adopted by farmers of the Corn Belt in the U.S. A. (NASS 2014).

None the less farmers with high confidence that their current Agricultural practice and strategies were sufficient to reduce weather-related risks were less willing to change their farming method. Hence, he presents the difficult change in mentality for farmers who have been carrying the same strategic production over long periods of years. It is important to note that healthy resources are critical for productive agricultural systems and poor soul management carries a social cost. With the increase in the prices of corn and soybean commodities across the U.S. Corn Belt, such as corn-based ethanol has led to an extension of Farming land into marginal land leading to the destruction of the ecosystems. This land encroachment has also led to an increase in soil erosion in the Corn Belt in the U.S. Although McNally made mention of possible adaptation measures by farmers and looked at the focus of these theses as one which focuses on the interrelationship between food security and climate-smart environment, man is at the center of these work should have been put in place in terms of sensitization of Farmers tell them how important it is to adapt

their agriculture to suit a climate-smart environment. This was not the case rather a simple presentation was said but no indebt convincing was made possible that is why to date though there is increased awareness of the effects of climate change not much adaptation has been made especially by farmers to alleviate the far-reaching consequences of climate change

Further Jemma Gornal et al. (*2010), presents* climate change and agriculture from the 18th century and that of the 21st century. Bringing out the direct and indirect consequences of climate change on agricultural productivity. In what concerns the topic under study, Jemma et al provide an evident assessment of the impacts of climate change on agriculture as being focused on a time horizon that is towards the end of the twenty-first century, Jemma et al illustrate these impacts of climate change on food based on anthropogenic activities (farming. Industries and development). He goes father to call our attention to the issue of climate change over the next few decades, in other to do so, Gornal at al group the impacts of climate change into two that is: the direct impact of climate change on agriculture. Here, he shows that crops planted in areas greatly depend on the climate type present in that zone, as such in case of new changes in climatic conditions then the farmers will need to adjust to these new changes in other to maintain productivity. an increase in seasonal temperature can bring forward the harvest time of current varieties of many crops (Germal et l 2010). In situations of extreme heat, crops can drastically reduce yield "*crops responses to changes in growing condition can be subjected to stress factors that affect their growth developments and eventual yield (page 5)*".this simply implies that the crop physiological processes related to its growth such as photosynthesis and respiration continuously depend on temperature. An example of a crop that can experience poor growth is groundnut which is grown in semi-arid regions which usually experience a temperature of 40℃, if after flowering the plants are exposed to temperatures exceeding 40℃ even for a short period, and yields can be drastically reduced (Vera Prasad et al 2003) in Jemma Gornal et al 2010) while maize reduces pollen in temperatures above 36℃.

Jemma et al (2010) did not limit themselves only to temperatures as they consider heavy rain fall as factures to crop reduction. Here in case of heavy rainfall will likely lead to flooding which can wipe out the entire crop wide are4as and excess water can lead to soil water logging which is a process where the soil gets too wet that there is insufficient oxygen in the soil for plants' roots to be able adequately to respire as such, lead to a reduction in plant growth. In a study carried

out by Kettlewel et al 1999 in Jemma 200, studies carried out showed that heavy rainfall in August was linked to lower grain quality and also fungal disease infection of the grains there by leading to a lesser quality of grains produced. For the indirect impact of climate change on agricultural production, Jemma Gornal et al brought forward pests and diseases. An increase in anthropogenic carbon dioxide (CO2) will lead to an increase in pests such as Aphids and weevil larvae hence affecting the crops produced annually. Apart from pests and diseases, Jemma Gornal et al present carbon dioxide fertilization as another factor that indirectly affects agricultural production. As an increase in CO2 can also affect plants' physiological process of photosynthesis and transpiration. Estimates suggest that increasing atmospheric CO2 could increase photosynthesis in crops by nearly 40% crops such as maize, millet, sorghum and sugarcane will benefit from the increase in CO2, on the other hand in case of a reduction in CO2 emission the positive effects of its fertilization will be felt on crop yields than its effects on climate change. Jemma Gornal et at spoke of the direct and indirect impacts of climate change on crops and how producers need to adapt to these changes but did not give clear measures these producers could use in adapting their productions to the various changes. For instance, in cases where pestles serve as a hindrance to good production, insecticides are available to remedy the situation. And also in cased where soil absorbs much water leading to a loss in oxygen for plants, other plants can be grown to absorb the excess water leaving just the eight quantity for plants.

III.2. EFFECTS OF CLIMATE CHANGE ON CROP PRODUCTION

To add, the author Japneet Kaur (2017), presents an agricultural approach to the topic of Agricultural Productivity and climate change. Agriculture is a fundamental part of the Indian economy capturing about 14% of the GDP and a source of employment for the population, even though India has been known for its steady development ratio, it still faces the problem of poverty as most studies on the agricultural sector of the economy does not contain real facts. That is so because all studies that have been carried out are rudimentary and indebt findings are done in foreign countries like the U.S.A and simply adapted in India. As such most predictions in the sector do not give the real impacts of climate change on Agriculture leading to a fictive analysis because the means of production of both countries differ, that is in, developing and developed countries. Studies carried out by Aggarwal (2009) showed that if there was an increase in temperature by 1% then crops such as wheat, soybeans, mustard, groundnuts, and potatoes can witness a decrease.

With such a review, if there is an increase in temperature to 2.5 degrees or 4.9 degrees then by the year 2099 there would be a 10-40% destruction of these crops. Japneet also says that in recent years India has been plagued with so many natural disasters including drought, floods, heat waves, and cyclones (Goswami et al 2006) Japneet (2017) causing a fall in the productivity of food grains aggravating the vulnerability of small farm owners. Leading to food insecurity and poverty. India witnessed more than 4 million tone loss in wheat due to an increase in temperature from 3-6 ℃ in March 2014. There had been a similar situation in 2002 when drought destroyed more than 10% of the total food produced. According to Japneet though many studies say that global warming is not only a consequence of human activities and industrial waste but could also be a result of rice production and animal waste coming from agriculture as it holds about 65% of CH4 emission. He goes ahead to say that although weather conditions affect crop productivity to a considerable extent, soil fertility, varieties of seeds, pests and disease are some of the other factors that are dependent on climate variation as such any rise in temperature will lead to a favorable breading space for pests' multiplication. India accounts for 17% of the world's population and is the second most populated country in the world, a large section of the Indian population is unable to get adequate calories a day and so is undernourished. Given that more than 60%, of the population, is dependent on the primary sector for living this, means that the livelihood of a large number of rural and urban house hold stands in danger in case of continuous change in the climate.Japneet states the problem of poor data collection to determine the exact effect of climate change on the nation's agricultural sector because most studies are being conducted abroad and findings are being adopted in India therefore India could improve on its technology as a means to get a correct impact of climate change on its agricultural sectors then it will be able to adopt solutions that are suitable for its context rather than those which are not suitable for his environment. With this, there will be a reduction in biological fertilizer, adaptive mix cropping systems and the ability to effectively manage water during rain falls to fight drought. This will go a long way to mitigate the adverse effect of climate change on the Agricultural sector and result in the problem of poverty as an average farmer will be able to produce more.

More so, Amidu Issaharu Zakaria (2014), Provides an economical approach to Climate change in Ghana's economy. He identity's agriculture as one of the key sectors where appropriate climate change policies can help improve livelihood Climate change policy discussions turn to focus more on mitigation rather than adaptation mean while the mitigation measures are to a larger

extent the obligation of developing countries. The government is therefore on the call of pursuing its primary objective of assisting farming households to adapt efficiently to the diverse effects of climate change (Sapong and Anyidola (2012). This study shed more light on the need to adapt measures and policies that will enhance farm-level adaptation. Meanwhile, the objective of this study is to assess the impact of climate change on the Ghanaian economy and poverty level through its impacts on agricultural productivity taking into account the role of autonomous adaptation by farmers. Zakaria therefor presents five crops including maize, cassava, soybeans rice, and yam that are greatly affected in Ghana due to climate changes. Concerning different models (the biophysical crop simulation model and past crop forecast model). Zakaria goes ahead to show us how these crops are affected in the field with different climates and CO2 levels. Concerning the biophysical crop simulation model, crops can be more accurately predictable than past crop forecast models. The biophysical model is also widely used to estimate the impact of climate change on crop yield as the analysis was carried out by (Parry et al 1999) on crops including wheat, maize, soybeans, and rice yields during the 21st century and it was found that climate change will have far-reaching consequences on these crops in India and Nigeria from the 1990s to 2020. Apart from the biophysical model Zakaria also mentioned the regressive analysis which is the use of statistics to quantify the influence of climate change on Agricultural Productivity. This model is based on the time factor that is it allows the quantification of the past effects of one factor (climate variation) hence allowing a prediction to be made in the future concerning the impacts of climate change on Agriculture. He urges the government to put more effort into helping farmers through innovation (working materials, subsidies, corporations, etc.) to effectively adapt to these climate changes in other to increase production. Although Zakaria made mention of a well-elaborated study using different models to access the impact of climate change on Ghana's Agriculture, these models did not elaborate on how farmers could on their part adopt new farming practices that could improve their production and provide smart climatic conditions.

To add, Elodie Blanc (2011), presents an extensional approach to the research topic as it looks at the four major crops produced in Sub-Saharan Africa (SSA) these crops include Cassava, maize, millet, and sorghum. Elodie's aim of the study is to estimate both crop productivity and supply response to weather by using two distinct scenarios that study the impact of climate change on crops. The first scenario is the uniform scenario where there is an identical temperature in all regions and the General circulation model (GCM), which regroups a variety of scenarios. They

look at the effects of forcing agents such as house gases (GHG) to estimate possible future changes in climatic conditions. In other to further assess the impact of climate change on Agriculture, Elodie talks of (the crop growth model and the regressive analysis). In the crop growth model, quantity is used to identify the response of crops to climate change study focusing on the USA Adams et al (1990) apply the crop growth model simulating rainfall conditions. Their finding shows that by 2050 maize yields are likely to increase by 49%) which predicts an average increase of 4.32℃ and 0.2mm of rainfall per day over the country. However under hotter and drier conditions) where temperatures are expected to increase by 5.09℃ and precipitation by 0.09mm per day maize yields are expected to decrease by 20%. This is advantageous because data collected is daily and as such crops can easily be monitored under different soil characteristics. Elodie also talks of the Research for Development (R4D) which is a set of applied research approaches that aims to directly contribute towards achieving international development targets through innovation, in this, there is a wide range of understanding of the concept.

The Consultative Group for International Agricultural Research (CGIAR) was founded in 1971 as a response to address global hunger in India, Pakistan, and other south Asian Countries. The adoption of improved agricultural practices and technologies developed by the CGIAR including high-yielding rice and wheat varieties, fertilizers, pesticides, and irrigation has proven to be a powerful instrument of the green revolution in fighting hunger in that part of the world. However, agriculture R4D has not realized its full potential since the world food system continues to face challenges of persistent food insecurity and rural poverty in many parts of the developing world. The adaptation of improved agricultural techniques and practices by farmers has often been less than expected when considering their demonstrated benefits. Many studies show that scientifically proven techniques alone are not the only key to getting impacts, if technology gets adapted, it is often not so much because of quality and suitability but because of good social management and implementation processes (Hartmann and Linn 2008). New challenges like population growth and climate change are adding complexity to the mission of the CGIAR and R4D.

In addition, in the work by Ernest L Molua (2008). Agriculture is the mainstay of the Cameroon economy, as Ernest Molua provides an economic view of climate change and its effects on Agriculture. About 45% of the Cameroonian gross domestic product (G.D.P) originates from

agriculture, *with close to 80% of the labor force employed in this sector. Agriculture is often limited by seasonality and magnitude of moisture availability*(Molua 2006) production is characterized by a low level of inputs used and many farmers are unable to provide modern inputs (quality seed stock, fertilizer, and pesticides). According to Ernest, the distribution of the impacts of climate change on Cameroon's economy has far-reaching consequences while traditional technology such as multiple cropping and terracing act to buffer the system against climate variability, conserve soil fertility and sustain yields (Molua 2005). Irrigation is an important buffer against climate variability and change. However, Molua says Cameroon's croplands are sparsely irrigated (the supply of water to land or crops to help growth typically utilizing channels), irrigation being done mostly in the drier north that produces 30% of the animal crop production (Molua 2003). He further suggests that forecasts on agricultural climate should be made available and possible through studies of the economy and local production as it will serve as guides to decision-makers on how to better make laws that will boost the economy.

The process of forecast does not limit itself only to agriculture, as the process will also serve as a guide to both business men and the government to know the kind of investments to undertake and its potential risks with regards to climate senility. For example, long-term investments such as plants and animal breading programs, building, and establishing perennial crops and forest plantations, and purchasing and selling lands for building major infrastructures such as dams and water distribution systems, and transport facilities are long-term investment possibilities by the government and private individuals. Molua, therefore, brings an economic view of climate change on agriculture and serves as a guide for investments. According to IPCC projection (1998), equatorial countries, for example, Cameroon, Uganda, and Kenya may be about 1.4℃ warmer by 2050, a rate of warming of about 0.2℃ per decade. This condition may not be favorable for most agricultural products as Molua says "the *diagrammatic observation reveals a possible relationship between rainfall and agricultural sector performance in Cameroon page (5)*". Meaning that if the rains witness a delay or are the irregular yield of most crops in Cameroon will be affected. This has led to farmers' adaptation measures which include mix farming and also including livestock while others have engaged in non-farming activities such as (craft and trade). Enhancing the responsiveness of the agricultural sector to forecast production variations and possible food crises. Farms programs must be instituted to encourage farmers to use adaptive farm Management strategies to respond to changing climate. Molua says that these climate changes will

affect more agricultural-dependent countries such as Cameroon and the reason why he is creating awareness on this sensitive issue is to make the best use of climate as a resource for agricultural enhancement, the capability to respond to variation a change. This research seeks to bridge the gap that exists between government and private investments and climate change in a bit to solve the problem of wrong investment by the government by providing adaptive research techniques that will determine the most favorable environments to invest in by incorporating climate change considerations into agricultural development plans. His limits come from the fact that although he encourages farmers to adapt their agriculture to fight climate change, he does not provide means of how they could adapt, and as such the knowledge is not backed by action and follow-up. Calling on decision-makers to pass laws that will favor agricultural practices is a great thing but bringing evidence on how climate change is affecting the present agricultural environment will not push the decision-makers to improve their conditions

Again, S. Mark et al (2007), presents a dynamic approach to climate change and agriculture. Agriculture and climate change cut across many disciplines such as economics, geography, and environmental sciences showing that one cannot be treated in isolation. Mark et al call for all stakeholders to work hand in hand to effectively develop measures to fight the adverse effects of climate change. Over the years, climate change and its far-reaching consequences have been regarded as individual issues treated with isolation where each stakeholder will not seek the opinion of the other to devise measures to fight against climate change. S Mark et al have come to remind the stakeholders that climate and agriculture are interrelated and should not be treated as separate entities, they call on economists, geographers, and environmentalists to involve all the various disciplines to take collective action to fight against a common problem. The purpose of undertaking agricultural adaptation concerning other disciplines is to effectively manage climate risk over the coming decades as climate changes, this, therefore, implies a common form of joint corporation research carried out now can serve as a source of information to farmers, decision-makers, and the general public. This has a considerable advantage in understanding adaptation strategies over a period which may be short and long-term strategies**.** A significant benefit from adaptation research may be to understand how short-term response strategies may link to long-term options that are to ensure that policies and decisions implemented over the next two to three decades do not undermine the ability to cope with potentially larger impacts later in the century. On the other hand, it becomes difficult to effectively include various disciplines in decision-

making as their diverse views will be hardly accepted by each stakeholder. Thus leading to a great deal of time wasting because each stakeholder will want his or her perspective adopted by the rest and the decisions taken in such instances are sometimes faulty leading to a more damaged climate and a worse situation on the agricultural level.

From the above literature, we could observe that authors such as Clodine, Arora, Vanden Berg, McNally, and Jemma Gornal et al, were interested in the courses and resilience of climate change on man's life while Japneet, Amidu, Elodie, Ernest Molua and S. mark et al were interested in demonstrating the subsequent outcome of climate change on food production to the world. Our work is interested in understanding the weak adaptation of farmers in Banyo towards new techniques of maize production. In other words, we will try to find out why after all that the state has done to improve agricultural practices, Farmers in Banyo still use traditional planting and harvesting of maize.

IV. RESEARCH QUESTIONS

Research questions serve as a foundation for our study and helps us define the scope and objectives of our research. They play a crucial role in shaping our research, provide a clear purpose and focus, guiding us towards meaningful outcomes. Therefore, our research questions will be grouped into three. That is the main question and two secondary questions.

IV.1 Main Question

- How do we understand and explain the low adaptation process of maize producers towards new techniques of production in Mayo-Banyo division?

IV.2. Specific Questions (S.Q)

- (S.Q1) How do farmers in Mayo-Banyo perceive new maize production techniques?
- (S.Q2) What are the dynamics that can explain the low adaptation of maize producers towards new techniques of maize production in Mayo-Banyo division?

IV.3. Main Hypothesis

- We can explain the low adaptation process of producers to new maize production techniques through the lack of material and financial capital.

IV.4. Specific Hypotheses (S.R)

- (S.H1) Agricultural innovations are perceived by farmers in Mayo-Banyo as a form of domination that leads to the loss of socio-cultural landmarks.
- (S.H2) The dynamics that may explain the weak adaptation of maize producers in Mayo-Banyo are both internal

V. Main Objectives

- *To explain and understand the causes of the low process of adaptation of maize producers to new production techniques in Mayo-Banyo Division*

Specific Objectives (S.O)

- (S.O1) To determine or explain the social representations of Mayo-Banyo farmers on new maize production techniques.
- (S.O2) To analyze the dynamics which explain the low adaptation process of maize producers towards new techniques of production in Mayo-Banyo.

VI. METHODOLOGY

Methodology refers to the systematic and organized approach or framework that researchers use to conduct their studies. It encompasses the methods, techniques, procedures and tools that are employed to gather data, analyze information and draw conclusion. In the paragraphs below we are going to be looking at the various theories, data collection tool and method of analysis used in collecting and interpreting data in this research paper.

VI.1. THEORETICAL FRAME WORK OF THE STUDY

A theory can be considered as an assumption or system of assumptions, accepted principles and rules of procedures based on limited information knowledge, devised to analyze,

predict or otherwise explain the nature or behavior of a specifies set of phenomena. It is also defied as an ordered set of assertions about generic behavior or structure assumed to hold throughout a significantly broad range of specific instances (Wacker 1998.p.364). This work makes use of three theories:

VI.1.1. THE THEORY OF SOCIAL REPRESENTATIONS BY SERGE MOSCOVICI

Representation is a transversal and interdisciplinary concept, located in between the psychological and social interface. This makes its definition complex. Many scientists, such as the psychologist Denise JODELET, agree to define representation as "a form of knowledge, socially elaborated and shared, having a practical aim and contributing to the construction of a reality common to a social whole". The study of representations began with renowned sociologists and anthropologists in the 19th century. Social representations were born from the sociological concept of "collective representations" stated by Emile DURKHEIM. He was considered one of the founders of modern sociology. He distinguishes between "collective representations" and "individual representations". For the latter, the "individual conscience" does not have much weight and only exists through the "collective conscience", which imposes itself on individuals from one generation to another, and materializes through legal, economic, moral, and religious operating rules. Then, it was with Serge MOSCOVICI that "the theory of social representations" was truly elaborated through his study of "principles" on psychoanalysis in 1961. Social representations constitute a particular modality of knowledge, generally qualified as "knowledge of common sense", who's specificity lies in the social character of the processes that produce them. They, therefore, cover all the beliefs, knowledge, and opinions that are produced and shared by individuals of the same group, concerning a given social object.

The theory of social representations explains that belonging to a group determines our ways of seeing things. It makes it possible to answer questions related to how individuals and groups develop their vision of the world.

The theory of social representation will allow us to highlight the farmer's perceptions developed around new techniques of maize production in the Banyo sub-division

VI.1.2. STRATEGIC DIFFUSION BY EVERETT MITCHELL ROGERS

The diffusionist approach was developed by Everett Mitchell Rogers. His works focused on traditional anthropology known as diffusionism which was first instigated by an anthropologist by the name of Kroeber Alfred Louis who was interested in the penetration of innovative techniques in the cultural sphere.

