

## THE IMPACT OF CLIMATE CHANGE ON HUMAN'S DAILY LIFE IN MO O VILLAGE, TRAN DE DISTRICT, SOC TRANG PROVINCE, VIETNAM

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### ABSTRACT

Climate change is one of the challenges of human beings in the current time. Vietnam is one of the most heavily impacted countries in terms of climate change. Climate change has been remarkably increasing the vulnerability, threatening to be underdeveloped the development of society<sup>2</sup>. Soc Trang is one of the provinces in the Mekong Delta that is affected by climate change, mainly in coastal areas. The local people live mainly on the weather during time, due to climate change in recent years, the human's daily life has been more difficult. People are greatly influenced by the transformation of the weather especially the elderly, women and children. The study aimed to analyze the impacts of climate change on the lives of people in Mo O, Tran De, Soc Trang. The study conducted in-depth interviews with 40 households living in the study area, with a descriptive statistical analysis method, showed the living conditions of local people in the study area including positive and negative aspects by the climate change, then proposed several feasible and effective solutions to adapt to climate change in order to ensure sustainable development and contribute to improve the human's daily life of the local people.

**Title:** The Impact of Climate Change on Human's Daily Life in Mo O Village, Tran De District, Soc Trang Province, Vietnam

**Key words:** Climate Change, Human's Daily Life, Mo O, Tran De, Vietnam

### 1. INTRODUCTION

Climate change has been affecting the fundamental elements of human life on the global such as water, food, health and the environment. The report of the Climate Change Impact Assessment, World Development Report 2010 and other studies showed that the climate change is causing global catastrophes of nature and the environment, threatening the lives of millions of people across the planet, which can explode the waves of migration, even threatening the survival of many nations which are in low position compared to sea level. The results from these studies suggested that by 2050, some 150 million people may have to leave coastal areas due to rising sea levels, such as inundation, landslides and saline intrusion. By 2080, cereal production will fall by 2-4% while cereal prices may increase by 13- 45%, and famine can affect 35 to 60% of the world's population; Rising sea levels can cause flooding and salinity intrusion in lowland areas, thus affecting agriculture, industry and socio-economic systems in the future. If this prediction happens, the climate change will cause major changes in some parts of the world, pushing many regions into areas of poverty due to natural disasters, droughts, etc [11].

Actually, the effect of the climate change has been greatly changing to the human lives and livelihoods of the people, especially the poor of the coastal community. The climate change is happening daily, hourly and ongoing with the fast speed. The climate change is extreme harsh, Vietnam in generally and the Mekong Delta in particular, has been influenced strongly. The climate change is causing many impacts on society. The increase of the climate change is one of the pressure to damage the livelihoods of coastal people [5, 6]. In particular, the dynamics of migration depend on economic constraints or opportunities, social networks, political situations and environmental pressures as well as climate pressures [2; 4]. The migration is often considered as a potential solution to cope with and relieve the impacts of climate hazards and bring benefit to easily vulnerable populations [10]. The poor fishermen in Ca Mau are facing with the depletion of aquatic resources and the weather will becoming more severely. They have improved their livelihoods by diversifying many livelihood activities, relocating to other areas, intensifying, linking and producing specific commodities by specialized farming [6].

Trung Binh Commune located at the end of Hau River is a coastal commune which is located in the estuary of Hau River or the estuary of Tran De in Soc Trang Province, it is adjoined to Nam Song Hau National Highway to connect Can Tho City, Hau Giang Province and Bac Lieu Province and it far Ho Chi Minh which is the biggest City in Vietnam about 250km. The people of Mo O hamlet live mainly on fishing and aquaculture, rice farming, crop production and animal husbandry. The majority of the population is Kinh, Khmer and Chinese. Due to the topographic features of the surveyed communes is located in coastal estuaries and directly adjacent to the sea, they are directly affected by changes in the weather. In particular, the phenomenon of the increasing of sea level, tides, rainstorms and prolonged sunshine have been remarkably causing the greatest impact to the livelihoods, activities and health of local people, affecting the economic and social development of the coastal area. The

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increasing of sea level and tides have led to the salinity intrusion of seawater causing flooding the area of cultivation, aquaculture and residential areas close to the sea. Salinity intrusion leads to soil erosion, soil alkaline, soil and water pollution, biodiversity loss in coastal ecosystems and land loss due to landslide prolonged. The typhoon directly affects the fishing activities as well as the crop production such as sugarcane, rice, crops and so on.

