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Research Article

Saltwater damage in the Vietnamese Mekong Delta: A case study of agricultural livelihoods in Hung My commune, Tra Vinh province

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Abstract: This study examines the considerable impact of Saline Intrusion (SI) on the livelihoods of households (HH) in Vietnam's Mekong Delta (VMD) which is main rice production powerhouse of the country. As a notable occurrence in the region, its damage has been evaluated through both quantitative and qualitative approaches. The principal conclusions are to the identification of capital elements via the examination of sustained damage and resilience in addressing forthcoming crises. The analysis of gathered data has shown the growing threat to the estuary's agricultural output caused by the incursion of SI. This has particularly affected food production, which is a crucial and longstanding industry in the VMD's economy. Therefore, it is essential to prioritize the implementation of sustainable agricultural practices and develop ways to bolster resilience, which includes enhancing disaster preparedness and promoting sustainable livelihoods. This paper means to setup precedent for future studies, advocating for the inclusion of socioeconomic and ecological factors in policy framework development to mitigate the risks posed by environmental alteration and improve the resilience and adaptability of impacted farmers.

Keywords: Salinity intrusion; Agriculture base; Loss threshold; Household livelihoods; Resilience quality; Adaptive capacity.

1. Introduction

In recent decades, the repercussions of climate change on the environment and humanity have arisen as among the most significant topics of discussion and concern on the international policy agenda [1–3]. A contemporary critical submission, the fifth evaluation publication of the Intergovernmental Panel on Climate Change (IPCC) of the United Nations addresses the devastating impacts of the changing climate on economic sectors such as agribusiness [4, 5]. Southeast Asia's economic output would be marginally impacted by a decline in agricultural productivity [6], given the predicted reduction of the agricultural segment [7, 8]. According to Ministry of Agriculture and Rural Development (MARD), the VMD is a significant rice-producing in the region [9, 10], contributing 18 percent to the overall Vietnam's GDP [11, 12]. However, this area is threatened by the effects of climate crisis and its implications, as the intensity of such crisis has grown over the past decade [13–16]. SI, which closely relates to this dire environmental disaster, is a natural phenomenon caused by water scarcity, upstream dam activity, and rising sea levels [17–20]. This situation has drastically influenced the likelihood of people across the delta, resulting in considerable

losses to material and ecological resources, along with negative impacts on finances, social structure, and communities. In 2016, a vast expanse of rice and aquaculture land, exceeding 215,000 and 68,000 hectares respectively, was profoundly affected by severe drought and salt intrusion, leading to an estimated economic loss of approximately 7,517 billion VND across nine provinces and one municipality in the estuary [14]. In 2020, 685,558 people, 130 thousand of whom were children, were exposed to several health risks, including inadequate drinking water and poor cleanliness [17]. Many men in their working ages have moved to nearby provinces or HCMC to trade their labor in the low-skilled industries as they were said to repay debts from the previous drought-related saltwater intrusion [21]. Furthermore, these adverse outcomes have directly impacted the livelihoods of the residents not only on economic terms but also in land planning level [22], particularly those involved in farming and ranching practice [23, 24]. Consequently, policymakers and scholars have emphasized the investigation of climate variability and its effects on the design of sustainable agriculture strategies [25–29]. While the authorities have implemented numerous adaptation strategies in response to climate change and variability [9, 30]. Nevertheless, the quality of effort is relatively limited and fragmented [8, 31–33].

Firstly, to be plausible resilience against climate change means encompassing the capacity to anticipate, consolidate, and coordinate emergency response [14, 16]. The concept of sustainable livelihoods was initially introduced as a means of integrating socioeconomic and ecological factors into a cohesive, policy-relevant framework by Brundtland commission on environment and development [34]. Then its idea was further elaborated by the 1992 United Nations Conference on Environment and Development, specifically within the framework of Agenda 21, which underscored the significance of income security as a coherent goal for poverty improvement [35]. While several research literatures indicate that flexibility approaches highlight the importance of learning capacity in both individuals and organizations [36–38], education and literacy as well as with information exchange are crucial for community resilience to disasters [39, 40]. Previous case studies in Vietnam determines that identifying dependent factors is the first step in developing adaption strategies to reduce environmental risks [20, 41–43]. It suggests that sustainable living can act as an “integrating part” to address development challenges, resource managing, and poverty relief simultaneously [42, 44]. This research aims to dissect information collected from affected farmers in SI-infested areas to re-evaluate their position in response to environmental challenges.

2. Methodology

This study seeks to provide a better insight on the topic by integrating the systematic, data-oriented approach of quantitative research with the detailed, interpretative analysis typical of qualitative research. Thus, allowing a more distinct examination, using the advantages of addressing the study problems from different points of view.