The diffusionist model perceives adaptation as a process characterized by many phases, from the first exposure of the use to the innovation to the confirmation or rejection of the adaption. For Everett Rogers, the characteristics of innovation as seen by individuals will determine its level of adoption. Everette Rogers characterizes five determinants of the adoption of a new technique:

Its relative advantage, its compatibility with the values of the group it belongs to, its complexity, the testing possibility, and its visibility give five stages including (knowledge, persuasion, decision, putting into practice, and confirmation). The users are also grouped into five categories that are (innovators, the first users, the first majority, the second majority, and the latecomers).

The contribution of this school of thought in our work is that it gives us the possibility to understand farmers' attitudes in the Mayo-Banyo division towards change and innovational technologies such as improved seedling and sensitization on new planting techniques),

VI.1.3. THE DYNAMIST THOERY OF GEORGES BALANDIER

The notion of “dynamic” is conceived as being the opposite of static. Which refers to time and history. Because, a thing is dynamic in the sense that it is subject to change, and that happens over time. Whereas a thing is static when it is located out of time and does not undergo a transformation and is not subject to change.

> *Social dynamics are mainly considered under the aspect of the differences resulting from the future of societies, and not under that of the dynamisms of the dynamics inherent in the systems of differences that constitute them. The two dynamics are not, or are badly, recognized in their characteristics and their relationship.*

Inherited from the Frankfurt School, the dynamist theory of Georges BALANDIER[11] is part of an approach that emphasizes the study of social change. There is indeed confusion and ambiguity since we do not distinguish between the internal and the external in the dynamics. Highlighting the mutations and changes brought about by scientific and technical development has generated another evolutionary vision that opposes functionalist and structuralist theories that prefer to emphasize convergence instead of divergence in the functioning of societies. Thus, neo-evolutionism rejects the philosophy of history as speculation in any ideology of continuous progress. Because each society has its specific course, which leads to the universality of social development. Societies are not linear in historical evolution, there is no continuity and monotonous reproduction. To this end, BALANDIER considers change to be a permanent state that can be exogenous; that is to say inherent to the internal structure where the strategies of the actors confront each other in an issue where various institutions and multiple structures contradict each other. He calls this first aspect of society "dynamics from within". The change can also be exogenous, that is. Relating to contacts and relations between the company and other companies. In this case, he speaks of: "outside dynamics"[12]. Thus, the social dynamic comes from the contradictions and challenges between different authorities, which leads to mutations. But the result of conflicts and contradictions which is change, resulting in mutations in society in general, is not something obvious and given, but remains to be unmasked and sought to understand behind the appearances of reality. The dynamist theory thus advocates a systematic study of society, which takes into account the different dynamics that clash. In other words, social reality is not a static given, it is the result of a set of internal and external mechanisms that must always be taken into account because:

> *Societies are never what they appear to be or what they claim to be. They are expressed on at least two levels; one superficial, which presents the official structures, and the other deep, which ensures access to the most fundamental real relationships and practices revealing the dynamics of the social system.*

The use of the dynamist theory of BALANDIER will make it possible to explain the endogenous and exogenous causes of the weak adaptation process of maize producers towards new techniques of production put in place in Mayo-Banyo

[11] Georges Balandier, *sens et puissance, les dynamiques sociales.* Paris, PUF,2004
[12] Chapter 1,"*Dynamiques du dedans" et "du dehors"*

VI.2. DATA COLLECTION TOOLS

Data collection tools can be defined as the instruments used in collecting relevant information from respondents, to help have an accurate response to the problem under study, these tools make use of both the quantitative and qualitative methods (Bernard 1994). In the course of our work, we will be making use of qualitative methods of data collection including the semi-direct interview, focus groups, and direct observation**.**

VI.2.1. Data Collection Technique

Data collection technique refer to the methods used to collect and analyze different forms of data. Standard data collection techniques include materials gotten from documentations, interviews and observations.

VI.2.2. Focus Group Discussion

It is a qualitative technique whose goal is to collect discussions centered on concrete, specific situations, and relevant topics for research. Focus groups consist of bringing together a tota number of six to twelve people to find out their point of view on a specific topic. It is precisely a method of investigation which makes it possible to confront a few respondents sharing a common cause to allow them to express themselves easily and deeply. This data collection technique is called upon to bring together six rural men and women from Mayo-Banyo around the issue of adaptation to new maize production techniques. It is a question of allowing farmers to express themselves on their daily experience and on how they perceive the measures put in place by the State for the adaptation of the production. The farmers targeted by the focus group are mainly rural farmers aged 30-60

VI.2.3. Semi-Direct Interview

We call is semi- direct interview because the respondent is guided in the process of answering the question paused. In this form of the interview, the researcher has a pre-disposed set of questions with guided responses. But the respondent is free to use whatever language is best suitable for him. The technique is advantageous because the researcher can guide the respondent into getting real information.

The semi-direct interview gives us the ability to get information from administrative authorities, traditional heads, and NGO's.in essence it helped us acquire information from key persons who are directly linked to our research topic. For our research we will interview the following category of people:

- Farmers
- Corporative
- Common Initiative Groups
- Delegate of agriculture in Mayo-Banyo.

This data collection technique has the following advantages:

- The response is well structured
- There is a close link between the interviewer and the respondent
- From the interview, a new hypothesis can be developed

In the course of our work, this technique will help us listen to the point of view of farmers and to get direct information from the study population, to understand what they regarded as climate change and the new techniques of maize production.

VI.2.4. Direct Observation

The word observation comes from the Latin word "*observable*" which means pay attention. It should be noted that in social sciences, observation means to look and listen with the objectives to obtain information on the study subject. Therefore in research, the researcher has to make use of his five senses that is (sight, smell, feel, hearing, and taste).

Concerning observation in our study, we visited farmers in their respective farms, watched them plant, and even helped them plant. It could be seen that their practices and seedling used were traditional that is reserved seedlings from the previous harvest).

VI.2.5. The Use of Documentation

Documentary research is essential in research because it allows the researcher to learn about previous issues developed on the subject of research. As Henriette DANET (2006:12) points out, "all research work must be based on the work of predecessors"; works that constitute sources

of information capable of directing the researcher toward his problem. This step remains essential and even mandatory insofar as, according to Raymond QUIVY and Luc Van CAMPENHOUDT [13]

"*When a researcher begins a work, it is unlikely that the subject treated has never been approached by someone else before, at least partly indirectly*"40. As part of this approach, we consulted documents relating to sustainable development, the concept of a green economy which encompasses the management and sustainable use of natural resources, the protection of the environment, and local development which hardly excludes Planning. Also, documentary observation capitalizes on a diversity of sources likely to provide relevant data or information that can enable the researcher to understand the specific aspects of his or her object of study.

These sources are written or oral (books, official texts, seminars, workshops, posters, scientific articles, reports, theses, dissertations, and press.). We were able to find them in the documentation centers of the city of Yaoundé such as FALSH, CPPSA (*Cercle Psycho-Philo-Socio-Anthropo*), MINADER (Ministry of Agriculture and Rural Development)

As part of this research, the documentary observation allowed us to become acquainted with the literature on the different themes of our problem. Indeed, these listed documents (books, scientific articles, theses, dissertations, reports, and official texts) inform us about what has been done, and what remains to be done to better guide our work.

VI.3. TECHNIQUES OF DATA ANALYSIS

This is referred to the styles in which data collected will be analyzed ad treated for better understanding. In the course of our work, we will make use of content analysis and categorical analysis**.**

VI.3.1. Content Analysis

As part of this research, content analysis will be used to process the collected data. The discourse occupies a privileged place among the empirical materials of the researcher in the social sciences. Indeed, it is composed of complex data, which cannot validly be understood by

[13] Raymond QUIVY et Luc Van CAMPENHOUDT, *Manuel de recherche en sciences sociales*, Paris, Dunod, 1995

immediate reading. Various methods have emerged with a dual aim: the development of analytical procedures and their adaptation to an explanatory perspective.

Content analysis is a set of techniques used to process linguistic materials. These materials may have been collected through surveys or interviews and compiled for research. Content analysis is used to analyze recorded and transcribed texts or speeches. However, it does not apply to the processing of just any text, but targeted texts. When the texts are obtained employing surveys or interviews, this choice manifests itself in the wording of the questions in the sampling of the population under investigation. When the analysis is applied to "natural" texts, these must be carefully chosen, because it is not an analysis of the language. It is for this purpose, the determination of the conditions of production of the text from which meanings are attributed to the words[14].

As part of this research, content analysis will be used in two forms: categorical analysis and content analysis of social representations.

VI.3.2. Categorical Analysis

Categorical analysis works by splitting the text into units and then classifying these units according to analogical groupings. Among the different possibilities of categorization, the investigation of themes or thematic analysis is quick, provided that it applies to direct and simple speech[15]. The categorical analysis will be used through the following steps:

The division of speeches into units of meaning. Here it will be dividing the responses of the respondents from Mayo-Banyo and keeping only those that corresponded to the items addressed. In fact, in most cases, before arriving at the questions asked during the interviews, the interviewees make statements, which sometimes do not refer to the study. For example, some farmers first talked about the problems they encounter daily in the village before really discussing the production situation. Thus, it is necessary to avoid getting lost and to delete useless sentences.

The inventory consists of grouping together the words and phrases going in the same direction. In practical terms, after having selected the relevant responses from each respondent,

[14] Paul HENRY,"*Problem de l'analyse de contenu*"*in langages*, N®11,1968
[15] Laurence BARDIN, *L'analyse de contenu*, Paris, PUF,1977

they had to be grouped according to the direction offered by each statement. Indeed, the responses received in our survey will be grouped according to the items. As an illustration for the "production technique" item, respondents who spoke of low agricultural production will be grouped on one side. The process will be the same as the other items.

Categorization will be used to construct meaningful categories of meaning. Indeed, the answers gathered during the inventory will make it possible to form groups according to the item addressed. This work will be carried out from the objectives of this research and made it possible to formulate the tracks approached by the respondents item by item. For example, concerning the social representations of Mayo-Banyo farmers on new maize production techniques, it is necessary to state the points of view of these farmers by grouping them into response categories.

Codification will make it possible to transform the raw data from the interviews. At this level, the respondents' answers will be reported in tables. These tables provided information on the item addressed, the response category, and the number of actors linked to this category. Being in a qualitative survey, the number of times the answer came up is not a priority, it is just a means of knowing the answer has greater importance in terms of generality.

The analysis will make it possible to interpret the responses of the respondents through the theories. The interpreted data will make it possible to respond to the hypotheses formulated further by giving their rate of invalidation and/or confirmation.

VII. TEMPORAL PLAN

Chapter one. will focus on the Conceptual Analysis and presentation of the maize production zone in Mayo-Banyo

While chapter two will be looking at the Strategies developed to improve maize production in Mayo-Bany**:**

This chapter three will focus on the social representation around the Innovation of Maize production in Mayo-Banyo division.

Finally, chapter four will be looking at the social dynamics around the weak adaptation process of farmers to new techniques of maize production

PART ONE :

CONCEPTUAL FRAMEWORK AND DEVELOPMENT STRATEGIES TO INCREASE MAIZE PRODUCTION IN CAMEROON

Before revealing the factors responsible for farmers in adaptation to new techniques in maize production in the Banyo sub-division precisely in the villages of (Mayo-Fourou and Toukouroua), it is first necessary to make a general presentation of the municipality to see if the process of adaptation to new techniques of maize production if feasible enough. Taking into consideration their cultural and environmental background. For this reason, the first part of this study opens with the sociography of the municipality of Banyo (chapter 1) and closes with the evaluation of the knowledge of various actors and actions working for a shift in techniques of production (chapter 2).

CHAPTER ONE

CONCEPTUAL FRAMEWORK AND PRESENTATION OF AREA OF STUDY

This research, therefore, aims to understand why farmers in Mayo-Banyo do not adapt to new maize production techniques despite the different strategies put in place by state and private actors, Chapter one consists of breaking down the central themes used throughout our research paper. It will help use establish a scope boundary. On the other hand, presenting the study area helps in identifying with the people through an in-depth representation of their environment.

I. CONCEPTUAL ANALYSIS

Conceptual analysis in practice consists of distinguishing terms, analyzing the understandings to which they refer, and representing them. Concepts include some of the most fundamental entities or phenomena associated with a discipline (Cocchiarella, 1996, p. 8). In a sense, therefore, concepts can be understood as relating to Plato's 'Forms' or Aristotle's 'Universals' (an abstract idea or mental image). A concept is a theoretical term that refers to a property or a construct (often a complex entity or phenomenon) that suggests the role it plays in a theory, or concerning other concepts: it is the idea that is represented by a term or word. Our work calls upon two concepts which will be developed in the paragraphs below.

I.1 Climate changes

Climate change refers to long-term variations in temperatures and weather patterns. These changes can be natural, such as variations in the solar cycle. But since the 1800s, human activities have been the main driver of climate change, mainly due to the burning of fossil fuels like coal, oil, and gas. Burning fossil fuels generates greenhouse gas emissions that act like a blanket wrapped around the Earth, trapping heat from the sun and raising temperatures. https://www.um.org accessed 20:05:2022:13:30).

According to (Tsalefack, 1999), climate change is a more or less significant modification over a relatively short interval of the parameters of the global climate of the earth or its various regional climates. These modifications are generally due to basic procedures to the earth or

external influences (Olongo, 1975). According to the United Nations Framework Convention on Climate Change (CCNCC, 1995 in Démangeot, 1998), the notion of climate variability applies to climate changes that are solely of natural origin. Climate change is a long-term variation or modification in the average condition or variability of the weather, on a regional or planetary scale (Tsalefack, 1999). According to specialists, human activities would give rise to the carbon emissions that cause climate change, so the mitigation of the phenomenon requires a change in our society's behavior vis-à-vis the environment. Increasing individual involvement with climate change is therefore central, given the secondary importance attributed to the phenomenon compared to other current issues.

Since the announcement by the IPCC (Intergovernmental Panel on Climate Change) that human actions are the source of climate change and the major associated risks is that people have become better informed about possible daily actions to mitigate the consequences. However, studies of the social perception of climate change present inconsistencies between naïve and scientific knowledge of the phenomenon, which characterizes collective thinking and social representations. The importance of knowing them better lies in the impact of public opinion on the actions of governments, even more, important than the opinion of specialists (McDaniels, Axelrod, & Slovic, 1996)

This deviation is measured by changes in all conditions associated with the weather such as temperature, wind patterns, and precipitation. Carbon dioxide and methane are examples of greenhouse gas emissions that cause climate change.

In Mayo-Banyo, climate change has affected maize production, even though this crop is known to grow well in sun-lighted areas. In addition, the quality of seeds and the increase in temperature have led to a drop in maize production, which harms the quantity of maize produced and also the lives of the population. Therefore, the drought, floods, high temperature, and the invasion of current pests in Mayo-Banyo show that the current climate change in the locality has direct and concrete consequences on the production of maize.

I.2. Crises in Maize Production

The peasant situation in the southern countries is marked by a dependence on the agricultural production of maize affected by climate change. In developed countries, production

systems have undergone rapid changes thanks to the agricultural revolutions during the second half of the 20th century, increasing yields from one (1) ton per hectare to ten tons per hectare. In some developing countries located in Asia, the "green revolution" and the support of public authorities have been of great help in increasing yields, which has gone from two (2) tons per hectare to ten (10) or even thirty (30) when the conditions are made suitable to carry out three campaigns in a year. The Malthusian concerns of the 1960s have been belied by history. During the last fifty years of the 20th century, the world population has increased by 2.4 and food production by 2.625. This progress is attributed to the contemporary agricultural revolution which is insufficient and unevenly distributed to meet the needs of humanity, of which two billion people, mostly peasants, suffer from food shortages. 26 of them, which consist of more than half live in southern countries. In developing countries, agricultural aid is projected to farmers on large agricultural estates to the detriment of small producers. These measures resulting from structural adjustments limit State interventions linked to subsidies on agriculture and the protection of commercial products. This leads to a crisis in agricultural production in developing countries. (Arame TOP 2004:26)

In Cameroon, two types of maize production are traditionally distinguished: family or "peasant" farms and agro-industrial farms in the private or public sector. The formers are still imbued with a logic of self-subsistence, even if cash needs have greatly increased. Thus the release of food production to cover the basic needs of the family group remains a priority, reinforced since the collapse of the purchasing power of traditional cash crops. They use essentially family labor and rudimentary equipment, mostly manual cultivation (Jean-louis FUSILIER 1993:18).

As Rene Dumont describes it "*a technique as good as it is, is of no help until it is accepted and used by the farmers, and experience shows that the techniques spread much more quickly in the agriculture of industrialized countries than in others*" (Henri Mendras 1984:9). Even though the techniques may be good, but are not used by farmers does not help to increase the production of maize which is constantly in demand for consumption, export, and transformation. This tension between high demand and low production is causing what we term a production crisis in maize.

Regarding the division of Mayo-Banyo, we could observe crises in terms of maize production because Farmers could use the same natural resources such as land, labor, and capital and obtain consistent production, but over time, variations in climatic conditions such as heavy

rains and drought reduced the annual production of farmers over the years. Coupled with the fact that farmers in this locality still practice traditional farming methods. This change in climatic conditions has favored an increase in the demand for these natural resources, which are gradually depreciating in time and space. However, this discrepancy has led the division into a maize production crisis.

II. GEOGRAPHICAL PRESENTATION OF THE STUDY AREA

The Adamawa Region is one of the ten regions of Cameroon, the third in size delimiting Nigeria to the west and the Central African Republic to the east, it is a mountainous area that delimits forest Cameroon from the south and the savannah of the north and having its capital as Ngaoundere. Adamawa is one of the most geographically diverse regions of Cameroon. The mountain of Gotel and the Mambila on the border with Nigeria are largely composed of granites and therefore crystalline and metaphorical rocks such as mica, schists, and gneiss, these are often covered with volcanic basalt. To the east of the region, granites continue to reign with the sedimentary rocks of the More River (https://fr.m.wikipedia.org consults 28:06:2022-11:20).

The Municipality of Banyo was created in 1960. Its territorial jurisdiction covers the entire district of the same name. The population of Banyo is approximately 151,656, including 37,077 in urban areas and 114,579 in rural areas, according to the general population and housing census (GPHC) data and applying the growth rate of Adamawa which is 3.2%. The population of the municipality of Banyo is quite cosmopolitan because almost all the regions of Cameroon are represented there, there is also a good Nigerian community and in total it is 20 communities living there. The prevailing climate in the commune is of the Sudano-Guinean type characterized by a relatively long rainy season (07 months) and a dry season that lasts an average of 05 months. The unevenly distributed rainfall is abundant and varies between 1200 and 1600 mm. The temperatures vary between 16° in December, and January and 32° from the end of February. The soils, essentially superficial, are brown ferritic, loamy clay, and sandy loam. The base is essentially made up of various metamorphic rocks (gneiss, schists, and mica schists), and the majority of cultivable areas are found near watercourses. The terrain is largely rugged with an altitude varying between 800 m and 1800 m. it is a rugged plateau formed by metamorphic rocks and ferruginous cuirass. The main ethnic groups are Foulbé, Wawa, Haoussa, Bororo, Babouté, Mambila, Tikar, Kwandja, and Yamba, and some foreigners who are the Bamoum, Bamileke, Banso, Gbaya, the Moundang,

Toupuri, Béti, Nyem, Koutine, Yamba and a few foreigners including Nigerians and Central Africans. Inter-ethnic relations are good (Community development plan of the Mayo-Banyo council, 2015)

II.1.Some historical breakthroughs of the locality

History reminds us that under this mountain lived a traditional chief and his people, the Boutés. These drove out the Wawa who were the first inhabitants. On the death of the chief, the problem of succession arose between his two sons since the two twin brothers all felt the desire to take over the management of the chiefdom. But in a well-organized society, there is a people with a single leader. This is how a discussion broke out between the two brothers. According to the Mbouté tradition, the second to come into the world remains the eldest. This one thus decides according to the rites to settle on the throne. Tchamba-Potopoto comes from the Bénoué valley. The Wawa in turn suffered raids and pressure from the Mambila in the West. According to oral tradition, they agreed to go to Kontcha to seek the protection and help of Ardo Haman Gabdo Dandi. This is what would have motivated the intervention of the Fulani. Another version asserts that the migration of the Peul Macina (Mali) towards the South along the Bénoué valley was caused by a series of years of drought which decimated their herds of cattle. Their installation in Kontcha will promote the reconstitution and expansion of their livestock (Community development plan of the Mayo-Banyo council, 2015).