Unemployment rate in the surveyed area have been alarming increasing in rainy season, people could not do fishing offshore, the plants were severely damaged by rainy and windy. Long-lasting sunshine also have caused many diseases for aquaculture such as shrimp. In addition, the high temperature have caused the lack of water for irrigation. Moreover, this is the small area where farmers are very poor in knowledge and techniques, the lack of capital as well as science and technology for production, the unstable product prices, the use of indiscriminate chemicals, competition of fishing areas from non-local people, and the damaged exploitation through illegal fishing gear. These factors are causing the level of vulnerability of people and the environment more severe in the context of the climate change.

The local people have considerably suffered to numerous difficulties by the climate change and led to the mass migration to large cities to live, which greatly affect the economic situation of the commune. Therefore, this study aims to indicate the impacts of the climate change on the migration of local people in Mo O, Tran De, Soc Trang from theoretical to practical investigation, then propose several feasible comments and solutions that effectively deal with the climate change to ensure sustainable development.

## 2. RESEARCH METHODOLOGY

Sustainable livelihoods approach is a method used to design a community – level development program that is used to assess the ability of households to tolerate events such as diseases or population breakdown [2]. However, this approach is limited in solving of vulnerable issues and adaptability to the climate change. Therefore, Hahn et al (2009) proposed method for livelihood vulnerable index (LVI) – the method combined by sustainable livelihood approach and many previous methods. LVI used a number of indicators to assess the vulnerability and vulnerability of factors such as health, food, water resources to the impacts of climate change [6].

The aim of the participatory fieldwork is to fully assess all aspects of vulnerability and adaptability of the locality from multiple perspectives. Through participatory approaches, community experiences in effective management of natural resources, environmentally friendly adaptation models will be encouraged to develop because they clearly understand the characteristics of the location. In addition, this approach promotes both top-down and bottom-up policy implementation, as well as enhances the capacity of local officials in skills and attitudes to serve the local people in order to develop sustainable policies on both economics and society and environment [6].

Vulnerability and capacity assessment as well as capacity adaptation to the impacts of climate change were conducted in Trung Binh commune, Soc Trang. This assessment aimed to determine the current status of the survey area under the influence of natural and unnatural factors as well as local adaptation capacity. The study data were collected from 40 households living in Mo O village, Trung Binh commune, Tran De district, Soc Trang province by stratified random sampling method with the criteria of habitats and economic features. The respondents were interviewed directly by the semi-structured questionnaires. In addition, the study also conducted data collection through expert methods. This method accumulated experts' opinions and assessments on the effect of the climate change on the subject under consideration. Expert opinions and assessments are gathered from research papers, evaluation reports or expert meetings.

## 3. RESEARCH FINDINGS AND DISCUSSIONS

### 3.1. The current status and the impact of the climate change in the study area

The study results on livelihoods of people in the study site indicated that the residents mainly live by fishing and aquaculture. Besides, animal husbandry and crop production are also dominant activities that the residents could do to earn money for their daily life. However, under the influence of natural factors, these are the most vulnerable livelihoods.