2.1. Overview of studied area

The case study was performed in Hung My Commune in Tra Vinh Province, one of the most adversely affected spots of salt intrusion in the Mekong outlet [45, 46]. In a typical dry season, the maximum saltwater incursion ranges from 1,5 million to 2 million hectares [10]. In 2020, approximately 5,177 hectares of rice, cultivated by 6,710 homes, representing 78% of all rice-growing families, were threatened by seawater intrusion [47].

Findings from the “Mekong Futures” envision indicate that households categorized as middle well-off, possessing a farm size of 0.4-0.7 hectares, generated an average monthly revenue of two million VND per laborer [2]. This income level is just above the poverty line issued by Vietnamese government for 2021-2025 period [48], which mean average family in VMD still vulnerable against prospect of climate disaster in term of financial asset. Although

a significant number of individuals in Vietnam have ascended from poverty, many "near poor" homes remain in a vulnerable state and could readily regress into poverty owing to adverse shocks [49].

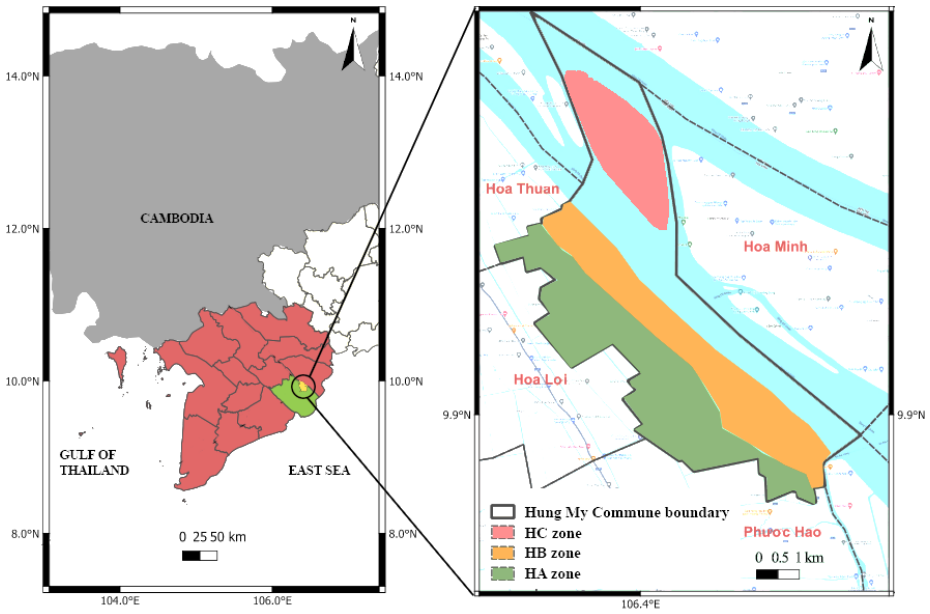

Figure 1. Geographical location of Hung My commune, Chau Thanh District, Tra Vinh Province in the VMD, Vietnam.

Located at the mouth of the Mekong waterways, the terrain of Tra Vinh (Figure 1) is distinguished by its lower, moister terrain. The land is notably irrigated by both natural and man-made canals, with a typical height ranging from 0.6 to 1.0 meters, encompassing two-thirds of the total area [23]. Furthermore, this region is susceptible to sea level rise, as the medium-range emission scenario predicts that by 2030, the sea level could increase by 13 centimeters [13]. Positioned adjoining to the Co Chien River in the Chau Thanh District, Hung My commune encompasses a total extent of 2,829 hectares (28.29 square kilometers), of which 59 percent is agricultural/forest territory.

2.2. Identifying relevant agents

On a local scale, vulnerability assessment is essential for understanding the effects of climate change on individual economy [5], which is beneficial for conducting research on SI damage assessment. Nevertheless, in their findings [37–39] suggested and emphasized that adaptable livelihood approaches may be rendered unsuccessful if they are not accurately assessed and identified in relation to the susceptibility of livelihoods to shifting climates. Investigations from [50, 51] outline that, for people and families, "key capacities" may be seen as assets and representing a pool of resources that individuals and social groups can use to enhance their well-being. Furthermore, the study [50] has recapped those instrument capabilities in accordance with the terms utilized in resilience thinking by his predecessors in this regard (Table 1).

Table 1. The concept of Resilience quality of capital capacities [50].