In any event, after occupying the pastures of the Mayo-Yim valley, Ardo Haman Dandi first subjugated the entire region between Sambolabo, Mbah, and Djoumbal (the current town of Banyo). However, it was under the reign of Ardo Oussoumanou that the city of Banyo became the capital of the kingdom of Kotecha, Banyo, and Gaschaga (Nigeria). When the Germans arrived during the colonial conquest, they asked the inhabitants what this place was called. The Mboutés answered "*Bangnam"* the Germans, in turn, repeated saying Banjo. As j in German means y in French, when the Germans were defeated towards the end of the First World War in 1914 by the French, they, therefore, called this village Banyo, hence its current name in French. (Same)

II.2. TOPOGRAPHY

This is the study of the forms and features of an area. Including hills, valleys, rivers, or the representation of these features on maps

II.2. Location of the Municipality of Banyo

The Banyo Sub-division is one of the 03 sub-division in the Mayo - Banyo division of the Adamawa region and of which it is the seat of guardianship. It has an area of 4380 km² and is limited to:

• the North, by the Faro and Déo Division;

• the South by the Mayo-Darlé council.

• the East by the municipality of Tibati; and

• the West by the Federal Republic of Nigeria. (Same)

The Banyo sub-division is mainly comprised of very old rocks, probably Precambrian, migmatites, and granites. Granite intrusions took place in a later, but also Precambrian era; these alkaline granites (younger granites of the English authors) notably form the massifs dominating Banyo and Mayo Darlé. Finally, much more recently there were volcanic manifestations, marked mainly by rhyolites (Mayo Djinga, Roséré Mémal) of the Neogene age, and basalts (plateaus of the Sambolabo-Mayo Kélélé region). Large-scale tectonic movements, impossible to date with precision, but relatively recent, led to the collapse of the Tikar plain (elevation difference 400 m), and the uplift in the Nigeria-Cameroon border region of high plateaus (elevation difference + 300 600 m) forming a continuous line (J.Hault 1964).

Thus the Banyo sub-division, from the morphological point of view, can be roughly divided into three zones:

-The plateau, at an altitude of 1,000 to 1,200 meters, from which rise some isolated massifs of intrusive rocks.

-The high plateaus, called fabe (sing. fabal) by the Foulbé.

-The plain of the Tikars. Each of these three zones has very distinct physical and climatic properties that closely condition their use by man, habitat, agriculture, and livestock

This whole area has been deforested for centuries and subjected to the incessant journey of livestock, is subject to intense erosion. This erosion takes on particular forms on the plateau which would deserve an in-depth study. Comparison of areas belonging to the same petrographic type (migmatites), some located south of the laminate, at altitudes of 800 to 900 meters, unfavorable to breeding, the others on the plateaus, around 1,100-1,200 meters, constituting the areas of great cattle range, is particularly interesting. Bush fires rage everywhere, and the forest is only represented by narrow gallery forests along the waterways[1]. In sparsely populated areas, a certain balance is eventually established and the forest can be regained. As can be seen at various points in central Cameroon, by examining aerial photographs taken about ten years apart. On the contrary, on the plateau, the fire is lit systematically, to destroy the dry grass and promote the regrowth of new grass. It is an absolute necessity for the breeders, the lack of grass at the end of the dry season is such that the fires must be extended to the entire surface of the district. Under these conditions, the balance between the regrowth of the forest and the action of the fires cannot be maintained, the plant formations are steadily impoverished, losing their power to fix the soil (J.Hault 1964).

The climatic vegetation is a dry and dense forest, 12 to 15 meters high, of which the sacred groves of the Wawa villages constitute the only witnesses on the plateau but of which the important shreds remain on the sides of the main mountain ranges.

The plateau is still covered with a relatively dense shrubby savannah, where we find the classic species of the tropical savannah, Bauhinia Thonningii (Peul Barkehi), Annona Annenaria (Dou houhi), Hymenocardea (Samatahi), etc. ., which play a non-negligible role in indigenous technology and food in times of scarcity.

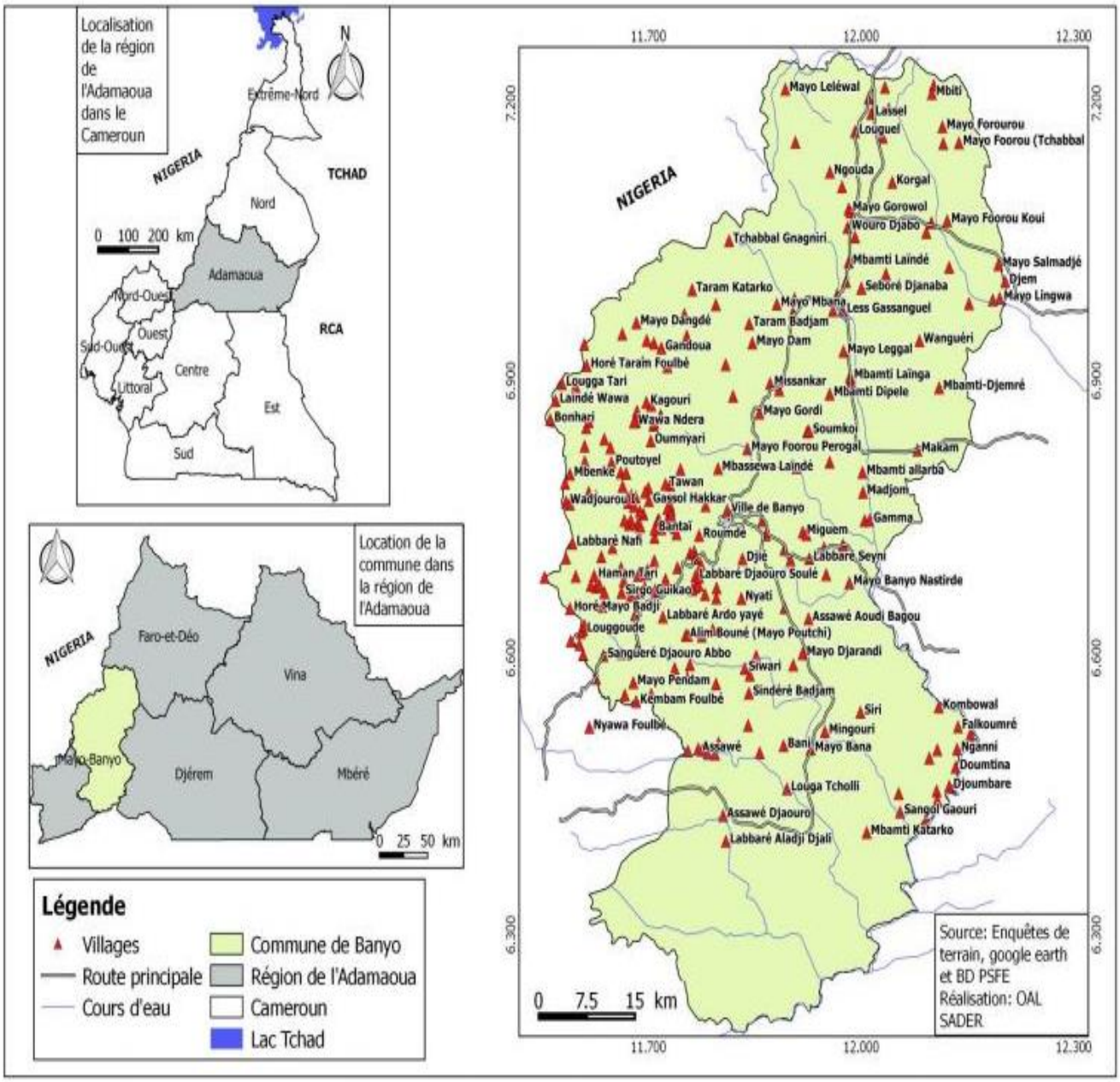
Except on the ridges, the density of shrubs remains high (their mutual distances are of the order of a few meters), and the regrowth of grasses and rhizome plants remains intense. The plateau does not give the impression of a decertified area. It simply appears that the vegetation is less dense and less tall than in the lower areas not traveled by livestock. However, there is a clear difference in the action of erosion, the particular forms observed on (same).

The plateau can only be attributed to the indirect action of livestock. Farmers in the Adamawa attribute the range of cattle in the rainy season to a particularly disastrous effect. It seems to produce a settling, asphyxiation of the soil which transforms it into an inert material, unsuitable for the development of plant life. It is observed that in the vicinity of the ridges often traversed by livestock, the surface horizons of the soil lose their porosity and their permeability to air and water. They have become unsuitable for growing grasses, and even for those rhizome grasses that resist drought and bushfires. This transformation is long-lasting and can persist long after the livestock has ceased to frequent the area. There is sometimes a curious inversion of the distribution of plants. As the bushfires could no longer pass, for lack of food, the bushes which were there, and whose deep roots penetrate below the asphyxiated zone, prosper better than elsewhere. Paradoxically, these areas of heavy cattle traffic sometimes appear more wooded than the surrounding savannah.

This effect is not directly related to soil processes specific to the tropics; nothing similar is observed in the zones of altitude 800-900 meters, where the superficial layer of the ground, lateritic soil with concretions, supports a uniformly dense savannah; neither in one nor in the other zone, does one observe the tendency to the formation of crusts or cuirasses. (J.Hault 1964)

MAP 1: Cameroon Map with a focus on the study area

MAP 2: BANYO SUB-DIVISION



Carte 1 : Localisation de la Commune de Banyo

- **Climate**

The climate that prevails in the commune of Banyo is of the Sudano-Guinean type characterized by a rainy season of seven months (from April to October) and a dry season of five months (from November to March). The seasons are governed by the movements of the FIT (intertropical front) which is the meeting zone of the two winds (PCD 2015).

The rainfall is abundant (1500 to 1800 mm) but unevenly distributed due to the rugged terrain. The temperatures vary between the extreme heat of March (30 to 34°) and the winter cold of December-January with a minimum of 16°. The average temperature is 25° and the relative humidity varies between the two extremes. The winds that cover the town are the harmattan and the trade winds.

- **Floors**

The soils in the municipality of Banyo are for the most part essentially superficial, ferritic of brown color, loamy clay, and sandy loam. The basement consists of ancient materials from the Precambrian era associated with granite, syenite, diorite, and ancient syntectonic and Mecachists, gneiss, migmatite, and anatectic or oriented granites are also encountered. Here, the agricultural land is found below the mountains on the edge of the rivers (idem).

- **Relief**

The relief is rugged with an altitude varying between 800 m and 1800 m. it is a rugged plateau formed by metamorphic rocks and ferruginous cuirass. Several landslide and subsidence areas meet particularly the areas of Nyati, May Foorou Nyalédji thus presenting serious security risks for people and livestock. You can also admire some plains in the areas of Mbenguedje, Mbassewa, Mayo Nyiwa. (Idem)

- **Hydrography**

The commune has a dense hydrographic network whose main rivers are: Mayo-Banyo, Taram, Mayo-Foourou, Mayo-Wodeo, Ndjé, Soumsoum, Nyawa, Siri, Makam… converging towards Mbamti (upper part of Mbam). Most of the villages are located near these rivers (same).

- **Ecological units**

We have in the municipality of Banyo four major ecological units which are:

- Tree and shrub savannahs;

- The gallery forests;

-The amrécages (idem).

- **Hydrocarbons**

The Adamawa is sometimes referred to as Cameroon's "water tower" because many of the country's rivers originate in this region, with the latter experiencing floods from May to September during the rainy season. The region's rivers flow into three different basins, namely the Niger River, Lake Chad, and the Atlantic Ocean. A long volcanic history has left many crater lakes in the area. The best known are Lake Tison and Lake Mbalang near Ngaoundere (same).

- **Vegetation**

The vegetation is very contrasting. On the plateaus, it is essentially made up of shrubby and wooded savannah made up of Annona senegalensis, Harungana madagascariensis, Piliostigma thonningii, Hymenocardia acida, Entanda africana, Ficus, Termalia glancescens, Daniellia oliveri, Lophira lanceolata. The grassy savannah exists in places, especially at the top of the mountains (Tchabbal). In the valleys, we have gallery forests with the presence of large trees, characteristic of Khyaya grandifolia, Mitrigina atrata, and Afzelia spp.

The major constituent herbaceous vegetation of the grassy savannah is populated by Andropogonaceae, Cyperaceae, Pennissetumsp, etc. these large families only constitute the groupings or plant associations whose floristic procession is innumerable (same).

- **Wildlife**

The different plant formations of the town are full of multiple wildlife species including primates (baboons, magistrates, etc.), antelopes, buffaloes, hyenas, warthogs, reptiles, and birds. The inventory of fauna and flora species of the Commune is presented as follows (same):

- **Wildlife species**

As reptiles, we can meet monitor lizards, boa snakes, najas, vipers, and green mambas Mammals are warthogs, hyenas, hippos, buffoon cobs, antelopes, wild dogs, and hinds.
The birds are Great hornbills, storks, guinea fowl, pigeons, scavengers, partridges, and quail. (Same)

- **Plant species**

Here we have among others, Pygeun (Prunus Africana), iroko (Chlorophora excelsa), Pachy (Afzelia bipidensis), Sappelli (Entandrophragma cylindricum), Padouk (Pterocarpus soyauxili taub), Bahia (Hallea ciliata), obobo (Therminalia superba), Roniers (Borassus aethiopium), Tali (Erythrophleum ivorense), Cassia (Cassia siamea), Therminalia laxiflora (idem).

II.2.3. Economic activities practiced

In general, economic activities as in most localities revolve around: Agriculture, livestock, beekeeping, small trade, crafts, the informal sector (motorcycle taxis, loggers, car drivers), and low exploitation of timber from gallery forests. In terms of infrastructure, the municipality is considerably behind and the only sectors with infrastructure are basic education, secondary education, water and energy, health, public works, housing and urban development, post and telecommunications, communication, territorial administration, decentralization and maintenance of order, livestock and agriculture in the 28 possible sectors.

The municipality of Banyo as an institution faces several weaknesses and constraints due to the lack of human, financial, and material resources. However, this commune has several natural resources, the most important of which are: the subsoil (rich in sapphire), tourist sites (mountains (Mount Djoumba), lakes, and caves), pastures, arable land, abundance of plants, gallery forests, and numerous waterways. However, it should be noted that the exploitation of these resources remains weak and for the most part artisanal and anarchic (same):

II.2.4. Economic Populations

The Banyo division includes three large population groups: - The animist farmers, who remained grouped by tribes and chief ferries, occupy the Tikar plain and the edge of the plateau.

They belong to the Ba (Mambila) Tikar and Kondja groups. The cultivators of the plateau, subjected for several generations to the Foulbé, were reduced to various forms of serfdom. Except for one group, the Wawa, who enjoy special status and have partly retained their organization, most are detribalized and live scattered along the rivers.

The nomadic Peul, or Mbororoen; in general, several hundred reside on the territory of the laminate, with very important herds. - The Foulbé (sedentary Fulani), descendants of the conquerors of the country, live scattered over the territory of the laminate; most are heavily imbued with black blood and their custom has undergone alterations, but they remain essentially breeders and only practice agriculture as a supplement.

The geographical environment influences the habitat through various factors, the main one being altitude. Staying at altitude is sought after by light-skinned Mbororoen, who are very susceptible to malaria. Scantily clad, they do well in the highlands, 1,600-1,800 meters above sea level, where the temperature sometimes drops to 7 or 80 at dawn; they do not willingly descend below 1,000 meters in altitude. Conversely, the very mixed Fulbe and sedentary farmers prefer to live in the plain or on the edge of the tray, saying they couldn't stand the cold. The fact that the high plateaus are not used by farmers also encourages large breeders to settle there, because they are sure to find peace there.

The altitude conditions breeding. Roughly, the 1000-meter altitude contour line delimits the favorable zone where ecological conditions do not allow the proliferation of tsetse, and where, therefore, livestock can live. Breeding is still possible up to an altitude of 850-900 meters but in more precarious conditions[2].

In their conquests, the Foulbés systematically sought to establish themselves in areas of plateaus allowing breeding. They were not able, except for isolated exceptions, to settle in the regions of altitude lower than 800-900 meters, where they only made incursions and raids (same)

- **Cultural life**

The Adamawa maintains a vibrant traditional culture. A notable example is the Menang, a Tikar dance. Performers may dance for several reasons, from aiding warriors to celebrating the sensuality of women. Births, funerals, and weddings are also often the occasion for great celebrations among the non-Muslim populations of the region (same)

- **Education**

Adamawa's level of education is generally very low. Bororo nomads rarely send their children to school. Meanwhile, Fulbe people in the city often marry off their daughters at the onset of puberty, and married girls do not attend school. The province has an estimated illiteracy rate of 80%.

Another obstacle is the lack of schools and teachers. Most schools are located in major cities or the capital, which means that students often have to travel long distances or live far from home, especially at the secondary level. In addition, Cameroonian teachers assigned to the province often refuse to leave because of its remoteness (idem)

II.2.5. Distribution of the population's municipality according to the place of residence and according to certain Specific groups.

According to the declarations of the village chiefs on the one hand and the census data of 2005 updated by applying the growth rate of 3.2% on the other hand, the commune has an estimated population of 151,656 inhabitants. Using the demographic weight of the specific groups of the said census, in particular, 10.7% of the population being infants are of the ages (0-35 months)

• 16.9% of the population is the target of people below schooling age (0 to 59 months);

• 6.3% of the population belongs to preschool (4 to 5 years old);

• 23.4% of the population is considered to be of primary school age (6 to 14 years old)

• 18.5% of the population representing adolescents (12 to 19 years old);

• 34.7% of the population is considered of young people (15 to 34 years old) (idem)

Moreover, this population according to the specific groups is therefore presented as follows:

Table 1: Population distribution in Mayo-Banyo Municipality according to the place of residence and according to certain specific groups

Specific Groups	Urban	Rural	Total
Male	17633	49554	66948
Female	19444	64925	84077
Total	**37077**	**114479**	**151556**
babies (0-35 months)	3967	12260	16227
Young children de (0-59 months)	6266	19364	25630
The population of less schooling age (4-5ans)	2410	7410	9858
Population of schooling (6-14ans)	8676	26812	35488
Adolescents(12-19ans)	6859	21197	28056
The population of youths (15-34ans)	12866	39759	52625

Source: *PCD* Banyo

We can observe that most of the men and women are in rural areas. Most of the children below the schooling ages are in the rural sector and finally, the youth population of the division is found in the rural sectors. Therefore if the majority of the population (youths) live in the rural area there is an urgent need for sensitization in the ways agriculture can be ameliorated given that they are the backbone of the agricultural sector in the region.

III. CONCEPTUAL ANALYSIS AND OVERVIEW OF MAIZE PRODUCTION IN MAYO-BANYO

The food system of the department of Mayo-Banyo is based on cereals, mainly maize. The intensification of maize cultivation is mainly intended for rural self-consumption and supplying cities. In rural-urban areas, maize consumption is at 90%, which leads to an increase in productivity. It is a form of opportunity to improve food security for the municipality**.**

- **Agriculture**

The Fulbe's, masters of the territory, consider agriculture as an axillary activity, reserved for servants as far as possible. Their organization of space, if one can use this term, is

centered on the free movement of the whole territory by the herds. The indirect effects of overgrazing and deforestation, soil erosion and degradation, and regression of agriculture, are indifferent to them. Under these conditions, farmers were forced to give up the extensive cultivation of maize (J.Hurault 1964)

Traditional agriculture allowed, thanks to a precise rotation system, based on shrubby vegetation remaining in the ground for two years, the indefinite cultivation of the same land, and made possible complete stability of the farming villages. But it demanded that the crops be completely isolated from the herds, even in the dry season. The current system, imposed by the Fulbe, must accommodate the free movement of livestock in the dry season, and the passage of bushfires. As a result, the traditional system of rotation disappeared and, despite the manuring of the fields by cattle, which is always insufficient, the soil tends to lose its fertility after a certain number of years. Farmers are forced to emigrate. Domination by the Foulbé resulted in the dislocation and scattering of groups of farmers, which must now be seen as more or less completely detribalized (J.Hurault 1964).

