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Community Based Adaptation To Climate Change And Social Economic In Xe Champhone Wetland, Champhone District, Savannakhet Province

Phoummixay Siharath[1], Somchay Vilaychaleun[2], Khampasith Thammathevo[3], Keophousone Phonhalath[4], Soulyphan Kannitha[5], Chankhachone Sonemanivong[6] , Keoduangchai Keokhamphui[7], Phaiphana Siharath[8]
[1,2,3,4,5,6,8]Faculty of Engineering, National University of Laos, [7]Faculty of Water Resources, National University of Laos

Article Info	ABSTRACT

Keywords:
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resilience,
wetland

Climate change is key significant factor that impacts on multi-dimensions, which is relevant to social economic development, livelihood and environment, hence, Community Based Adaptation (CBA) to climate change is a mechanism of adapting based on the existing practices, knowledge, policy and experiences of the rice farmers to sustain their lives on changing climate, the objective of the study is to assess the social economic and find the practice management of rice farmers to adapt during flood and drought seasons. Hence, according to the research finds that, majority of the rice farmers are experienced and learnt from the previous effect and adjust themselves by using knowledge skills, experiences to build the resilience for their rice and crop planting in order to prevent and avoid the damages from climate change within the wetland. Besides that, the local communities still utilize the existing potential natural based adaptation to be flexible sustainably their agricultural activities and livelihood during rainy and dry season.

Corresponding Author:
Phoummixay siharath
Faculty of Engineering, National University of Laos
phoummixay2011@gmail.com

INTRODUCTION

For the time being, climate change is major issue around the world(Balehegn et al., 2019; Chen et al., 2018), its impact is not only in the urban area but also in the remote areas, due to flood and drought disasters occurs several times in every year(Bronen, 2015; Cha et al., 2024) and temperature is increased continuously that causes the weather turbulence and fluctuation irregularly (Clarke et al., 2019; Danraka et al., 2024). These impacts effects mainly on the crop yields of the local community and their lives being are destroyed and damaged numerously (Berkes, 2004; Desta et al., 2012), therefore, community-based adaptation to climate change is also the solution or alternative to adapt on sustainable lives in order to mitigate and avoid the following impact on the crop yield (Dong and Zhang, 2011; Grantham et al., 2011; Province and Lao, 2011). In addition, to build the climate resilience to combat on natural disasters is the solution methods of sustainability (Johnson et al., 2005; Lloréns, 2008;

Taillardat et al., 2020), however, social economic development is significantly driven to sustain on livelihood and wetland (Keskitalo and Kulyasova, 2009).

Within Xe Champhone wetland boundary, there are 44 villages that rely on the wetland ecosystem services and more than 95% of local people are farmers and most of the farmer agricultural activities are serving by the wetland as well (Donatti et al., 2020; Lacombe et al., 2017; Leh et al., 2020).

Sui Lake is very crucial part of Xe Champhone wetland, it provides a plenty of numerous richness of ecosystem for instance: fish aquatic animal, water, food and energy for local people, furthermore (Keskitalo and Kulyasova, 2009; Meynell, 2017; Province and Lao, 2011), it is regulating the rainfall water during rainy season to protect flood and drought disasters (Baig et al., 2016; Rajendran and Thivyatharsan, 2013; Rizvi et al., 2015), therefore, most of villages live nearby the Lake such as Phonthong, Doneyeng, Sakeun Tai, Sakeun Neun, Dongmeaung villages. There are irrigation systems to support and pump water from Sui Lake for their rice planting and other agricultural activities.

Area The Study

The Xe Champhone wetland is one of the first two vital and recognized wetland under the Ramsar Convention on Wetlands of International Significance(Krittasudthacheewa et al., 2019; Leh et al., 2020; Shindell et al., 2004), the site is situated in south east of Champhone district, Savannakhet Province, it is about 54 km west of Savannakhet city and it is around 476 km way to southern provinces that is far from Vientiane capital. Its surface area is approximately 12,400 ha (Meynell, 2017) that covers within two districts (Champhone and Xonbouly districts), these areas are abundant biodiversity and also provides water, food and energy for local communities to secure and sustain their livelihood(Hale et al., 2009; Johnson et al., 2005; Nandy and Ahammad, 2012), because, most of the local people are farmers and based on the wetland, in particular, rice farmers group both raining and off seasons as their main activities and income sources (Mekaoussi et al., 2023; Roberts et al., 2012) and also pumps water from Sui Lake through irrigation canals and drain water to the famer rice fields. In addition, local people also do fishing from the Sui Lake as well. The study is mainly conducted and emphasized on rice farmers for those who are living surrounding Sui Lake (downstream and upstream areas) as indicated in Figure1.

