



Original Article

## The Impact of Flood Damage on Farmers, Agricultural Sector and Food Security in Laos: A Regional Case Study of Champhone District, Savannaket Province

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### Abstract

This study is an assessment of the impact of flood damage on farmers, the agricultural sector, and food security in Laos, specifically in Champhone District, Savannakhet Province, a central part of Lao PDR. This research analyzed the perception level of flood impacts on the farming community, evaluated the flood disaster management of food security in agriculture, and determined the contributed potential strategy in minimizing the negative impact of floods on the agriculture sector and the country's food security. The study collected and analyzed the data from 110 respondents (farmers) from the Champhone district. Most of the respondents suffered individual losses from the flood damage. The respondents also took about two to five months to restore their farms after the floods destroyed their farmland.

**Key Words:** Flood Impacts, Natural Disaster, Food Security, Climate Change

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## I. INTRODUCTION

Agriculture is important to humans all around the world. It is the basis of life, from the food we eat to the clothes we wear, which is a major contribution to the economy. Agriculture serves as the backbone of a nation's economy. Activities ranging from raising livestock to growing crops are incorporated into agriculture. Food security is very important in feeding people all over the world (Agriculture Business Idea Nigeria, 2019). Natural disasters, especially floods, are often caused by climate change. Farmers and agriculturists face flood impact in different forms, like loss in production, damage to agricultural infrastructure, and even psychological distress for farmers. This results in the agricultural sector being very vulnerable, affecting the food security of every country in the world (Muhammad et al., 2018).

Malnutrition caused by hunger can lead to chaos. Flood disasters will have an impact on the mental health of the victims, the country's socio-economic status and food security. This will then result in instability in the human population and the socio-economical economy of the nation. Flood risk causes hardship in rural areas due to its impact on agricultural productivity.

The Lao People's Democratic Republic (Lao PDR) is highly susceptible to climate change and natural hazards, particularly floods and drought conditions, which seriously affect the country's agricultural production. Although gradually declining in terms of its contribution to GDP in recent years, agriculture continues to play a major role in Lao PDR's economy. Champhone district, located in Savannakhet Province, and its surrounding agricultural lands are located along the bank of a river, an area which is prone to flooding. Since 1992, villagers have experienced four major floods, the most recent in 2015 when 106 hectares of agricultural land were flooded, damaging more than one third of cropped land. Four years earlier, in 2011, the village lost all its crops during a major flood that persisted for three months. Almost 400 hectares of farm land are potentially vulnerable to flood damage in any given year, and the water level can remain persistently high for months at a time.

Strong southwesterly winds cause flash floods in Lao PDR each year from August to September. It is most common in the central and southern provinces. In recent years, Laos has been severely affected by floods. Savannakhet Province produces the

largest amount of agricultural production in Laos compared to other provinces, and is also the province most affected by disasters, especially floods.

The cause of flooding is low agricultural land. The increase in rainfall due to the increase in rainfall during the rainy season increases the flow of water, causing landslides and landslides. The Champhone district is already experiencing this problem. Increased soil and landslides cause more cement to flow into the river, widening the water, creating shallow water barriers, exacerbating flooding, prolonging and damaging rice production, houses, irrigation, infrastructure and roads.

Champhone District, Savannakhet Province, located in the central part of Lao PDR, about 45 km<sup>2</sup> from the provincial capital, with a total area of about 1,114 km<sup>2</sup> and a population of 21,042, is one of the districts in Savannakhet Province that is affected by floods every year. It adversely affects agriculture, farmers, and food security (PAFO Report, 2020).

The way of life of the people in Champhone district is mainly based on natural resources. Therefore, there are risks from climate change and floods. Cultivation is the main livelihood and economic activity of the people in Chophone district. The main crops grown in the district are rice and soybeans. Champhone district produces rice not only for consumption but also for export to neighboring districts and provinces. Livestock production is a subsistence activity and an important source of income after crop production. However, agriculture in Champhone district is greatly affected by climate change, especially by floods, which have a direct impact on crop production and livestock. The people in Champhone and the surrounding districts are at high risk of food insecurity (National Economic Research Institute NERI, 2017).

