

## Opportimising Use of The Barotse Flood Plain for Socio – Economic Development of Western Province, Zambia (Conference ID: CFP/703/2018)

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### **Abstract**

*The natural environment of the Barotse Flood Plains is characterised by annual floods that occur between December and July with loss of crops due to flooding being a common annual occurrence that results in food insecurity.*

*The main economic activities on the Barotse flood plains are crop husbandry, livestock rearing and fishing. However, these activities have been conducted at subsistence level for hundreds of years as people have not found the best way of dealing with floods. With the increase in the number of people there is need to look at more sustainable ways of accelerating socio – economic development on the flood plains.*

*This paper seeks to discuss the possibility of opportimising use of the Barotse Flood Plain for socio – economic development of Western Province, Zambia. The vulnerability and resilience of the people of Barotse land are examined particularly to suggest how best we could improve production and productivity with regards to crop cultivation, livestock farming and fishing as major socio-economic activities that can be easily adapted to this environment.*

*This study is about the flood plain that stretches from Lukulu in the north to Senanga in the south found on either sides of the might Zambezi River. The actual study area is Limulunga, Mongu, Kalabo and Nalolo districts. The main respondents are civil servants, traditional leaders, civil society and ordinary citizens familiar with the study area.*

*Today Bulozhi is an arena of relative undevelopment vulnerable to climate change, but this study shows that this condition can be changed for the better if the natural environment is manipulated to promote production of diverse crops using irrigation, introduction of aquaculture to increase fish production and introduction of better livestock management practices.*

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**Keywords:** *Vulnerability, resilience, adaptation, climate change, floodplain*

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## 1. INTRODUCTION

### 1.1 Background

The Barotse flood plain stretches from the Zambezi River's confluence with the Kabompo and Lungwebungu Rivers in Lukulu District, to just above Ngonye Falls in Sioma District in the Western Province of Zambia. It is approximately 200 km in length and 70 km at its widest point (Flint, 2008). It includes a system of vast plains dotted with mounds, canals, lagoons and swamps.

The entire area is drained by the Zambezi River and its tributaries. It is flooded from December / January (after the main rainy season) to June / July. The peak of floods is in April and the floods begin receding shortly thereafter in May.

Traditional cattle rearing, subsistence crop husbandry and capture fishing are the main traditional economic activities of this area. However, crop yields are usually low due to annual floods that destroy field crops. The government annually responds to this challenge by distributing relief food to the affected communities as food for work and food for free. However, this relief food is never adequate; and there is need to make the Barotse Flood Plains food secure.

### 1.2 Statements of the problem

Barotse floodplain is an area that is characterised by high potential for crop farming, livestock farming and fishing (both capture fishing and aquaculture). However, the area also experiences high level of poverty among its inhabitants (Madzudo, Mulanda, Nagoli, Lunda, & Ratner, 2013).

The Central Statistics Office *Living Conditions Monitoring Report* of 2016 shows that at provincial level, "the percentage of population living in extreme poverty was highest in Western Province (73 percent...)" (CSO, 2016). This is worrying considering that this is an area that is a potential grain basket.

The problem that remains unanswered is why the identified potential of the Barotse flood plain as a grain basket has never been realized after more than 50 years of independence.

### 1.3. Significance of the Study

This study is an attempt to help have Zambia's desire to be a middle income nation as expressed in the vision 2030 attained (Ministry of Finance 2006). By optimizing use of the Barotse Flood Plain Zambia will be able to attain sustainable development goals goals number 1: "End poverty in all its forms everywhere"; goal number 2: "End hunger, achieve food security and improve nutrition and promote sustainable agriculture," and goal number 13: "Take urgent action to combat climate change and its impact" by the year 2030 (UNDP, 2015; UN 2015).

