



**LIVELIHOOD TRANSFORMATION TOWARDS
CLIMATE CHANGE ADAPTATION IN BEN TRE:
*A GENDER ANALYSIS***

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CONTENTS

1. INTRODUCTION	3
2. WOMEN IN LIVELIHOOD TRANSFORMATION IN THE CONTEXT OF CLIMATE CHANGE.....	4
3. CLIMATE CHANGE IN VIETNAM	6
4. RESEARCH SETTING	8
4.1. Geographical and socio-economic features of Ben Tre	8
4.2. Climate change in Ben Tre province	10
4.3. Livelihood transformation toward climate change adaptation in Ben Tre province	12
5. GENDER ANALYSIS.....	14
5.1. Theoretical framework and research methods.....	14
5.2. Gender in Ben Tre.....	15
5.3. Gender-based climate change impact on livelihoods in Ben Tre	16
5.4. Making decisions for livelihood transformation	18
5.5. Access to resources in livelihood transformation	22
6. DISCUSSION	26
7. CONCLUSION AND POLICY IMPLICATIONS	29
REFERENCES	30

LIST OF ABBREVIATIONS

CC	:	Climate Change
FGD	:	Focus Group Discussion
FPE	:	Feminist Political Ecology
GRDP	:	Gross Regional Domestic Product
IPCC	:	Intergovernmental Panel on Climate Change
MONRE	:	Ministry of Natural Resources & Environment
RCP	:	Representative Concentration Pathway

LIST OF TABLES

Table 1. Population of Ben Tre province in the 2010 – 2019 period, by gender	15
Table 2. Literacy rate of the population over 15 years old and the labour force over 15 years old in the 2010 – 2019 period.	15
Table 3. The proportion of the population attending school at all levels in 2019	15
Table 4. The labour force in Ben Tre province by gender in the 2010 – 2019 period	16
Table 5. Comprehensive analysis	27

LIST OF FIGURES

Figure 1. Map of Ben Tre Province	8
Figure 2. Map of Ben Tre Province - The dyke and tidal flap valve system to prevent saltwater intrusion built by the state.....	11
Figure 3. Map of Ben Tre Province - Map of provincial agricultural zoning and fresh - salty - brackish water areas.....	17

1. INTRODUCTION

The impact of climate change differ across contexts, societies, and countries as well as between urban and rural areas. The impact is also different for women and men – in terms of gender – due to cultural, economic, and social factors and the severity of climate change.

Climate change presents a major challenge for humanity and economic security. In this context, women in many different parts of the world play an important role in transforming livelihoods to cope with this change (IPCC, 2019). According to Jerneck (2018), many theories, policies, and practices have been developed regarding adaptation addressing women, gender, and the environment. In this transformation, gender is an important social category in the process of development and adaptation. The changing climate impacts tasks subject to the traditional social division of labour and livelihoods. For instance, people have to go further to get water for their daily use. This task often belongs to women, while men refuse to participate because they think society has not assigned it to them. This places an additional burden on women (Sultana, 2014). On the men's side, since climate change greatly reduces a family's income, men may be inclined toward other adaptations. These might include migrating far from home for work, leaving women to face an increased workload to compensate for the loss of labour (Sellers, 2016). The impact and response to climate change have certain differences by gender. However, the extent of this difference will depend on the social context in which it occurs, where the roles of men and women are partly conditioned by the society to which they belong.

In Vietnam, coastal areas are considered to be at risk of livelihood vulnerability due to climate change, with the Mekong Delta being the most vulnerable (MONRE, 2021). The Delta is a predominantly agricultural region, incorporating rice cultivation, aquaculture, fisheries, and forestry. It contributes 50 percent of Vietnam's rice production (90% of which is grown for export) and 70% of its aquaculture products (IUCN and VAWR 2016). Communities along the Mekong are being affected by changes in climatic and hydrological conditions affecting household incomes as well as social and economic changes affecting their well-being (WWF-Greater Mekong, 2016). Therefore, people in the Mekong Delta are transforming their livelihoods and lifestyles to become more resilient and adapted to climatic changes over time. In particular, climate change is a threat to the livelihoods of the farming community, in which men and women play their roles in the livelihood transition process depending on the tasks assigned to them in their family's agricultural work.

Ben Tre, a province in the Mekong Delta, provides an example of how transformation towards climate change adaptation is well reflected through a gender perspective. According to the 2022 research project "The transformation of southern medium-sized cities toward climate change resilience, the cases of Ben Tre and Binh Duong provinces", the livelihood transformation of communities in Ben Tre to cope with climate change includes the following main components: (i) Changing crops and livestock; (ii) applying new farming methods; (iii) diversifying livelihoods; (iv) seasonal intercropping; (v) off-farm work; (vi) changing careers, and; (vii) abandoning land and migrating to look for new jobs. This transformation varies over time with changes in natural conditions. It is also partly regulated by government policies and trends in crops and livestock farming. In this livelihood transition, gender power relations are manifested during the process. This report will provide an analysis of the process of livelihood transition adapting to climate change from a gender perspective with Ben Tre as a typical case study.

2. WOMEN IN LIVELIHOOD TRANSFORMATION IN THE CONTEXT OF CLIMATE CHANGE

Assan, Suvedi, Olabisi, & Allen showed that up to 75% of women implement adaptation strategies to improve resilience to adverse climate impacts (Assan, Suvedi, Olabisi, & Allen, 2018). Boetto & McKinnon (2013) also show that women have more positive reactions to environmental protection activities than men (Boetto & McKinnon, 2013). In harsh situations, such as drought, women have to travel long distances to carry water for family usage. Meanwhile, when floods occur, women can contribute to climate change adaptation by carrying out their family roles through household chores and protecting children, the elderly and sick, and their belongings during floods. In this environment, women play a particularly important role in climate change adaptation because they are closely connected to the domestic context where they can undertake many different tasks to protect family livelihoods (Khalil, Jacobs, McKenna, & Kuruppu, 2019).

Regarding access to resources, in a study by Figueiredo and Perkins on water resources, it was found that the sustainable management of water in the context of climate change requires the participation of women to cope with and adapt to climate change (Figueiredo & Perkins, 2013). As Sultana (2018) points out, although they do not have many opportunities to access technological resources and skills to participate in marketing, like men, women still play an important role in social activities, specifically those that support communities to overcome livelihood difficulties caused by climate change (Sultana, 2018).

In developing countries, women make up a significant proportion of the agricultural workforce and are central to food processing and preparation (Hellin & Fisher, 2019). At the same time, women have a special role in families and communities when creating new strategies to cope with droughts, floods, instability, and other serious factors related to climate change (Carr & Thompson, 2014). Another study shows that women are highly adaptable and can play their role well in livelihood transformation because they are close to nature. As such, they understand transformations of nature and adapt quickly when they begin to occur (Resurrección, 2013). In other words, the environmental sensitivity of women is thought to be better than that of men (Arora-Jonsson, 2011). Similarly, a study in Vietnam showed that women perform their role in meeting the daily food needs of the family during prolonged flash floods (Pham, Doneys, & Doane, 2016).

It is undeniable that, in the context of livelihood transformation due to climate change, women are likely to be more vulnerable than men because they are responsible for both their livelihoods and housework. They also have an important role in the household's adaptation to climate change. Therefore, to analyse the situation through a gender lens, some researchers often look at it from the perspective of women's roles, viewing them as a vulnerable group. Meanwhile, men are only a comparison to analyse the roles of women.

Gendered experiences differ in various livelihood areas such as agriculture, forestry, fisheries, water resources, energy, and urban livelihoods. In Vietnam, particularly in southern coastal cities, the impacts of climate change are focused mainly on agriculture, fisheries, and urban livelihoods.