Thus the laminate of Banyo presents in an acute form this opposition between agriculture and stockbreeding, noted in numerous points of tropical Africa. The traditional method of association of the one and the other, the fencing system, is not known to the inhabitants of the Adamawa region. They do not know how to establish fire-resistant quickset hedges, such as those tribes found on the high plateau of Guinea, this fencing system makes it possible to preserve the fields from cattle invasion and also to fix the habitat. This is a key issue, not just for the Banyo laminate, but for all of Adamawa; its solution is all the more urgent as the rapid development of stockbreeding, leading to an increasing overload of pastures, makes the fate of farmers more and more precarious (idem).

Agriculture in Banyo remains subsistence-based and barely feeds the locals. Maize which is the main food is sold on the markets only in minute quantities. Cassava flour is imported in addition to the Tibati area. Potatoes and groundnuts, supplementary crops, do not give rise to any export; the soil and the climate do not allow the creation of shrubby plantations, except in the Tikar plain, where small coffee plantations have been created since 1954, on the initiative of the administration (idem).

The cycle of agricultural work. In November, with the dry season, the bushfires begin, which continue until January. For three months the municipality is completely chartered, strewn with stumps of mutilated and blackened trees, which presents an aspect of desolation. The cattle are stationed in the valleys, and contracts are made between breeders and farmers for the manure of the fields. From February, the green shoots spring from the ashes and the cattle resume their normalization; in April-May, the savannah brings fought the European climate; grass abounds everywhere, and the breeders settle for a while, it is for them the period of rest and family celebrations.

The Gbaya, Mbum, and Dourou are the region's most prolific farmers, though even the herdsmen farm in the rainy season. Farms are typically small plots that are cleared or burned out of the brush and then planted during the dry season. Crops grow during the rainy season when they are harvested. Because the dry season is so long, crops must be preserved, so most are transformed into grain, which is pounded by hand with mortar and pestle.

Cash crops and maize play a small role in the economy of the region because the population is produced in small quantities and the event of climate change worsens the conditions of production in the area (idem). And despite the existence of a Departmental delegation and a District Delegation for agriculture and rural development with posts throughout the territory, farmers do not adapt to new agricultural techniques (idem).

Table 2: The Prices of Maize According To Months

N	speculation	Price of single unit minimum		The maximum price for more than one item		Unit of measurement
		amount	period	amount	period	
1	Maize grains	2000-2500	August-October	4000-4500	March-May	Bucket of 15l

Source: Departmental Delegation of Agriculture and Rural Development of Banyo 2014

It is important to note that the statistics presented here allow us to understand the Variation in prices during the agricultural year, it should be noted that agriculture in the real sense is practiced as a means of subsistence by this community. Changes in climatic conditions affect the output resulting in to decrease in supply over demand. That explains the variation in prices

III.1. FACTORS THAT INFLUENCE MAIZE PRODUCTION

- **EROSION**

The different forms of erosion have gradually affected the production of maize in the division. There are several forms of erosion: these erosions turn to form cricks. This evolution is facilitated by the gradual disappearance of the forests gallery under the effect of bushfires, and by the trampling of livestock in search of water. Accumulation in the valleys of a mass of loose material; relatively very rapid displacement of the meanders of the watercourses along the alluvial plains are thus formed. Undermining of the base of the ground movements by the displacement of the meanders, and landslides of the slopes, sometimes 20 to 30 meters high, creating gullies. Meanders are sometimes seen penetrating deep within convex landslides. The appearance of canaliculi, then new layers, superimposed on the local relief, originating in particular on convex slopes. These forms of erosion are found almost exclusively in the vicinity of large cattle tracks (J.Hurault 1964)

This action of erosion gives the impression that the land is no longer in balance with the current topographic forms as if it had changed in nature or consistency. This is a subjective impression; there is no reason to believe that a superficial action dating back a few centuries could have led to changes in the entire thickness of the decomposed rock, that is several tens of meters. One can think more logically that these very loose formations were in balance with topographic forms created under forest cover, or at least under cover of dense savannah (idem)

The erosive actions (grazing of the heads of the thalweg, undermining along the slopes) correspond to a significant accumulation. A short distance from the source (a few kilometers), the alluvial deposits are already relatively significant, and 10 kilometers from their source most of the rivers flowing on the plateau have an alluvial valley whose width varies from 100 to 200 meters. The thickness of the alluvium is not considerable and nowhere does it appear to exceed ten meters. These deposits are facilitated by the low slope of the rivers flowing on the plateau. (Same)

These alluvial soils, dark red to brown, are exceptionally fertile. They lend themselves perfectly to the cultivation of maize, as well as the lower part of the eluviums at the base of the ground movements. This is an ecological factor of fundamental importance, influencing directly agriculture and indirectly the social structure of populations.

Apart from these alluvial terraces, which represent 1 to 2% of its total surface, the plateau has become unsuitable for any agriculture; it is exclusively devoted to livestock, and the scarcity of grass in the dry season forces livestock to move constantly. The continuous growth of the herd, made possible by progress in veterinary medicine, continues to aggravate the ravages of erosion. This development constitutes a serious threat to the future of the division. (same)

- **Temperature**

Temperature is the degree or level of coldness or hotness of a substance, expressed in centigrade (C) or degree Celsius and degree Fahrenheit (F). It affects various growth processes in crops, especially in maize seed, photosynthesis, transpiration, respiration, protein synthesis, seed germination, and translocation. Plants mature earlier in hot areas with high temperatures because photosynthetic translocation occurs faster.

Maize requires a general temperature range of 0 to 50 degrees Celsius. Different crops have varying optimal or favorable temperature ranges during the night or day for growth and optimal yields. Temperature rise increases chemical reaction rates and enzyme activity in crops. Every 10 C increase in temperature can double enzymatic reactions in plants.

On the other hand, extremely high temperatures limit the growth and development of maize. As an example, low soil temperature inhibits water absorption because water is less mobile and more viscous with less permeable plant protoplasm. Furthermore, water solidifies and expands if temperatures drop below the freezing point, rupturing plant cell walls. The fluctuation in climatic conditions has led to changes in temperature which has affected the growth of maize in Banyo

- **Wind**

The wind is moving air resulting from differences in heating and pressure gradients. The movement of large masses of air and the jet stream flow make up a global scale of air movement. Local air movement is small in scale. Less turbulent and lower surface winds occur at night because there is no heat from the sun.

During storms, the production of maize in Banyo sub-division witnesses a drop because during heavy wind storm the maize planted are broken or sometimes off-rooted before maturity.

This is because the soils are light, with the constant process of erosion the soil loses its strength when faced with heavy wind.

From the above analysis, one could understand that the department of Mayo-Banyo is in the Adamawa region and that its main activity is agriculture, although some minor activities such as animal husbandry and small businesses exist. It has a tropical climate suitable for agriculture, and good vegetation but the education system is characterized by a low level, the children of this division do not go to school much. It should be noted that the majority of the division's population lives more in rural areas than in cities. Over the years, climate change has greatly affected the agricultural production of maize in this locality due to the increase in temperature, the reduction in rainfall, and the inability of farmers to adapt to new means and production techniques

CHAPTER TWO

STRATEGIES DEVELOPED TO IMPROVE MAIZE PRODUCTION IN CAMEROON

In Cameroon, agriculture is the main activity. It is practiced by more than half of the population. To increase the production of maize the government has implemented several strategies by engaging with national and international partners, and also, by implementing projects and programs to facilitate the production of maize by local actors. In this chapter, we will be talking about presenting the quantitative overview of maize flows in Cameroon and presenting the different actors in charge of maize production in Cameroon in general and in the department of Mayo-Banyo in particular. (MINADER,2009)

II. QUANTITATIVE OVERVIEW OF MAIZE FLOW IN CAMEROON

Cameroon is an agricultural country. The rural sector contributes almost 30% to the GDP and employs about 60% of the working population.7 The extension of the country in latitude (from the humid forest zone to the Saharan zone) gives it a great diversity of climates and of landscapes which allows the cultivation of a wide range of crops. The country also has vast land resources that are still largely underexploited. The low population density also places Cameroon in a favorable situation in terms of land availability. In addition to development companies and NGOs, the National Agricultural Extension Program (NAEP) set up in 1986 provides technical support to producers throughout the country.

This natural and institutional environment has enabled the agricultural sector not only to contribute to the equilibrium of the trade balance but also to improve the food security of the populations and boosted the employment rate in rural areas.

Maize occupies an important place in the various functions of agricultural production. In terms of food, maize remains the leading cereal consumed in the country (2/3 of production, or about 400,000 tons in 2000), far ahead of sorghum, rice, or wheat. Maize production is also used to supply local agro-industries (breweries, feed mills) and countries in the sub-region. In 2000, it represented a market of nearly 20 billion FCFA for producers. (Jean Louis FOSILIER: 1993)

Maize is exported in two forms: grain corn and corn grits for brewing; other maize-based products (seeds, flour, starch, oil, sweetcorn) · are mentioned in customs statistics but for negligible tonnages. Data from Customs and those from the *Syndicat Maritime* converge, so the assessment of maize exports does not seem to be a problem, unlike rice. Informal exports from Nigeria would be negligible according to the first results observatory on border trade. One can however suspect substantial exports during years of great drought given the intensity of the links of this region with Nigeria (Jean Louis Fosillier: 1993:5)

However, the sector is not spared by the generic constraints of the agricultural sector in Cameroon (rudimentary techniques, low productivity, weak organization of actors, etc.). As a result, the evolution of production has not kept pace with population growth. The latter is maintained at an accelerated rate of 2.8% per year and 4.2% per year in urban areas, against 2.4% per year for agricultural production. The rise of agro-industries and growing demand from neighboring countries contribute to widening the gap between domestic supply and demand. Cameroon has thus gone from being a net exporter of maize in 1974 to a state of net importer since the 1980s, which further deteriorates its already negative trade balance (NEPAD and FAO 2004:2).

In Cameroon, maize production faces several constraints and advantages. As disadvantage we have: The narrowness of the cultivated surfaces. In the locality, the farmers have a reduced surface which limits the quantity of production (0.5 to 1 hectare on average). In addition, there is also an under-exploitation of available natural resources (water, soil) which leads to low productivity (1 to 2 tons/ha), resulting in insufficient production to cover internal and sub-regional demand; marketing constraints are perceptible through the importance of post-harvest losses (12% of production), seasonal price fluctuations, very high marketing costs (around 40 to 50%), abnormal prices between towns and within towns, seasonal competitiveness of production, insufficient primary processing. As another constraint, we have the weak organization of the actors which is reflected through the lack of knowledge of some of the most efficient farming techniques tested by the others, the absence of a grouped strategy of the producers for the purchase of inputs, storage and marketing, weak stock management and processing capacity, lack of links between production and consumption, and other possible actors in the sector.

Although maize production in Cameroon faces several constraints, it should be noted that there are some advantages related to maize production. These assets are: The consumer market

(human, animal, and industrial) is in demand and has clear growth in Cameroon and the Central African sub-region. Maize is thus a potential source of improved food security and increased income for producers; Maize production involves more than one million farmers which, taking into account the processing and marketing actors, induces a large redistribution of income. Maize cultivation is profitable (except for mechanized farms), while the product is potentially competitive on the sub-regional market (DRC = 0.5),14 which augurs well for the sustainability of performance and Maize has great production potential, both in terms of agro-ecological availability of still under-exploited resources such as land and labor (NEPAD and FAO 2004:2-3).

II.1 MEASURES IMPLEMENTED BY THE STATE TO IMPROVE MAIZE PRODUCTION

The orientations of this national development strategy which covers the second phase (2020-2030) of Vision 2035 are articulated around the objectives formulated in this reference framework. This Vision, which aims to make Cameroon "an emerging country, democratic and united in its diversity" includes the general objective of reducing poverty to a socially acceptable level. To maintain the course of emergence by 2035, the National Strategy for Development (SND30) aims to carry out the structural transformation of the economy by making fundamental changes in economic and social structures to promote endogenous, inclusive development while preserving the chances of future generations. The course is to make the country a New Industrialized Country, efforts will be articulated around the industrialization strategy, which therefore constitutes the center of interest of this national strategy. (SND 2022-2023)

The priority sector for Agro-industrial development was set up for maize and other cereal exploitation. They were the subject of a specific medium and long-term development plan, aimed at increasing production, strengthening competitiveness, and developing value chains downstream, in particular through the establishment of processing industries. In this approach, the Government was systematically sought, in partnership with the national and/or foreign private sector, to bring out "national champions" around whom the production, processing, and marketing (including exports) of this sector was organized and structured itself. (SAME)

However, to achieve increased agricultural production, the strategy emphasizes the following items among which we have the following:

the promotion of a medium of accessing large farms by facilitating access to land: Targeted and privileged support from the State to farmers' organizations in terms of access to agricultural inputs, new production techniques through mechanization, extension, and agricultural advice; agricultural credit through the opening of specialized credit lines with microfinance establishments and interested banks, without prejudice to the project to create an agricultural bank; markets through better organization of internal marketing channels, border markets and support for the promotion of Cameroonian agricultural products on external markets;

More so, the government set aside programs to improve maize production and correct market failures through institution building. For example, the National Support Program for the Maize file has trained small producers, as well as the distribution of seeds and the financing of their micro projects (Fiscal year implementation report: 2010)

Information about the agricultural calendar is made available to farmers as a means to guide their planting seasons. At the same time, the government has put in place a data collection medium (barometer) to help track rainfall and precipitation to guide farmers on what to expect in future years as the climatic condition keeps getting worse by the day.

Similarly, an effort has been made to improve access to land which requires legislation that clearly defines property rights and establishes new ground rules for land tenure. Usually, this also requires the strengthening of the local land register and sometimes new financing mechanisms for land purchases as well as an improvement in the land rental market. (https://www.fao.org consulted on the 2022:15:45)

Seeds, pesticides, and fertilizers are provided free of charge to farmers. The same applies to the acquisition of certain equipment by producer organizations working with these programs and projects. A National Agricultural Extension Project (NAEA) was launched by the government in 1990. In its second phase, the PNVA became the National Agricultural Extension and Research

Program (PNVRA). It covered the whole country and had until closing in June 2004 benefited from 29,241,211,000 CFA francs including 23,596,603,000 for the extension component and 5,644,608,000 CFA francs for research. (P. Dugue et al 2017)

Table 3- Breakdown of the Agriculture Budget

	2004	2005	2006	2007	2008	2009
%functioning	68.6	67.7	72.7	70	69	62.1
%investments	31.4	32.3	27.3	30	31	37.9

Source: MINADER (2017)

From the table above, we could see that the financial budget allocated to the ministry of agriculture varied from 2004 to 2009, and at the same time the investment level also constantly fluctuation and varied across the years.

Government support for agriculture has increased, taking the form of subsidies for inputs such as improved seeds and inorganic fertilizers. There has also been supporting for financial services that benefit small farmers and common initiative groups of farmers. Increasingly, the government is providing farmers with information on market trends and prices of food crops in accessible urban markets so that farmers can get the best income from their produce. In 2005, a broad-based strategy was launched to guide the country toward achieving agricultural development. This strategy is composed of a set of projects aimed at solving the main problems considered major constraints to agricultural productivity in Cameroon. Three projects in this strategy directly address issues related to closing the achievement gap (MINADER 2006). These include.

II.1.1 Agricultural Mechanization Support Project.

Its overall objective is to increase the productivity of food crops (maize) and to increase the surface area of small farms by promoting agricultural mechanization. To achieve this objective, PAMA improved the access of small and medium-sized farmers to small agricultural equipment and machinery; facilitate the acquisition of production equipment through loan programs; and propagate the use of adapted equipment.

II.1.2 The Support Program for the Production and Distribution of Seeds and Planting Material

It is aimed at medium and large farmers with the development of supervised seed production farms. This project, therefore, promotes private investment in the seed production farm; facilitates funding support for seed production; oversees the quality of seed produced by trained farmers, and ensures that the seed produced reaches the desired rural communities through appropriate distribution and marketing channels.

II.1.3 Agricultural Soil Management Project

Its main objective is soil conservation through the fight against erosion. To achieve this goal, this project will begin by developing a more detailed mapping of available soil resources, and then investigate and recommend appropriate conservation strategies that can contribute to long-term soil fertility.

It should be noted that many other activities are indirectly contributing to maize agricultural productivity within the framework of the national strategy. These are activities that contribute to the improvement of communication infrastructure, market access, empowerment of common initiative groups of farmers, extension services, and others (MINADER 2006). While the national strategy has been implemented since 2005, no evaluation has been done to assess the impacts of this strategy on increasing maize agricultural productivity. However, unverified local reports claim that yields have varied significantly for some crops. For example, local government officials say yields of maize fell from an average of 1.1 tons to 1.9, and potatoes from 10 to 23 tons per hectare from 2005 to 2010, respectively.

Finally, it should be noted that after all that the government has done in the division to improve the production of maize, there is a persistence among many farmers of a conservative attitude toward the maintenance of traditional activities at the expense of the development of new production activities which will favor the growth of maize in a short time for local consumption. (MINEPAT, 1917:45)

III. MEASURES IMPLEMENTED BY NON-GOVERNMENTAL ORGANIZATIONS

The economic crisis that affected Cameroon in the year 1998, led several international institutions concerned about development to carry out activities to increase productivity and improve the living conditions of the populations in Cameroon.

III.1. FOOD AND AGRICULTURE ORGANIZATION (FAO)

FAO Representation in Cameroon was established on September 2, 1978, with the signing of the Headquarters Agreement. However, Cameroon has been a member since 1960. Since September 4, 2015, the office has been a Liaison and Partnership Office.

Over the years, FAO's technical and financial support to Cameroon has focused on the implementation at the national level of the Special Program for Food Security and the strengthening of national capacities for the formulation of policies and projects relating to food and agriculture. Today, one of the major characteristics of this cooperation is the strengthening of resilience, which includes measures aimed at coping with natural disasters.

Ongoing projects contribute to the priority areas of the 2022-2026 Country Programming Framework (CPF). The latter is aligned with national priorities, including the National Development Strategy 2020-2030 (NDS 30) and the Rural Sector Development Strategy (SDSR/PNIA 2020-2030). The (RSDS) also takes into account global priorities, including the United Nations Sustainable Development Cooperation Framework 2021-2025 (UNSDCF), the Sustainable Development Goals (SDGs), and FAO's strategic framework for the period 2022-2031 through the adoption of the "4 Best" and the COP26 resolutions on climate change. (https://www.fao.org>Cameroon view 1-07-2022:12:41)

III.1.1. Rural Sector Development Strategy (RSDS)

This is a project that started in the year 2022 and it's to run till 2026. This project has the following objectives of Providing favorable conditions for economic growth through the accumulation of national wealth. The RSDS are put in place and implementated to contributes in obtaining the structural changes essential for the industrialization of the country.

Improve the living conditions of the populations and their access to basic social services by ensuring a significant reduction in poverty and underemployment.

As well as improve Governance to strengthen the performance of public action to achieve developmental objectives.

Also, Measures for adaptation and mitigation of the effects of climate change and environmental degradation are well management and strengthened. (https://www.fao.org consult on 30-06-2022 at 13:25)

Furthermore, to promote the production and accessibility of quality seeds to farmers, the Cameroonian government through its Ministry of Agriculture and Rural Development (MINADER) has encouraged the financial and technical support of the Food and Agriculture Organization of the United Nations (FAO) through projects like. (https://www.fao.org>Cameroon view 1-07-2022:12:41)

III.1.2. Support for building the institutional and technical capacities of the seed sub-sector in Cameroon

It has as the aim of improving access to quality seeds for farmers that the government of Cameroon through its Ministry of Agriculture and Rural Development (MINADER) has encouraged financial and technical support from the Food and Agriculture Organization of the United Nations (FAO) through a project entitled “Support for institutional and technical capacity building of the seed sub-sector in Cameroon”. This project aims to build the capacities of public and private actors in the seed sub-sector in the maize sectors.