Furthermore, this study is in line with Zambia's Seventh National Development Plan: 2017 – 2021 which is aimed at "accelerating development efforts towards Vision 2030 without leaving any one behind," (Ministry of National Development Planning 2017, & 2018). This study if taken into consideration will greatly contribute to the attainment of economic diversification and job creation, poverty and vulnerability reduction, reducing development

inequalities, enhancing human development and creating a conducive governance environment for a diversified economy (ibid).

## 1.4. Objectives of the project

The general objective of this study is to identify ways and means of optimising use of the Barotse Flood Plain for socio – economic development. The three specific objectives are:

1. To identify the main environmental and social factors that cause food insecurity on the Barotse Flood Plain;
2. To list possible adaptive strategies to the challenge of climate change in order to improve house hold food insecurity on Barotse Flood plains; and
3. To assess the role of traditional leaders in the fight against climate change and natural resource management in the Barotse Flood Plain to promote socio – economic development

## 1.5. Theoretical Framework / Model

This study is guided by the iceberg theory of culture which is used to elucidate the concept of culture to illustrate the fact that there are much bigger aspects of human culture beneath the small visible parts that we see just like the larger invisible part of the iceberg lies below the water surface.

The portion below the surface of the water in the iceberg theory of culture represents the values, beliefs and attitudes of the community that guide its socio – economic development. In this study, this layer includes the traditional environmental knowledge which has enabled the Lozi people to adapt to their environment from precolonial days to date. It is difficult to make sense of the 'visible'

aspects of a culture without understanding the 'invisible', underlying elements from which they originate.

## 2. METHODOLOGY/RESEARCH DESIGN

### 2.1 Project Design / Approach

This study is both explanatory and descriptive in nature. According to Bless, Claire and Achola, Paul *“the purpose of explanatory research is to gain insight into a situation, phenomenon, community or person. The need for such a study could arise out of lack of basic information on a new area of interest,”* (Bless, Claire and Achola, Paul, 1990, p41).

On the other hand, *“the purpose of descriptive research is to give an accurate account of characteristics of a particular phenomenon, situation, community or person. It also includes the estimates of how frequently some events occur or of the proportion of people within a certain population sharing certain views or acting in a certain manner,”* (ibid, p42).

This study is qualitative in nature as it is focused on adaptation of human beings to their environment.

*“The purpose of qualitative research is more descriptive than predictive. The goal is to understand, in depth, the viewpoint of a research participant. Realizing that all understanding is constructed, different research participants are going to have different interpretations of their own experience and the social systems within which they interact. Moreover, the researcher is*

*going to impose his or her cultural, social, and personal identity on any interpretation of the research participants' experience. For these reasons, the qualitative approach is typically less concerned with aggregate generalizations. Much of qualitative research does not claim to be generalizable. Rather, it claims only to represent the people studied"* (Vanderstoep, W. Scott & Johnston, D. Deirdre, 2009).

The research also adopted an enquiry based qualitative approach through structured review of the literature available to obtain secondary data that answer the research questions.

## **2.2 Sampling procedure**

The respondents were non-randomly selected using both convenient and purposive sampling methods. Purposive sampling technique is a non-probability sampling technique that is used when one needs to study a certain cultural domain with knowledgeable experts within, it is also known as judgemental sampling (Bless, C & Achola, P, 1990; Vanderstoep, W. Scott & Johnston, D. Deirdre, 2009). In this case, the researcher's judgement is based on the judgement of the research subjects. Convenience sampling method was employed to get data from ease to reach respondents. Convenient sampling allows a researcher to select units where he/ she is assured of finding many people e.g. at the market, bus stop, seminar / workshop until the required number of respondents is reached (Bless, C & Achola, P, 1990).

## **2.3 Target populations and Sample size**

A total of 100 questionnaires were used to collect data from the members of community,

Non-Governmental Organisations and civil servants. Out of 100 questionnaires 52 respondents provided feedback. Additional information about what community feels about the subject was obtained through focused group discussion with the community in Libonda Ward where the researcher conducted a Climate Risk Assessment. The Climate Risk Assessment validated the information received through questionnaires.