In agricultural practices (crop production, soil preparation, sowing, irrigation, weeding, harvesting, storage, etc.), men and women often plant a range of crops. Depending on the country, this can make women or men more or less vulnerable to climate shocks (Altieri, M. A., 2015). However, women often have 'double jobs' as farmers and homemakers. Besides, women are under more pressure to provide meals for their families because they are primarily responsible for household food security (Amelia, H. X. Goh). Furthermore, in Vietnamese small-scale crop production, men and women face different challenges. Male farmers can be pushed to migrate to cities or industrial zones to earn an income in unstable conditions. Meanwhile, female farmers have to stay at home to take care of their farms while also shifting to temporary work such as pulling weeds, selling agricultural products from other farms, or starting a small business (Trung, P. T., 2013). More women (63 percent of female farmers) participate in crop production than men (57 percent of male farmers) and women often work in off-farm and unofficial jobs. As a result, women suffer more than men in this area. In general, this off-farm, unofficial work plays an important role in adaptation either for permanent migration or day labour for both genders.

Fishing has become expensive because of the decline of the fish population. Husbands and wives who used to work in fishing must now move to industrial activities. In this shift, women often work as temporary workers or find themselves back in domestic duties whereas men struggle to transition to new work (Nowak, B. S., 2008).

Though they attain higher education levels than men, the paradox is that women are often self-employed in shrimp or fish farming and work in the last stage of the supply chain. In contrast, men have more power in this supply chain because their jobs require higher qualifications in technology such as water quality control, breeding, and disease monitoring. On a small-scale farm, men and women participate equally. But women have more jobs than men in the large-scale fishery sector (CARE, 2013). In this industry, men face more challenges than women.

In this study, we also perform gender analysis based on comparing the impacts of climate change as well as the roles of men and women in the process of livelihood transformation, decision-making, and access to livelihood resources. However, our analysis will start from the context of household livelihood transformations and the participation of both men and women.



Shrimp farming in Ben Tre - Photo by Pham Thi Bich Nga

3. CLIMATE CHANGE IN VIETNAM

According to the Intergovernmental Panel on Climate Change (IPCC), Vietnam is forecast to be one of the 30 countries most adversely affected by climate change (2007). In fact, Vietnam has seen manifestations of climate change in terms of its basic climate (temperature and rainfall) as well as its weather (storms, heavy rains, and droughts). Over the past 60 years, Vietnam's average annual temperature (1958-2018) has increased by about 0.89°C. Meanwhile, between 1986 and 2018, temperatures increased by about 0.74°C across the country. Average annual rainfall has tended to decrease in the north and increase in the south. In 2015-2016 and 2019-2020, El Nino caused the worst drought in more than 100 years, leading to serious economic damage (National Climate Assessment, 2021).

The impacts of climate change in Vietnam can be seen in all major sectors: agriculture, forestry, fisheries, water resources, energy, transportation, and health. At present, these include the impact of climate change on hydrometeorological disasters, resources, the environment, the ecosystem, and socio-economic activities. Meanwhile, the national climate assessment report concluded that climate change may increase strong storms in the East Sea of Vietnam (Bien Dong) region, rainfall, the risk of drought, desertification, saltwater intrusion, flooding, erosion, and leaching. It also found that landslides will make the land unusable for other purposes. Apart from those natural consequences, there is a greater risk of forest fires, and spreading of forest pests and diseases which will also increase under the influence of temperature changes affecting the output and value of forest products. Likewise, levels of biodiversity, the structure of species, and the composition of ecosystems will be subject to change.

Over the past decade, natural disasters have claimed thousands of lives every year and cost about 1.5 percent of national GDP. According to climate change scenarios from the Ministry of Natural Resources & Environment (MONRE) in 2012, by the end of the 21st century, when sea levels rise by one meter, an estimated 40 percent of cultivated land in the Mekong Delta, 11 percent in the Red River Delta, and about 3 percent of other coastal provinces will be affected by frequent flooding and saline intrusion. This will directly affect the lives and livelihoods of about 20 percent of the population. In total, the damages could be as much as 10 percent of GDP per year.

Climate change in the Mekong Delta: The Mekong Delta, a rich plain in the south of Vietnam, plays an

important role in the national economy and food security. The region covers about four million hectares, accounting for 12 percent of the country's land mass. It has an average elevation of about 1.5 meters above sea level, a population of 18 million people (19 percent of the country's population), and a dense network of rivers and canals. Economically, it has advantages in agriculture, the food industry, tourism, and renewable energy. Indeed, it is Vietnam's largest agricultural production center. The Mekong Delta contributes significantly to the supply of rice and aquatic products for domestic demand and export and has a convenient location for trade with ASEAN countries and the Mekong Sub-region.

According to global forecasts, the average temperature of the atmosphere will increase. As a result, extreme situations will become more frequent, longer, and more intense. Storms in the sub-equatorial region will become more common. Meanwhile, rising sea levels threaten coastal areas and deltas, with the Mekong Delta one of the most at-risk in the world. The Mekong Delta has to deal with heat, unseasonal rain, inundation, subsidence, coastal erosion, and saltwater intrusion from high tides that penetrate deeper and deeper into the fields.

Regarding rising sea levels, the calculation method for forecasting climate change has changed dramatically, shifting from one based on the emissions scenario to the Representative Concentration Pathway (RCP). Similarly, the 2016 updated scenario on rising sea levels of MONRE has also seen big changes. Therefore, the new forecast of rising sea levels for the Mekong Delta is as follows:

- In RCP scenario 4.5, which MONRE considers the most likely, by the end of the 21st century, sea levels will rise in the Mekong Delta by 53 cm (32 - 77 cm) in the East Sea of Vietnam (Bien Dong) and by 55 cm (33 - 78 cm) in the West Sea, compared to 1986 - 2005.
- In RCP scenario 8.5, the worst-case scenario, sea levels will rise by 74 cm (48 - 105 cm) in the East Sea of Vietnam and by 75 cm (52 - 106 cm) in the West Sea.

Sea levels rise slowly and gradually given the current rate of only about 3.0mm/year. As such, the problem of rising sea levels is more permanent and less urgent than subsidence in the Mekong Delta.

The consequences of climate change and the problems it causes in the Mekong Delta are also considered to

be becoming more severe partly due to hydropower construction. Chinese dams¹ have large reservoirs that store water in the flood season and discharge it to generate electricity. The remaining 11 dams planned on the main stream in Laos and Cambodia operate daily, storing water for about 16 hours and discharging it for about eight hours. In normal years, Chinese dams do not have much capacity to control water resources. This is due to their small contribution and because dams also have to discharge to generate electricity. During dry years, these dams increase water storage and worsen the situation. In 2016, an extreme El Nino caused record-low rainfall across the basin, resulting in historically low flood water levels and severe saltwater intrusion in the Mekong Delta. Therefore, the original cause of drought – salinity in the Mekong Delta – was El Nino.² Hydropower is a secondary factor that exacerbates the situation, but is not its original cause.

In the Mekong Delta, 93 communes have special difficulties while coastal areas and islands in eight provinces all suffer from the above-mentioned climate change phenomena. Besides, these communes are located next to the sea, by large estuaries, or are dune communes between large rivers. Therefore, when the effects of climate change, in general, and saline intrusion, in particular, are very significant, they are directly and comprehensively affected. For instance, the 2016 drought had a profound and negative impact on all these areas. Due to frequent impacts of natural disasters such as drought, saline intrusion, alkaline soil, etc., these localities are depleted of available resources that are favoured by nature, greatly affecting the natural resources, activities, and livelihoods of people, in general, and the poor in particular. Ben Tre has special features such as the lowlands where many large branches of the Mekong River flow through the entire province. Therefore, Ben Tre suffers most of the consequences of climate change occurring in the region. Natural and socio-economic features will be described in the next section.