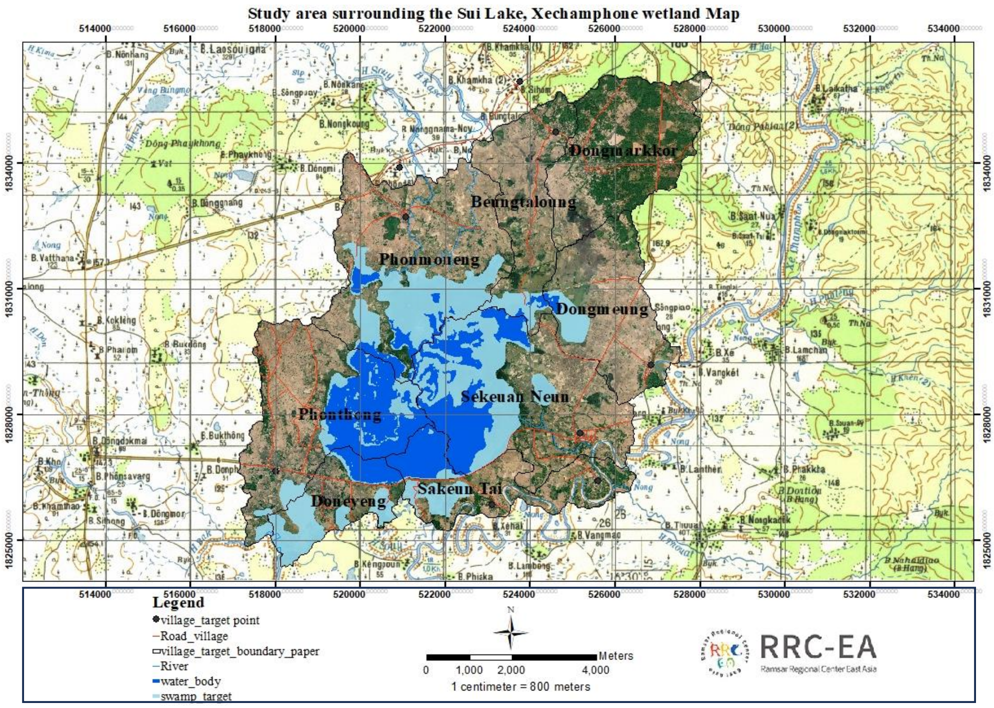

Figure1. Study area surrounding the Sui Lake, Xe Champhone wetland Map

METHODS

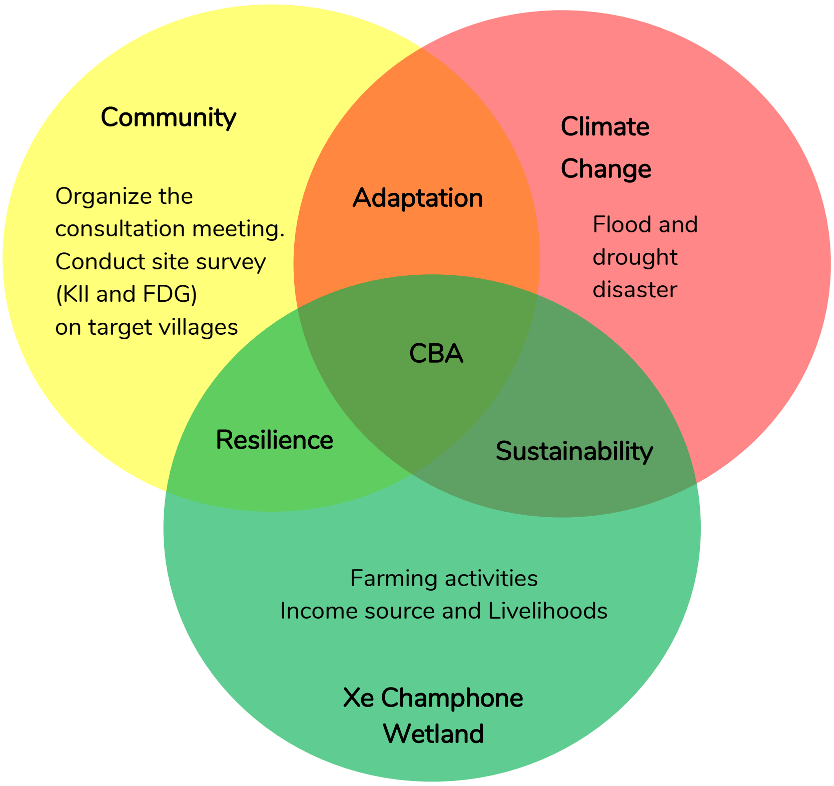

Figure 2. Community Based Adaptation to climate change Diagram

Data collection

Desk review

Reviewing of the existing data and information availability as offline and online (Sonemanivong et al., 2023) that relates to the Xe Champhone wetland and community-based adaptation as scope the study for instance: CBA context and its significance, GIS information, mapping target villages based on this information (Boutsamaly et al., 2023; Poudel et al., 2021), then numbers of sample design are defined to collect and support the research work (Siharath et al., 2023), therefore, desk review was conducted to understand the general background, methodology of the study(Xaiveeheuang et al., 2023).

Field work

Data are collected by method of Key informant interview (KII) and Focus Discission Group (FDG) (Lebel et al., 2023) with provided questionnaires (Osuman, 2019; C. Wamsler et al., 2016; C. J. E. Wamsler and society, 2015; Woroniecki et al., 2019). Therefore, KIIs were conducted with chief of villages and also head of village groups and FDG are proceeded with local people of each village, there are 8 target villages namely Phonthong, Doneyeng, Sakuen neau, Sakeun tay, Dongmeung, Phonmouang, Dongmakor, Beungtaloung.

Local people are appointed and gathered either at temples or village offices; it is based on their convenient situation of each village as shows in Figure 3. Therefore, totally, there are 160 samples, second part is field work at sites, it is prepared and designed to incorporate and consult with local district authorities as main sectors to work with for instance: District office of Natural Resource and Environment (DONRE), District of Agriculture and Forest office (DAFO).

RESULTS AND DISCUSSIONS

Based on the data collection among of target villages, Figure 3 and 4 indicate significantly the rice yield during wet and dry seasons between 2019-2023. Deu to climate change and their geographical areas during wet season: some areas of rice field at Donyeng, Sakeunneu, Sakeun tai and Lamphanh, Dongmeung, Dongmarkor and Beungtaloung villages can not grow rice properly. Because, rice field will be flooded areas, rice farmers just sow the seedlings and leave them, not consider and expect to attain the rice yield when harvesting. In opposite, during dry season, some areas of rice fields at Phonthong, Sakeun neu, Dongmeung, Phonmouang, Dongmarkor and Beungtaloung villages are not sufficient water to grow rice, some families are pumping water from Sui Lake by themselves, there is no enough irrigation system to support as indicated in Table1.