Quality	Descriptions
Responsiveness	Capability to organize, recognize, foresee, strategize, and ready for an emergency or unexpected occurrence
Resource mobility	Ability to deploy funds and facilities for action. This encompasses the capacity to access monetary and other commodities through collaboration
Learning capacity	Capacity to assimilate prior knowledge, circumvent recurrent mistakes, and improvise to enhance productivity

To assess the vulnerabilities of HH using this theoretical framework, the research needs to determine the main assets of the affected and measuring their capacity against risk is the basis to gauge the risk endurance of said homes. Hence, two sets of parameters have been needed. Firstly, reviewing previous studies of [42–44, 51–52], the common approach frequently evaluates the five primary elements of farmer resource: natural, social, financial, physical, and human. The addition of the components of employment strategy, as well as natural catastrophes endurance, was further analyzed and divided into subsections of each criterion due to their influence on the resilience and economic vulnerability of farming residences (Table 2).

Table 2. Dividing five main capitals to subcomponents and categorize by resilience quality.

Capital	Indicators	Resilience quality
Human	H1: General education	Responsiveness
	H2: Health	Responsiveness
	H3: Knowledge SI-resilient livelihood	Responsiveness
	H4: Knowledge of actions to protect livelihood before SI event	Responsiveness
	H5: Learning from experience	Learning capacity
	H6: Innovation for SI-resilient livelihood	Learning capacity
Social	S1: Knowledge sharing for SI-resilient livelihood	Resource mobility
	S2: Support to recover/overcome after the event of SI	Resource mobility
	S3: Training by local government	Learning capacity
	S4: SI defense measure regulations	Responsiveness
Physical	P1: Early warning system	Responsiveness
	P2: Livelihood preparation before SI events	Responsiveness
	P3: Community-level protection infrastructure	Responsiveness
Natural	N1: Condition of natural system for SI	Responsiveness
Financial	F1: Financial support for SI-resilient livelihood	Resource mobility
	F2: Access to finance sources for SI-resilient livelihood	Resource mobility
	F3: Family savings	Resource mobility

It is essential to identify factors that hinder or facilitate future change and to compare the results with those from conducted survey [58]. The principal benefit of this technique is that the collected knowledge would be essential for preparing precisely targeted adaptation strategies [42].

The second criterion for evaluating the vulnerability of HH is how much damage caused by SI they can sustain. The loss limit is divided to three level:

Total loss: farmhands were forced to sell their land and changed occupations which were interpreted as complete destruction of livelihood.

Heavy: affected who lost more than fifty percent of their investment in agriculture and pushed them to seek external help.

Minimal damage: homes were marginally affected by SI and/or self-sustained thanks to their own capitals.

2.3. Data collection

a) Define a farming household

The “farmer family” assessment entails measuring the total well-being and productivity of those reliant on agricultural activities for their living. This procedure includes not only the members of the agricultural dwelling who own and operate the farm but also those who are hired as a labor force to assist with various tasks. The assessment may involve examining factors such as access to resources, land ownership, income levels, food security, and overall living conditions. By understanding the dynamics of the agriculture residence and the roles of each member, interventions can be developed to encourage flexible agricultural practices and improve the living standard of those involved in the agricultural sector. The individuals selected to represent those residing within the irrigated region have been categorized into

three distinct groups: HA, HB, and HC (HH of zone A, zone B and zone C respectively-figure 1).

b) Define different studied neighborhoods by focusing on water stress

HA is "water stress" level less - because has multiple water supplies (from inner irrigation, public water supply).

HB is "water stress" level medium - has only inner irrigation.

HC is "water stress" level high - no water supply.

HA is composed entirely of landowners with agricultural property situated within the protection canal. On the contrary, the HB group includes farmers whose properties are situated beyond the SI barrier, while the HC group comprises families residing on Con Co island. The placement of each HH was determined to be within a radius of 5 kilometers from the primary irrigation system.

c) The sample size calculation

This approach involves determining a more precise sample size by analyzing the disparity between the population and the sample. Due to the challenges of surveying the entire population within time constraints, a sample was selected from the population, and a comprehensive survey was subsequently performed. With the purpose of determine the sample size, the following Yamane formula was applied [53]:

$$n = \frac{N}{1 + N \times e^2} \quad (1)$$

where n is the experiment amount; N is the number of HHs in the studied area; and e is 10% of N. The sample size necessitated the establishment of a 10% significance level, as the number of individuals meeting the criteria was limited, hence necessitating a higher sample size. In 2019, Hung My Commune had an inhabitant of 10,068 which equivalent to 2,405 homes. While based in dominance rice culture of VMD, agricultural sector had only 43.85 percent of its economy (which consist of 1,057 farming families) [54]. Therefore, the optimal number of sample size for carrying out survey was decided as around 200 households using formula (1).

2.4. Sampling collection

This survey covers the social aspects of the vulnerability of rural communities in the Hung My commune of Tra Vinh province within the project to understand how these vulnerability characteristics affect the extent of damages and impacts experienced by selected houses during salinity intrusion periods, which hit the province. The specific objectives of the work within this survey are:

To assess the demographic characteristics and vulnerability (five-capital analysis) of targets.