Champhone district is an important economic district for rice and food production in the Savannakhet province, central Lao PDR. The livelihood of many people depends on the food produced in the district, such as rice, vegetables, meat, and fish. Floods affect the Chomphon district every year with increasing severity due to declining forest cover and increased rainfall, on some occasions lasting more than 15 days (National Economic Research Institute NERI, 2017).

Data gained from this study may be helpful in the analysis of the impact of flood damage on farmers, the agricultural sector, and food security in Lao PDR. It is important to know the nature and extent of the effects of flooding as a basis

for developing strategies to address the negative effects of floods. It can also serve as a basis for developing primary policies and proposing funding from other development partners in the future.

## **1. Statement of the Problems**

Regular flooding occurs due to heavy rainfall with moist-westerly winds blowing from the Indian Ocean from mid-May to September and due to the location of major rivers. Some floods are also intensified by tropical storms which reach the country from the South China Sea. The main factors determining the severity of flood impacts relate to inadequate protection along the critical flooding points and poorly developed water control gates. According to the World Food Program (WFP), 16 flood events were reported during the period between 1996-2002 of varying magnitudes and durations. In recent years, recurrent flood events have caused severe damage to the agricultural sectors, particularly to rice production (Ministry of Agriculture and Forestry, Laos, 2014-2016).

### **1) Flood impact on psychology**

The psychological impact on flood victims is not only profound and long-lasting, but also far greater than the economic impact. The rainy season comes every year, making the flood victims in Chaphone District, Savannakhet Province, feel uncomfortable and unsafe.

### **2) Flood impact on food security**

Floods are one of the main causes of hunger, food insecurity and malnutrition in the world. When floods occur, people try to cope by cutting back on diets, selling livestock and tools, and keeping children out of school. These methods can have long-term effects, putting people in a cycle of hunger and poverty.

Food security for all people in Chaphone district, Savannakhet province can be explained as having access to the basic food they need both physically and economically. Floods have affected the agricultural sector in terms of damaged farmlands, reduced yields, and difficulty accessing food for people due to lack of transport systems and roads. People also lack awareness of food access and food availability during flooding.

## 2. Objectives

This study aims to analyze the level of farmers' awareness of food accessibility, food availability, and food utility. Respondents were those affected by the flooding in recent years and employees operating in the agricultural sector. The results can be used to supplement plans and strategies for the development of the agricultural sector in the Champhone district, Savannakhet province. It also serves as a basis for policy development to seek funding from other development partners in the future.

The purpose of this research is:

- (1) To identify the flood impacts on the farming community
- (2) To determine the assistance to be provided by the Government after the flood damage

## 3. Scope of Case Study

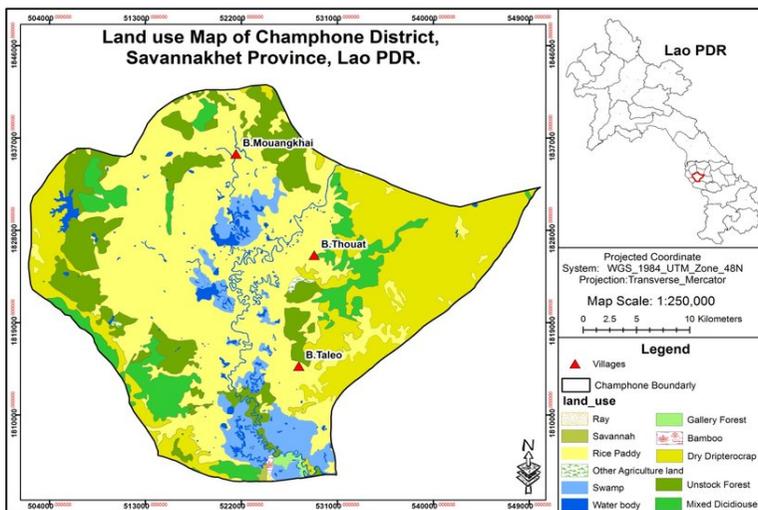
The 〈Figure 1〉 is a Geographical scope map for map of Laos.