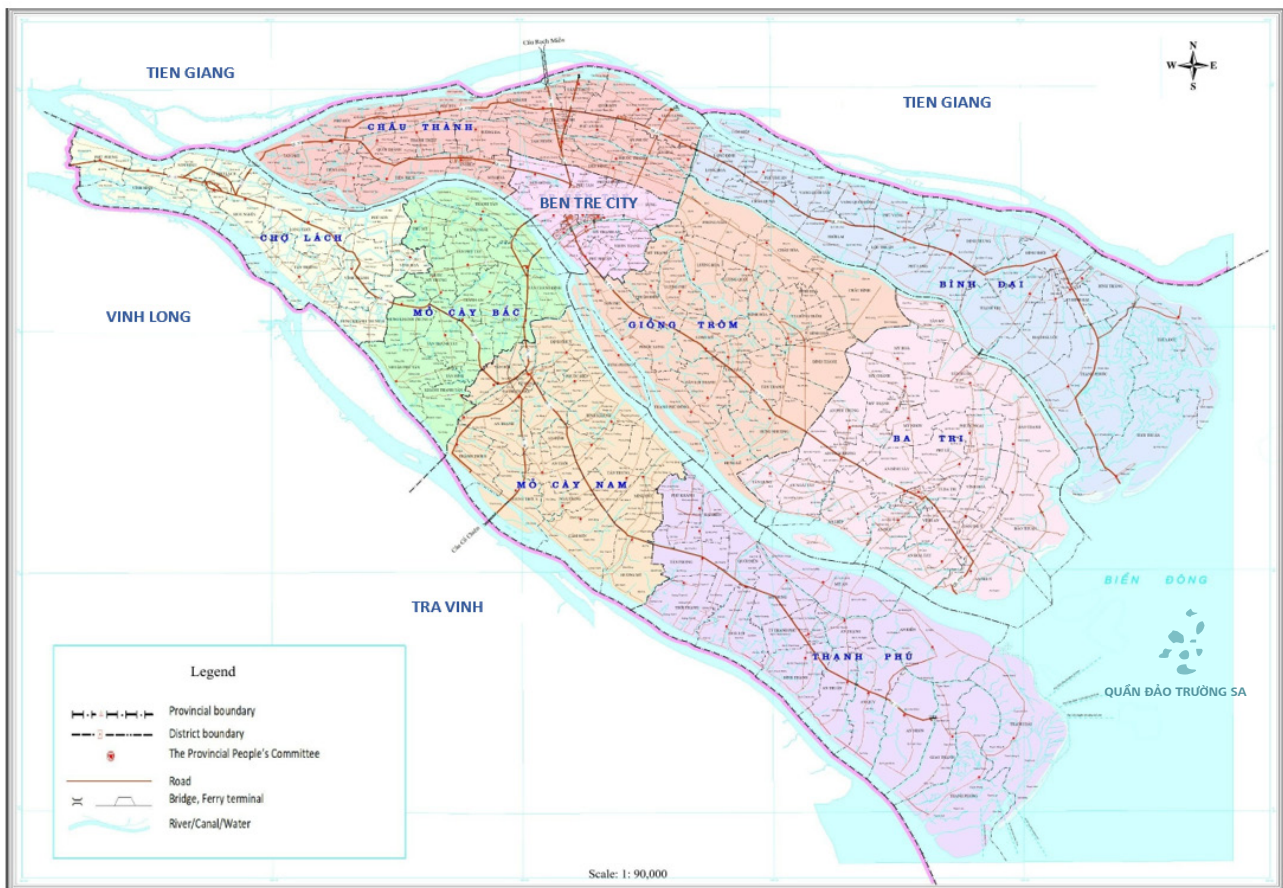
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- 1 The Mekong River has a length of 4,763 km, originating in the high mountains of Qinghai province (China) and flowing along the length of Yunnan province (China), through Myanmar, Thailand, Laos, and Cambodia before entering Vietnam and flowing into the East Sea of Vietnam (Bien Dong). The Mekong River basin has an area of about 71,000 km², accounting for more than 8% of the entire basin area and 20% of Vietnam's area. Agriculture is the foundation of the economic growth of the Lower Mekong Basin, providing livelihoods for 70% of the population in the basin (<https://vnmc.gov.vn/>). The Mekong River basin has great potential for hydropower. China has constructed 11 hydropower dams, of which two are large storage dams, along the main stream in the Upper Mekong Basin. The total production capacity is estimated at 31,605 MW. As of 2019, the number of hydropower projects in the lower basin was 89 (mostly in Laos) with 12,285 MW total installed capacity (<https://www.mrcmekong.org/our-work/topics/hydropower/>).
 - 2 El Nino occurs every two - seven years. In extreme times, this can lead to drought. In the context of climate change, extreme weather events are forecast to occur more frequently, ranging from once every century to once every 20 - 25 years. In contrast to El Nino, La Nina can lead to a lot of rain and floods. According to the law of compensation, during a drought due to El Nino, one must always be cautious of La Nina afterwards.

4. RESEARCH SETTING

4.1. Geographical and socio-economic features of Ben Tre

Ben Tre is on the edge of the Mekong Delta, downstream of the Mekong River, and borders the East Sea of Vietnam.

Figure 1. Map of Ben Tre Province



Source : <https://bentre.gov.vn>

Geographical features: Ben Tre is formed from three islands: An Hoa, Bao, and Minh. Ben Tre has low-lying terrain compared to the region's average elevation and is divided by four large rivers: My Tho, Ba Lai, Ham Luong, and Co Chien with a total length of 298 km. The province's natural area is 2,356.85 km², accounting for 5.84 percent of the Mekong Delta. It has a coastline stretching over 65 km bordering Tien Giang to the north, Vinh Long to the west and southwest, and Tra Vinh to the south. Ben Tre's topography is flat, with many sand dunes interspersed with fields and gardens. There are no large forests – only a few mangrove forests along the coast and estuaries.

Ben Tre, which is often flooded by tides is one of the most vulnerable areas in Vietnam to climate change and rising sea levels. The system of rivers, canals, and artificial waterways forms a very convenient transportation and irrigation network. Along the main rivers, there is a canal or an artificial waterway every 1 to 2 km. There are over 60 rivers and canals with a width of 50 - 100 m. In addition to the Tien River tributaries, it is worth noting the following important rivers and canals: Ben Tre River, Cai Mon Canal, Mo Cay Canal, Mo Cay - Thom Canal, Bang Cung Canal, Ba Tri Canal, Dong Xuan Canal, and Chet Say Canal - An Hoa.



Photo by Phan Thi My Lien

Ben Tre's climate is characterised by the sub-equatorial monsoon tropical region. It has high temperatures with little variation during the year, and an average annual temperature ranging from 26°C to 27°C. Although adjacent to the East Sea of Vietnam, Ben Tre is less affected by storms than northern provinces (from about 150° north latitude and above). Ben Tre is affected by the north-east monsoon from December to April and the south-west monsoon from May to November. The north-east monsoon season is a dry period, while the south-west monsoon season is a wet and rainy period. Average annual rainfall ranges from 1,250 mm to 1,500 mm.