To understand the relationship between social vulnerability characteristics of a "farmer family" and how said member built their ability and protected their living environment during the saltwater intrusion (measures, methods, techniques, etc.).

To understand how the above aspects affected the level of impact experienced.

The study employed a quota of 208 HHs as its targets of the assessment, owing to time and financial constraints. In accordance with the research design framework, a series of multi-level interviews with key informants were undertaken to choose the study site within the province. The Five Capital framework (human, physical, social, natural, financial) must be applied for the assessment of the social vulnerability of the targets. In addition, pertinent documents including maps, and the annual report were considered.

A total of 10 individuals, consisting of field personnel from Can Tho University and local partners, were trained extensively before conducting interviews as part of a questionnaire pretest. The surveys were done across two distinct time frames, spanning from September to October and then again in December 2023. Four staff members were sent to each of

the major zones, while the HC received one pair of surveyors. The participants in the study were the head of households or their spouses, whose major source of income was primarily derived from activities related to crop cultivation, ranching, or aquaculture. A systematically structured questionnaire was utilized to gather data on socio-demographic characteristics, employment, community connections, wellness, access to food and water, emergencies, and environmental disparities. The poll item was drafted based on the subsections or measures illustrated in Table 2. This process also utilized the assistance of local leaders in choosing appropriate and suitable indicators that accurately represent the socioeconomic characteristics of the community being examined.

2.5. Benchmarking

Each household survey was thereafter entered into a digital database and assessed according to the established parameters (Table 3). Subsequently, each indicator is arranged according to its mean values, and then it is shown in diagrams for a more comprehensive explanation. Using this technique, an examination of principal patterns about each attribution may either hinder or aid response to saline shocks. The band score from 1 to 5 indicates capital capacity intensity to identify from the insufficient and affluence. These indicators are then classified into 5 divisions in which 1 shows strong weakness while 5 indicates strong ability. The score 3 belongs to the neutral answers and normal tones from the interviewees. Score 2 gives the weak potential and 4 is for strong reactions and perspectives. These segments of capital capacity could cover all the feedback from the interviewees focusing on the concerned issues.

Table 3. Capital capacity score ranges from scarcity to abundancy (self-assessed value).

	0-2	**2-4**	**4-5**
Farmer HH's capital (I-V)	Asset depleted	Transitional	Great capacity

3. Results

3.1. Tendency of main major assets between study zones

All data retrieved from their questionnaire was evaluated by the authors and transformed into a capacity score based on the scale in Table 3, subsequently shown in Figure 2. This graph presents the variations of five major assets of surveyed households in three chosen sites with each household is represented by a specific color.

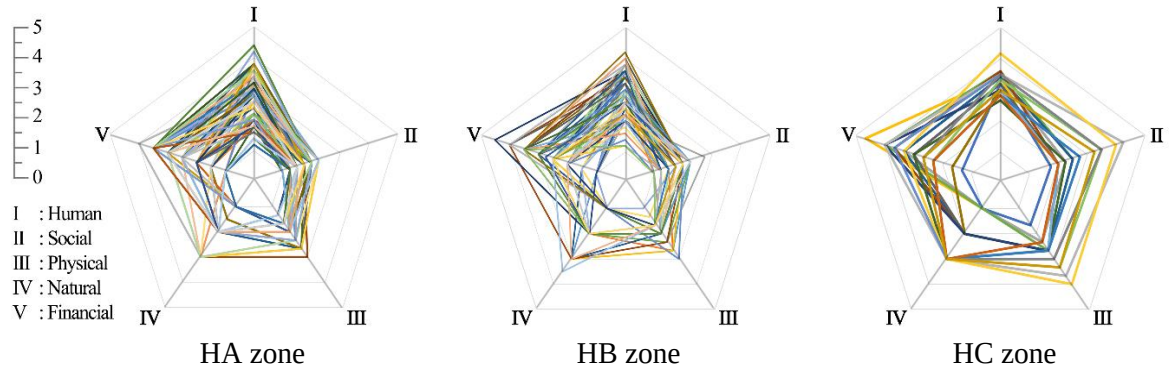

Figure 2. The discrepancies in asset evaluating of farming family between 3 HH groups.

Firstly, these charts illustrate the considerable discrepancy among existing assets. Many of the farmers in question are constrained by Social and Physical resources, since only a small number of families have attained the median value in both domains. The amplest capital could be seen as Human asset which shows a wider distributing tendency than others.