## 4. Research Methodology

In this study, there were 110 farmers selected as respondents. The selected respondents are those farmers affected by the floods in Champhone district, Savannakhet province. The data was collected through a survey form that involves the four sub-sectors of agriculture: agriculture, livestock, fisheries and food crops. A face-to-face approach to the respondents was conducted to gather the information. The designed questionnaire is a multiple-choice test, which is composed of 41 questions to be completed within 15 minutes.

The Questionnaire Instructions are divided into seven sections (Financial impact of flood information; Damages and impacts of flood on respondents and their farms information; Time taken to stabilize farm information; Perceptions of accessibility, availability, and utility of food security information; Perception level toward food accessibility; availability and utility in affected areas; and What kind of farmers do you want the government to support?). The collected data in this study was used to analyze the impact of flood damage on farmers, the agricultural

〈Figure 1〉 Geographical scope map: Map of Laos



sector, and food security. The data will also be used to analyze the level of knowledge of each farmer.

The collected data in this research was analyzed using the Statistical Set for Social Sciences Software (SPSS) program to generate survey statistics: frequency distribution, percentage, reason, and standard deviation.

## **II. LITERATURE REVIEW**

Climate change is a global challenge to food security. Food security in the agricultural sector has faced challenges such as changes in rainfall patterns, droughts, floods, and others. The United Nations (UN) provided statistics that show that among natural disasters, floods and storms cause the greatest loss and damage in modern society. The level of damage arising from floods and storms only during the last decade has been higher than damage from earthquakes. The damage from earthquakes is less due to the improvement of construction methods and others, but unfortunately, the natural trend of development in some countries, such as Iran, has caused damage to the environment and natural resources, and the damage from floods is in progress (Norouzi & Taslimi, 2012).

The floods have severely affected farmers' livelihoods, post-flood food shortages have increased food insecurity, confirming that the growth and development of crops on farmland is affected by floods, floods make it impossible for plants to absorb the nutrients needed for proper growth, floods cause erosion or loss of nutritional status of community crops. It shows that floods have reduced the efficiency of agricultural land in terms of food production, resulting in food insecurity, reduced income, affecting household investment or occupants, and loss of livelihoods and sources of income from the floods. It makes it difficult to take care of family members, especially children. In addition, those living in flood-prone areas face poor living conditions (Week & Wizer, 2020).

### **1. Definition and Models of Impact Flood in Agricultural Sector and Food Security**

The agricultural sector has a role to play in ensuring food security, especially in

developing countries, but the biggest challenge for this sector is climate change. The agricultural and food systems around the world are facing the problem of climate change, causing floods and other phenomenon resulting in the decrease of soil fertility and poor agricultural yield. This climate change problem is critical to the agricultural sustainability and food security of developing countries (Apatha et al., 2009).

According to Wang et al., 2018, the floods are one of the major natural disasters affecting farmers, the agricultural sector, society and the economy. The awareness of flood risk is beneficial to farmers in implementing management in flooded areas. However, flood risk awareness suggests that flood experience, education, and awareness of flood perceptions, attitudes and perceptions of people in response to such incidents can be helpful in improving farmers' understanding of flood response.

The reshuffle of the Government of Lao PDR has led and ensured an effective, timely response to the long-term effects of floods and mitigation of agricultural risks and food insecurity.