Thus, from June 07 to 10, 2020, a joint mission of FAO and MINADER teams supervised the distribution of agricultural inputs to farmers’ organizations (POs) in the regions of East, West, Adamawa, and the Far North. The seed multipliers benefiting from the support in these regions have undertaken, by signing an agreement, to return to the project 175 kg of seed per hectare of a cultivated field. In total, 50 maize seed multiplier organizations from Bertoua, Bafoussam, and Ngaoundere respectively, provided 1,543 bags of fertilizer and 4,250 kg of certified maize foundation seed, to plant 183 hectares of certified seed. In the Far North, 06 organizations of

sorghum seed multipliers have received 80 bags of fertilizer and 170 kg of basic sorghum seed, for a total emblem area of 14 hectares.

The objective of the project is that at the end of the 2020 agricultural campaign, this input support will enable seed multipliers to make available 32 tons of certified maize seeds and 2.45 tons of sorghum seeds, which MINADER will distribute to vulnerable households and populations. The project will thus contribute in the medium and long term, to facilitating access to quality seeds adapted to the conditions of their environment, but also to increasing the production of seed companies in the regions of the East, West, Adamawa, and the Far North. "*This year our maize production will be better than last year," rejoices Henri Tongambou, the beneficiary of 140 kg of maize seeds and 44 bags of 50 kg of fertilizer for 05 hectares of land to be sown. "I was able to accept the doses of fertilizer to be applied to each plant of maize and this because I was able to have easy access to fertilizers"*, (MINADER, 2020).

According to Jeannette (2011), junior professional in crop production at FAO Cameroon, explains that *"one of the main challenges to be met during the implementation of this project is linked to climate change which conditions the estimation of expected production* Because, of the delay of the rains Coupled with the unequal distribution of the latter in time and space conditions the different stages of cultivation, that is limiting the exact estimate of the expected productions. However, there is an expression of the wish that the seed multipliers constituted in professional organizations, extend their action on the entire national territory to be able to respond to the national and even sub-regional demand for seeds of guaranteed quality.

The technical cooperation project Support in the building of an institutional and technical capacity which falls in line with the seed sub-sector in Cameroon, under Priority one of the 2018-2020 Country Programming Framework. (RSDS)) also its an answer to the National Policy for plant and seeds (NPPS). This is particularly the axis relating to the improvement of the institutional framework, equipment, and capacity building of actors in the seed sector. (https://www.fao.org consult on 30-06-2022 at 13:25)

III.1.3. North-East Bénoué Project (PNEB) to meet the food needs of the populations during the lean season

These are part of the activities to support food products which have made it possible to accumulate harvests. The abundance of production led the North-East Bénoué project to reorientate its intervention and to organize the village granaries around the marketing of maize by setting up unions of village farms, within the marketing commissions of maize committees (https://www.fao.org consult on 30-06-2022 at 14:30pm)

III.2. INTERNATIONAL FUND FOR AGRICULTURAL DEVELOPMENT (IFAD)

The International Fund for Agricultural Development (IFAD), a specialized agency of the United Nations, was one of the main outcomes of the 1974 World Food Conference. The conference was organized by the United Nations in respond to the food crises of the early 1970s, when global food shortages caused widespread famine and malnutrition, mainly in the Saharan countries of Africa.

World leaders realized that food insecurity and famine were failures in food production and also structural problems related to poverty. This situation was compounded by the fact that the majority of the poor in the developing world lived in rural areas.

In response to these complex challenges, it was decided that an “International Fund for Development should be established immediately to finance agricultural development projects, primarily for food production in developing countries. The Fund will primarily finance projects and programs specifically designed to introduce, expand or improve food production systems and to strengthen related policies and institutions”. Three years after the Rome conference, IFAD was established in 1977 as an international financial institution. Cooperation with IFAD dates back to 1981 when they opened a country office in Cameroon which has become a sub-regional hub to facilitate project development and implementation. As part of the fight against hunger and famine in Cameroon, IFAD has set aside some projects that help boost maize production in the community. These projects include:

III.2.1. Community Value Chain Development Support Project

This project was launched in December 2011 by the Deputy Prime Minister for Agriculture and Development and the Director of IFAD's West and Central Africa Division. The project adopts a value chain approach to strengthen the link between agricultural production and food demand (maize), and between producers and consumers. Accordingly, the project emphasizes production and marketing, as well as processing capacity. This holistic approach will help improve the maize available on the market to meet consumer demand.

The Commodity Sector Support Project was developed as part of the Government's emergency plan to combat rising food prices. Its main objective is to reduce rural poverty and increase food security through the sustainable development and competitiveness of maize. Value chains that have significant economic potential, nationally and internationally. It specifically aims to increase maize production and improve the conservation, processing, and marketing of these products, and strengthen technical and organizational capacities. (https://www.ifad.org consult on 08-07-2022 at 11:28)

III.2.2. Rural Microfinance Development Support Project (PADMIR)

PADMIR was launched in January 2011 and aimed to reduce the poverty of the target group through increased incomes and improved food security, particularly in cereals such as maize. The project is aligned with Cameroon's microfinance policy. It will serve as a support mechanism to finance family farms in their efforts to improve agricultural productivity and diversify their livelihoods by:

Create a more conducive environment for microfinance that better response to the difficulties posed by rural farmers By providing access to financing for the most disadvantaged rural populations, in particular women and young people, to services that meet their needs by strengthening networks of existing microfinance institutions and institutions operating in rural areas and offering services to the target group, expanding the reach, and developing appropriate services and products (HTTPS:// https://www.ica.coop. cooperative accessed on the 10:7:2022:7:20)

The development of cooperative movements in Cameroon began during the colonial period when the colonialists created and managed the first cooperatives (Portères, 1948) and in the department of Mayo-Banyo several cooperatives were created in the field of maize production will be analyzed in the following paragraph:

III. LOCAL ORGANISATION OF MAIZE PRODUCERS

This is a combination of cooperatives and common initiative groups or agricultural association, they are typically formed to provide support provide resources to and collectively address common challenges and issues in the farming sector. This part will be looking at various cooperatives and common initiative groups that have been set to increase maize production in the locality.

III.1. COOPERATIVES

Cooperatives are people-centered enterprises owned, controlled, and managed by and for their members to achieve their common economic, social, and cultural needs and aspirations. Cooperatives bring people together democratically and fairly. Whether the members are customers, employees, users, or residents, cooperatives are democratically managed according to the “one member, one vote” rule. Members share equal voting rights regardless of the amount of capital they invest in the business.

As businesses driven by values, not just profit, cooperatives share internationally agreed principles and act together to build a better world through cooperation. By placing equity, equality, and social justice at the heart of the business, co-operatives around the world enable people to work together to create sustainable businesses that generate jobs and long-term prosperity.

Cooperatives allow people to take control of their economic future and, because they are not shareholder-owned, the economic and social benefits of their activity remain in the communities where they are established. Profits generated are either reinvested in the business or returned to members. (https://www.ica.coop.coorperative accessed on the 10th:7:2022:7:20)

The development of cooperative movements in Cameroon began during the colonial period when the colonialists created and managed the first cooperatives and in the department of

Mayo-Banyo several cooperatives were created in the field of maize production. These cooperatives will b examined in the paragraphs below.

III.1.1 Association of Maize Farmers (ADYCAM EN MAYO Fourou)

It is a cooperative with the registration number 20-10CRM-AD-03-013-COB-001001-02. This cooperative has as its objective to ameliorate the well-being of its member through its diverse activities including the purchase of maize at the end of a planting season which is later sold at high prices in the market allowing farmers to make more profit for their maize.

This cooperative also helps in obtaining seeds especially donations from the state in that most of the time local farmers get access to these improved seedlings takes longer as individuals but with the help of the cooperatives, each member has a greater chance to have access to seeding in a lesser time phrase. Its members are prone to have high-quality seeds at moderate prices which in turn boost their output at every planting season.

III.1.2. Société Cooperative Simplifié de Producteurs de Maïs (Toukouroua)

It has registration number 20-072-CMR-ad-o3-013-COS-001001-001002. This cooperative has the objective to sensitize the population of Toukouroua to the new methods of maize production. The urpose of this is to gradually help them adapt to the new techniques of maize production in other to ameliorate their production. As a means to attain these objectives, workshops are being organized to teach the local farmers the importance of adapting their farmhouses to make their production more resilient to the changing climate.

Apart from that farmer are being given a small number of seeds to plant on a separate portion of land so that they can compare the output at the end of the planting season with that of their traditional maize seeds. Over the past two years, more farmers were beginning to adapt their maize with the improved seeds but due to the economic crises faced this year in Cameroon and the drastic increase in prices of goods and services, it has become difficult for the cooperative to continue its sensitization process by working with practical examples.

III.2. COMMON INITIATIVE GROUP (CIG)

In the same light, CIGs were created in the sub-division as a means of assistance to maize producers to work as a team to ameliorate their production capacity and selling power. In the Couse of our research, we came across certain Cigs and their functions that we will elaborate on in the paragraphs below**.**

III.2.1. Tawakaou Halilla Cig in Banyo

This cig was created by a group of women having as their main objective to work together on a command farm and the proceeds from the farm are shared among its members equally. The purpose of this joint action was to fight against the expensive nature of labor. These women believed that working together will save them some income that could have been spent on laborers. They have been working together in this way since 2011.

With assistance from the government they get improved seedling which they use in their farms and they are happy with the outcome as their produce is better over the years. This cig is also used as a point of sensitization so that other farmers reluctant to adapt their production may see reasons why they could adapt to the new techniques of production.

This cig was created also as a means to ease communication from the state to the local farmers, working as a group makes communication fast and easily adaptive. In other to reach as many farmers as possible, they were asked to create cigs to ease communication as a result the cig of Tawakaou was rated and since then they have been in communication was authorities to build each other.

III.2.2. CIG “la terre ne trompe pas”

This is an initiative group of young maize producers in Mayo-Fourou village. They have been existing since 2020 and are 12 in number. They have an objective to jointly work on each member’s farm. This joint force gives them the ability to work faster and more efficiently. And save money that was supposed Tobe used to hire laborers. These initiative groups came as a result of the scarcity that exited in getting workers caused by bike riding. Many youths now prefer to ride bikes as a source of living rather than engage in farm activities. As a result, this group was created and

since its creation, it has helped its members become more efficient in their farms and had also increased each embers output.

They encourage the use of modern seeds and fertilizers, with support from the ministry of agriculture and rural development, these farmers have started growing maize not only for home consumption but also for business purposes. This year, they faced the problem of scarcity of improved seeds because they did not receive seeds from the ministry because of the Ukraine-Russia crises as it used to be done in previous years

III.2.3. Ralatal "Rwire MDASSEWA (Mayo-Fourou)

Farmers in this cig share information on techniques of improving their financial situation geared towards an improvement of agricultural productivity. These common initiative adopts improved methods of agricultural production like an improved seedling, improve soil fertility, improve storage, and discouraging methods that reduce food supply. With the advent of these common initiative group, they have been an improvement in the Agricultural innovation, productivity, and trade of its members than before. Information from them. Regular quarter meetings, social gatherings, and associations involved in agriculture constitute the bedrock of these groups that receive attention. Research documents

The objectives of this common initiative group have been to uplift and modernize the agricultural sector from the base through common initiatives, evidenced in farmers' groups and associations. Today the agricultural sector in Cameroon is characterized by the existence of thousands of informal and formal farmers' groups, associations, and cooperatives

In an interview with XO:7 (field work in Mayo-Fourou on the 12:08:2022 with XO:7, 45years female) she has a lot of admiration for the group as she explains the reason why

> *Before, we worked in isolation and disorganized. But today, with the support of the state and some goodwill individuals, we understood the need to organize ourselves into a network of peasant innovators of which I am the president. This network allowed us to get to know each other better, bring us closer also strengthen our solidarity and share our knowledge. This network has also made it possible to identify a group of experimenting peasants distributed in 4 neighboring villages, to accompany us in the search for combinations of technologies best suited to improve the agricultural yields and our living conditions.*

From the above analysis, it can be said that a lot of efforts have been made by the State, non-governmental organizations, and civil societies to ensure an increase in maize production through several projects such as easy access to land, provision of work equipment, donation of seeds and fertilizers to farmers to improve their production. We could also add the sensitization carried out by non-profit organizations on climate change and the improvement of planting methods to achieve food security in Cameroon in general and in the Mayo-Banyo department in particular.

PART TWO:

LOW ADAPTATION AND PERFORMANE MECHANISM FOR BETTER OUTPUT OF MAIZE PRODUCTION IN THE MAYO-BANYO DIVISION

Techniques in maize production fall in line with sustainable agriculture. This improvement in agricultural techniques has been on an increase for the past decades, with an exponential increase in the world's population, there is the need to grow food around the clock and in all seasons to feed this ever-growing population. Despite the efforts put in place by the state and other stakeholders to improve farmers' adaptation process to new techniques of maize production in Mayo-Banyo precisely in the villages of Mayo-Fourou and Toukouroua. In other to fight against poverty, hunger, and starvation in the locality. Most farmers are resisting adaptation to these new techniques of production. Hence the theory of social representation which play a great role to understand why this resistance while the dynamic theory will evaluate the internal and external circumstances preventing easy adaptation. chapter 3 will focus on the factors responsible for farmers in adaptation to new techniques in maize production. While chapter 4 will focus on the factors that explain producers' approval of new techniques of maize production.

CHAPTER THREE:

INTERNAL AND EXTERNAL FACTORS OF THE LOW ADAPTATION OF FARMERS TO NEW MAIZE PRODUCTION TECHNIQUES IN THE MAYO-BANYO DIVISION

Adapting to new production techniques involves the complete transition from traditional agricultural practices (the use of labor to plow the fields, the use of rudimentary tools, the use of unimproved seeds, and reduced agricultural spaces) to modern agricultural techniques (use of machines, use of improved seeds and cultivation in large areas). The adaptation process could only be made possible if maize farmers understand what climate change is and why it is important for them to adapt their production system to maintain a constant increase in production over time. Contrary to this understanding, we will have farmers who are unwilling to change their long-term practice for something new. Therefore, in this chapter, we will examine the internal and external dynamics that explain the low adaptation process of farmers to new production techniques.

I. INTERNAL FACTORS OF LOW ADAPTATION PROCESS TO NEW PRODUCTION TECHNIQUES

Adapting to new production techniques involves abandoning old agricultural practices such as manual labor, use of traditional seeds obtained from the previous harvest, and adopting modern farming techniques which include the use of modern agricultural equipment such as tractors for labor and improved seeds for plantations. This part will be presenting cultural and social phenomena responsible for low farmers' adaptation.

Table 4: Cumulative Table Representing Data from Our Field Work

Type of obstacles	**Internal obstacles**	**Explanatory Factors**	**N of occurrence**
Internal factors which explain the low adaptation process of farmers to new techniques of production	Cultural Obstacles (8 times)	-limited knowledge of farmers on climate change -Climate Change is seen as an abstract reality -Cultural Transmission	13
	Social Obstacle (5 times)	-Agro-pastoral conflicts -Agriculture as a form of interaction	
External factors which explain the low adaptation process of farmers to new techniques of production	Economic Obstacle	Lack of finances and Information (2 times)	**4**
	Obstacles linked to low state support	Weak process of producers' sensitization (2 times)	
Economic Means	-The use of machines, qualified personnel, the use of modern seeds, fertilizers, and modern planting practice	-facilitate work - facilitate the creation of new seed species - Transform organic materials into fertilizers	**3**
II Grouping of Producers	-Grouping of Producers into CIGs and cooperatives - the age of the agricultural population -gender of the head of the family - The level of emancipation of the village head	-Contribute to government motivations -Encourage others to adopt -A way of transmitting knowledge.	**2**
Total			**22**

Source: Field Study

The sociological interpretation of the table above makes it possible to understand the internal and external obstacles which explain the weak process of adaptation of farmers to new techniques of maize production in Mayo-Banyo. According to their number of occurrences which is at (17) out of 22 respondents, the internal factors come first, then come external factors. It is in this chronology in ideas that we will structure our chapter 3 by looking at each component stated above.

Table 5: The internal factors that explain the low adaptation process of farmers to new maize production techniques

Internal Dynamics	Modalities of answers	Occurrences
I. Obstacles related to cultural phenomena	- limited knowledge of farmers on climate change -Climate change is seen as an abstract reality - Taste of maize as an obstacle to adaptation -cultural transmission	07
II. Obstacles related to social phenomena	-Agro-Pastoral conflicts - Agriculture as a form of interaction	02
Total		09

Source: Obi Eban Ruth (6th- 08- 2022)

The sociological interpretation of the table above makes it possible to understand that the cultural obstacle is the most important internal factor on the internal factors which explains the low process of adaptation of the producers to the new techniques, then comes social obstacles. It is in this framework of ideas that the third chapter is structured in six sub-parts that are limited knowledge of producers to climate change (i), the Phenomenon of Climate Change perceived as an abstract reality (ii), Taste of maize as an obstacle to adaptation (iii), cultural transmission (iv), agro-pastoral conflicts(v) and Agriculture as a place of family interaction (vi)

I.1. OBSTACLES RELATED TO CULTURAL PHENOMENA

A culture can be understood as “the set of traits, spiritual, material, intellectual and affective, which characterize a society or a social group (UNESCO, 1982). “For Edward Tylor (1974), who established a canonical definition of culture, it is a “complex whole” that encompasses

knowledge, beliefs, arts, morals, laws, customs, and any other capacity and habit acquired by Man as a member of society. In sociology, culture is analyzed as the ways of thinking, describing, and acting specific to a society, as well as the material and immaterial objects that together form the way of life of a group of people, the production of maize n is not exempt from this practice as the mode of production is strongly influenced by the beliefs of the population. Consequently, the failures of farmers in Mayo-Banyo division and specifically the populations of Mayo-Fourou and Toukouroua to adapt to new maize production techniques are due to cultural belief systems:

The obstacle in our study can be understood as a situation or a phenomenon that prevents farmers from adapting to new maize production techniques in the context of climate change. The attitude and behavior of farmers are influenced by a series of factors. In carrying out their daily agricultural activities, they will generally do what past generations have taught them to do, what their impulse tells them to do, or what their neighbors and friends are doing. Even when these practices may not be beneficial to them. Consequently, we identified the following socio-cultural obstacles that prevent Mayo- Banyo maize producers from adapting to new production techniques: limited knowledge of farmers on climate change, Climate change seen as an abstract reality, the taste of maize as an obstacle to adaptation, cultural transmission, agro-pastoral conflicts, and agriculture as a form of interaction

I.1.1. Limited Knowledge of Farmers on Climate Change resulting to low adaptation

In Mayo-Banyo division, the population does not adapt to new production techniques, especially in the villages of Mayo Fourou and Toukouroua because for them, climate change is not a reality in their society and what they see on television is mostly affected by developed countries where industries are seen as a main source of pollution causing climate change whereas here in Africa we have an abundance of trees and water bodies so there is nothing like climate change in Africa worse not in their village. This is how (AB:1) the situation

> *We are not affected by climate change and neither is my production, what I see on television is a political stunt pulled by the state to oppress us and make us accept their new seedlings to extort money from us and us feeding chemicals that will bring us disease in the long run, I believe these seeds are no different from the ones we keep ourselves, this is all to make us spend our money. Source (field survey carried out on 06/08/2022 on (AB:1),48,50, 52,40 years, males)*

As Henri Mendras (1984:66) affirms "*the traditional peasant cultivated the field which he had inherited and cultivated after his father". In this field, he knew all the smallest detail. {…} which often varies from place to place, humidity, and relief. Result of long years of apprentice*ship". From this point of view, the local farmer in Mayo-Banyo believes he knows his farm and his method of cultivation because this culture has been transmitted to him by his ancestors and can envisage solutions to the problem of reduction in harvests hence portraying a cultural point of view rather than an environmental improvement of its cultivation techniques.