The distribution of HA capitals is highly limited and concentrated, indicating that the scores are generally lower across most metrics. The Human and Financial parts are undoubtedly the most significant, and they are much greater than the other aspects. Unlike HA, the HB zone diagram displays a broader configuration, indicating that scores are enhanced across all indicators. Nonetheless, while the Natural and Financial indicators may be more pronounced, the chart continues to show a similar trend to the previous one. The most extensive shape among the three radar charts is that of HC, signifying the highest output or scores in most data points. The financial, human, and physical qualities in this section are significantly advanced, exhibiting consistently high scores throughout the chart. In general, Figure 2 indicates that "Human" is the predominant capital possessed by Hung My inhabitants, which could be advantageous in mitigating the setbacks of SI.

3.2. Representation of SI damage in different studied neighborhoods

In HA (Figure 3), the scores primarily persist within the "Heavy damage" spectrum, with a small number of them extending to the "No damage" area. The scores of many assessments begin in the "Heavy damage" section and progressively increase as they approach the "No damage" sector. Like HA, HB (Figure 4) also demonstrates a consistent trend throughout the assessments. In contrast to HA, the scores are slightly lower overall, with a greater number of individuals falling within the "Heavy damage" and a smaller number reaching the "No damage" zone. The aggregate score levels indicate that HB presents less favorable conditions than HA, despite the consistent trend. However, HC (Figure 5) exhibits a markedly distinct pattern, with certain landowners having a "Capitals score" that is even lower than the "Total loss" range. Nevertheless, the variety of capitals in HC is increased by the fact there are two families in the No-damage zone. In summary, the most favorable trend is demonstrated by HC, as a greater number of assessments reach the "No damage" range. While HA has shown improvement, the majority of interviewees' score remains in the "Heavy damage" region, suggesting that this group continues to encounter some obstacles. The most significant challenges confront Zone B, as most scores remain in the "Total loss" and lower "Heavy damage" tiers, indicating severe conditions that impede improvement.

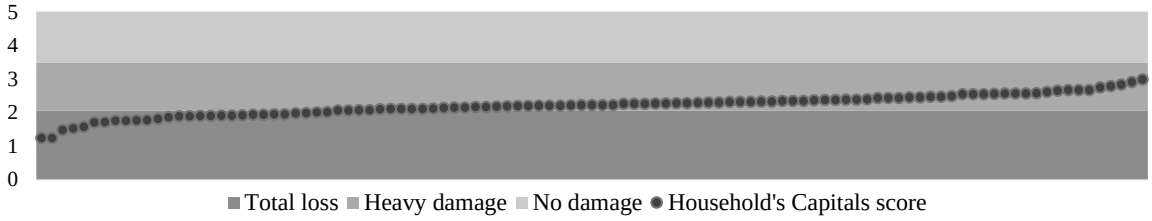

Figure 3. Loss range of studied farmer group in HA.

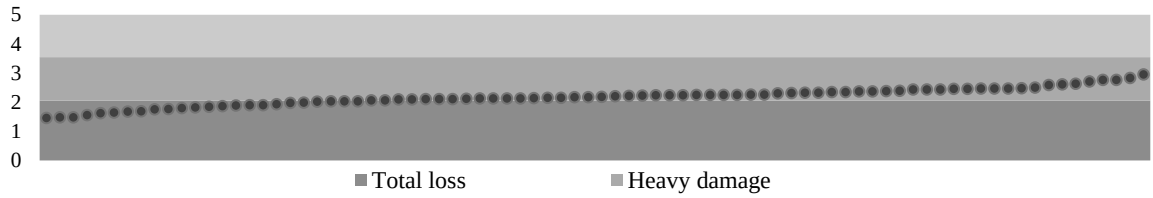

Figure 4. Loss range of studied farmer group in HB.

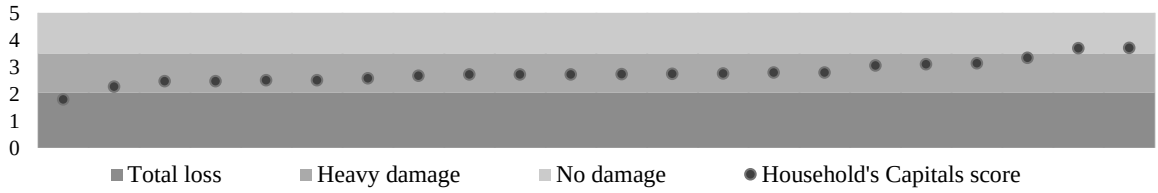

Figure 5. Loss range of studied farmer group in HC.

3.3. Notable revelations from survey

SI had a substantial negative influence on agricultural output, resulting in reduced planted crop areas, damage to rice volume and other products, livestock disease, a drop in agricultural inputs such as nutrients, and contamination of aquaculture cultivation land.