## **2. Problem of Impact Flood in Agricultural Sector and Food Security**

Malaysia is also one of the countries facing the effects of climate change, which has led to natural disasters, especially floods. The country conducted an analysis last year on the level of awareness of the impact of floods on agricultural communities affected by floods. The findings confirm that most of the damage caused by the floods was RM1,001 million or 240,625 million USD or more. It will take two to five months for the farmer to recover emotionally and mentally, which is the same period of time that is needed to carry out the farmer's aspirations activities on a regular basis (Hazran et al., 2017).

The agricultural sector in Laos PDR is vulnerable to floods. Floods during the planting or harvesting seasons can cause significant damage to farmland and crops. floods cause huge damage in the plains of Laos, especially in the Chaphone district, Savannakhet province, where it occurs every year. As a result, farmers are facing higher risk when it comes to decision-making, whether to postpone the planting or not, resulting in a decrease in production, which greatly affects the

level of food security in the country.

Climate change causing flooding is the major constraint and barrier to achieving agricultural food security in Lao PDR. Floods severely affect farmers because they greatly damage the farmlands and crops, resulting in limited access to food, which also affects the food availability and food security of the country.

### **3. Framework for Disaster Management**

To prevent, control, and mitigate the effects of natural disasters, such as floods, particularly in agricultural production areas, the following steps must be defined: Integrate natural resource management, prevention, and control into the agriculture development plan at every level and in each period to apply them all at the same time. To cooperate with international organizations to develop workplans for disaster risk reduction in the agriculture area. This aims at technical capacity building in reducing risks, disaster management planning, and coordination and exchange of information with other relevant parties by improving mechanisms, roles, and duties of relevant sectors, and providing instructions to implement workplans systematically within operational frameworks for each period, such as short-term (preparedness for handling disasters), short-to medium-term (disaster risk reduction), and medium-to long-term (adaptation or resilience to climate change).

The Agricultural Development Strategy sets out the development goals for 2025 by focusing on flood-adapted agriculture and focusing on small-scale land needs, ensuring food security and improving farmers' livelihoods. In order to achieve this long-term strategy, the expected specific goals are: Ensuring food security is a top priority in improving agriculture and livestock.

Food security in the event of a disaster is a major challenge for the agricultural sector. The government needs appropriate policies to promote food security and good nutrition for people in vulnerable areas. Disaster risk and how to deal with it, especially floods, are likely to increase every year.

Access to food is essential for people living in flood-prone areas, and disaster management policies provide emergency relief to the basic needs, food and shelter of flood-affected people. Improving preparedness through farmer-centered flood management, enhancing coordination between communities and governments

at various levels, strengthening community resilience and self-help mechanisms.

Establish a disaster management implementation team at the district level to be a channel of information, local needs, ensure readiness and awareness of urgent needs in flood-affected communities. The key to change in the area of food security is effective policies and in line with disaster management strategies.

### III. RESULT AND DISCUSSION OF MODEL ANALYSIS IN IMPACT OF FLOOD DAMAGE

#### 1. Demographic Profile of the Respondents

The demographic profile demonstrates the demographic data of the respondents such as gender, age, level of educational qualification, years of agriculture and farming, main occupation, and income.

The gender distribution of the respondents is shown in <Table 1>. Provides information on the gender distribution of the respondents in the study. The majority of the respondents are male, which is composed of 70.9% of the total, while the female respondents are composed only of 29.1%.

Respondent's age distribution: The results showed that the outstanding age of the respondents who were active farmers was between 31 and 40 years (40%), the second group was between 41-50 years old (26.4%), the second two groups of the respondents composed of the older group (between 51-60 years old) and the younger group (30 years old) were the same at 15%. The last group of respondents, those 61 years old and above, had the lowest distribution at 6.4%.

Demographic data analysis also indicated that the majority of the respondents were educated up to primary level (38.2%), followed by lower secondary level (25.5%) and upper secondary (18%). There were also 15.5% respondents who received further higher education with certificate or diploma level qualifications. The last group of respondents are those farmers who have never been to school (4.5%).