The wind from the northeastward, the lasting rains and hurricanes is increasingly effected on the crop productivity as well as the catching of near-shore fishermen. The residents do not have enough experience and capital to equip large vessels for offshore fishing, while near-shore fishery resources are dramatically declining. According to the survey, fishermen have caught only by rudimentary tools and caught the small products with cheap price for selling including shellfish, snails and young fishes, or the residents have done piling work, knitting the fishing net and the hired to generated the income to live day by day, but the last 5 years, due to the changed of the weather, the volume of fishing is not much, the job hired is less. That is the reason why unemployment rate is increasing day by day, even the residents have to move another place to earn the money for living. On average, there are three members in a family in the study site and the person in the family can earn 5,000VND - 25,000VND, which is the income for the whole family a day. During rainy season, people do not go to work continuously all week, they have to borrow rice, money from distant relatives to live. If the family has children to work away, they will be received money from their children which is monthly on average about 250,000VND - 1,000,000 VND. Families have been received the money from children, grandchildren. They are a major part of the family with older people who are getting unworkable as well as ill. With such difficulties, but fishermen still stickily live in their land area because of several reasons. The first reason is mentioned is familiar with living place, acquaintances, relatives as well as neighbors who are helping each other. In part, they still live on the sea because this dominant job is from generation to generation. Fishermen began to live on marine life at a very young age; On the other hand, most of the surviving fishermen in the village are elderly people from 45 years old and over, accounting for 87%, 91% of the people are illiterate, they are familiar with the fishery, so it is difficult to apply for any companies or do other occupations because of limitation of their age and experience on new jobs, education level and professional in the specific work. They can not return to vocational training, the reason why the residents at the study site has becoming unemployed and they

believed that they only earn money for living day by day by loading and unloading cargo at the fishing ports, factories and companies or doing seasonal works and hired labors. Most of families have children who are working away from home are mainly from the age of 15-40, but their tendency to work is to earn money for the family, after the age of labor or they earn amount of money, they are still going to return this land to live where there are their grandparents, parents and relatives.

The temperature is gradually increasing each year, the serious sunny has remarkably prolonged its impact on shrimp farming due to many epidemic diseases resulting in dead shrimp mass. Previously, people could raise two crops of shrimp and one crop of rice in a year, however due to the weather has been changing of the long rainy season as well as sunny season and the low humidity in recent years. The hot temperature is sometimes prolonged from 23 to 40 °C affecting the shrimp, rice farming. Because of the poor harvest, people only raise one crop of shrimp or one crop of rice, but, the productivity of crop is still not high, many families even have to suffer losses. In addition, the prolonged hot weather has caused to the need to irrigate more water for crops while the fresh water is drying up with the salinity and alkaline condition, local people have to dig deeper wells to fresh water. Many families are unable to dig wells leading to poor crops, "poor and poor" [8].

The rise of sea level and the high tides combined with rain is causing landslide and waterlogging areas of crops and food crops along the sea dykes, causing low productivity or loss of crops. Coastal landslides and dike erosion occurring annually have a very serious impact on the lives of coastal people and coastal ecosystems. Households with land and coastal habitats were previously relocated by local authorities to resettlement sites. 40% of local people are supported from 5,000,000-10,000,000 VND to build houses. By 2015, most of these households are expected to live on the land. they are residing because they have not yet been issued with a land use right certificate or a decision regarding the land they are living in. Most of the houses are built on a temporary basis, partly because of financial constraints. Some do not know when the government will recover land, only about 25% of households which have permanent housing.

On natural resources: Near-shore aquatic ecosystems (including shrimp, crab, fish, etc.) and mangrove forest are easily getting vulnerable [8]. The first reason mentioned is the change of the water environment. Due to the influence of weather change, the water environment is no longer suitable for aquatic species to migrate to others. The second reason is growing number of fishermen (including boats from other provinces), while fisheries resources are decreasing and lacking of measures and mechanisms for recovery. Another reason is that local people use destructive fishing nets, both large and small fishes, so fisheries resources do not have time to recover. Local authorities have not strictly controlled the use of fishing gear. Another important resource is wildlife in mangrove forests such as bats, birds, monkeys, weasels and so on will be depleted without appropriate management policy. The land resources of the surveyed area in Trung Binh commune are also facing the risk of pollution due to salinity, alkalinity, waterlogging and land loss due to landslide. The surveyed area is geographically located in the estuary of the coastal area. The topography is low compared to the sea level so that it is directly affected by the rising of sea level and the high tides which leads to sea water intrusion, soil salinity intrusion, soil erosion, especially in the dry season. Salinity intrusion of seawater causes severely degradation of coastal land resources. The high and rapid increase in salt and iron in soil results in microorganisms in the soil, plants as well as animal husbandry which are not to adapt quickly with the environment, resulting in reducing the yields of crops and livestock as well as land loss gradually. In addition, the landslide phenomenon occurs quite serious along the sea dyke in the area of Mo O hamlet in Trung Binh commune due to the lack of forestation for environment protection.