There are a variety of prohibitions in the Mayo-Banyo division. Being an Islamic State, certain food taboos must be respected and honored by members of the community, we could observe a good example of taboos such as the consumption of "pork meat". Apart from food taboos, during our research period, we were also able to discover through our exchange with the study population that ignorance of the concept of climate change could be considered a taboo, in what we could consider as the "climate change taboo". "A Taboo could be defined as a practice that is not considered acceptable in the community. (AB:2) (interview carried out on 07/08/2022,57years, male), tells us that "*we here, we don't know anything about climate change, what we see is simply that the rains are coming late or too early compared to past years*". Upon further research, we realized that most respondents preferred to say 'variation' in wet and dry seasons rather than using the word climate change. It becomes difficult for a population to adapt to a change that they don't even know is happening. This simply explains the reason why the populations of Mayo-Banyo do not adapt to the new techniques of maize production.

I.1.2. Climate change seen as an abstract reality

During carrying out our research, we interviewed the chief of Mayo-Fourou who revealed to us that climate change is not only a natural event but should also be considered a spiritual aspect and should be treated as such. . Failure to follow these practices will have significant consequences for the community's total maize production.

Image 1: Impact of climate change on maize production

Source: Obi Eban Ruth (08/10/2022 in Mayo-Fourou)

These photos taken during direct observation show that climate change affects maize production despite the different measures that have been developed. Going into our interview with the AB:3, 75 years) makes us understand that**;**

> *the inhabitants of Mayo-Fourou perceive climate change as a revelation from our ancestors and we do not take these seasonal changes as ordinary, for example during long dry seasons it means that the gods are angry and that is why they refused to bless our land, and in other to appease the gods we have to offer sacrifice (killing cows and goats). These sacrifices soothed their hearts and we could be sure of the excellent weather conditions needed for our next season. This purification process goes as long as seven days where we pray and fast for self-cleansing, and the 7th day, we gather the whole community in the market square where the chief priest says out some enchantment and the caw and bulls are killed and their blood sprinkled on the ground. Followed by singing and dancing. Source: (field survey carried out on 08/10/2022 withn AB:2, 75years male)*

What could favor a good climatic condition in Mayo-Fourou was the way its people honored their culture and traditional beliefs. In case people had sinned, there had to be a purification session which had to be honored by all the members of the village. The cleaning ceremony could take up to a week (7 consecutive days) if all the villagers do not implement these practices, it will lead to a bad agricultural season such as increased plant diseases, increased price of agricultural equipment, bad weather conditions such as heavy rains or long drought

With modernization and an increase in population movement in the villages, partly caused by the increase in insecurity of the Islamic group (Boko Haram), people from different cultures have integrated into their community, this mixture of cultures has greatly reduced the level of cultural practices such as the offering of sacrifices to the gods to bless their land for each planting season. Such practices were part of their cultural beliefs passed down from generation to generation. This cultural mix brought about what we have today as a change in agricultural practices, as the gods no longer bless the fruits of their hands and their lands have become deserted compared to decades past. This may explain why maize production in Mayo-Fourou is steadily declining.

In another interview conducted (on 10:08:2022), (AB:4) explains why he viewed climate change as far beyond what we consider physical to something spiritual and should be treated as such in other to obtain a lasting solution to the failures of the inhabitants of Mayo-Fourou to adapt their corn production to new production techniques. In his words;

> *What is the need to try to adapt to new production techniques when the result will always be the same, our people are confused and there is a conflict that must be resolved before projects can be carried out. For the past few decades, our ancestors believed in Islam, but today we have a series of religions popping up left and right, it's not the same anymore. Source (field work carried on the 10/08/2022 with AB:4, 60 years male)*

This is to say here that the conflicts we see between religions are the causes of climate change in their community. The population could come together as one person and channel their request to their creator and they will listen but today this is no longer the case. It seems that if they were abandoned by the gods, it could be explained by the long rains and heavy rains that come with the strong winds that usually end up destroying the crops rather than watering them down, he exclaims;

> *We used to plant maize twice a year, but we don't do that anymore because the rains start late, so our bountiful season has also changed in aspect, the more time passes, the more our season of plantation lengthens. Our Ancestors could start planting in March but today it's July, a difference of five months*

This cultural change can be seen as a consequence of climate change. So adapting to new production techniques according to (AB:4) will not appear as a sustainable solution and their corn

production will not increase either rather if they could return to their roots (the ancestors believe in a GOD) then they would have had a lasting solution to climate change because it may seem that the prayers of these religious groups are causing confusion in the sky and causing the changes we see in the physical world in regards to climate change.

Along the same lines, Willis Jenkins et al (2018:91) argue that climate change could be viewed from a spiritual perspective, with each religion interpreting climate change from its values and norms rather than a simple understanding physical. He staked for religions explaining what climate change was, from these explanations one could conclude that despite the difference in cultural values, climate change had a similar consideration and therefore should be considered and treated with the utmost care regarding their diverse norms and values as he asserts;

> *The 2015 interfaith climate statement at the Paris meeting affirmed that all faiths recognize a moral obligation to avoid harm, respect equity, and care for vulnerable people. This closely follows the Parliament of the World's Religions' 2015 call for climate action, "Embracing Our Common Future," which also mentions duties to future generations and respect for all life*.

Along the same lines, Mike Humle describes climate change as more of a spiritual occurrence than just change as seen by scientists in his article Mike Humle (2017). His perspective matches that of the chief of Mayo-Fourou where he exclaimed about the existence of gods who promote growth or droughts in the village.

People have always sought to make sense of their variable weather, to seek explanations for why the gods seem to bless or curse mankind by offering them good or bad weather. Agricultural societies, in particular, have always been aware of their dependence on the gods of time, for the behavior of time makes the difference between abundance and scarcity, profit and loss, and between life and death herself. Yet religious modes of explaining climate change began to be replaced in the 17th century by naturalistic accounts of climate misdeeds.

From this, one could understand that the inhabitants of Mayo-Fourou do not adopt the new production techniques because they see climate change as a spiritual fact and that the adaptation of their cultivation to the new techniques will not help them to improve their production, rather if

there can be a single believe practice then their production will increase regardless of any form of adaptation although every religion has a way of perceiving climate change.

I.1.3. Taste of maize as an obstacle to adaptation

Despite the efforts put in place to bring farmers to adapt their maize production to new production techniques, some farmers are still strong resistance because they sense that these hybrid seeds are less tasty than their traditional seeds. That's why it's common for them to have little slogans like *"the village food tests better than that of the town". "Village food*" implies here that they are grown naturally without chemical fertilizers, while" *town-grown food*" is linked to the ideas they have around the crops grown in urban centers. Therefore, even if hybrid maize seeds were made available for each planting season, they would not stop planting their traditional seeds, but rather plant the two seeds on separate farms giving priority to their traditional seeds. In an interview with (XO: 1) (survey carried out on 08/11/2022 with XO:1, 50years, female) to find out why she is still making use of the traditional techniques of maize production, her answer was as follows: "*When I buy corn that has been grown with fertilizer, I know it because it has an odor, it is not natural and it does not taste good in the mouth compared to that grown with from natural fertilizer obtained from animal dumps*".

Likewise, during another interview, we understood that she was not the only one to consider the taste of maize as a factor in why farmers do not adapt their production to new techniques. (XO:2) (survey carried out on 08/11/2022 with XO:2, 52years, female) says for her part *"if you look at the grains of these improved seeds sold to us you will notice that they are very small and also very sweet, they taste unnatural in the mouth, they taste like sugar has been added to this*"

I.1.4. Cultural Transmission

The production links between parents and children are strong and a form of unity in farming and it is also a way of transferring traditional values and norms from parents to children, this practice gives parents the possibility of spending more time with their children through the long periods spent cultivating with their children, unlike modern farming methods which use "tractors" which reduces the working days and thus the time spent between parents and children is reduced,

mechanization allows plowing to be carried out quickly and to better respect the optimal sowing dates which is an important factor in yield.

In the same manner, parents do not have strict working hours for their children but the values that allow the father to be the leader of the "team" are respected while the mother and children are helpers to the entire team. This form of farming does not take into consideration skills rather it takes into account age and cultural values. That is why in such a system the father is allowed to be the head of the farming team.

In a survey carried out with (XO:3) in Mayo-Fourou she affirms that (survey carried out on 12 /08/2022 with XO:3,83years, female)

> *I prefer using these traditional methods of production because I spend more time with the children, during school periods we do not have any. I don't see them for long but working on the farm allows me to bond with them and makes me understand their lifestyle.*

In the same spirit, Céline Bessière (2004) affirmed that "*Farming families are united entities. They are both places of production and circulation of feelings, reciprocal family obligations, affective and personal ties, but also bearers of the interests of individuals and between relatives".*

I.2. OBSTACLES RELATED TO SOCIAL PHENOMENA

In this part, we will be presenting the social obstacles responsible for the low adaptation of farmers to new techniques of maize and they include agro-pastoral conflicts and family exploitation as a place of interaction.

I.2.1. Agro-pastoral Conflicts

The most common activities carried out in Mayo-Banyo are agriculture and animal husbandry. Over the past 25 years, conflicts between herdsmen and farmers have increased. In a focus group discussion that took place in Mayo-fourou and Toukouroua, participants made it clear to us that there was a long-standing conflict that existed between herdsmen and farmers. Land borders are known to be the main cause of these existing conflicts because most headsmen do not respect their limits of space to graze their cattle. Disgruntled farmers view this act as disrespectful

and engage in a verbal and physical struggle that ends in the destruction of property and loss of lives.

(BA:5) was firm in his speech and blamed the influx of cattle on farms for the failure of farmers to adapt to new maize production techniques in Mayo-Banyo and especially in Toukouroua villages and Mayo-Forou because he asserts ”*what is the need*? *Investing so much money in buying seeds, renting tractors to run a farm where you might only harvest half of it and the rest will be destroyed by cattle? We should carry out our traditional method in other not to cry too much when this happens”. Source:* (field interview conducted on 12/08/2022 with AB:5.60years male)

In the same view, (AB:6**)** “*I always have to secure the boundaries of my agricultural land to avoid encountering a situation where my maize will be destroyed. I use sticks and iron bars but the security is partly because some of the parts of the farm are still destroyed by cattle*” (Field interview 08/10/2022, 60 years, male) Despite the efforts put in place by the state and local authorities to control these cattle, the destructions have increased over the years. This is the result of longer lifespans and the increase in animal diseases. The herdsmen are obliged to be in constant movement in search of land for grazing, during these movements the farms which are along their route are destroyed. Most of the farmers in this community have lost hectares of farms to herdsmen as they migrate to a new settlement.

Again, conflicts between herdsmen and farmers are caused by the change in planting season caused by climate change. The planting season drifted at a difference of five months. Maize was officially planted in March in Mayo-Banyo but today it has been moved to July. According to (AB:6), the unsuitability of farmers to new production techniques is the shift in the planting season which coincides with the grazing seasons for cattle. “*we have to fight to have land for agriculture and at the same time the cattle need this land for grazing, I can’t put so many inputs and I’m afraid that they will be destroyed in this difficult economy*” (field survey 12:08:22-10:17 with AB:6, 71 years, male). In the same line, John Peter Okoro (2018) in Cotula Toulmin & Hesse (2004) asserts that the existence of conflicts between chiefs and farmers is due to the search for fertile land

At first, the rainy season was characterized by cattle raising, greater milk production, and shorter grazing hours, cattle raising coincides significantly with the production of arable crops

resulting from the conflict between herders and farmers. The resulting increase in competition for arable land has often led to serious outbreaks of hostilities and social friction between the two user groups in many parts of Cameroon. The conflicts have not only increased the level of insecurity but have also demonstrated a high potential to exacerbate the food crisis in Cameroon and other affected countries due to the loss of lives of farmers, animals, crops, and valuables.

Along the same lines, Chris and Smith (2020) go on to assert that the causes of these conflicts between herdsmen and farmers have existed for many years, but in recent decades they have become more prevalent due to an increase in population and increased insecurity forcing people to leave their home colonies

> *The livelihoods of farmers and pastoralists depend on reliable access to land and water. While farmers tend to be sedentary, traditional nomadic and semi-nomadic herders graze their livestock according to seasonal migrations and seek water and pasture that will sustain their herds, often crossing national borders to meet these needs. As pastoralists migrate in search of water and pasture, they may encounter farms, insecurity, and other population centers that block traditional grazing routes, legal grazing reserves, and water points. Where different livelihoods overlap, deadly clashes have sometimes erupted between farming and pastoral communities due to encroachment on farmland, crop damage by livestock, theft of herds, and deterioration of farming systems resolution of these conflicts.*

From all that was said and observed during our focus group session with maize producers in Mayo-Forou and Toukouroua, one could conclude that the failure of farmers to adapt to new methods of producing maize corn is the fear of investing in the acquisition of modern equipment for agriculture and cultivation.

I.2.2. Agriculture as a place of family interaction

Family interactions occur mainly during planting and harvesting periods. Like both parents, children and extended relationships spend more time working in the fields. Traditional values are easily passed on to children during these times as they watch how the elders perform their distant practices. Also during these times, stories about their beliefs and cultural norms are told to children who in turn accept them and it becomes part of their personality. Therefore, adapting to new production techniques will bridge these interactions that have existed between family members as machines use less time, especially since adapting to new production techniques will involve the

integration of foreigners (experts who teach them new production methods such as engineers and agro-technicians) in their family environment, thus breaking up this long-standing culture that only existed between family members. (AB:7) in Toukouroua highlights the importance of the interactions that exist between the family members in his remarks

> *we prefer to do a small peasant agriculture because we stick to each other and we watch over each other on the contrary with the use of modern technology, first we will not spend much time together as before, because the machines will take over our working time and also we will not practice subsistence agriculture rather we will seek industrial agriculture because earning money will be at the center of our existence we do not wish to lose these dykes to the pursuit of worldly reach* source: (field survey carried out on 09:08:2022 with AB:6, 60years, male)

In the same sense, Henri Mendras (1984:102) speaks of family farms as a place of interactions, the author makes us understand that each of the members of his family is at the same time a work companion:

> *The father most often retains the management of the farm, otherwise, he remains the adviser whom we respect; the woman takes care of her activities while participating in many of the men's jobs, and the children are apprentices and constant helpers. Stains are regulated by custom according to gender and age.*

From the above, it can be seen that the family plays an important role in the socialization process of their children. Learned behaviors become difficult to change over time and space. This could explain the poor adaptation process of farmers to new production techniques.

II. EXTERNAL FACTORS OF FARMERS' LOW ADAPTATION TO NEW MAIZE PRODUCTION TECHNIQUES IN MAYO-BAYO DIVISION.

Besides the internal factors responsible for the low adaptation process of farmers to new production techniques, there are also external factors that are considered as reasons for the low adaptation process of maize farmers to new production techniques. They include economic and political factors.

Table 6: The external factors that explain the low adaptation process of farmers to new maize production techniques

External Factors	Modality of responses	occurrences
III. Economic Obstacles	-Cost of modern farm equipment - transportation cost	05
IV. Obstacles linked to low state support	- Lack of support staff - Lack of channel of information on state subsidies (iv).	03
Total		08

Source: Field survey August 2022

The sociological interpretation of the table above makes it possible to understand that the economic obstacle is the most important external factor on the external factors which explains the low process of adaptation of producers to new techniques. then come to the obstacles related to low state support. It is within this framework of the idea that the second part of the third chapter is structured in four sub-parts that is: the high cost of modern farm equipment (i), cost of transportation(ii), lack of support staff (iii) and lack of channel of information on state subsidies (iv).

II.1. ECONOMIC OBSTACLE RESPONSIBLE FOR THE LOW ADAPTATION OF MAIZE PRODUCERS TO NEW TECHNIQUES OF PRODUCTION

In the context of our work, economic obstacles refer to the financial and material means needed by farmers to adapt their production to the new techniques of agriculture and as a result, we are going to group these economic obstacles into two categories namely expensive nature of working equipment and high cost of transportation.

II.1.1.The high price of modern agricultural equipment

Modern agricultural production is capital intensive as it uses “tractor” machines which are expensive if they have to be rented or even purchased, modern seedlings, fertilizers, and insecticides used are also expensive and sometimes limited in supply. This modern method also requires additional experts in the field to guide farmers on when to apply insecticides and

herbicides. Some of these farmers in question are migrants from neighboring countries (Chad and Central African Republic) who do not have access to large areas and therefore cannot afford the expensive equipment that comes with these new production techniques.

Thus, compared to traditional methods which require less capital because in terms of equipment there is the use of hoes and cutlasses and in terms of sowing they make use of the previous harvest in terms of fertilizer they make use of animal dumps even without sowing the soil, the cows are allowed to graze the area for some time and their dumps are also a form of fertilizer for their farms. In addition, they do not need additional qualified personnel to teach them how to carry out their agricultural activities, which reduces the expenses incurred by the farmers. (AB:7) explains his perception of modern production techniques

> *I would have loved to adapt my crops to these new production techniques such as the use of hybrid seeds for planting and machines for sowing the soil, at least I will work faster and have less body pain after a day's work, but the problem is that we don't. Because we are not sons of the soil, we don't have the resources to get these modern farming facilities, and that's why we still practice this traditional method of farming, if our fathers did, so do we can do it. Source: (field survey carried out on 11/08/2022 with AB:8, 71years, male)*

The use of modern agricultural techniques undermines long-term soil fertility, and the intensive use of chemical fertilizers, insects, grasses, and machinery will lead to the destruction of the natural fertility of the soil and the dependence of farmers on these techniques. Thomas Daum (2020) states that

> *Mechanization can harm long-term soil fertility, especially when disc plows are used. The use of heavy tractors can trigger soil erosion. The tractor increases the compaction of the soil considering the weight, it follows problems of flooding and erosion, which considerably reduce the fertility and consequently the yield*

II.1.2. Distance of Producers From Urban Centers

The remoteness of villages from the urban center is also responsible for farmers' inability to adapt to new production techniques. The urban centers where these hybrid seedlings are sold are far from the villages, which means that farmers have to travel far to obtain these seeds and also have to travel a long distance. Apart from the distance, there is also a problem of insecurity in road transportation as there has been a reoccurrence of accidents causing so many injuries and deaths.

Farmers are not willing to risk their lives to get seeds that are subsidized with their traditional seeds. This transport cost is a limiting factor for farmers to adapt to new production techniques. Unlike traditional production methods where seedlings are taken from previous crops, meaning that they don't need to travel in search of planting seeds, it costs less and takes less time. An interview conducted in Toukouroua with (AB:8) on 11:08:2022 at 1030am confirms the latter "*If I need to get these modern seeds I will have to travel a long distance spending no less than 1000 frs on transport to the big city market, whereas with this method of cultivation all I need is to select seeds from my previous harvest"(source,AB:7,carried out on the 11/08/2022 with AB:7,81years male)*

From this point of view, we can retain that, the scarcity of these seeds is a cause of the adaptiveness of the producers because the latter must provide more effort to have seeds.

II.2. OBSTACLES RELATED TO LOW-STATE SUPPORT

For a population to move from their traditional methods of practicing agriculture to a modern system, there should be massive government assistance to guide farmers into accepting and adapting to these new techniques. A series of activities need to be done including sensitization, and government financial and material support to assist farmers. In situations where this assistance is not felt by farmers then they will be unwilling to change their long-time agricultural practice.

II.2.1. Lack of Agricultural Technical Support Staff

For a new product to be adopted in a community, there must be a wide dissemination of information about this product. In the case of modern maize production techniques including herbicides, modern seeds, and the use of machines (tractors), it has been observed that many farmers are unaware of this information which could help them increase their local production in the face of changes in climatic conditions. The level of awareness is slow because most farmers have not come across these teachings on modern production techniques. In an interview with (AB:9), he made us understand that the personnel available to carry out the sensitization on the new production techniques are not enough and the information does not often arrive in time in certain villages.