The target respondents were members of the community that are directly affected by floods, the Barotse Royal Establishment who are custodians of Land and customs, Civil Servants whose mandate is to work with the community to bring about social transformation, and Non-Governmental Organizations that operate from the Barotse Flood Plain on a number of interventions aimed at alleviating poverty. The targeted group of respondents was familiar with the climatic and socioeconomic aspects of the Barotse Flood Plains as well as what should be done to bring about socio – economic transformation in this area.

## **2.4 Instruments of data collection**

Data was collected from the respondents using 100 questionnaires out of which 52 were successfully completed by the targeted respondents. Additionally, data from the focused group discussions was captured using a climate risk assessment template.

## **2.5. Data analysis techniques**

Data processing is the process through which facts and figures are collected during research are assigned meaning, communicated to others and retained for future use. It can be defined as a series of actions or operations that converts data

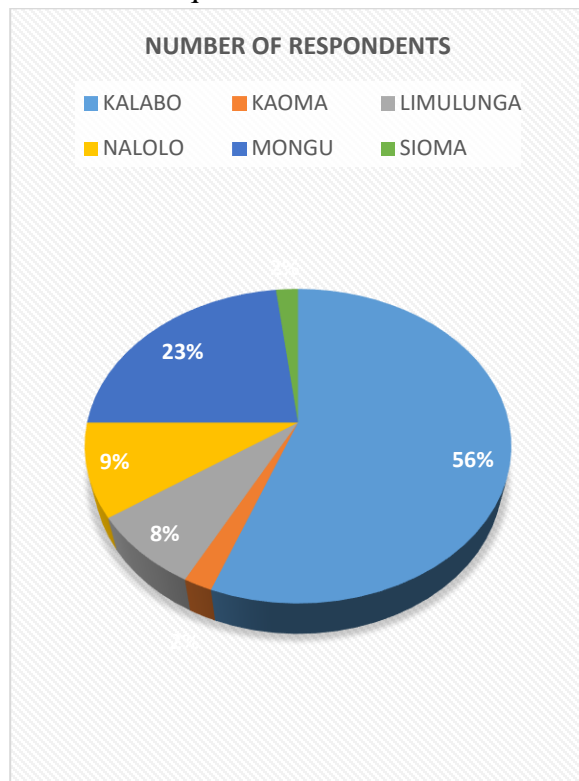
into useful information (Vanderstoep, W. Scott & Johnston, D. Deirdre, 2009). For this study the data collected was processed using MS – excel; and the research findings were firstly presented before a panel of academicians at Information and Communications University and published in an international journal as a way of disseminating the research findings.

### 3.0. RESULTS AND DISCUSSION

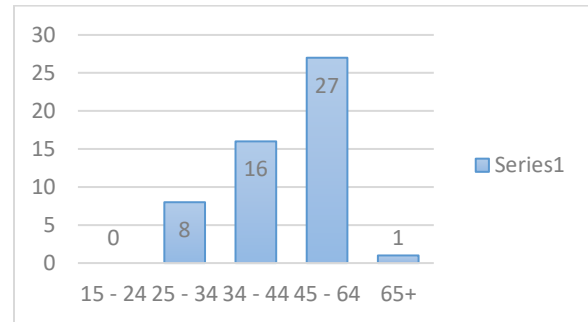
#### 3.1. RESULTS / RESEARCH FINDINGS

##### RESPONDENTS' DISTRICTS

52 Respondents from Kalabo, Limulunga, Mongu, Nalolo, Sioma and Kaoma participated in this study by submitting filled in self-administered questionnaires