Groundwater resources in the two communes of Trung Binh are facing the danger of exhaustion due to the impact of natural and unnatural factors. Salinity intrusion of seawater causes salinity intrusion and alkalinity of groundwater. At the same time, the agricultural production is to need of fresh water for daily life and irrigation. Therefore, the exploitation of underground water has been intensified (deep well drilling, well drilling not to comply with the regulations on underground water exploitation of the locality). With unsustainable groundwater extraction, regardless of regulations as well as lack of local control, there will be many future implications.

### 3.2. The impact of the climate change on people's migration status

Among the determinants of migration, the climate change can contribute significantly to this issue or directly impact under the form of livelihood depending on the area affected by the climate change. Even when the climate change does not directly force people to relocate, it can be a reason for people who are extreme difficult to stay where they are in [9].

Migration is one of strategies to cope and adapt to the climate change of the residents, especially when their livelihoods closely depend on the ecosystem. By negatively affecting the livelihoods, production systems and ecosystem services that a community is to live on, the climate change can lead to different forms of migration [9].

The results showed that most of the resettled households in the study area interviewed that the environmental pressures has enormously affected on their livelihoods and this was considered as the main reason for the resettlement and migration in the rural area, mainly residents move to other areas with better development conditions, do non-agricultural seasonal jobs in cities such as Can Tho, Ho Chi Minh, Binh Duong, Binh Phuoc accounting for more than 75% of households. Households do not have many options for livelihood diversification, landlessness and low education, they are often on-site migration as a viable solution. In other words, households often move to other rural areas and work as agricultural laborers. However, these households migrated as a way to adapt to weather changes and livelihood instability in terms of their survival. Another safeguard method is that households are relocating in difficult period to meet basic needs. For example, single households and difficult households by small children accounted for 19%.

They usually choose to stay at the site, if they are in working ages, they can work at seafood processing company in the center of the Trung Binh commune, with enough income to cover the family from 1,500,000VND - 3,000,000VND / month, they work paid by the products. However, there are sometimes no products, they have to live in the package of the money earned before, if they are getting difficult, they will borrow or loan for their relatives and acquaintances or others.

In the early stages and transition of the shocks and climate pressures, migration is a livelihood diversification solution. Migration is an adaptive solution to help households who are affected cope with the impacts of climate change. In contrast, the context of migration is intrinsically temporary or seasonal in the short term. However, returning home is often a suitable option of many people who are migrants in the long term. There is more than 90% of respondents asked who have the children to earn their living in other place, they said their children would be comeback when migrants have some own capital.

As mentioned above, the climate change impacts on the migration of farmers who are the most vulnerable social group. They have little or no resources to cope with economic shocks. Moreover, they cannot actively make decisions, lack access to essential social services, infrastructure, housing, resettlement and information needed to help them adapt to the climate change.

On the other hand, the migration can lead to new injuries or greater vulnerability to the migrants at their destination as well as family members who stay at their living area. They often are getting difficult to access basic social services in the new place, including living conditions such as drift in the river, boats, shelter for temporary living day, renting house, lacking of clean water for daily life, health care, education and so on. Migrants mainly work in the informal sectors with unstable jobs and lack of health protection measures, even unemployment. The real impact on displaced communities will only be assessed based on where they can settle and how they are received. For local communities, the impact of the climate change related to migration is expected to affect all possible factors such as health, employment, housing, education and security.

The migration can have negatively affected on the immigration because of pressures on infrastructure and employment. On the other hand, the climate change does not only affect the vulnerability of a community, but also their relocation can cause changes in the livelihood strategies of their neighbor communities [7].