Most of the respondents experienced agriculture and farming for 16 years or above (67.3%), followed by 13-15 years (18.2%). The lowest group experienced agriculture and farming for about 1-4 years (1.8%) only.

**〈Table 1〉 Demographic profile of the respondents (n = 110)**

Variable	Category	Frequency	Percent (%)
Age	20-30 years	15	13.6
	31-40 years	46	41.8
	41-50 years	28	25.5
	51-60 years	14	12.7
	>61 years	7	6.4
Gender	Male	78	70.9
	Female	32	29.1
Level of education	Never been to school	5	4.6
	Primary school	52	47.3
	Lower secondary	18	16.4
	Upper secondary	18	16.4
	Certificate/diploma degree	17	15.5
Years of agriculture and farmers	1-4 years	2	1.8
	5-8 years	3	2.7
	9-12 years	11	10
	13-15 years	20	18.2
	16 years and above	74	67.3
Main occupation	Farmers	72	65.5
	Government/private	18	16.4
	Self-working pensioner	9	8.2
	Others	8	7.3
Monthly income per year	Less than 10,000,000 Kip or US 1,000	47	42.7
	11,000,000-20,000,000 Kip or US 1,100 - 2,000	31	28.2
	21,000,000-30,000,000 Kip or US 2,100 - 3,000	17	15.5
	31,000,000-40,000,000 Kip or US 3,100 - 4,000	8	7.3
	More than 41,000,000 Kip or more than US 4,100	7	6.4

The majority's main occupation of the respondents (64.5%) are farmers, followed by government/private employees (17.3%), self-employed (8.2%) and the lowest percentage of the respondents are those who are pensioners (7.3%) and others (2.7%).

Respondent's Monthly income per year: In terms of economic status, 43.6% of the respondents earned less than 10,000,000 Kip per year. There were also 6.4% of respondents who earned more than 41,000,000 Kip annually.

## 2. Analysis of Financial Impact of Flood

The financial impact of the flood on the farmers and agriculture sector in Laos can be shown in 〈Table 2〉. This table showed the defining data on the financial impact of floods when it comes to the losses and damage of properties, agri-

**〈Table 2〉 Analysis of financial impact of flood**

Cost	Percentage (%)	Frequency (n=110)
No losses	14.5	16
Less than 1,000,000 Kip or US 100	33.6	37
1,001,000 – 5,000,000 kip or US 100 – 500	35.5	39
5,001,000 –10,000,000 kip or US 500 – 1,000	10	11
≥ 10,000,000 kip or ≥ US1,000	6.4	7

cultural inputs and facilities and agricultural crops and machineries. These variables were calculated to determine the percentage (in terms of cost or amount of money) of losses and damages in Chaphone District, Savannakhet Province, Laos.

It can be concluded that the majority of respondents most affected by the floods are between 1,001,000–5,000,000 kip or US 100 - 500. However, 14.5% of the respondents did not experience any losses. This is mainly because their farms were not affected by the floods. They also moved their livestock to higher ground and did not grow crops during the rainy season.

### **3. Analysis of Damages and Impacts of Flood on Respondents and Farms**

〈Table 3〉 Shows the findings of the respondents' perceptions on the amount of flood damages and impacts to the farmers and to their farmlands, which were categorized into four levels based on the sort of damage and impact (Not affected, Low, Medium, High). The table shows the three variables with the highest percentages of high-level damage and inter-variance, namely emotion and psychology (32.7 percent), drainage and irrigation (33.6 percent), and crops/livestock variables (35.5 percent). Respondents were emotionally and psychological challenged. Some farmers have shifted to other activities and stopped growing crops during the rainy season due to the lack of response to floods. The young farmers have lost interest in any farming activities because of the floods that damage the farm. Most of the respondents' farms were damaged by the floods, their crops or livestock were severely affected, and their agricultural activities were ruined, as the plants such as bananas, rice, and vegetables are not strong enough to withstand the harm caused by the floods.