- Last season, rice farmers at Phonthong village could grow and harvest the rice only wet season, the rice yields were approximately 1,037.5 tons in wet season and harvested averagely 416 tons in dry season, due to limitation of water, before 2023, rice farmers did not grow rice in dry season, recently, it is supported by the Korean government to construct the Agri-irrigation system.
- In average, rice farmers at Donyeng village are able to grow rice two seasons, nevertheless, the rice yield in wet season is less than dry season, therefore, it was 474 tons and 658 tons, in wet and dry season, respectively.

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- As well as, rice farmers at Sakeun neu village can grow rice two seasons, therefore, it was 1.430 tons in wet season and 690 tons in dry season. There is irrigation system to support, but it is not be able to access through all rice field of farmers.
- Similarly, rice farmers at Sakeun tay and Lamphanh villages can grow rice in two seasons, therefore, it was 1,280 tons and 755 tons, in wet and dry season, respectively.
- An overall, rice farmers at Dongmeung village are able to yield rice in two seasons, the rice yield in dry season is less than wet season, therefore, it was 250-993.75 tons in wet season and 43-69 tons in dry season, due to lack of irrigation system water to support.
- Typically, rice farmers at Phonmouang village are able to produce rice yield in two seasons, the rice yield in dry season is less than wet season, therefore, it was 2,301 tons in wet season and 700 tons dry season, due to lack of irrigation system water to support.
- In general, rice farmers at Dongmarkor and Donedeng villages can produce rice in two seasons, hence, the rice yield were ranged between 262.5 tons to 792 tons of dry and wet seasons, respectively.
- For the most part, rice farmers at Beungtaloung village can havest rice two seasons, the rice yield in wet season is more than dry season, consequently, it was 930 tons and 288 tons, in wet and dry season, respectively.