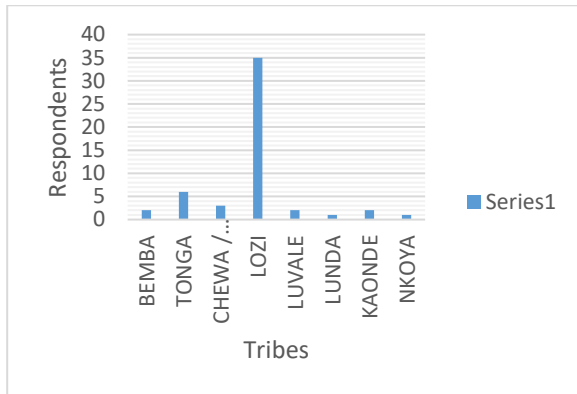
##### RESPONDENTS' AGE



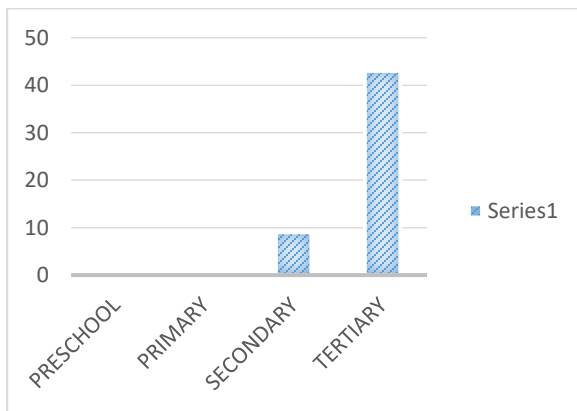
All the respondents are adults aged between 25 and 65 years of age and capable of understanding the economic life of the people that live on the Barotse flood plains.

##### RESPONDENTS' ETHNICITY

It is good that 35 out of 52 or 67.31% of the respondents are Lozi by tribe because this increases chances of dealing with respondents that understand the Lozi traditional land tenure system and socio – economic life much better, having been taught about the traditional aspects of the Lozi from child hood. The involvement of respondents from other ethnic groupings helps to have a balance view of the subject matter as they objectively look at what is obtaining on the ground. 32.62% of the respondents are from other Zambian ethnic groups.

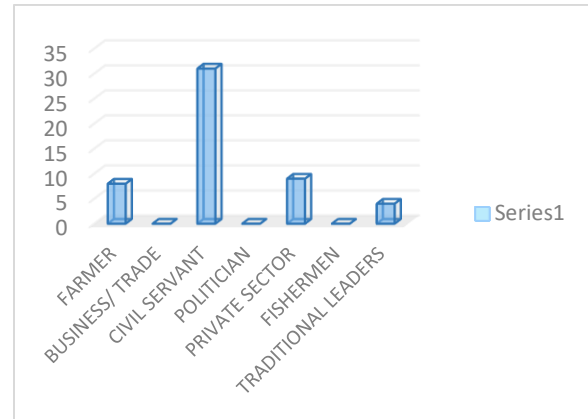


## RESPONDENT'S LEVEL OF EDUCATION



The respondents are suitably qualified to intelligibly fill in the questionnaires. Education broadens people's world view. So the information given by the respondents is reliable as 43 (82.69%) of them attained tertiary education and the remaining 9 (17.31%) are secondary school leavers.

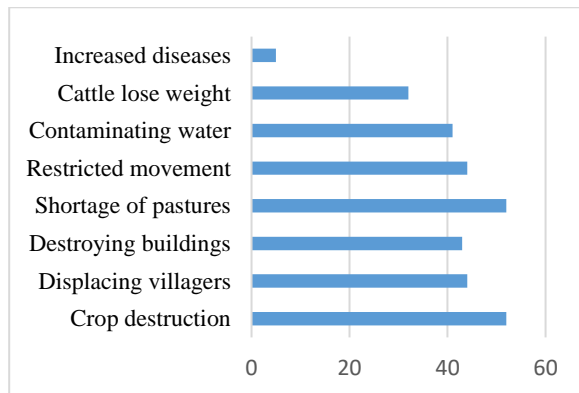
## RESPONDENTS' OCCUPATION



57.69% (30) of the respondents were civil servants. These were much easier to reach via email due to financial constraints. These respondents were drawn from Ministry of Agriculture, Ministry of Local Government, Ministry of Fisheries and Livestock; and have been working in these flood prone areas for many years. Their experience helps to provide insight in what should be done to develop the Barotse Flood Plains. The farmers, traditional leaders and the private sector participants who make 42.31% provide views from the community's perspective and help in giving a balanced conclusion.