〈Table 3〉 Analysis of damages and impacts of flood on respondents and farms

Variables	Not affected		Low		Medium		High	
	%	N	%	N	%	n	%	N
Emotion and psychology	19.1	21	30.9	34	17.3	19	32.7	36
Farm infrastructures	40.9	45	12.7	14	21.8	24	24.5	27
Farm tools and utility	42.7	47	21.8	24	19.1	21	16.4	18
Fertilizer stock	52.7	58	12.7	14	13.6	15	20.9	23
Farm store	47.3	52	17.3	19	16.4	18	19.1	21
Drainage & irrigation	35.5	39	17.3	19	13.6	15	33.6	37
Crops/livestock	24.5	27	20.0	22	20	22	35.5	39
Farm machinery	62.7	69	14.5	16	10	11	12.7	14
Worker	66.4	73	12.7	14	7.3	8	13.6	15

#### 4. Analysis of Time Taken to Stabilize Farm

〈Table 4〉 Illustrates how long respondents took time to get the farms back on track after the flood damaged their farmland. In terms of the emotional and

〈Table 4〉 Analysis of time taken to stabilize farm

Variables	Not affected		Less than 1 months		2-5 months		6-9 months		10-12 months		More than 1 year	
	%	N	%	n	%	N	%	n	%	N	%	n
Emotion and psychology	30.9	34	14.5	16	20.9	23	10.9	12	15.5	17	7.3	8
Farm infrastructures	40	44	10.9	12	19.1	21	12.7	14	9.1	10	8.2	9
Farm tools and utility	50	55	15.5	17	11.8	13	10	11	8.2	9	4.5	5
Fertilizer stock	47.3	52	14.5	16	9.1	10	11.8	13	7.3	8	10	11
Farm store	42.7	47	16.4	18	13.6	15	16.4	18	5.5	6	5.5	6
Drainage & irrigation	33.6	37	19.1	21	16.4	18	11.8	13	10	11	9.1	10
Crops/livestock	28.2	31	18.2	20	23.6	26	20.9	23	3.6	4	5.5	6
Farm machinery	50.9	56	25.5	28	10	11	5.5	6	4.5	5	3.6	4
Worker	64.5	71	11.8	13	7.3	8	6.4	7	4.5	5	5.5	6

psychological aspects of the farmers, the majority of respondents had enough time to re-establish themselves in order to continue the farming operations in crops of livestock in two to five months. Farmers can survive the damage from a flood due to the support and assistance provided by the government.

## 5. Analysis of Perceptions on Accessibility, Availability and Utility

〈Table 5〉 Shows the flood in the affected area, respondent assessment of food security in terms of food access, food availability, and food utility. The results showed that all the three factors, food availability ( $M = 2.42$ ), food accessibility ( $M = 2.36$ ) and food utility ( $M = 2.697$ ) had a moderate mean score.

The highest mean score ( $M = 2.61$ ) was given to a statement assessing food availability, "It was difficult to get an adequate food supply after the flood had ended." It can be inferred that while some respondents had adequate food supplies at home, others did not. The statement 'My family and I had to go without food for a few days' ( $M = 2.10$ ) received the lowest mean score. As a result of this finding, the respondents were able to obtain appropriate food supplies in their area following the storm. In addition, the government of Laos and international organizations were reported to be proactive in offering assistance to flood victims around the country.

The item that measured food accessibility factor, food aid distribution was not within the scope of the family, and because the road was damaged, they could not access the highest average score record ( $M = 2.63$ ). Understandably, some respondents had difficulty accessing food because their access roads and vehicles were damaged by the floods, resulting in a lack of assistance. There was a minimum average score ( $M = 2.03$ ) for food. It stated that it was difficult to buy food because the road was damaged and inaccessible. The government, in concurrence with international organizations, has been helping to repair roads so that farmers have access to any support and assistance.