Socio-economic features: Ben Tre province has one provincial city (named Ben Tre City) and eight districts. The rate of urbanisation in Ben Tre is about 20 percent. According to the 2019 census, the population of Ben Tre is 1,289,098. It has a population density of 538 people/km², a rise of 0.24 percent compared to 2018. Almost one-in-ten (9.8 percent) people live in urban areas (126,362) while 90.2 percent live in rural areas (1,162,736). Just

over half (51.07 percent) of the population is female. The unemployment rate of the working-age labour force is 1.88 percent and the corresponding underemployment rate is 2.61 percent.

Regarding economic aspects, Ben Tre has a waterway transport system with four main rivers flowing into the East Sea of Vietnam. It also has a system of canals and artificial waterways that provides important transport links between Ben Tre, the Mekong Delta, and the Southern economic region that is advantageous for socio-economic development. Ben Tre achieved economic scale by 55,250 billion VND (around USD 2.39 billion) in 2020. It recorded a growth rate of GRDP 0.84 percent and GRDP per capita of 42.8 million VND/person/year (about 1,848 USD/person/year). By GRDP, at the beginning of 2022, the agriculture, forestry, and fisheries sectors accounted for 35.97 percent. Meanwhile, industry - construction accounted for 19.51 percent, the service sector for 40.71 percent, and product tax minus product subsidies for 3.81 percent. Agriculture focuses on aquaculture,

planting coconuts and fruit trees (pomelo and lemon), vegetables, grass for livestock, and rice. However, the area for rice cultivation is decreasing. The forestry economy promotes afforestation, especially mangrove forest with cork, *avicennia marina*, and *casuarina* trees. Ben Tre is determined to focus more on key industries including coconut production and processing, seafood processing, and renewable energy in the near future.

4.2. Climate change in Ben Tre province

According to the Institute of Meteorology, Hydrology, and Climate Change, due to the above geographical conditions, Ben Tre is one of the places most affected by climate change. This directly affects production and the lives of its people. The main effects of climate change in Ben Tre are prolonged heat waves, an increase in average temperatures of 0.1 - 0.3°C, and rising sea levels of about 5mm/year (People's Committee of Ben Tre, 2011). Meanwhile, some other effects of climate change include saline water intrusion and a lack of fresh water that negatively affects many local fruit orchards. Common natural disasters in Ben Tre include: (1) Rising sea levels and saline intrusion; (2) changes in temperature and rainfall; (3) storms, tropical depressions, and cyclones, and; (4) high tides, river bank erosion, and coastal erosion. Climate change affects all sectors and industries in Ben Tre, including: Agriculture, forestry, and fisheries; water resources; transportation; and public health. Of these, aquaculture and agriculture are the most vulnerable (Ben Tre People's Committee, 2011).

Rising sea levels and saline intrusion: Due to its location, Ben Tre is affected by freshwater from the Mekong River and tides that push saltwater in from the East Sea of Vietnam. As such, it depends on the flow of freshwater and climate change. The climate and methods of regulating water sources are complicated by saltwater intrusion each year. On average, saltwater intrusion usually occurs in the estuaries of the Mekong Delta from about December to May, peaking at the end of the dry season around April to early May. In the dry season, when the water from upstream decreases, the tide strongly affects the system of rivers and canals. This leads to deep saltwater intrusion both in the rivers and in the fields.

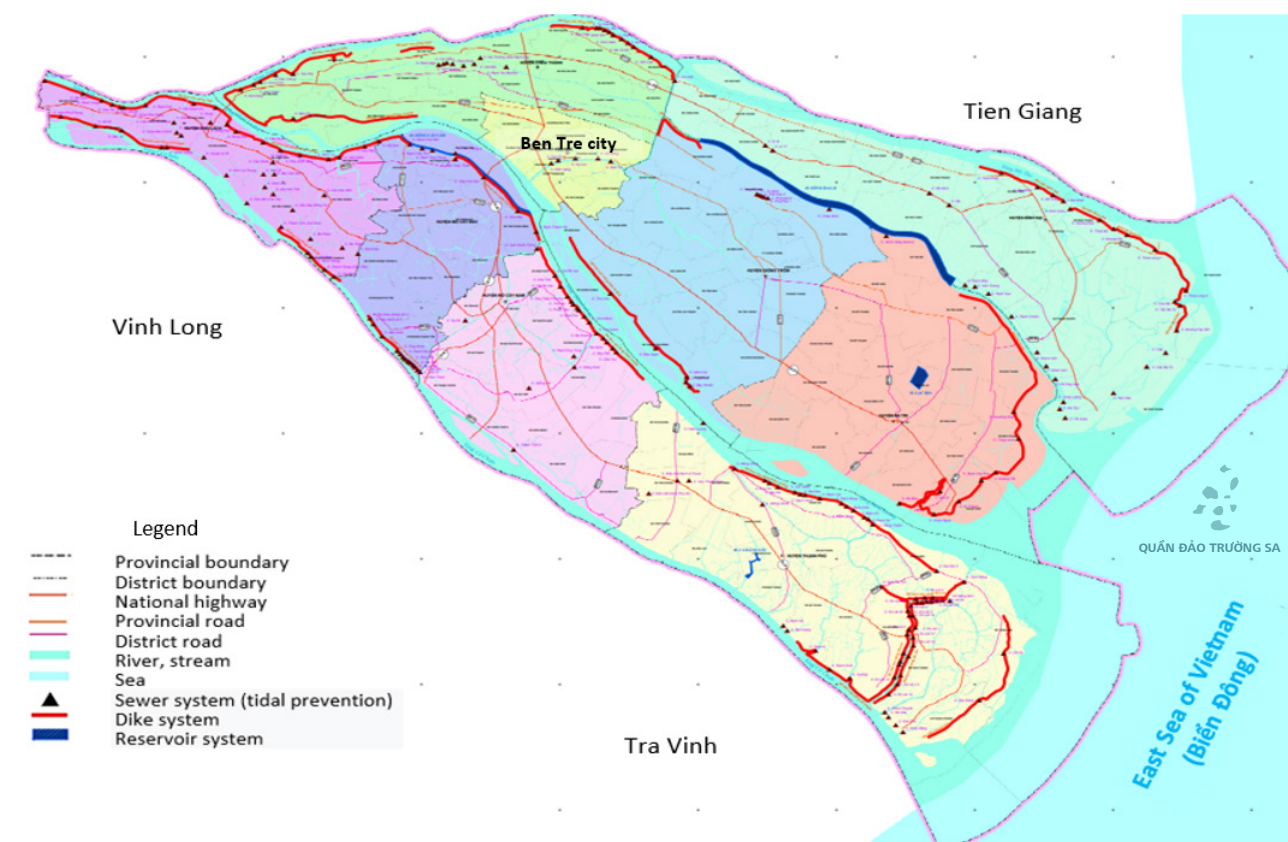
In 2010, salinity of 4‰ penetrated about 60 km inland. In the dry season of 2013, the 4‰ salinity line penetrated about 50 km of the Ham Luong River, 45 km of the Cua Dai River, and 52 km of the Co Chien River. Salinity of 1‰ covered almost the entire province, seriously affecting water supplies for domestic use and agricultural production (Vo Van Ngoan, 2014).

The dry season of 2015 - 2016 recorded very high salinity intrusion. The entire province was affected by saline intrusion, including the specialised fruit and flower growing area in Cho Lach district - located entirely in a freshwater area - which was also affected by saltwater intrusion.