## NEGATIVE EFFECTS OF FLOODING



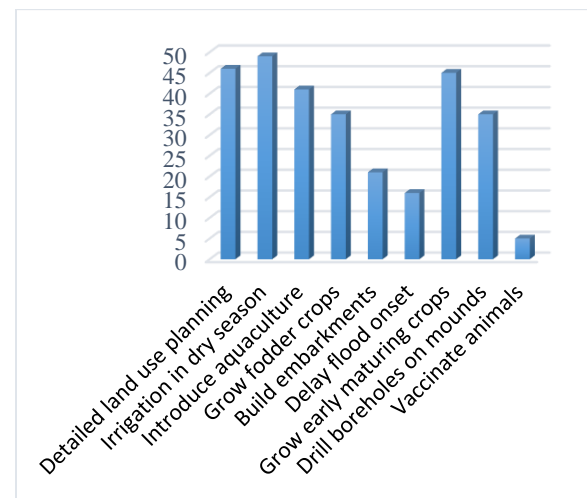


Annual floods negatively impact on the community through observed increase in diseases for both humans and livestock in the flood period, cattle lose weight due to insufficient pasture, water becomes contaminated due to insanitary conditions on the plains, human movement is restricted, grazing lands become flooded resulting in reduced pastures, infrastructure such as houses are destroyed, people become displaced as their villages become completely flooded and field crops such as maize are destroyed. This trend perpetuates poverty and food insecurity.

### **WHAT CAN BE DONE TO MITIGATE IMPACT OF FLOODING?**

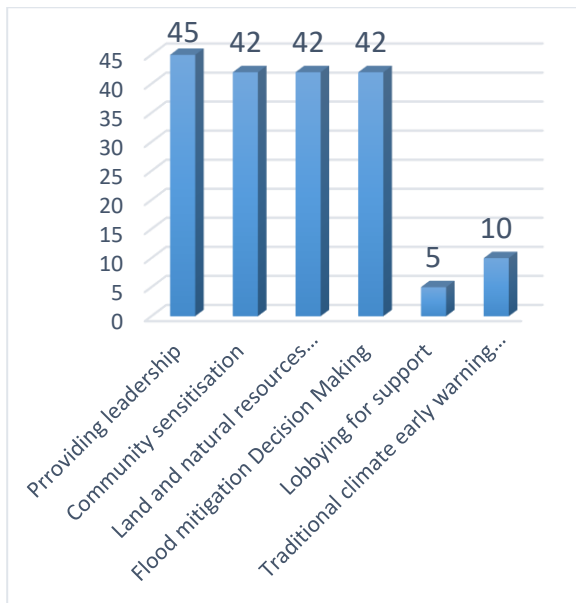
The respondents feel that the impact of floods can be mitigated by developing a detailed climate proofed land use plans to guide implementation of development programmes, projects and activities; use irrigation to grow crops on the flood plains in the dry season; introduce pen fishing (aquaculture) to increase fish production and restock natural waters, grow fodder crops for feeding animals on the plateau when the plain is flooded; build embankments to support cultivation of field crops such as maize, build artificial levees to delay onset of floods so

as to allow crops to mature before they are flooded, introduce diverse early maturing crops, drill bore holes on raised ground to provide safe clean water for domestic use and regularly vaccinate animals against diseases. If these measures are implemented levels of poverty and food insecurity will be drastically reduced.