Since, in 2019 there was flood and also impacted on their crops in particular, at Sakeun neun, Dongmakor and Donedeng and Beungtaloung, there were no rice yield anymore. Figure5 depicts on social economic information of target villages that most of their main income are from agricultural activities, particularly, the rice yield from wet and dry seasons, Figure6 shows that local communities are typically rice farmers that covers 86.67% to 96.61%, consequently, according to the surveys were found that there was an average income ranging from 20,000,000 to 35,000,000 LAK/year/person among of 8 target villages, therefore, the incomes can be concluded as followings:

- Phonmouang village shows the highest average income, hence, it is about 35,00,000 LAK/year/person.
- Phonthong and Doneyen village depicts medium average income, consequently, it is about 27,000,000 LAK/year/person.
- Sakeun neu, Sakeun tay and Lamphanh, Dongmeung and village have lower medium average income, thus, it is about 25,000,000 LAK/year/person and
- Dongmarkor and Beungtaloung villages indicate lowest average income, therefore, it is approximately 22,000,000 LAK/year/person.

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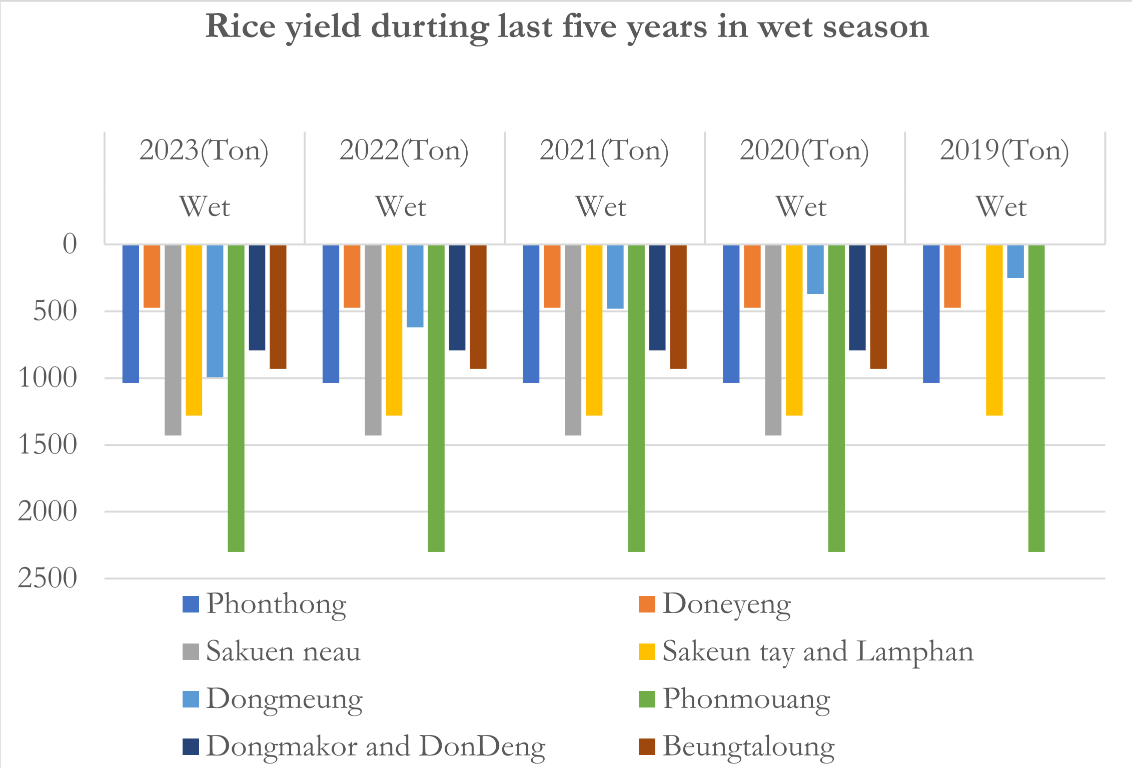