In the dry season of 2019 - 2020, saline intrusion was particularly complicated. Salinity penetrated four tributaries in Ben Tre province. Meanwhile, the Ham Luong River was subject to deeper saline intrusion and higher salinity concentration than the remaining tributaries. Salinity intrusion varies during the day due to tidal influence. At the peak of high tide, salinity of over 4‰ reached the eastern parts of Chau Thanh and Cho Lach districts, about 40 – 60 km from the coast. Salinity gradually increased towards the sea, reaching more than 16‰ and, in some places, up to 20‰. At low tide, salinity penetrated about 20 km deep in the Tien and Co Chien rivers. In the Ham Luong River, it penetrated 40 km deep with salinity of up to 16‰. The deepest salinity peak of the two years was about 20 km apart, with salinity ranging from 2‰ to 9‰ (Southern Institute of Irrigation Science, 2019).

According to the scenario in which sea levels will rise by 75 cm by 2100, Ben Tre province will have 725.25km² of flooded area. This will include areas of specialised rice cultivation (162.81 km²), aquaculture (90.14 km²), and land for fruit trees (40.38 km²) (Ben Tre Province People's Committee, 2011). This saltwater intrusion process is more severe over time making the prevention of saltwater intrusion difficult and causing losses to people. The process of saltwater intrusion also causes a lack of freshwater, especially in the dry season, which will seriously affect production and daily life. To prevent saltwater intrusion, the provincial government has built a system of dykes and tidal flap valves over the years (figure 2).

Figure 2. Map of Ben Tre Province - The dyke and tidal flap valve system to prevent saltwater intrusion built by the state



Source: The People's Committee of Ben Tre province, 2022

Changes in temperature and rainfall: Statistics on annual temperature changes from 1977 to 2010 show that the average annual temperature trend in Ben Tre province has increased markedly. Indeed, 2010 saw a particularly high average temperature, reaching 29.6°C. The province's average air temperature increased from 0.05 to 0.150°C/10 years in the 20th century, with longer and warmer summers (Ben Tre Province Department of Natural Resources & Environment (DONRE), 2010). Increased temperatures and prolonged heat waves are two factors that adversely affect the living environment of aquatic organisms (shrimp, crabs, clams, etc.), creating conditions for the development of some harmful alien organisms.

Data from 1998 to 2010 shows a negligible increase in rainfall. Rainfall has tended to increase in the range of 11 – 20mm from 1990 to 2006, but this is not significant. However, it is worrying that, in recent times, the rainy season has seen abnormal changes both in time and intensity. In particular, the rainy season tends to happen about two weeks later while rainy days are shorter, and the most intense rain will fall around the end of the rainy

season, which is detrimental to production (WWF, 2012). Meanwhile, unseasonal rain has been seen in the dry season (December 2011 and March 2012) and these rains bring thunderstorms, whirlwinds, and lightning. Changes in temperature and rainfall affect agricultural production, crop changes, disease spread, and aquatic regimes.

Storms, tropical depressions, and cyclones: In Ben Tre, storms usually begin in October and end in December. They most commonly occur in November (Ben Tre Province People's Committee, 2011). Every year, between six and nine storms and tropical depressions directly affect Ben Tre province. From 1940 - 1990, no data was available on storms entering mainland Ben Tre province. However, after 1990, Ben Tre began to suffer from a number of storms, greatly affecting coastal areas (Ben Tre Province People's Committee, 2011; Oxfam, 2008). Because the area is less affected by storms, people have little experience in storm prevention. Therefore, when a storm occurs, it causes damage to property, lives, and production. It also disrupts sea dykes and destroys mangroves, which reduces biodiversity as well as ecosystem functions.

Erosion of riverbanks and coastlines: Climate change causes rising sea levels and high tides. For instance, the highest tidal peak in 2013 alone was 199 cm, while the highest from 1984 to 2012 was 197 cm. High tides, combined with fast-flowing water, will cause accidental charging in the coastal areas of Ben Tre. This, in turn, will cause damage to protective forests, coastal mangroves, field soil, saline soil, etc. In Ben Tre, coastal erosion often occurs in three coastal districts: Ba Tri, Binh Dai, and Thanh Phu (People's Committee of Ben Tre province, 2011). The rate of coastline and coastal erosion in Ben Tre province is increasing due to climate change. In 2010, on the 5 – 7 km of coastline in the Bong and Loi dunes (Thanh Hai commune, Thanh Phu district), the average rate of erosion was over 20m/year, killing many protective forests (Ben Tre Province, DONRE, 2010).

4.3. Livelihood transformation toward climate change adaptation in Ben Tre province

Due to frequent saline intrusion, people in Ben Tre province have had to transform their livelihoods to adapt to the harsh natural conditions. Farmers have changed their agricultural practices, including shifting their production from freshwater agriculture to brackish or saltwater agriculture or aquaculture, changing crops and livestock, applying new farming methods, diversifying livelihoods, seasonal intercropping, off-farm work, and changing careers. Some farmers are able to invest in hi-tech farming. However, those who cannot have to rent out their land, or abandon it and work for companies in the region. Meanwhile, many farmers – especially the young – have left for big cities such as Ho Chi Minh City and Binh Duong in search of work. Below are forms of livelihood transformation in agricultural households:

- *Diversify sources of livelihoods: Raise additional livestock (pigs, hedgehogs, pets) in addition to agricultural production activities; cultivate a variety of agricultural products; and diversify household income sources through different types of service businesses.* In Ben Tre, different groups of farmers were found to have different ways of adapting to their new circumstances. In the agriculture area, farmers depend on crop production for their incomes. They have cultivated and intercropped many new species of fruit trees in the two last decades and earned a lot of money from them. These new fruit trees need fresh water absorbed more frequently than coconuts. As a result, farmers changed their irrigation systems and built rainwater storage for the dry season.
- *They switch or return to more salt-tolerant types instead of salt-sensitive crops, livestock, and aquatic products.* When salinity does not result in a major disaster, farmers find various seedlings that suit their crops with higher commercial value such as grapefruit/pomelo, orange, and guava, or crops that can be harvested in a short time (seedlings, flowers, etc.) At this time, traditional local coconut trees were replaced by these new fruit trees. However, as salinity intrusion has seriously damaged production, people then switch or return to farming crops, livestock, and aquatic products suitable to the new climate and hydrology conditions such as brackish water shrimp (in salt and brackish water areas) or a new species of coconut "dua xiem lun or dua uong nuoc" (dwarf coconut or juice coconut). These new coconut species are preferred by farmers because of their shorter planting time, rich in amount of fruit, easier harvesting due to their closeness to the



A farm with mixed crops and a freshwater irrigation system (source: authors)



A household in the city has invested in a water filtration system (source: authors)

ground, and good price due to the sweet juice and soft flesh. However, the quality of fruit is still affected by climate shocks.

- *They equip themselves with knowledge and experience in dealing with drought and salinity.* Farmers do not irrigate crops with salt water, build freshwater reservoirs, or buy freshwater storage facilities. Some households even buy their own water filters and make their own freshwater irrigation systems for their gardens. They also build their own salinity-prevention culverts and dykes to prevent salinity in their gardens (in addition to those of the state) and learn about pests, pesticides, and farming techniques.
- *They abandon, sell, or lease farmland and change their occupations from agriculture to other work such as services, labour, and trading.* For agricultural households, when their livelihoods are affected, they leave their land vacant, lease or sell it, and look for non-agricultural work in the local area or other cities. This transition is similar in urban and rural areas in Ben Tre province. However, in urban areas, people have more options to change their livelihoods and have a wider range of career opportunities. Therefore, in urban areas, they can simply maintain their agricultural activities (for example, only

growing simple crops such as bananas and coconuts) and have other, non-agricultural work as their main source of income.