The respondents waited for help from the government and Flood Centres to provide basic equipment and essential supplies for them. The Food Utility Measurement Statement stated that each family was given sufficient cooking utensils that recorded the highest average score ( $M = 2.85$ ). The findings also indicate that

**〈Table 5〉 Analysis of perceptions on accessibility, availability and utility**

Statement	Scale					Mean	SD
	1%	2%	3%	4%	5%		
Food availability							
It was difficult to get adequate food supply after flood had ended.	33.6	24.5	7.3	16.4	18.2	2.61	1.533
Raw ingredients for cooking were hard to find around my area.	34.5	26.4	9.1	13.6	16.4	2.51	1.488
Food sources were very limited in my place.	40.9	16.4	8.2	13.6	20.9	2.57	1.617
My family and I had to endure hunger a few days without food.	30	25.5	19.1	17.3	8.2	2.48	1.304
My family and I had to fight to get food every day.	37.3	21.8	20.9	10	10	2.34	1.336
The food supplied did not meet the nutritional needs of my family and I.	51.8	20	7.3	8.2	12.7	2.10	1.440
A lot of food given by flood centre ended up wasted.	47.3	10.9	12.7	20.9	8.2	2.32	1.446
Overall mean						2.42	1.452
Food accessibility							
It was difficult to get food for my family from the flood centre or other sources because there was no vehicle.	38.2	22.7	13.6	13.6	11.8	2.38	1.414
It was difficult for me to buy food because the road was damaged and not accessible.	57.3	12.7	9.1	11.8	9.1	2.03	1.404
Food aid distribution was not within the reach of my family and me because the road was damaged and not accessible.	40.9	10.9	10	20.9	17.3	2.63	1.590
The vehicle that my family and I used was damaged and unusable thus preventing us from getting our food.	42.7	19.1	12.7	10.9	14.5	2.35	1.481
I did not have money to pay the cost of repair of my vehicle to get food.	38.2	22.7	14.5	20	4.5	2.30	1.289
No repair service for damaged vehicle after flood has added problem to us in getting food outside the village.	37.3	17.3	13.6	25.5	6.4	2.46	1.379
Overall mean						2.36	1.426
Food utility							
Daily cooking was difficult because my kitchen appliances had either been damaged or lost.	38.2	20.9	19.1	15.5	6.4	2.31	1.297
Basic equipment for cooking was hard to get.	31.8	21.8	15.5	23.6	7.3	2.53	1.346
Flood centre provided adequate cooking utensils to me and members in my community.	39.1	7.3	8.2	25.5	20	2.80	1.636
Each family was given sufficient cooking utensils.	33.6	7.3	13.6	31.8	13.6	2.85	1.510
Cooking was difficult even with existing equipment because of lack of electricity and gas supply.	26.4	24.5	10.9	36.4	1.8	2.63	1.270
Overall mean						2.62	1.412

Note: 1 = Strongly agree, 2 = Agree, 3 = Neutral, 4 = Disagree, 5 = Strong disagree.

adequate processing equipment and basic utensils, such as stockpiles, condiments (salt, sugar, flour, etc.) were provided to each family after the flood. The lowest average score for this factor was from the statement stated that daily cooking was difficult because the kitchen appliances were damaged or lost (M = 2.31).

## 6. Analyze of the Perception Level toward Food Accessibility, Availability and Utility in Affected Area

〈Table 6〉 Demonstrates respondents' level of awareness about food accessibility, food availability, and food utility in the affected area. These factors indicate that perceptions at each level, such as food availability, were moderate. Food accessibility and food utility were low.