Figure 3. Rice yield during last five years in wet season

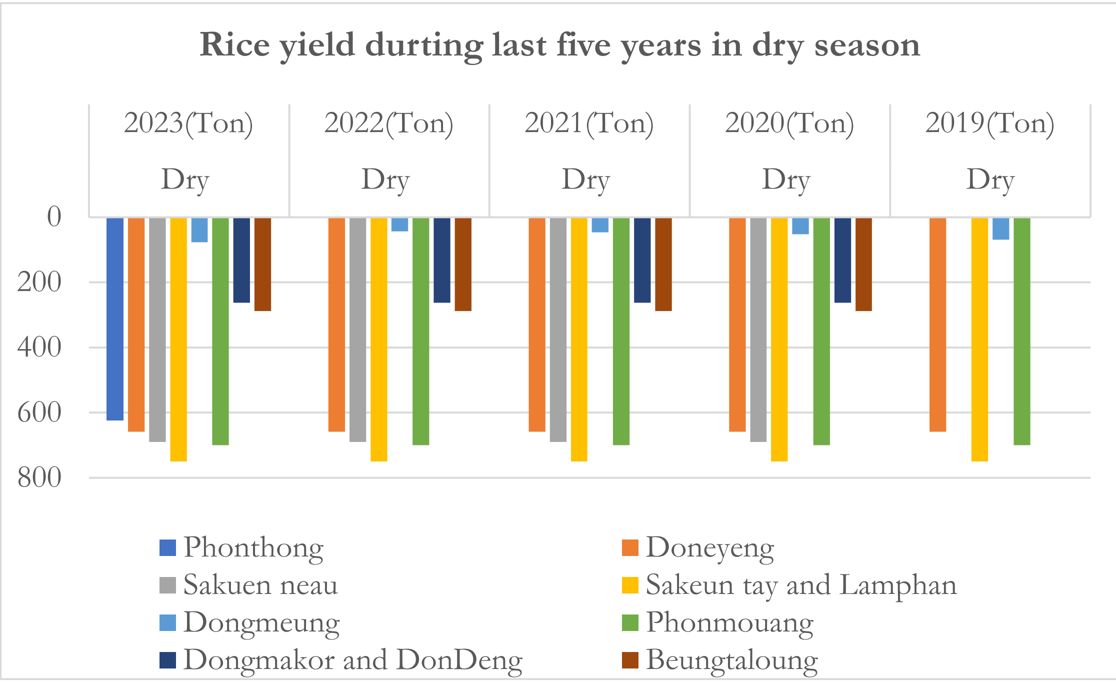

Figure 4. Rice yield during last five years in dry season

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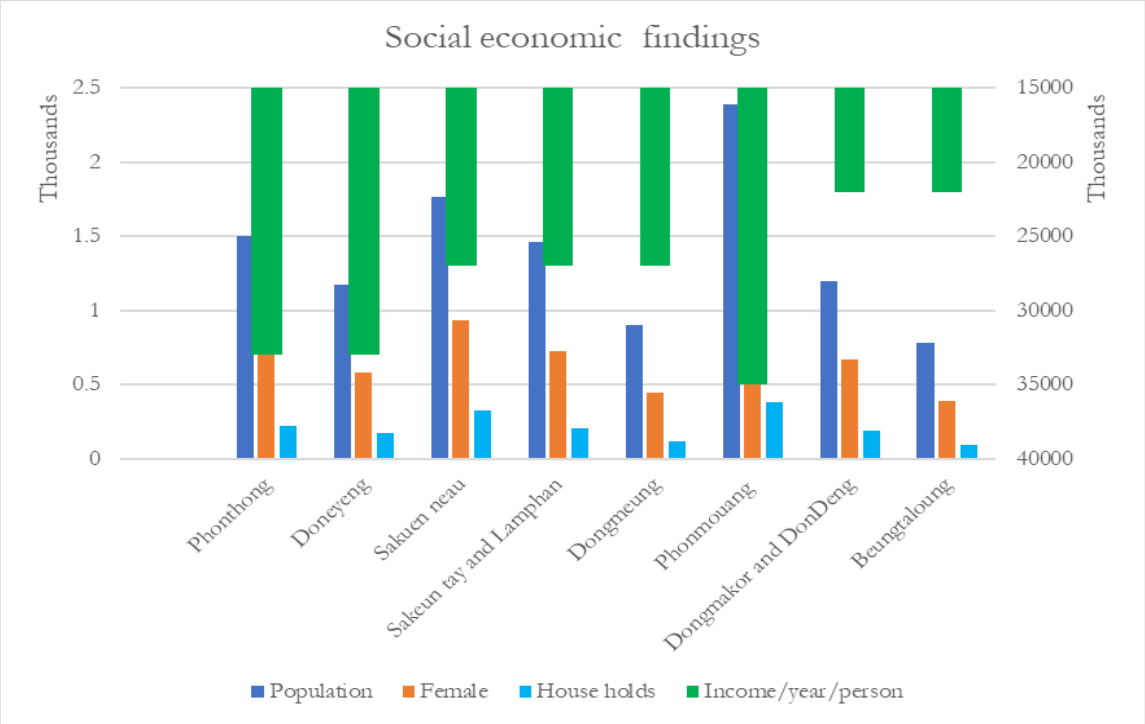