In urban areas in Ben Tre province, where people's livelihoods do not depend entirely on agriculture, besides farming, they can also do other jobs such as businessmen, office workers, or government officials. The impact of climate change on this group is not as severe as those in rural or semi-urban areas, who depend solely on agriculture. Particularly for those who do business or produce agricultural products in Ben Tre, climate change reduces the stability of their business activities because they depend on changes in agricultural products. Besides, another characteristic of livelihood transformation in urban areas is that, for people whose livelihoods are entirely based on non-agricultural jobs, their incomes are hardly affected by climate change. Instead, climate change mainly affects their daily lives, increasing spending on equipment (heat protection, fresh water, etc.) and business and production activities.

In general, in the context of livelihoods affected by climate change, based on accessible resources and opportunities, households will devise strategies to adapt and change their livelihoods. In this transition, gender differences appear depending on the household's livelihood characteristics.

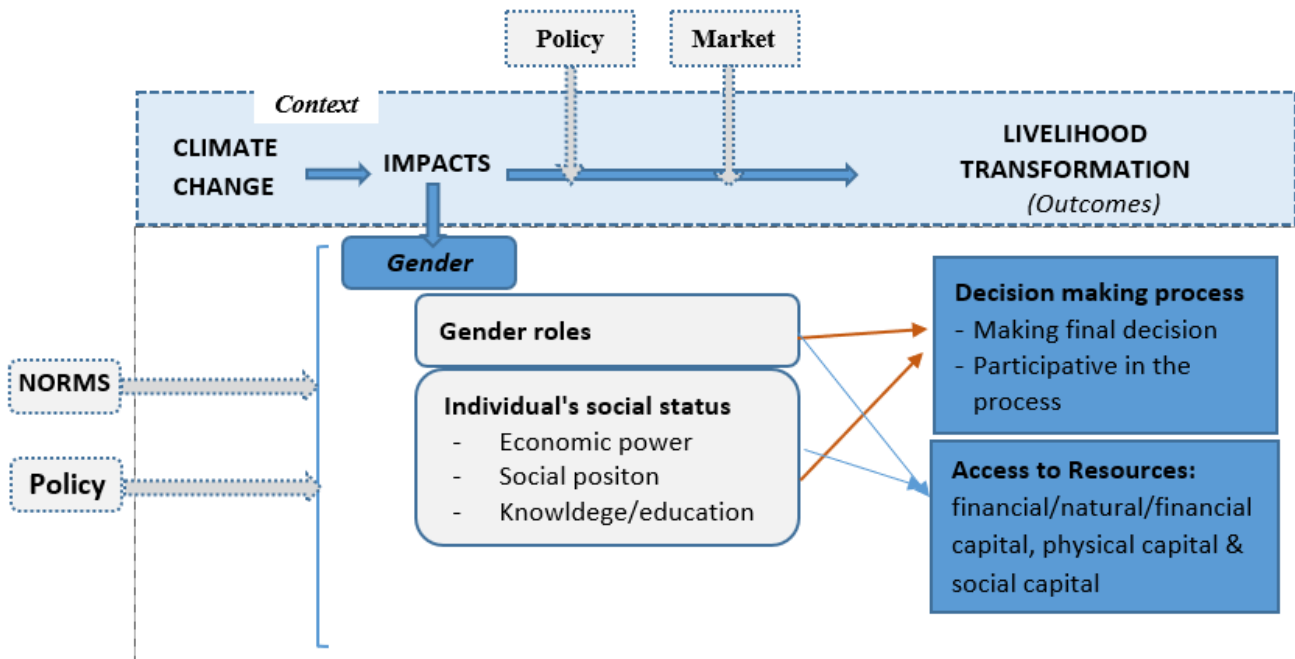
5. GENDER ANALYSIS

5.1. Theoretical framework and research methods

The Feminist Political Ecology (FPE) approach is employed in this study. This framework emphasises the role of gender and power relationships in making decisions and the access and use of resources. Women are often seen as more vulnerable than men, particularly in the context of climate change, due to factors such as their socio-economic status, their roles at home and work, and their limited access to resources and decision-making.

From a gender perspective, this research will analyse livelihood transformation based on the FPE approach. Different dimensions will be considered, including access to resources for livelihood transformation, the decision-making process, and gender roles. The role of gender in livelihood transformation to adapt to climate change will be discussed in relation to the obligations of men and women in their roles of husband/wife, and father/mother.

ANALYSIS FRAMEWORK



Research methods: To conduct this research the following data collection methods were applied:

Documentary research: We drew on the 2022 report “The transformation of southern medium-sized cities toward climate change resilience, the cases of Ben Tre and Binh Duong provinces” as well as literature including published research reports, journal articles and books, and local government reports on the topic.

Qualitative primary data collection and analysis: We conducted 15 in-depth interviews and two focus group discussions. In total, there were 30 respondents, including both men and women, numbered from 1 – 30 (No. 01 – No. 30). The study was conducted in Ben Tre City, the central urban area of the province. Ben Tre City has characteristics of both urban and rural areas. In this

report, when referring to agricultural occupations, our analysis does not include aquaculture and afforestation because these are not typical types of agriculture for Ben Tre City. Ben Tre City is experiencing a strong livelihood transition due to the impact of many factors such as climate change, urbanisation, and modernisation. In addition, this area is also typical of a place where traditional and modern culture intertwine, leading to changes in social norms, especially in gender aspects.

- In-depth interviews including with entrepreneurs, farmers, and local government officials.
- Focus group discussions including with a group of farmers and a group of entrepreneurs/traders (coded as FGD.01 and 02).

5.2. Gender in Ben Tre

Population by gender: There are more women than men in the local population. Accordingly, data for 2010 - 2019 shows that women always account for more than 50 percent of the population in Ben Tre province. Specifically, in 2010, there were 641,693 women, accounting for 50.95 percent of the population. In 2014, the female population continued to be greater than the male population with 649,038 people, accounting for 51 percent. This increased again to 51.07 percent in 2019. Preliminary data for 2022 shows that the female population accounts for 50.66 percent.

However, recent data on replacement fertility rates shows that the future population ratio by sex could soon look very different. In recent years, Ben Tre has experienced low fertility. Indeed, it is one of the 21 provinces with the lowest fertility in the country, with an average rate in 2021 and 2022 of just over 1.2 children per woman. Gender imbalance at birth in Ben Tre is also high. Accordingly, Ben Tre's sex ratio at birth is 100 girls for every 109 boys (109/100 girls) (Ngoc Hoa, 2022). If there is no improvement in the coming years, the male population could surpass the female population.

Table 1. Population of Ben Tre province in the 2010 – 2019 period, by gender

	2010	2014	2019	Partly 2022
Total population	1,259,394	1,272,510	1,289,098	1,298,000
Male	617,701	623,472	630,762	661,000
Female	641,693	649,038	658,336	657,600

Source: Ben Tre Provincial Statistics Department (2023)

The percentage of the population aged 15 and over who are literate: Women make up the majority of the population. However, the literacy of women aged 15 and over is not as high as that of men, even though

it has increased steadily over time. In 2010, the female literacy rate for women 15 and over was 90.77 percent. By 2014, it had risen to 91.44 percent and, by 2019, it had increased again to 93.3 percent.

Table 2. Literacy rate of the population over 15 years old and the labour force over 15 years old in the 2010 – 2019 period.

		2010	2014	2019
The literacy rate of the population aged 15 and over	Total population	93.6%	93.4%	95.2%
	Male	96.2%	95.8%	97.1%
	Female	90.8%	91.4%	93.3%

Source: Ben Tre Provincial Statistics Department (2023)

Basic education by gender: The rates of women participating in high school education is higher than that of men. According to the 2019 Population and Housing Census, the rate of the population attending high school is significantly different for men and women at the lower and high school levels. If, at the primary level, the proportion of boys and girls of school age is roughly the

same (98.2 percent and 98.6 percent) then, at the lower secondary and high school levels, fewer boys attend school than girls. Specifically, the lower secondary school attendance rate is 87.7 percent for boys and 91.9 percent for girls. Meanwhile, the high school attendance rate is 58.3 percent for boys and 73.7 percent for girls.