The sensitization process takes a lot of time because in terms of human resources we are just for us in the office and during the planting season that is to say when we do sensitization in the most affected villages. the outreach method used hands-on where we teach using examples for example we could ask a farmer who is willing to give us a piece of his land to plant using the improved seeds just to compare its level of growth compared to traditional seeds. During harvest, the portion of land used for growing modern seeds does better than that of traditional seeds. With this, farmers can see the differences between the two seeds. To carry out this activity, from village to village, you can go to certain villages when they have already planted their plantation, coupled with the fact that apart from fieldwork, you also have to do administrative procedures and therefore the lack of information is a difficulty we encounter here. (source: field survey with AB:8,54years male)

In the same perspective, Ayat Ullah et al (2022) point out that lack of information could delay the process of adapting farmers to new production techniques, regardless of the quality of the technology, this should be supported by a mechanism appropriate information to enable farmers to adapt their crops and produce in a smart environment.

Agricultural technologies have been steadily developed and their uses are promoted to benefit farmers and include genetic improvements in seeds, climate-smart technologies, fertilizers and integrated pest management strategies. However, in the developing world in particular, adoption of these agricultural technologies has remained low. There is no doubt that these studies are useful in understanding the barriers to technology adoption. Therefore, farmers' awareness of technologies, such as improved varieties and fertilizers, is an important indicator of their adoption of the technology.

II.2.2. Lack of information on state subsidies

To get farmers to adapt to modern reduction techniques, the State has decided to grant subsidies. (The various subsidies granted by the state are explained throughout chapter two) nevertheless, most farmers do not adapt to these new production techniques because they lack information on the subsidies granted, this information is limited to certain categories of people. And in situations where the information is known, the subsidy is insufficient. In the case where a farmer has 10 hectares of maize fields and the subsidy covers 2 hectares, the farmer will have to purchase the remaining 8 hectares of seedlings, which will triple the cost of production from its original cost. Sometimes the irregularities that exist with the seeds cause the insecurity of the farmers in obtaining these subsidies. These absences of subsidies and the lack of information on the exact day farmers will have their subsidies or not are considered to be a factor in the

maladjustment of farmers to these new production techniques. In an interview with (AB:10) in Mayo-Bayo he mentioned that

> *the government usually sends subsidies in the form of seedlings which are distributed to various farmers but sometimes these seeds arrive late and the distribution process is longer this year especially since we did not obtain these subsidies due to the crises between Ukrainian and Russian farmers are forced to buy in the market and the prices have also increased with the overall increase in the prices of goods in the market. Source: (field survey carried out on the 12:08:2022 with AB:8,54years, male)*

In the same logic, TNH (2009) affirms that despite the tears of the farmers to obtain the subsidies do not reach the most the population (press news)

> *Following deadly riots triggered in part by high food and fuel prices, the government announced in April 2008 an "emergency plan" to strengthen the country's agricultural sector. The government said it would partly subsidize farmers' fertilizers and equipment. So far, we have seen absolutely no realization of this plan on the ground. It seems that this huge program was announced just to calm people's anger at the time, but everything remained only intentions. 20-25 years ago the government strongly supported the farmers, but after the structural adjustment programs it ended*

At the end of this chapter, it appears that the factors influencing farmers' lack of adaptation to new production techniques are both internal and external. And this is grouped into four sections: cultural (weak culture of producers to climate change, climate change as spiritual perception, taste, and cultural transmission). Social factors (agro-pastoral conflicts, lack of manpower) economic obstacles (high cost of products, cost of transport), and finally political obstacles (lack of support staff, lack of information channel on subsidies of State). However, what is the mechanisms that explain farmers' innovations in new maize production techniques in Mayo-Banyo?

CHAPTER FOUR:

MECHANISMS OF ACCEPTANCE OF NEW MAIZE PRODUCTION TECHNIQUES IN MAYO-BANYO DIVISION

Climate change and variability are not new phenomena, but they have taken on a particularly significant scale in recent decades. All continents are affected by this phenomenon but to varying degrees. In Cameroon, the strong dependence of the majority of the population on agricultural and pastoral activities depends on the climate. This situation justifies all the attention that the national public authorities and the international community pay to the urgency of setting up programs to reduce the vulnerability of poor populations, particularly those living in rural areas. However, despite its importance, this attention from development organizations should not suggest that local populations are passively subjected to this situation. On the contrary, they did not wait for a signal from the outside to become aware of the phenomenon and put in place appropriate and often innovative strategies and solutions to deal with climate change and variability. In this chapter, we will present the different forms of adaptation perceptible in the Mayo- Banyo. It will be proper for us to also present the mechanisms which have favored the adaptation of certain agricultural producers, namely: the economic means, the grouping of producers,

I. ECONOMIC FACTORS THAT PROMOTE THE ADAPTATION OF MAIZE PRODUCERS TO NEW PRODUCTION TECHNIQUES.

Raymond Boudon's work on the evolution of values makes it possible to explain social innovation as a social phenomenon (Boudon, 2002). Boudon borrows the notion of individualism from (Weber 1971), the idea of the process of rationalization of values. Changing practices is risky, and farmers who have adapted have taken calculated risks they understand the impacts involved and have compared these alternatives with the 'old' techniques, and therefore determine that the alternative is better. This change was made possible by extensive sensitization of agents, suggesting to the farmer that innovation improves productivity, and explaining how much the innovation costs, how to use it, and what benefits are expected from its use. From this, one can expect a smooth adoption of innovative maize production techniques. One of the main things an extension worker does is promote these new technical practices to risk-averse farmers and encourage them to try them themselves or get involved in groups that are trying to make likewise.

In this fact, some farmers distinguished themselves from the totality of the agricultural population by adapting to new production techniques. The North Cameroon region is characterized by a degradation of natural resources with significant socio-economic consequences for the populations. Faced with these difficult environmental conditions for agriculture in the Banyo locality (Mayo-Forou and toukouroua). To improve the productivity of maize, the producers have resorted to modern agricultural techniques through investments of an enormous economic capital during the agricultural campaigns, and this is observable through the use of machines, a qualified workforce, and the use of improved seeds, fertilizers, and modern planting methods.

However, speaking of the use of machines, innovators use tractors for various activities. Like clearing. Tractors are used to plow large areas and they take less time to do this work. Compare to those who use physical power for clearing. Similarly, tractors are also used to spread products (herbicides and insecticides) on arable land. In addition, tractors are also used for planting and the fertilization of the maize fields and also harvesting. This is how in an interview with (XO:4) asserted:

> *When I had 03 hectares, I did the work by hand but with the extension of my fields to 15 hectares, I used the machines. It facilitates the work because before I had to travel to Kousseri to look for workers and it was very expensive in terms of accommodation and salary. But with machines, the work that could be done in a week is done in a day: Source: (field survey of 03/08/2022 with XO:4, 49years, female in Mayo-Fourou).*

From the explanations given above, it can be understood that the use of machinery in agriculture is important and more profitable, in the sense that there is a suitable mechanism that helps in plowing, planting, harvesting, and especially the application of fertilizers and herbicides at appropriate levels. Thus influencing the growth of plants and thus increasing their possible yields. It is with this observation that (Segun R. Bello, 2012) asserts that

> *Plowing the soil with the machines is done to destroy the shelters of pests and disturb their life cycle, aerate the soil, eradicate weeds, incorporate crop residues, manure, fertilizers, and weed killers, and facilitate the setting to implement other agricultural cultivation practices. After obtaining a suitable seedbed, crop growth mainly depends on the proper sowing depth, because seeds that are too shallow are prone to bird attack, while seeds that are too deep may not germinate due to a heavy soil load on the seeds. Thus, planting with machinery gives the plant the right depth needed for it to germinate.*

In addition, speaking of skilled labor, to increase production, maize producers employ agro-technicians. Farm management skills are very diverse and much cannot be learned from a book but only from experts in the field. It is only with the advice of experts that many farmers learn the difference between good and bad decisions, and the differences between profitable, less profitable, and unprofitable farming practices (Noemi Nemes, 2009). These qualified people guide most large agricultural producers through the various steps to increase their productivity. These agro-technicians follow the plantations from the preparation of the space through the sowing until the harvest by telling the farmers when to add fertilizers, and how to weed and treat the pests. Therefore, to increase production, these technicians advise farmers to use modern seeds which are more resistant and grow at a faster rate than traditional seeds. Indeed, to obtain the expertise of these qualified agro-technicians to help monitor seed quality or even better develop a preferred seed, it is necessary to have financial stability in addition to paying for their expertise. (XO:5) affirms that;

> *I didn't like traditional maize because it didn't work well at the same time, I also didn't like modern maize, so I had to enlist the help of agrotechnicians who developed my cereals that combine both the traditional and modern maize seedlings and that's what I used in my 15 hectares of land and they are doing well as you can see for yourself.: Source: (field survey with XO:4, 49years ,female on the 03/08/2022, in Mayo-Fourou)*

From the above statement, we could understand the importance of experts. That is to say (a collaboration of farmers and experts). This collaboration is not only important for the farmers but for the whole population. Cooperation between farmers and experts is important since, thanks to their expertise in agricultural matters, post-harvest waste can be reduced thereby increasing the food supply of the population. Farmer-to-farmer collaboration is also important and could be encouraged as knowledge and skills can be transferred from farmer to farmer with little or no cost paid, increasing productivity.

Moreover, in terms of fertilizers, farmers who have adapted to new production techniques have done so with the use of fertilizers. These fertilizers are not primarily chemicals, but strategies derived by farmers to control pests in their farmlands. According to these words, we can understand that adaptation is not only summarized in terms of equipment, it is also a new agricultural initiative that is adopted to increase productivity. These are the same explanations that (XO:6) makes us understand (interview carried out on 07/08/2022 with XO:6,55 years female) "*to*

block the way to invaders I buy the skins of caws during the periods of Ramadan a little everywhere as it is cheaper during this period that I burry in all the field after sowing. They are used to attract ants which kill the termites which come to destroy the seeds". This illustration shows us that farmers can do without insecticides to keep invaders away from production areas.

In the same logic, AB:9, (interview carried out on the 06/08/2022 with AB:9, 48 years male) makes us understand that fertilizers today are very expensive. Despite this, some of them have looked for new ways to continue and even improve their production. By practicing animal husbandry to find an agricultural balance "*for example, I have a farm, I collect the waste that I dry and when my maize is already a month old, I take people who help me to spread this waste throughout the planting they serve to fertilize the soil and increase production.* As a result, we can see that farmers use their imagination to restore soil fertility and ensure constant production to meet the needs of the population.

The modern planting method is an explanatory factor in the process of adapting producers to new production techniques. Because this method directs the sowing which is done in line. The gap between the maize plants according to AB:10 (interview carried out on the 06/08/2022 with AB:10, 61 years male) is 15 cm and the gap between the lines varies between 70 and 80 cm, unlike traditional techniques which do not respect the distance between the feet of corn and the lines. The modern cultivation technique facilitates the treatment of the field by "*herbimais*" and the spreading of fertilizers because it facilitates the circulation of individuals in the fields; likewise, it also makes it easy to break dry maize. In addition, this technique makes it possible to cover and exploit the entire cultivable area.

Image 2: Modern maize cultivation method

Source: field survey Obi Eban Ruth (

This photo taken during direct observation shows that farmers who have adapted to new production techniques prefer to sow in rows because this sowing method increases production and facilitates harvest.

From these points of view, it can be understood that the factors that influence the adaptation of farmers to new production techniques are financial and most of the producers who have adapted to these production techniques are mainly those who are educated and have acquired experience in the field of agriculture in the broad sense. Moreover, adaptation processes are mainly for marketing purposes rather than home consumption practiced by small-scale farmers. In addition to the economic aspect which influences the adaptation of farmers to the new production technique,

we also have the grouping of farmers into Cooperatives and Cigs, the age of the agricultural population, the sex of the family head, and peer pressure.

II. GROUPING OF PRODUCERS

The process of grouping farmers into cooperatives and cigs has also favored the adaptation of farmers to new production techniques in Mayo-Banyo. The goal of most cooperatives and cigs is to increase agricultural productivity for marketing, which is why most farmers who belong to these initiatives have learned and adapted to new agricultural techniques to increase their production, improving thus the adaptability of these farmers to new production techniques.

Moreover, farmers find it easy to adapt to new production techniques through CIGs/Cooperatives as most government subsidies still favor those who are part of the initiatives and groups. It should be noted that government agricultural subsidies come in the form of seeds, fertilizers, sensitization on agricultural techniques, and modern work equipment. Therefore, being part of a corporation or a CIGs automatically means adapting your culture to reflect the subsidies granted by the government. Cooperation between farmers and other farmers is also enhanced and influencing farmers' adaptation to new maize production techniques. Indeed, through interaction with farmers who have adapted, it becomes easier to convince other farmers who are yet to adapt to do so. Even more, this is done with the harvested product. The harvested product is seen as a form of rapid testimony that facilitates and influences farmers to adapt to new production techniques.

Through field observations, we found that younger farming households adapted their agriculture more than older farming households. This is consistent with the findings of the (National Climate Change Adaptation Research Faculty, 2011), which observed that the physical strength, endurance, and mobility of older people are reduced due to age, making them unable to adapt to new production techniques. The Organization for Economic Co-operation and Development (2016) also estimated that age affects the ability of older people to adapt to new agricultural production techniques, even if they are concerned about climate variability, they are unable to personally take action to stop it. Young farming households are more likely to adapt to climate variability than older farming households. Age is a determining factor for a person's more or less acceptance of climate variability and willingness to adapt accordingly.

In addition, household heads are very important in helping farmers adapt to new production techniques. As we observed in our study area, we saw that individuals and families who had adapted to new production techniques were led by dynamic family heads. Most of these heads of families were male. It is in this sense that a study was conducted in London by (Akinyemi Leocadia Zhou, 2021) to see which sex will adapt to new agricultural production techniques and it was found that the descriptive statistics indicate that the majority of farming households in London are headed by women (53%) rather than men (46.8%). Consequently, it is more difficult for women farmers to adapt to new production techniques compared to men, as shown by the marginal effects where women have a 7% probability of not adapting to new production techniques compared to men because women are confronted with numerous cultural constraints which then make it more difficult for them to apply certain coping methods.

From this observation above, we could say that gender plays an important role in the adaptation of farmers to new production techniques. Therefore, to get more people to adapt to these new maize cultivation techniques in Banyo (Mayo-Fouru and Toukouroua), it is then necessary to start sensitizing the sons and husbands of the community. Due to their cultural heritage, they are the heads of the family while the women and children succeed them. With this design in mind, adaptation to new production techniques will be made possible and easy.

Moreover, the adoption of new techniques in farming practices is a personal decision, determined by the benefits of the practice itself as well as the preferences, incentives, and constraints of the individual farmer. However, societal factors strongly influence how an individual farmer perceives farming (Durham, 1997), and the decisions of individual farmers.

Similarly, peer pressure plays an important role in farmers' willingness to change practices. In the interviews conducted as part of our research, the question "what will my neighbors think of my way of doing things" was mentioned several times as an obstacle to changing practices. In this context, "opinion leaders", the individuals in a community who have adapted are primarily those who have been exposed through education or have empowered leaders to know how other communities practice agriculture. Communities that have adapted are strongly influenced by their traditional leaders. As they influence the behavior of other members of the community, they have an important impact on land users in their decision-making. They maintain or create new norms in a community, which influence the behavior of other land users. Therefore, gaining the approval

and trust of opinion leaders is a key driver toward the adoption of sustainable practices by farmers. A village or community without such a leader will be slower to adopt than communities that have active opinion leaders

Table 7: Factors That Influence the Adaptation of Maize Producers

Factors favoring adaptation	Explicative factors	Responses
1. Economic means	-the use of machines, -The use of qualified agro-technicians - the use of improved seedlings, -the use of organic fertilizers -modern planting methods	-Facilitate work -faster than manual work -the possibility of developing new seeds -production of organic fertilizer from waste
II. Grouping of Producers	- Grouping o producers in cooperatives and cigs - Age of the agricultural population -sex of the family head - the emancipation of the village chief	Contribute to government grants -Encourage others into adapting through the transmission of knowledge
Total		

Source: fieldwork (August 2022)

The interpretation of the above table helps to understand the factors that promote the adaptation of farmers to new maize production techniques in Mayo- Banyo. According to our illustration (60%) of these successes are attributed to the economic factors as it comes in the first place, then comes the grouping factors with a percentage of (40%)). It is within this framework of ideas that the chapter is structured into nine sub-parts: use of machines (i), skilled labor (ii), use of improved seeds and fertilizers (iii) youth farming households (iv), modern planting method (v), the Grouping of producers into cigs and cooperatives (vi), the emancipating of the village chief (vii), the gender of the family head (viii) and peer pressure (viii)

From the above analysis, it is understood that many factors constitute an obstacle to the process of adaptation of farmers to new production techniques. Nonetheless, several other factors, including economic viability and farmers' cooperatives, are considered influential factors in the adaptation of farmers to new production techniques in Mayo-Banyo division

GENERAL CONCLUSION

At the end of this scientific exercise, our wish is to have enlightened our readers on the obstacles caused by the low process of adaptation of maize producers to the new production technique. Our research work consisted, essentially, of presenting the internal and external factors which explain this low process of adaptation of maize producers in Mayo Banyo (Mayo-Fourou and Toukouroua). In this sense, it is important to remember that our effort first consisted in evaluating the level of knowledge of the problem of new maize production techniques in the context of climate change.

To better understand the object of the study, it was important to define a common thread to guide us throughout the research. It is in this sense that our work was structured around the following central question: How to explain and understand the low process of adaptation of producers to new production techniques of maize in the Mayo-Banyo division? In this question, a hypothesis was formulated, namely: We can explain the low process of adaptation of producers to new techniques of maize production through the lack of material and financial capital.

Note, however, that this hypothesis was only a provisional answer to the original question. To this end, it was subjected to the test of the facts of the realities on the ground. Indeed, the sociology of environment studies, like general sociology, aims to flush out the social reality hidden behind social appearances. As part of our study, the data collected in the field made it possible to arrive at certainties. Thus, the confrontation of hypotheses with facts is more likely to provide information on the results of this research. This conclusion is therefore mainly focused on the discussion of the results, the lessons learned from the study, and the projections for the end of the research.

On this subject, to know if the hypotheses put forward at the beginning of our work are confirmed or nullified after our field survey, it is necessary to move on to the phase of verification of the specific hypotheses formulated at the start. As part of this work, two secondary hypotheses were formulated at the beginning of this research. We proceed to the verification of each of them separately.

• **Secondary Hypothesis n°1**

"Agricultural innovations are perceived by the farmers of Mayo-Banyo as a form of domination that leads to the loss of socio-cultural landmarks. (the ways of ancestral production".

The field survey and the data taken from several documents made it possible to note that the producer of maize in Mayo Banyo division are:

• Holding on to the form of traditional production as a means of preserving their tradition which is transmitted from generation to generation

• Low or abundant harvest is attributed to the village gods, so in situations where there is abundant harvest, it is said the gods are happy and they have made the harvest to be so. On the other hand, it means precisely that the gods are not happy and it is seen through their decline in harvest.

• The form of traditional agriculture promotes living together unlike the modern technique

• Agriculture is seen as a traditional norm and value which should not be regarded as a means of getting rich.

Because of the field data and our direct observation, it is obvious that the first hypothesis put forward is in line with the reality on the ground and is therefore completely confirmed.

- **Secondary Hypothesis n°2**

"The factors that explain the low adaptation of maize production in Mayo-Banyo are internal (the quality of seeds, the quality of the soil, and the persistence of the agricultural tradition) and external (the equipment which is expensive, the lack of information on new techniques and climate change"

The field survey also revealed two types of obstacles that favor the low process of adaptation of producers to new maize production techniques in Mayo-Banyo (Mayo-Fourou and Toukouroua). Namely the internal and external dynamics.

As for the internal dynamics, with the field data and our direct observation, we were able to observe that.

Concerning the internal dynamics, the sociological analysis of these verbal responses from respondents revealed two internal obstacles (cultural and social obstacles). The cultural barrier is sub-divided into four categories, namely: the limited knowledge of farmers on climate change, climate change perceived as an abstract phenomenon, obstacles linked to taste support, and transmission of cultural values

Concerning the social obstacles linked to the low process of adaptation of producers to new maize production techniques, we find there: agro-pastoral conflicts, and agriculture as a place of family interaction.