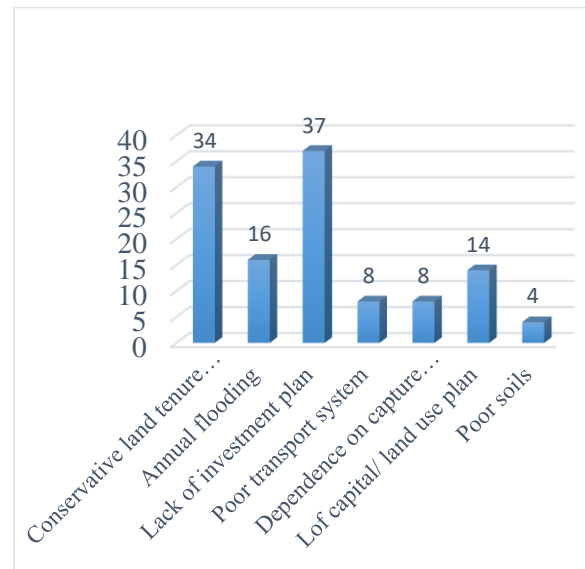
### **THE ROLE OF TRADITIONAL LEADERS IN MITIGATING THE IMPACT OF FLOODS**

Traditional leaders still play an active role in community mobilisation for participation in priority community projects, community mobilisation projects designed to delay onset of floods, allocation of land for development activities, sensitisation of the community to ensure success of development projects, lobbying government for development projects and providing knowledge about traditional climate early warning systems.



## WHY IS THE BAROTSE FLOOD PLAIN UNDERDEVELOPED?

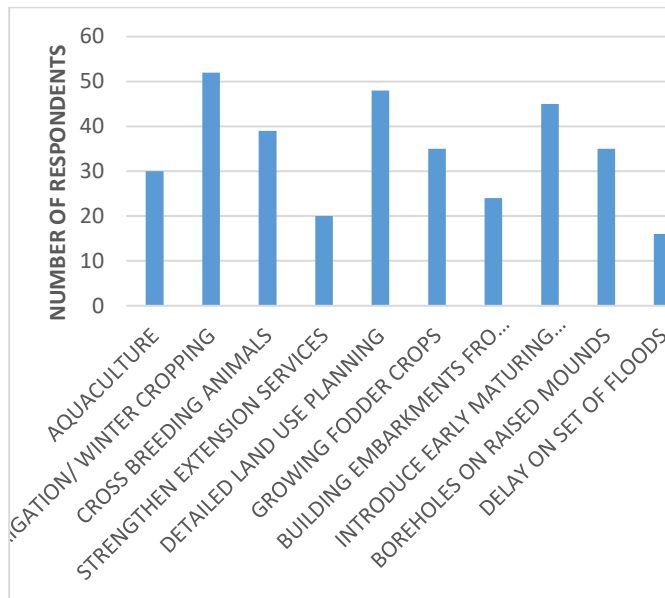
It is believed that the Barotse Flood plains has remained under developed because of the following factors: Traditional Lozi conservative land tenure system, annual flooding, Lack of investment plan, poor transport system, overdependence on capture fishing and absence of a detailed land use plan.



## POSSIBLE SOCIO - ECONOMIC ACTIVITIES THAT CAN BE IMPLEMENTED ON THE BAROTSE FLOOD

The respondents felt that the following are possible socio – economic activities that can be successfully implemented on the Barotse Flood Plains; capture fishing, aquaculture (fish farming), winter cropping, irrigation / water harvesting, animal husbandry, cultivation of diverse crops, sand mining, canal clearing and digging, tourism and manufacturing of various products.