Table 3. The proportion of the population attending school at all levels in 2019

	Total population of age groups at the high-school level		The percentage of the population of school age attending high school	
	Male	Female	Male	Female
Primary	46,706	43,739	98.2% (45,878)	98.6% (43,148)
Secondary	36,081	34,692	87.7% (31,654)	91.9% (31,913)
High School	25,778	25,683	58.3% (15,050)	73.7% (18,934)

Source: General Statistics Office (2020)

Labour force by gender: The numbers of female workers is much lower than that of men. There were 382,028 female workers in 2010, 30,641 less than the number of male workers. In 2014, there were 380,772

female workers, down from 2010, and 53,881 less than men. In 2019, there were 387,289 female workers, 54,224 less than men.

Table 4. The labour force in Ben Tre province by gender in the 2010 – 2019 period

		2010	2014	2019
Labour force over 15 years old	Total population	794,697	815,437	828,802
	Male	412,669	434,659	441,513
	Female	382,028	380,778	387,289

Source: Ben Tre Provincial Statistics Department (2023)

Gender in government: Data for 2015 - 2020 shows that 9/43 officials in the Party Executive Committee in Ben Tre province were women, accounting for 20.93 percent. Women also participated in the Standing Committees of the Provincial Party Committee and the Provincial People's Council: 22/36 departments and branches had female officers (P. Tuyet, 2018). Meanwhile, women made up 89/196 officials in the Executive Committee of the Commune and Ward Party Committees, a rate of 45.4 percent (Hong Quoc, 2020). However, in general, the participation of women in government is still lower than that of men, especially at the provincial level.

In general, according to provincial statistics, the gender ratio in the population structure in Ben Tre is similar to the national trend, with more women than men. Women of working age participate in the labour force at the same rate as men. In terms of social position, in Ben Tre, not many women occupy leadership positions. However, on a more positive note, the proportion of girls attending and graduating from secondary school is quite high. Education and social position are also factors that help women in the livelihood transformation.

5.3. Gender-based climate change impact on livelihoods in Ben Tre

Ben Tre has an agricultural land area of 179,947 hectares which accounts for 75.64 percent of the total agricultural land of the province (Ben Tre Provincial People's Committee, 2022). So, in recent times, saline intrusion and climate change have created significant impacts on households' livelihoods and incomes in both urban and rural areas. However, this impact varies by region. Land and water resources in Ben Tre are divided into three regions: fresh water, brackish water, and salt water (figure 3). Each region has common forms of agricultural production due to the customs of their communities and provincial agricultural planning. Experiencing periods of salinity intrusion, from low to high levels, people have more or less adapted to saltwater intrusion over the decades through adopting farming methods suitable for salt water. Along with the development of updated

technology, they can use technical measures to cope with the increase in water salinity, thereby reducing damage to aquatic products, plants, and livestock.

Adapting to the impacts of climate change on livelihoods is a long process. This takes place at the household level, in which the tasks of men and women are intertwined. This division of responsibilities is influenced by cultural norms, which leads to men and women being affected by climate change in different ways as well as participating in the family's livelihood transformation process with different tasks. In our research, when we analysed the impact of climate change on livelihoods and the gender-based transformation, we divided into two areas of profession (agriculture and non-agriculture). This is because the impacts of climate change and the livelihoods transformation between these two areas are clearly different.

In the area of agriculture, sub-groups include farmers whose income mainly comes from farming and farmers whose income is independent of agricultural production. Farmers suffer from the impacts of climate change on livelihoods including salinity intrusion- damaging crops, the appearance of strange pests and diseases, contaminated and salinated underground water, as well as fresh water shortages during the dry season. During this process, both men and women consider that climate change has an impact on their household income. However, several men affirmed that they suffer more as they are mainly in charge of agricultural work.

When salinity occurs, I am more affected (than my wife). Because I'm a breadwinner, I am in charge of this farm and take care of everything - (male, raising pigs and planting grapefruit, No. 10).

Meanwhile, women believe that they are also considerably affected because they are in higher need of fresh water for cooking, cleaning, gardening, and for their personal hygiene.

Figure 3. Map of Ben Tre Province - Map of provincial agricultural zoning and fresh - salty - brackish water areas



Source: The People's Committee of Ben Tre province, 2022 Brackish water area

Talking about climate change and saltwater intrusion, I think that men are affected quite a lot. And if men are affected, women in the family are also considerably affected. For example, when gardens, animals, and seedlings are affected by salinity, men lose their jobs. But then women are also affected. In life, women are more disadvantaged and they also have to share the family burden with men in many areas. For example, women are the ones directly responsible for raising animals, planting crops, and irrigating. For example, they have to go farther to take water (they have to buy (or ask for free) clean water during the dry season or when saltwater intrusion occurs). When the water source is not hygienic, the health of women and children is also affected. In addition, women have to sweep, clean, and wash household items. Women are the ones who directly do the cooking - (female, head of the Ben Tre province Women's Union, No. 03).

As for farmers whose income is independent of farm production, the impacts of climate change are less serious due to the small size of farms and the ability of farmers to invest in irrigation and a fresh water supply.

In the area of non-agriculture, we divide into two sub-groups: Businesses relying on farming or farm products and non-agricultural businesses. For those in non-agricultural business, we find no clear evidence of

climate change impact or gender-based differences. For those whose businesses rely on farms or farm products, the climate change impacts are salinity-damaged solar-heated water systems and metal furniture. In addition, agri-tourism activities are affected as fruit gardens are ruined. The shortage of fresh water results in limited productivity in food processing industries. Changing the types of agricultural products provided by local farmers also affects the production and trading of agricultural products of agricultural enterprises, in which women are considered to be more involved.

Usually, women care more about the environment than men. Men only care about drinking. My friends often ask me to go out drinking. That is the reality. Women are more concerned about the environment, more realistic, more involved in life... The coconut product-manufacturing industry recruits more women than men. My workshop is the same. Because this job is done manually, it needs more women - (male, owner of a business that produces products from coconut, previously this business produced products from grapefruit and did business in grapefruits, No. 22, FGD. 01).

In general, climate change affects men and women in different ways stemming from the division of labour in households. In addition, in the transformation of livelihoods to adapt to climate change, there are also

differences in the concerns of men and women, especially in agricultural households. The process of adaptation and transformation often requires the development and adoption of new skills or technologies. Technical expertise and the ability to use technologies to transform livelihoods can help communities effectively implement climate change adaptation measures. In this process, men (husbands) often play a clearer role than women (wives). In particular, the husband will often perform technical work such as gardening, building irrigation systems and livestock barns, repairing electricity and water supplies, or maintaining household appliances. Men will often be more interested in maintaining farmland, keeping ancestors' gardens, and handling technical issues for crops and livestock. In their livelihood transformation, women are also interested in increasing their family's income, so they also learn about different ways to earn money and cope with unfavourable weather. However, they are more likely to support switching to the cultivation of profitable species rather than focusing on the technical aspects. The results of shifting livelihoods to adapt to climate change often come from a consensus of male and female family members, especially in households with common sources of income such as farming or business. Moreover, this transition includes gender differences in decision-making and access to resources.