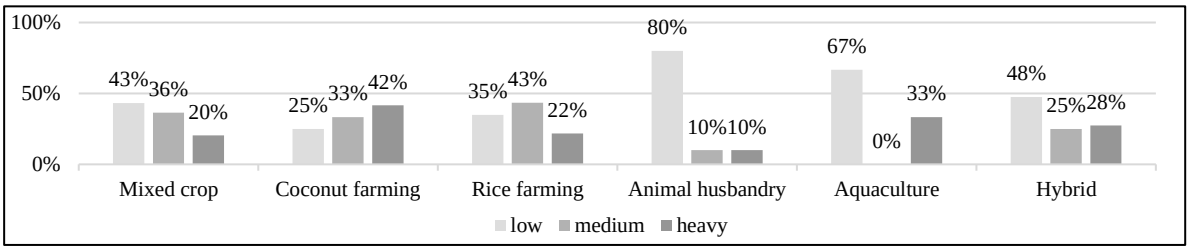

Figure 6. Finance loss by SI of studied Households by means of agricultural activity as main income source.

Collected data reveal significant disparities between different groups of landowners (Figure 6). Damage estimation showed Coconut farming suffered the highest rate of damage with 42 percent in heavy loss range. In contrast, the aquaculture group was less affected by SI as 67 percent of the families sustained no damage. Moreover, financial losses in animal husbandry are overwhelmingly low with very few farmers facing medium (10%) or heavy (10%) losses respectively. Mixed cropping and other hybrid agricultural practices also showed resilience in the face of saline water challenges. The data suggests that specific farming activities, such as animal husbandry, demonstrate greater resilience and reduce financial losses. Conversely, other agrarian forms, such as vegetation planting like rice or coconut, have a more diverse effect on interviewee's finance.

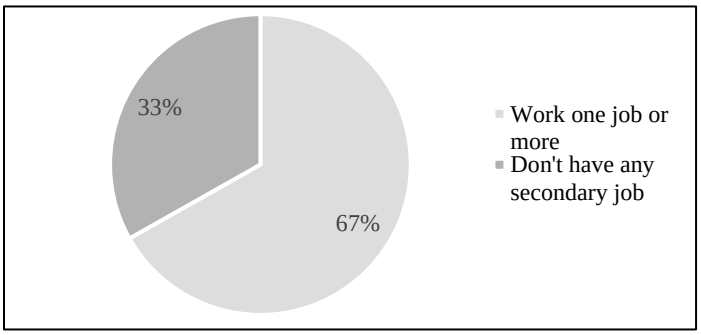

Figure 7. Demographic of households regarding to secondary job.

Many HH strive to secure employment in two separate works to bolster their income to make ends meet. Most families (67%) have at least one second occupation, according to Figure 7. This pattern might reflect economic pressures, suggesting that people generally need additional sources of income. The minority (33%) of people without a second job may be made up of HHs with alternative lifestyle choices or ones with a sufficient primary income.

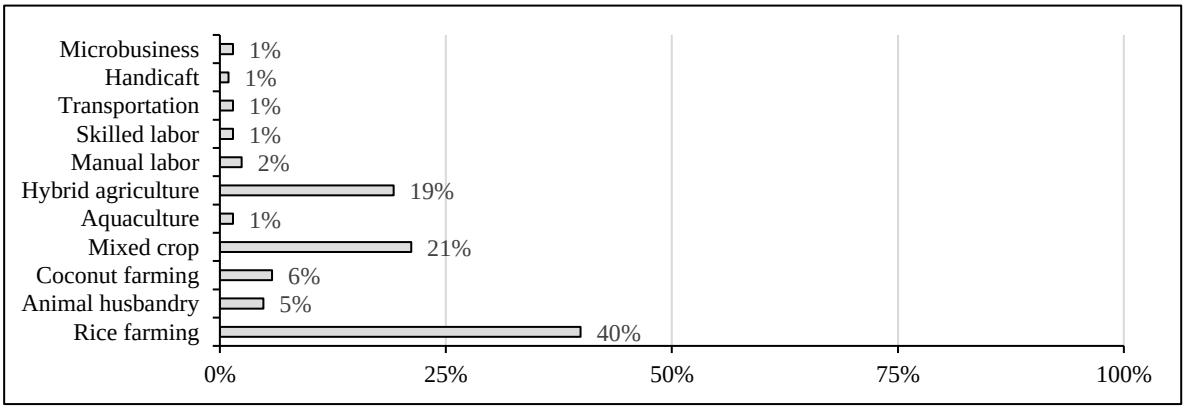

Figure 8. Main earning sources of household from surveyed categorizing by means of occupation.