### 3.3. Solutions to respond and adapt to the climate change of people in the study area

Migration is an important solution contributing to income diversification and improve the general capacity of households and communities to respond and mitigate the negative impacts of the climate change, helping people adapt, prepare and recovery after the impacts of the climate change [9]. However, not all farmers are able to effectively cope, adapt and recover from the negative consequences of the climate change, especially poor farmers because they have less resources to create the recovery after disaster. The result showed that the migration is considered as a failure result of agricultural development policy, farmers and rural development policies rather than evidence of successful adaptation to the climate change. These groups are little supported to relocate from areas which affected by the climate change or the new settlements. Long-term government restraint policies only exacerbated the situation, even after that, these policies gradually eased. Migrants find it difficult to adapt to the climate change where they migrate from livelihoods to the constraints of access to basic social services such as health care and housing and education. Migrants belonging to vulnerable groups such as the poor, ethnic minorities are the most affected. They may be pushed to live in vulnerable areas and the cycle of migration and the climate change may recur. Migration should be considered by policy planners as a more adaptable solution to cope with the climate change, which facilitates the migrants both departures and arrivals [3;4].

Not all households are able to adapt to the negative impacts of the migration, and those who remain trapped. One of the ways farmers responding to the climate change in the context mentioned above is to use local knowledge in their livelihoods. For example, farmers in Mo O hamlet, they are going to adapt to live and work naturally under the climate change and cope with the climate change harmoniously and breathe along the rhythm of the river system, canals as well as the rhythm of the seasons. They have sought to live by compromising under the impact of the climate change through the development of eco-friendly farming models which are suitable to the natural conditions of the region.

## 4. CONCLUSION

Mo O village, Soc Trang province was found to be the most vulnerable and exposed region in Mekong Delta in terms of climate change and variability. Climate change is the cause of mass migrations of farmers in Mo O village, Trung Binh commune, Tran De district, Soc Trang province in Vietnam. Farmers are the most vulnerable to the climate change due to the impacts of climate change as they live and do agriculture in rural areas that are vulnerable to climate change. Farmers' livelihoods are affected by the climate change pressure, which is one of the factors accelerating the progress of the migration of the rural population.

The climate change is doing increases the vulnerability of migrants in their arrivals, including difficulties in accessing social services such as health care, job search, education, environment, clean water, hygienic conditions and accommodation. In particular, the government considered the migration aiming to adapt to the climate change as a temporary and medium-term solution rather than in the long term, there is little supportive policy for migrants both in and out of destination.

The climate change is a challenge to farmers' adaptation efforts, especially for vulnerable groups such as poor farmers, ethnic minority farmers, poor adaptation. These groups are clearly exposed, especially in the context of the lack of necessary support from the community and the state. The migration status due to the climate change can create new vulnerabilities or exacerbate their own vulnerability or create new pressures on infrastructure, employment, and social security at the new destinations. This is seen as a vision of the failure of the migration in responding to the climate change in rural communities. Moreover, the limitation of supportive policies of the government also affect to migrants both in and out of the destinations.

With over 80% of the population being farmers, their livelihoods depend on natural conditions. Meanwhile, agricultural production is based on individual households with small scale, low level of technology. This is a great challenge for the people at the local here because the negative impacts of the climate change have been causing severe consequences for agricultural production, affecting the life and livelihood of farmers. Therefore, the effective prevention and adaptation to the climate change requires appropriate solutions in the short and long term in building and developing sustainable livelihoods, minimizing vulnerability for farmers. The solutions include raising awareness of farmers on the climate change, mobilizing socio-political

organizations to participate in disaster prevention activities, etc. In particular, there need to build a diversified livelihood model and sustainable development for farmers. In addition, solutions should also focus on integrating the climate change issues and the new rural program.

Continuing to develop research and projects in the field of agriculture, especially rice farming, prioritizing solutions to the climate change adaptation to the changing of farming, aquaculture and fisheries for the socio-economic development in the study area by future changes of temperature, precipitation, currents, extreme weather events such as droughts, floods, frosts, etc. These issues will impact on more complex trends. Development direction in the next period is to study the change and forecast for each sector, each field (forestry, industry, construction, land resources, and water to cope with the climate change happening. The findings of the study have important solution relevance that could enable households in Mo O village to better adapt to the effects of climate change and variability.

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