Figure 5: Social economic information

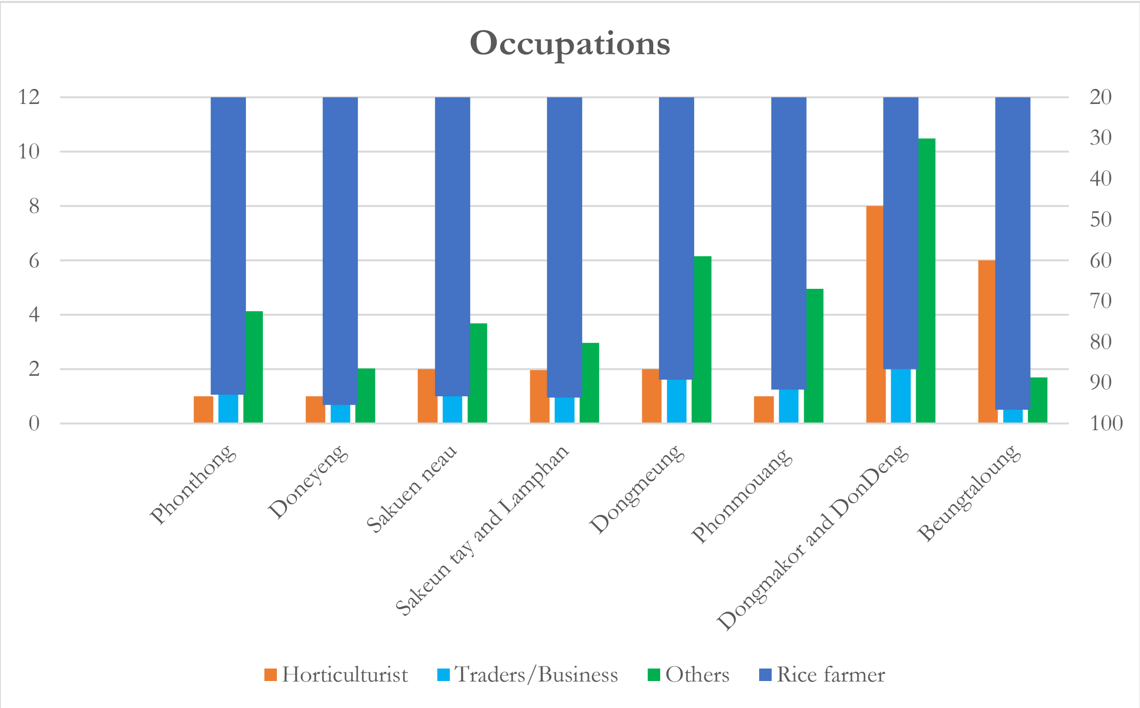

Figure 6: Occupations

Table1: Community Based Adaptation to climate change matrix

No	Villages	Sui Lake reference	Rice farmer growing		How to adapt when climate change
			On-season	Off-season	
01	Phonthong	Up and down stream	There are 229 households (or 415 ha) that will grow rice, during this season, in general, the local village can approximately harvest 2.5 tons per ha.	There are 130 households (or 208 ha) that will grow rice, the main area is called Na hai yai, which is trail areas of rice planting, therefore, there are existing irrigation canals to support the and pump water from Sui Lake, in average, it is able to have rice yield about 3 tons per ha.	• During wet season, rice farmers endeavor to avoid the rice planting where rice field is near by the Sui Lake, where is low land and floodable due to may be impacted rainwater and damage the seedlings. • In case, some risky years of flooding for rice planting, rice farmers will just sow the seedlings and not considered to harvest effectively. • Rice farmers use the seed varieties that is called Thadokham 8,11, and Khor kor 11 to prevent and build resilient on flood and drought disaster and also use the natural fertilizer from animals to increase fertility