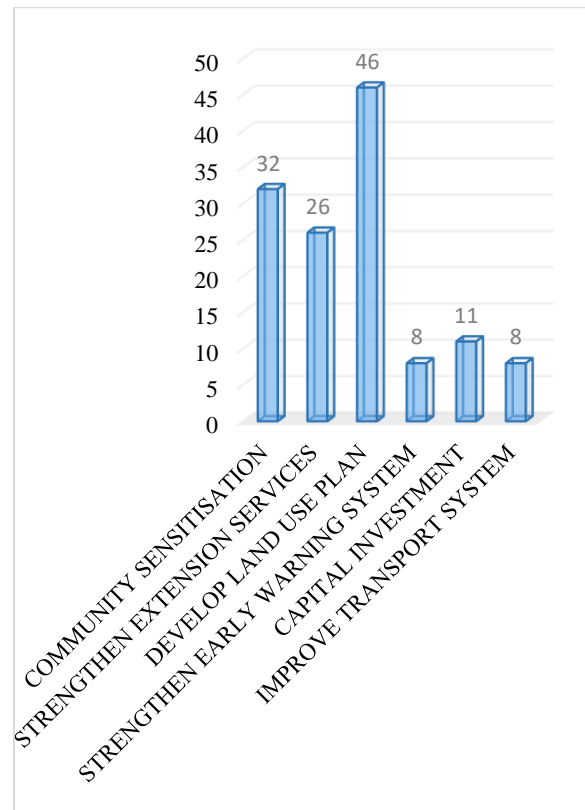




## What is required to bring about socio-economic transformation on Barotse Flood Plains?

To bring about socio economic transformation on the Barotse Flood plains the following measures should be implemented:

- Community sensitisation on the need to adopt new innovations
- Establishing a strong presence of extension services
- Developing a climate proofed land use plan
- Capital injection for start up projects and
- Develop climate resilient transport system



## 3.2. Discussion

But for the annual floods that occur between December and July, the Barotse Flood Plains would have been one of the richest provinces in Zambia. The fertile alluvium soils of the plains are suitable for cultivation of various crops; the abundance of water and pastures make the Barotse Flood plains suitable for cattle rearing; and the abundance of fish on the Zambezi River and her tributaries, numerous lagoons, ox – bow lakes, ponds, canals and streams make fishing another major economic activity on the Barotse Flood Plains.

Annual floods negatively impact on the community in a number of ways. Firstly, there is an increase in diseases for both humans and

livestock in the flood period. Secondly, cattle lose weight due to insufficient pasture on the plateau where the cattle is moved to during the flood period. Thirdly, water becomes contaminated due to insanitary conditions on the plains as the local inhabitants practice open defecation and the flood waters are the only source of domestic water available to the community. Fourthly, human movement is restricted as much of the plains become filled with water leaving only some mounds above the water level as habitable islands. Fifthly, infrastructure such as houses are destroyed are destroyed by flood waters. Sixthly, people are forced to move away from their villages when they become completely flooded; and often field crops such as maize are destroyed by floods. This trend perpetuates poverty and food insecurity.

However, these negative impact of floods can be reduced by developing and implementing a detailed land use plan that is climate proofed for socio – economic development. With such a plan in place it is possible to use irrigation to grow crops on the flood plains in the dry season; introduce pen fishing (aquaculture) to increase fish production and restock natural waters; grow fodder crops for feeding animals on the plateau when the plain is flooded; build embankments to support cultivation of field crops such as maize; build artificial levees to delay onset of floods so as to allow crops to mature before they are flooded; introduce diverse early maturing crops; drill bore holes on raised ground to provide safe clean water for domestic use; and regularly vaccinate animals against diseases. Such a plan

would greatly reduce levels of poverty and food insecurity on the Barotse Flood Plains.

Traditional leaders still play an active role in community mobilisation for participation in priority community projects, community mobilisation projects designed to delay on set of floods, allocation of land for development activities, sensitisation of the community to ensure success of development projects, lobbying government for development projects and providing knowledge about traditional climate early warning systems. It is difficult for any development initiative to succeed if it is not supported by the traditional leaders who are the custodians of land and natural resources.