## 7. The Farmers Want from the Government to Support

〈Table 7〉 The farmers want the government to support them. It was shown that

〈Table 6〉 Analysis of perception level toward food accessibility, availability and utility

Variables	Frequency	Percentage(%)	Mean	SD
Food accessibility level				
High (3.67-5.0)	33	30	1.88	.832
Moderate (2.34-3.66)	45	40.9		
Low (1-2.33)	32	29.1		
Total	110	100		
Food availability level				
High (3.67-5.0)	23	20.9	2.34	.805
Moderate (2.34-3.66)	27	24.5		
Low (1-2.33)	60	54.5		
Total	110	100		
Food utility level				
High (3.67-5.0)	21	19.1	2.31	.775
Moderate (2.34-3.66)	34	30.9		
Low (1-2.33)	55	50		
Total	110	100		

**〈Table 7〉 Analysis of the farmers want from the government to support**

Variables	Frequency	Percentage(%)
Seed	32	29.1
Irrigation	11	10
New machine	9	8.2
Finance	10	9.1
Livestock	36	32.7
Infrastructures	12	10.9
Total	110	100

respondents needed government assistance with the highest average scores of animal species (32.7%), followed by plant varieties (29.1%). As flood damage affects crops and livestock most, climate-resilient varieties need to be considered. However, other aid is also important: infrastructure, irrigation, finance, and new machines to ensure food security.

## IV. CONCLUSION AND RECOMMENDATION

### 1. Conclusion

This study was conducted to assess the impact of floods on the agriculture, farmers and food security in Savannakhet province, particularly in Champhone district.

The result of the study shows that the agricultural sector in Champhone district was severely affected by floods, which had a negative impact (directly and indirectly) on the agricultural members of the community. Food security for all people in Champhone district, Savannakhet province can be explained as having access to the basic food they need both physically and economically. However, due to floods, their agricultural sector was affected. It damaged farmlands and reduced yields, resulting in difficulty accessing food for people due to lack of a transport system and roads. The lack of people’s awareness of food access and food availability during flooding are also some of the problems identified concerning food security in the area.

Natural disasters, especially floods, are often caused by climate change, which has greatly damaged the agricultural sector in the form of loss in production and damage to farmers' agricultural infrastructure. As a result, the agricultural sector is at risk because of flooding, causing difficulties in agricultural production areas, resulting in declining agricultural yields and risk to food security. The respondents took time to restore their farms after the floods destroyed their farmland. The losses brought by the flood greatly affected their well-being, especially the emotional aspect. Most farmers spent about 2 to 5 months calming their emotions before resuming their farming and animal husbandry activities.

The government of Lao PDR, Ministry of Agriculture and Forestry needs to mitigate the risks associated with adverse and catastrophic impacts of floods. Integrating disaster risk management with a focus on disaster risk reduction measures, linked to poverty reduction, food security, and the challenges posed by climate change, should be prioritized for sustainable agricultural development. The study shows that the majority of the respondents wanted support and assistance from the government sector. The highest assistance needed by the respondents from the government is for the animal species and the plant varieties.

## **2. Recommendation**

Based on the findings, this study suggests that there is a significant need to strengthen farmers' social adaptation to the effects of floods and climate change. The recommendations are as follows:

First, Encourage farmers to make good preparations (such as for raising livestock during floods).

Second, Ensure that farmers have proper flood-resistant storage facilities to mitigate the effects of floods. In addition, extension projects and activities can help farmers rehabilitate their farms after the floods.

Third, Social protection systems and security measures, including compensation transfer mechanisms and agricultural insurance schemes, strengthen and improved food security and early warning systems to be used for the damage and damage caused by catastrophic floods.

Fourth, Strengthening the capacity management at the provincial and district

levels to ensure that the existing policies and strategies of the National Disaster Coordination Committee are properly implemented in the event of a flood.

Fifth, Grow agricultural products that can be harvested early by adjusting the time of a huge flood.

Sixth, The Department of Agriculture should develop a policy to reduce damage by moving animals to higher ground and allowing them to graze during the flood period.

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