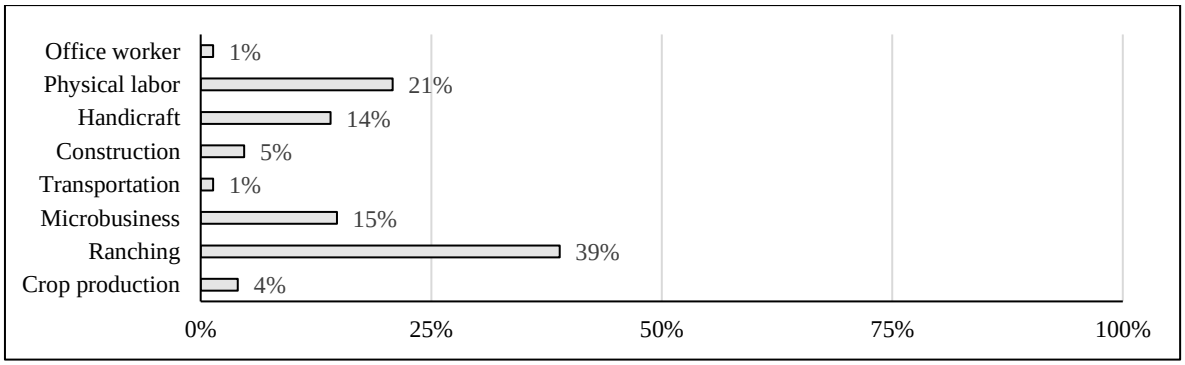

Figure 9. Secondary earning sources of household from surveyed categorizing by means of occupation.

Growing rice is the most common source of income for farmers, accounting for 41% of their earnings, indicating the prominence of rice growing in the surveyed region. The second most common main income source is mixed crop farming (21%) where these families engage in cultivating multiple crops, reflecting diversified agricultural practices. A modest proportion of farmhands rely on manual labor, skilled labor, micro-business, or handicrafts as their primary source of income, with each category accounting for just one percent. The minimal contributions as principal sources of income by concerned groups suggest limited opportunities or engagement in these fields.

At 39%, ranching is the most common secondary source of income, which is like the importance of wet rice as a primary source of income. This could indicate a trend where growers are diversifying by raising both cattle and crops. Physical work is a significant secondary source of income, accounting for 21% of total income, most likely because of seasonal or part-time employment. With 15% of the market, the microbusiness sector is notable for showcasing household-based entrepreneurship as a secondary source of income. Crafts are a common secondary occupation, accounting for 14% of all employment, maybe because they are flexible and enable workers to work from home. Construction and food production which consist of five and four percent respectively, like other small-scale jobs like office work and transportation, contribute relatively little to community economy.

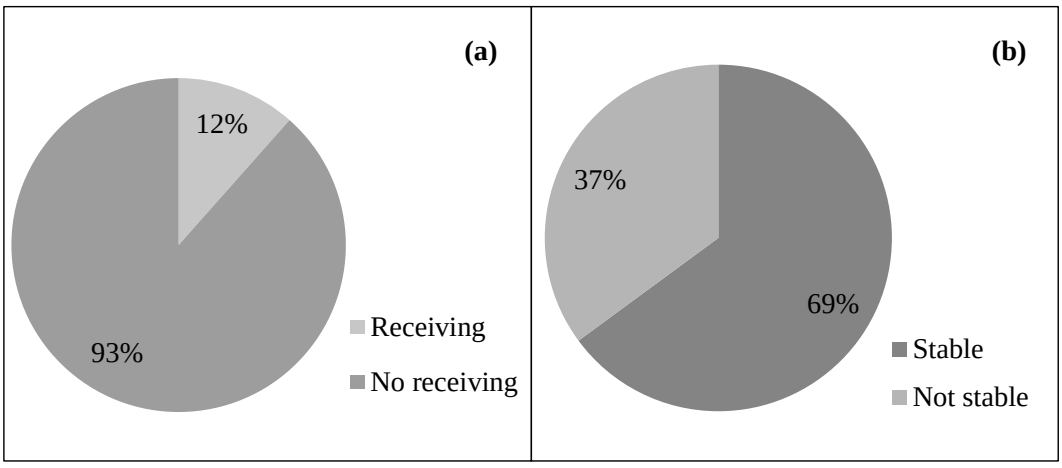

Figure 10. Percentage of farmer has received monetary support compared to percentage of their financial situation: (a) Distribution rate of government financial subsidy; (b) Stable income situation.

Figure 10 illustrates a stark discrepancy in the approach to combat poverty, as it reveals discrepancies between the data on the number of studied individuals experiencing financial difficulties and the allocation of government relief funds. Although two-thirds of the overall interviewees endure acute economic strain, just 12 percent of SI affecters receive monetary aid. If this tendency continues, most families that have not received any types of welfare would face significant challenges when a crisis happens.