No	Villages	Sui Lake reference	Rice farmer growing		How to adapt when climate change
			On-season	Off-season	
					of the soil for instance: cow dungs and not use chemical fertilizer.
02	Doneyeng	Down-stream and very few areas in up-stream	There are 174 households (or 158 ha) that will grow rice, during this season, in general, the local village can approximately harvest 3 tons per ha.	There are 174 households (188 ha), these areas will plant rice during dry season. There are existing irrigation canals to support the and pump water from Sui Lake where supports by JICA, it is able to harvest 3.5 tons per ha.	As above (01)
03	Sakuen neau	Up and down stream	There are 261 households (or 572 ha) that will grow rice, during this season, in general, the local village can approximately harvest 3 tons per ha.	There are 261 households (or 230 ha) that will grow rice, the main area is adjacent to Sui Lake, there are existing irrigation canals to	As above (01)

No	Villages	Sui Lake reference	Rice farmer growing		How to adapt when climate change
			On-season	Off-season	
				support the and pump water from Sui Lake, (called Sakeun irrigation), overall, average, it is able to have rice yield about 3 tons per ha.	
04	Sakeun tay and Lamphan	Down stream	There are 210 households (or 512 ha) that will grow rice, during this season, in general, the local village can approximately harvest 2.5 tons per ha.	There are 150 households (200 ha), these areas will plant rice during dry season. There are existing irrigation canals to support the and pump water from Sui Lake where supports by JICA, it is able to harvest 3.5-4 tons per ha.	As above (01)
05	Dongmeung	Upstream	There are 114 households (or 265 ha) that will grow rice, during this season, in general,	There are 60 households (18 ha), these areas will plant rice	As above (01) Opposite, in case, there is no sufficient water for rice planting, they will plan

No	Villages	Sui Lake reference	Rice farmer growing		How to adapt when climate change
			On-season	Off-season	
			the local village can approximately harvest 3.5-4 tons per ha.	during dry season. There are an existing irrigation canals to support the and pump water from Sui Lake. it is able to harvest 3.5-4 tons per ha.	crops for instance: maize, cucumbers, water melon, string bean as short corps periods and not need much water.
06	Phonmouang	Up stream	There are 386 households (or 767 ha) that will grow rice, during this season, in general, the local village can approximately harvest 3 tons per ha.	There are 337 households (or 200 ha) that will grow rice, the main area is called Na hai yai, which is trail areas of rice planting, therefore, there are existing irrigation canals to support the and pump water from Sui Lake, in average, it is able to have rice yield about 3.5 tons per ha.	As above (01)

No	Villages	Sui Lake reference	Rice farmer growing		How to adapt when climate change
			On-season	Off-season	
07	Dongmakor	Up stream	There are 105 households (or 246 ha) that will grow rice, during this season, in general, the local village can approximately harvest 3 tons per ha.	There are 26 households (75 ha), these areas will plant rice during dry season. There are an existing irrigation canals to support the and pump water from Sui Lake. it is able to harvest 3.5 tons per ha.	As above (01) In opposite, if some households, they need to plant rice during off-season, they need to pump water from Sui Lake by themselves through Done sala and Done Khaoung irrigation cannels).
08	Beungtaloung	Up stream	There are 105 households (or 372 ha) that will grow rice, during this season, in general, the local village can approximately harvest 2.5 tons per ha.	There are 60 households (69 ha), these areas will plant rice during dry season. There are an existing irrigation canals to support the and pump water from Sui Lake. it is able to harvest 3 tons per ha.	As above (01) In opposite, if some households, they need to plant rice during off-season, they need to pump water from Sui Lake by themselves and Water Kham (Gravity Fed natural water) is available for whole year. Where is from Hua khan khou and Sai kham heu thong.

CONCLUSIONS

In conclusion, the study found that, community-based adaptation is an alternative way to adapt and mitigate the impacts from the climate change either flood and drought, most of the local communities (rice farmers) for those who rely on rice planting surrounding or nearby the Sui Lake, they are familiar with and able to adapt when changing the climate in order to avoid impacts on their rice yields, they will know whether plant rice or not when the season comes, therefore, both upstream and downstream areas during the wet and dry seasons, rice farmers are needed to promote and support to use widely rice varieties to build the resilient on climate change whether flood or drought, in addition, rice farmers still need to be supported the technical skills on rice yield effectiveness as well.

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