It is believed that the Barotse Flood plains has remained under developed because of the traditional Lozi conservative land tenure system, annual flooding, lack of investment plan, poor transport system, overdependence on capture fishing and absence of a detailed land use plan. Of all these, the absence of a climate proofed land use plan is what has resulted in the poverty levels being witnessed today.

There is need to do the following to bring about socio – economic transformation on the Barotse Flood Plains: community sensitisation on the need to adopt new innovations; establishing a strong presence of extension services; developing a climate proofed land use plan to guide implementation of development initiatives in the Barotse Flood Plains; capital injection for start-up projects and developing climate resilient water and land transport systems.

## CONCLUSION

With reference to the research objectives, we can conclude that

- i. The main environmental and social factors that cause food insecurity and perpetual poverty on the Barotse Flood Plain are floods, dry spells, inadequate land use planning, conservative traditional land tenure system, use of destructive fishing methods, animal diseases in the dry season, inadequate provision of extension service;
- ii. Possible adaptive strategies to the challenge of climate change in order to improve house hold food insecurity on Barotse Flood plains include Capture fishing, aquaculture (fish farming), winter cropping, irrigation / water harvesting, animal husbandry, cultivation of diverse crops, sand mining, canal clearing and digging, tourism and manufacturing of various products can all be successfully implemented on the Barotse Flood Plains.
- iii. For any meaningful development to be achieved all key players should work closely with the traditional leaders. The role of traditional leaders in the fight against climate change and natural resource management in the Barotse Flood Plain to promote socio – economic development include the following community mobilisation for participation in priority community projects, community mobilisation projects designed to delay on set of floods, allocation of land for development activities, sensitisation of

the community to ensure success of development projects, lobbying government for development projects and providing knowledge about traditional climate early warning systems.

- iv. Crop cultivation, livestock farming and fishing are still the main drivers of economic development on the Barotse Flood Plains but there is need to strengthen extension services to ensure that the local inhabitants adapt their activities to climate change.

The study has demonstrated the fact that with careful planning, the causes of poverty on the Barotse flood plain can be eradicated to bring about socio – economic transformation. For example, the respondents pointed out that crop farming, fishing and livestock farming can be modernised to improve production and productivity.

As illustrated by the iceberg theory the people of Barotse Flood Plains have over years made attempts to achieve socio economic development by manipulating their environment. This can be seen in the establishment of gardens in different parts of their land cultivated at different times of the year to ensure food security. Furthermore, from history we learn that they used create mounds for cultivation of food crops and establishment of human settlements on the plain to ensure that floods could not easily destroy their property.

Learning from history, it is possible to transform the socio economic life of the people of the

Barotse Flood Plain in order to attain the sustainable development goals on ending hunger and poverty by 2030. All that is required is for all stake holders – political leaders, traditional leaders, private sector and the local community - to put in place a strategic plan to improve people’s livelihood and be committed to implement it.

## **RECOMMENDATIONS**

It will be necessary for the government leaders at Provincial Administration to arrange special meetings for the Barotse Royal Establishment, community representatives, civil society, Provincial Planning Unit, and experts under Ministry of Agriculture and the Ministry of Fisheries and Livestock to produce a strategic plan that will guide the implementation of some of the suggestions.

It will be necessary to improve extension services based on market linkages e.g. ZAMBEEF can train cattle farmers on how to fatten their animals using fodder during the flood period; and other market providers can establish extension service linkages aimed at improving fish and crop production and productivity.

Furthermore, there is need to strengthen research aimed at improving the capacity of the people of Barotse Flood plains to be more agriculturally productive.

Future studies may be carried out on topics such as:

1. Transformation of the Barotse Flood Plains into a grain basket;

2. Management of caging fishing in the Barotse Flood Plain pools under village headmen;
3. Possibility of establishing of village based agricultural cooperatives on the Barotse Flood Plains; and
4. How to improve water and sanitation services on the Barotse Flood Plains.

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