4. Discussion

The study verifies the notion that higher levels of livelihood assets (indicators and capitals) correlated with higher levels of adaptive capacity. Farmers with more capital capacity appear to be financially well situated and perform better during a crisis. While there have been other attempts to relate living and adaptability [42, 55–58], the finding helps provide additional insight on the matter and this approach that could be further experimented. The comprehensive interviews unveiled the strategies employed by agrarian cultivators to manage not just the escalating climatic variability and change, but also their reactions to other influencing factors. Reflecting from data reveal that during unfavorable agricultural seasons, some farmhands even sold their fields, got into desperate loans with excessive interest rates, and resorted to leaving to urban area to be better finance. Such extreme cases of loss of livelihoods are not a rare incident as families who deem stable finance is low (Figure 10).

4.1. Shortcoming of the research

This evaluation relies on both quantitative and qualitative data which has been carried out independently. The approach requires direct contact with affected inhabitants in considerable time with dedicated investigators for specific zones to help obtain valuable insights. Such information usually neglects or loses if only relying on government data due to lengthy collecting methods and finances constraints. The subjective nature of surveys is tackled by extensive review and constants organizing. Then, only data deemed to be worthy can be utilized in the assessment process.

However, while time consuming is the main adversary of such tactics, on-field problems also occur regularly. For instance, the absence of farmers who lost all means of income and were forced to relocate makes it difficult to collect their voices and consider the severe of whole situation. Furthermore, most of the interviews took place at farmers' residences, with fewer conducted in the fields. This could have potentially bias on the results obtained also raised concerns from other researchers [22, 40]. A restrained budget also has made it difficult to evaluate the project's impact in terms of limits of the studied sample size. Moreover, as the subject matter and context are intricate, encompassing a vast array of physical, social, economic, and practical variables which necessitate a foundation of knowledge could lead to inadequate answers from interviewees.

4.2. Suggestions

Multiple factors were discovered that impeded affected family’s ability to adjust to environmental challenges. These steps should be enforced to empower examined individuals in efficiently managing and adapting to the effects of ecological change. Improving the value of natural resources is considered essential for agricultural practices across all aspects of cultivation. Landowners with less financial resources, who possess fewer livelihood assets, are more susceptible to the consequences of weather crisis. Although national-sponsored development projects, such as the “Hunger eradicate and poverty relief” initiative, have been crucial and advantageous, they are not enough on their own to enable small holdings to effectively adapt to climate-related changes. Cooperative crop growing promotes social learning and collective assistance, which improves small-scale the ability of landowners to maintain their livelihoods significantly.

Evaluating the feasibility of alternatives involves identifying crops and livestock that exhibit more resilience to the specific climatic circumstances of the location, such as crops that can withstand drought or cattle that can survive in varying temperatures. Promote the amalgamation of crops and livestock to establish a rural system that is more varied and robust. Intercropping and integrated livestock-crop systems can enhance land use efficiency and mitigate dangers linked to monoculture farming. Capacity building and information transfer can

be achieved through a training program for farmers, which aims to educate them on the advantages and methods of crop diversification and animal production. Moreover, ensure convenient availability of essential resources, including seeds, livestock, and technology, along with credit and financial services, to assist in the process of transitioning. Possible measures could encompass subsidies, grants, or tax incentives to encourage the adoption of alternate crops and livestock. Ultimately, it is crucial to involve local communities, agricultural-orientation organizations, and other stakeholders in the decision-making process to guarantee that the transition is in line with their requirements and preferences. By considering these factors, a complete plan may be developed to transition from rice cultivation to more flexible agricultural methods, ultimately strengthening the ability of cultivation communities to withstand the impacts of climate crisis.

5. Conclusions

In conclusion, this research's examination of the destruction that SI inflicts on impacted studied Hung My commune, where the saline rampages, presents significant risks to conventional agricultural activities. The results demonstrate notable discrepancies in household resilience among various zones, with the most susceptible who are experiencing substantial losses and confronting severe financial instability. Although government interventions and local adaptive strategies have offered some relief, their effectiveness is limited when done separately. The review approach employs independent, field-based data collecting to provide insights often overlooked by official sources; yet it encounters problems like time limitations, absent perspectives from displaced families, and budgetary limits. Interviews mostly held at target's home may have impacted the outcomes, and the intricate nature of the topic complicates the acquisition of thorough responses. The research highlights the need for adaptable agricultural strategies in SI-infested areas to strengthen farmers' resilience. It advocates for diverse farming methods to provide additional income sources, reducing dependence on a single livelihood and ensuring that policies address the specific needs of affected communities. The recognition of SI harm to domestic livelihoods provides the foundation for further research aimed at improving the stability and resilience of agricultural communities against escalating climate change problems.

Author contribution statement: Developing research ideas: N.T.H.; H.V.H.; Process data: processing, manuscript writing: N.T.H.; H.V.H.; L.N.A.K.; Reviewed and completed the manuscript: H.V.H.

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