As for the external obstacles, the sociological analysis of the verbal expression of the respondents revealed two external obstacles, namely: economic obstacles and low state support). The economic factors and the absence of specialized personnel subdivide them into two (the cost of modern equipment and the distance of producers from urban centers). The fact is that economic factors have a great influence on the process of adaptation of producers to new maize production techniques. Shows that the:

Data collected from the field with regards to our secondary hypothesis n°2 is also completely confirmed.

From the above, it should be said that all these hypotheses have been confirmed following direct observation in the field and the interpretation and analysis of data collected in the field. The results of the confrontation of our hypotheses with the facts concur.

To corroborate the content of the main hypothesis which indicates that: "*We can explain the low process of adaptation of producers to new maize production techniques through the lack of material and financial capital".*

As for the lessons learned from the study, it must be said that, theoretically, this work is based on three models of analysis, namely dynamist theory, social representations, and strategic diffusionism. The use of the dynamist theory by Georges Balandier has made it possible to highlight the different endogenous and exogenous factors linked to the low adaptation process of maize producers towards new maize production techniques. In addition, the use of Serge Moscovici's social representations has made it possible for us to understand why most maize

producers are reluctant to adopt new production techniques because they do not want to stand apart from the rest of the producers in Mayo-Banyo as they will be regarded differently in the locality. And finally, the strategic diffusionism of Evette Michel Roger also makes it possible to analyze the different phases needed for adaptation to pass through so that it becomes complete and acceptable to all.

On the disciplinary level, this work falls squarely within the requirement of interdisciplinary studies. Because the need for the human sciences to open up to other sciences is now accepted. Thus, by focusing on this theme, we wanted to base our analysis on an interdisciplinary approach. It is therefore a way of "praising inter-disciplinary studies", especially as the Cameroonian sociologist Valentin NGA NDONGO points out the fact that a man in society is whole to be grasped in its physiological, anatomical totality, sociologically, anthropologically, and psychologically[16].

In addition, this sociological study, which, at the onset, was intended to be a contribution to the sociology of the environment, in a broader framework has been extended to other areas of general sociology such as the sociology of development and rural sociology. Similarly, it has also been extended into areas other than sociology such as environmental law, and socio-cultural anthropology.

- **Sociology of Development**

In this study, the sociology of development[17] was mobilized for two reasons: the first is that from the field results we found that the different factors that explain the low adaptation of producers are internal and external that is the socio-cultural and the economic dimension. The second is that this work has discovered the different factors that can influence adaptation (economic factors and the willingness of producers to work in groups). In addition, it was materialized in this work by the

[16] Valentin NGA NDONGO, cité par France Brandie EFANGONO, dans son mémoire (2022).

[16] Sociology of development: it is a specialized branch of the new sociology which studies the problems of development and which has as its field of study developing societies. In short, it is the sociological study of developing societies, namely: developing countries, developing local communities. In this paradigm, our research work is part of a professional or contractual sociology of development focused on fundamental research. Also called sociology of intervention or sociology of development support because it operates in the field in support of development activities and projects.

dynamist theory of Georges BALANDIER and made it possible to focus on the relationship that exists between local factors and national responses.

- **Rural Sociology**

In this study, rural sociology[18] has been mobilized to demonstrate that from field results the process of adaptation of producers is cultural. It was materialized in this work by the theory of social representations of Serge Moscovici and allowed us to explore the relationship that exists between farmers and state strategies**.**

- **Socio-Cultural Anthropology**

Thanks to the results obtained, this research discovered Socio-cultural anthropology[19] . for it made it possible to have a clear understanding of human settlement from the characteristics of the different human groups in the locality of Banyo and also to apprehend change. In addition, it is also mobilized in our work to describe socio-cultural factors common in groups and communities, the dynamics that promote the adaptation of producers to new production techniques.

As for the perspectives that are open up to this research, far from claiming to be the pioneer for having completed a diagnostic study on the crisis in maize production in the context of climate change, this study was inspired by numerous researchers works carried out in the framework of environmental and sustainable development. It revealed the profound obstacles that are responsible for the inadaptation of producers to new maize production techniques. However, this study deserves to explore other scientific horizons, which will make it possible to analyze the regulatory system of the model of adaptation to climate change or to further question the level of adoption of this model in the national development strategy in Cameroon.

[18] Rural sociology: is a field of applied sociological research and training that has historically focused onrural people and places

[19] Socio-cultural anthropology: field which is interested in human groups whatever their characteristics.

BIBLIOGRAPHY

I. GENERAL BOOKS*:*

1. BALANDIER Georges,2004 "*Sens et Puissance, les Dynamiues Sociales"*.. Paris, PUF.
2. BARDIN Laurence, 1977 "*L'analyse de contenu"*, Paris, PUF.
3. HENRY Paul,1968 "*Problem de l'analyse de contenu*" languages, , N°,11 "
4. WEBER Max "*Wisdom and Science in Sciology*",US, university of Texas 1917
5. COCCHIARELLA Nino, 1996 "*Formal Ontology and Conceptual realism"*, Indiana University, Bloomington U.S.A, Springer.
6. BOUDON Raymond, 2002 "*Theory du chois Rationnel au Individualisme Metholdlogues*", Paris Cede 06 France.
7. WACKER John, 1998 "*A Definition of theory: research guidelines for different theory-building research methods in operation organization",* Lund University, Department of industrial management.

II. SPECIFIC BOOKS:

1. Kwaja M.A Chris. And Katie Smith 2020" *Transnational Dimension of the Conflict Between Farmers and Herders in the Western Sahel and Lake Chad Basin*" SCG, Washington DC,
2. Aya Ullah, Shaheb Saquib and Harad Kachele 2022" *Determinants of Farmer Awareness and Adoption of extension Recommended Wheat Varieties in the Rainfed Areas of Pakistan*" MDPI, Basel Switzerland.
3. Mendras Henri 1984 , "*La Fin des Paysans Suivi D'une Reflexion sur la Fin Des Paysan*" Paris, PUF.
4. *Fosilier* Jean Louis 1993 *"La Filiere Mais Au Cameroun Quelles Pesrpective de Developpent de la Production de Mais*?" CIRAD
5. L.Uitto Juha *2017 "Evaluating Climate Change Action for Sustainable Development",* IEO, Global Environment Facility Washington, DC, USA.

6. ZHOU Leocadia 2021 "*Determinants and Adaptation to climate Variability Amongst Farming Households in Tyhume Vally communities*", department of agricultural economics and Extention, University of Fort Hare,
7. NEME Noemi "*Comparative analysis of organic and non-organic farming system, A critical assessment of farm Profitability*", CreateSpace US, 2009
8. DUGUE Nngouambe, FONGANG Kossoumna and. Ribier 2017 "Rapport *du Diagnostic du Conseil et de la vulgarization Agricole au Cameroun*". Iram Paris:
9. Bello Segun 2012 "*Agriculture Machinery and Mechanization"* CreateSpace US.

III. SPECIFIC ARTICLES

1. La Duram *A pragmatic study of Conventional and Alternative Farming in Colorado, in* Jean Louis Fosilier*"La Filiere Mais Au Cameroun Quelles Pesrpective de Developpent de la Production de Mais?"* CIRAD:1993
2. KUMAR NAVEN Arora *impacts of climate change on agricultural production and its sustainable solutions,published online,society for environmental sustainability.in* KUTI Nath Shri,*Society for Environmental Botanist,india,* Spinger Nature,2019,pp 10-
3. JEMMA Gornall, BURKE Richard, CLARK Robin, CAMP Joanne, WILLETT Kate and EILSHIRE Andrew, *Impact of Climate Change for Agricultural Productivity in the Early Twenty First Century in Philosophical* Translation Of The Royal Society, *London UK, TRS.2010,PP18-25*
4. HOWDEN mark, SOUSSANA jean-francois, TUBUBIELLO francesco, NETRA chitrI, DUNLOP Michael and MEINKE Holger, *Adapting Agriculture to climate change, in Proceedings Of the National Academy of Science US, Pennsylvania state university,2010,pp10-15.*

IV. MASTERS THESES AND PHD

1. Marh Anselme Tiwa Dany Frank, "Chanements climatique et Agriculture Paysanne a L'ouest Cameroon",Universite de Yaounde I, departement de sociologie, 2016
2. Kaur Japneet, "Impact Of Climate Change on Agricultural productivity and Food Security Resulting to Poverty in India", department of Economics, University of Ca'foscari Venezia 2017

3. Roech-Mcnally Gabrielle, “Agricultural Transformations: Climate Change Adaptation and Farmers Decision Making”, department of sociology and sustainable agriculture, Iowa state University 2016
4. Blanc Elody, “The Impact Of Climate Change On Crop Production In Sub-Saharan Africa*”*, department of philosophy, University of Otago,Dunedin, New Zealand, 2011
5. Amidu Issaharu Zakaria, “Agricultural Productivity and Poverty in Ghana’s Context; Micro-Macro Analysis*”*, graduate school for international Development and Corporation, University of Hiroshima. 2014

V. OFFICIEL DOCCUMENTS

1. Ministère de L’Agriculture et du Developpement Rural **“***Raport de mise en oevre de la strategies de Developpement du secteur Rural exercise “*2010:2011
2. Ministère de L’Agriculture et du Developpement Rrual” *Developpemnt Strategic du Développemnt Rural* “2006
3. Ministry of Economic Planning and Regional Development “*Raport de mise en euvre de la strategie de Développement du secteur rural”,* 2011
4. Ministere de L’Economie, de la Planification et de L’Amenagement du Teritoire “*Stretegie Nationale De Développement”* 2020-2030
5. Mnister de L’Economie de la Planification t de L’Amenargement du Territoire “ Plan quinquinal *Plan communua de développement de la commune* de Mayo-Banyo,2015
6. News and Press Release” *Cameroon Farmers Forgotten by the Government*”*guidian Post,* 2009.

VI. WEBSITES

1. http://www.accesstoseeds.org>index consulted on 2:03:2022:13:00).
2. Mbuli Clodine , Lotsmart Fonjong And Ambr Fletcher, Febuary 2021, *Climate Change and Small Farmers Vunerability to Food Insecurity in Cameroon, publishled online http://dot.org/103390/su13031523* https://dr.lib.iastate.edu consulted on 12:03:2022:16:40
3. Mendelsohn Robert, 19 january 2009, *the impact of climate change on Agriculture in developping countries, journal of natural resources policy vol 1,N⁰-1,* Yali university, New Hoven CT. U.S.A. http://globalcnange.mit.edu (consulted on 08:03:2022:11:30).

4. Molua Ernest, *"Turning up the heat on African Agriculture: the impacts of climate change on Cameroon Agricultural affaires" vol 2, N⁰-1, Depatment of economics and Management, university of Buea, Cameroon* 2008 https://www.researchgate.net(consulted on 6:03:2022:10:30).
5. United Nations International Strategy for Desaster Reduction Secretariat 2009, "*Terminology on Disaster Risk Reduction"*, United Nation Ofice for Disaster Risk Reductionhttp://ir.lib.hiroshima-u.ac.jp (consulted on 08:03:2022:13:00).
6. Humle Mike "*Climate Change and The Significance of Religion*" publish online,2017(https://www.um.org (consulted on 20:05:2022:15:10)
7. Hurault Jean "*Antagonisme de L'agriculture et de l'elevage sur les haut plateau de L'Adamawa. (Cameroun). Le lamidat de Banyo",* 1964http://dspace.unive.it>handle consulted on 18:03:2022:13:30).
8. https://www.researchgate.net consulted on 28:03:2022:17:00).
9. https://ideas.repec.org>pmo533 consulted on 01:04:2022:08:00).
10. https://wwwresearchgate.net consulted on 10:04:2022:15:40).
11. https://pubmed.ncbi.nlm.nih.gov consulted on 20:05:2022:13:30).
12. https://www.researchgate.net consulted on 20:05:2022:13:30).
13. https://www.mdpi.com consulted on 20:05:2022:13:30).
14. https://www.um.org consulted on 20:05:2022:13:30).
15. (https://youmatter.world definition consulted on 20:05:2022-15:00)
16. (https://fr.m.wikipedia.org consulted on 28:06:2022-11:20).
17. https://www.fao.org consulted on 22-06-2022:15:45
18. https://www.fao.org (consulted on 30-06-2022 à 13:25)
19. https://www.fao. Org(consulted on 30-06-2022 à 14:30)
20. https://www.fao.org>Cameroun (consulted on1-07-2022:12:41)
21. https://www.ncbi.nlmnih.gov/pmc/articles/PMC3906480/(consultedon03-07-2 022:15:00)
22. https://www.ifad.org (consulted on 08-07-2022 à 11:28).

APPENDIX

APPENDIX I.

ATTESTATION DE RECHERCHE

RÉPUBLIQUE DU CAMEROUN
Paix – Travail – Patrie
*****
UNIVERSITÉ DE YAOUNDÉ I
*****
FACULTÉ DES ARTS, LETTRES
ET SCIENCES HUMAINES
*****
DÉPARTEMENT DE SOCIOLOGIE
*****
BP : 755 Yaoundé
Siège : Bâtiment Annexe FALSH-UYI, à côté AUF
E-mail : depart.socio20@gmail.com

REPUBLIC OF CAMEROON
Peace – Work – Fatherland
*****
THE UNIVERSITY OF YAOUNDE I
*****
FACULTY OF ARTS, LETTERS
AND SOCIAL SCIENCES
*****
DEPARTMENT OF SOCIOLOGY
*****

ATTESTATION DE RECHERCHE

Je soussigné, Professeur **LEKA ESSOMBA Armand**, Chef de Département de Sociologie de l'Université de Yaoundé I, atteste que Madame **OBI EBAN Ruth**, Matricule **19Y678**, est inscrite en Master II, option Population et développement. Elle effectue, sous la direction du **Professeur ELLA ELLA Samuel-Béni**, un travail de recherche sur le thème : « ***Agricultural production and climate change in Mayo-Banyo Sub-division*** ».

Dans le cadre de cette recherche, elle aura besoin de toute information non confidentielle, susceptible de l'aider à bien conduire sa recherche.

En foi de quoi, la présente attestation lui est délivrée pour servir et valoir ce que de droit.

Fait à Yaoundé, le 21 NOV 2022

Le Chef de Département

Pr. Armand LEKA ESSOMBA
Maître de Conférences

APPENDIX II.

DEMANDE D'ACCES A LA DOCUMENTATION

REPUBLIQUE DU CAMEROUN
Paix - Travail - Patrie

MINISTERE DE L'AGRICULTURE
ET DU DEVELOPPEMENT RURAL

SECRETARIAT GENERAL

SERVICE DE LA DOCUMENTATION
ET DES ARCHIVES

Minader
Ministère de l'Agriculture et du Développement Rural
Ministry of Agriculture and Rural Development

REPUBLIC OF CAMEROON
Peace - Work - Fatherland

MINISTRY OF AGRICULTURE
AND RURAL DEVELOPMENT

GENERAL SECRETARIAT

SERVICE OF DOCUMENTATION
AND ARCHIVES

Yaoundé, le 30 MAI 2022

N° 00313 /MINADER/SG/SDA/Snfc

Réf : V/L du 19 avril 2022

LE MINISTRE

A

Madame OBI EBAN Ruth
Etudiante en Master II Recherche à Vocation Professionnel
Faculté des Arts, Lettres et Sciences Humaines
Département de sociologie
Université de Yaoundé I
Tel : 670 469 630

Objet : Demande d'accès à la documentation

Madame,

Faisant suite à votre correspondance sus référencée et relative à l'objet sous rubrique.

J'ai l'honneur de vous faire connaitre, que je marque mon accord pour le déroulement de vos travaux de recherches au sein du Département Ministériel dont j'ai la charge, durant la période ***du 23 mai au 30 novembre 2022,*** *en vue de la rédaction de votre mémoire de fin de cycle qui porte sur :* « **Agricultural production and climate change in the North of Cameroon : the Department of Mayo-Ray**».

A cet effet, vous voudrez bien prendre attache avec le ***Service*** *de la* ***Documentation et des Archives*** *du Ministère de l'Agriculture et du Développement Rural.*

Veuillez croire, ***Madame,*** *à l'assurance de ma parfaite considération.*

Pour le Ministre de l'Agriculture
et du Développement Rural
par Délégation
Le Secrétaire Général

APPENDIX III.

LIST OF KEY INFORMANTS

N	NAMES	FUNCTIONS	SEX	AGE
1	M. Souleymanou Ousmanou	Head of cooperation	Female	40
2	Bebe Maigari Ivette	Head of cooperation	Female	56
3	Inna Aissatou	Founder of cig	female	40
4	Hassan Mohamadou	Founder of cig	female	48
5	-Ibrahima Abbo	Adviser of the cig	male	63
6	Ausman	farmer	male	48
7	Harsan	farmer	male	57
8	Chef du village	Village chief	male	75
9	Moussa	farmer	male	60
10	Madam Rakiatou	Owner of farms	male	50
11	Madomene	farmer	female	83
12	Aishatou	farmer	female	52
13	Mohamede	farmer	female	71
14	Ali	farmer	male	60
15	Abdul	farmer	male	81
16	Delegue regional	Delegate of agriculture	male	54
17	Adama	farmer	female	49
18	Ibrahim	farmer	female	48
19	Aminatou Dada	farmer	female	55
20	Mvouti Anne Marie	farmer	female	61
21	Inna Aissatou	farmer	female	55
22	Bobbo Adamou	farmer	male	61

APPENDIX IV

Guide d'enquète de terrain

IV.1 GUIDE D'ENTRETIEN SEMI DIRECTIF AVEC LES ACTEURS INSTITUTIONELES

Module 1 : identification du répondant

1. Name
2. . Lieu de l'entretien
3. Age
4. Sex
5. acivity

Module 2 : Stratégies mises en place par le gouvernement Cameounais pour facilitè l'adaptation

1. Quel est le mode de production du maïs pratiqué dans cette zone?
2. Quelle sont les types de semences utilizer vous dans la localite?

3. Quelles sont les méthodes/techniques mises en place pour ameliore la production de mais?

4. comment ces mesures sont elles mises en oeuvre?

5. Comment les population font-elle pour s'adapter a ces nouvelles techniques de production?

6. si non pour Qoui?

7. Que pensez vous/ quelle perception avez-vous de ces nouvelles techniques?

Module 3 : Les contraintes d'adaptation aux nouvelles techniques de production

2. Quelles sont les difficultés rencontrées par les agriculteurs pour s'adapter aux nouvelles techniques de production de maïs

3. Quelle est la place des nouvelles techniques de production de maïs dans votre localit

GUIDE D'INTRETIEN ADDRESSE AU AGRICULTEURS

IV.2. Module1 : identification des répondants

1. Nom:
2. Sexe
3. age
4. Arrondissement
5. Date de discussion…….
6. Nom du village

Module 2 : les contraintes d'adaptation aux nouvelles techniques de production

1. La population s'adapte-t-elle à ces nouvelles techniques de production de maïs (si non pourquoi)

2. Quelles sont les difficultés rencontrées par les agriculteurs pour s'adapter aux nouvelles techniques de production de maïs

3. Quelle est la place des nouvelles techniques de production de maïs dans votre localité?

4. Les agriculteurs sont-ils satisfaits de ces nouvelles techniques de production de maïs?

5. Comte vous s'adapter au nouvelle techniqus de production si non pour koi?

IV.3. GUIDE d’intretien avec les organsation non gouvernemental (Gics et Coorperatifs)

Module 1: Identification

1. Nom du cooperative/gic/coorperatif
2. Objectifs de L’onganisatiom
3. Localitè Sible
4. Age du responsable:
5. sex

Module 2: Stratégies mises en place par l’organisation pour facilitè l’adaptation des producteurs de maïs

1. Y’a t’ill des measure prise par le gouvenment pour ameliore la production de maise dans cette localite?
2. La population s’adapte-t-elle à ces nouvelles techniques de production de maïs (si non pourquoi)?
3. . Quelles sont les difficultés rencontrées par les agriculteurs pour s’adapter aux nouvelles techniques de production de maïs?
4. . Quelle est la place des nouvelles techniques de production de maïs dans votre localité?
5. Les agriculteurs sont-ils satisfaits de ces nouvelles techniques de production de maïs?
6. Quelles sont les mesures que vous avez adopte pour ameliore la production de mais dans votre localitè sible?