5.4. Making decisions for livelihood transformation

Decision-making is the process of making choices with a group of people. For livelihood transformation, decision-making involves considering the information and available resources of the household. Men and women will share their voice – or, in other words, their power – in this process. At the household level, men and women can be the main decision-makers (controller role) or participants (supporter role). Their voice in this transition is determined by factors such as gender roles and power dynamics in the family as well as an individual's status in terms of economic strength, social position, and level of education.

a. Gender roles

Decision-making in the family is partly influenced by gender roles – the traditional roles of men and women in each household. Studies have shown that, from a gender perspective, men are often the breadwinners and decide all issues related to livelihoods (Tosh, 2017). In our study, the decision-making power is analysed from the personal stories of the interviewees. The research team also recorded their opinions, views, and assessments of the current situation of the decision-making power.

At present, Vietnam is rated positively for gender equality compared to other countries at the same level of development, especially in terms of economic participation and opportunities. Even so, limitations related to gender inequality persist. However, these are not as noticeable as in other countries in Asia. For instance, Vietnam ranks 65th in the Global Gender Gap

Index (Joanna Romero et al. 2017). Moreover, in the 2016 Human Development report, Vietnam was ranked 1st out of five gender equality groups (among countries with the best gender equality status in the world). This is also evident in Ben Tre.

Gender roles are expressed at the household level. During livelihood transition, the type of work and the state of mutual financial dependence between husband and wife are significant. For households whose main source of income comes from agriculture, for instance, men play an important role earning money through horticulture. Meanwhile, women often only play a supporting role and are, therefore, dependent on their husbands. As a result, ideas and strategies to change family livelihoods often come from men.

I came up with the idea of the farming model, for example, raising pigs. I also launched this grapefruit-growing model... For example, if I raise pigs, I do all the work. Then when traders came to buy, I asked my wife and grandson to help (counting the number of products and collecting money). I also planted grapefruits and, afterwards, harvested them. When the grapefruit garden died due to drought and salinity, I had to cut them down. When the land was empty, I went looking to buy banana trees to plant again. In general, I do all the heavy stuff - (male, raising pigs and planting grapefruit, No. 10).

However, for households in non-agricultural occupations or where farming is combined with other activities, wives play a greater role in creating and generating income because they have separate jobs from their husbands. In some households, women have even more opportunities to participate in the decision-making process for livelihood transformation. This may stem from their higher education and their other, more stable work (besides agriculture), so they are less dependent on the impacts of climate change.

Yes, my husband understands the technical things better. Technical things like electricity and water, for example. If something breaks, my husband fixes it. Or, if the stove gets hot, my husband installs a fan [and will] research some kind of wind flow to avoid [it] getting hot. I let my husband handle those things because I don't know about them. The same goes for homestays. For example, if doors, iron, or wooden items are damaged, my husband can fix them. That requires skills and some knowledge. Then, if you can't do it, you can hire someone [else] to do it. As for me, I [am] only responsible for operating the restaurant, advertising, approaching customers, handling customer complaints, and receiving customers - (female, owner of a homestay and restaurant whose husband is a police officer, No. 18).

In Vietnamese culture, men are traditionally given the role of household breadwinners. This role comes with responsibilities and more rights in the family than women, especially for important issues. However, a study

has shown that, in recent years, women have begun to have more agency. Now, the more popular form of decision-making is that husbands and wives discuss and make decisions together (Vu Manh Loi, 2013). For the livelihood transition process in Ben Tre, although women mostly hold the family purse strings, men still have the decisive vote in important matters such as owning assets, making decisions on significant purchases, and inheriting land. This happens partly because agricultural livelihoods depend heavily on land and men are the ones who undertake important and heavy work in agriculture.

He does the main job of gardening. I help him... but I keep the safe (laughs)... In general, they (husbands) can't keep the money, so they give it to ladies for safekeeping. These women are very good at keeping money. But they (husbands) can take it as long as they want, [the] wife can't stop them... - (group of retired and women farmers, FGD. 02).

In the context of urban development, traditional concepts of gender roles in the family are also gradually changing. As such, women have more decision-making power, especially in their own work. We interviewed a household where a retired husband and wife who previously worked for a hospital started their business by setting up a farm. However, the wife chose to raise pets (for commercial purposes) while the husband chose to raise wild animals. As such, they are independent in their own investments.

Raising pets – dogs and cats – is my business, and he raises wild animals, salamanders, porcupines, snakes, crabs and so on... As for investment costs, it is up to each person [to] spend on their own business. I have two separate budgets – mine and my husband's. The expenses for the family are my responsibility. It is a common budget for our family - (female, 61 years old, retired, raising pets, No. 27, FGD. 02).

Although women increasingly have a voice in family livelihood decisions and awareness of the role of women in society has been evolving, some believe that these changes are only superficial and skin-deep.

I often heard men, when they were drinking [and] talking to each other, say that "when I get home, I am willing to do whatever my wife tells me". However, in reality, things do not happen as they said. The guys who work at my office also think the same. They still have the mindset that women have to stay at home and, in general, women can't do anything. I also fell into a situation where I favoured men and looked down on women - (female, working at the Commune People's Committee, No. 01).

The results of this study show that the more women develop in terms of education, economic status, and social position, the more decisive a voice they have in their family. This will be reflected in the next section.

b. Individuals' social status

According to traditional social norms, women should stay at home and take care of the family. This view still exists in rural or newly-urbanised areas. Though, traditional social norms have changed for the better for the role of women compared to previous decades, especially in urban areas. In the context of women gradually achieving higher statuses in terms of economics, education, and social position, they certainly have influence on decision-making in the family.

- Economic power

Economic power is often associated with gender inequality and the women's empowerment movement. This is because women are often paid lower wages and are, therefore, thought to contribute less to the household economy, thereby affecting their decision-making power in the family (UN Women, 2018). Economic power at the family level is often related to the ability to earn money and manage assets. However, in interacting with the community, economic power is also the ability to have economic opportunities, participate in the labour market, be self-employed, and have influence on the community's economy. The root cause of inequality in decision-making power must be discussed in economic terms. Apart from that, a man or woman's voice also depends on their social positions and their individual income and financial contribution to the household to which they belong:

If you have more finances, you can talk, but if the finances come from the husband, the husband will have more say - (female, Head of the Commune Women's Union, No. 01).

According to Tosh (2017), when getting married, the man plays the main role in production activities, maintaining the household economy and "directing the labour of family members and other dependent people" (Tosh, 2017: 36). This theory remains true in Ben Tre.

People who can earn money often have more advantages. People who make money have more advantages than people who stay at home. If people have rights, their voices are stronger. Most of the time, I see that women must listen to their husbands, raise children, and don't "cross the line" (standard). When their husbands give some advice, women must listen to what they say without having other opinions - (female, ward People's Committee officials, No. 02).

According to Okin (1994), housewives are generally accepted as not being main workers in the family. Housework is often not considered important and, as a result, housewives usually follow the decisions of their parents and husbands who can generate income and socialise (Okin, 1994). Although women have a voice, men still play the decisive role in all decisions related to finance and property ownership.

For example, if my wife sells coconuts, I'll just tell her to keep the money and spend it on whatever she wants. My salary is enough for my expenses. If I want to buy this or that, I can just buy it with my salary. When my salary is all gone, I'll ask my wife to give me an amount of money and she'll give it to me. As for harvesting puffy coconuts, I let her keep the money and take care of everything - (male, farmer, planting coconuts, No. 07).

In property matters, decisions related to valuable assets are still taken by men:

According to the rule of my family, if my husband wanted to change the TV, I told him to buy a small one and, at first, he agreed. He asked how much for that small one which was around thirty or forty inches. But, finally, he bought a 50-inch TV - (female, retired and a farmer, No. 25, FGD 02).

Especially with regard to property ownership, the man is still the default owner and decision-maker:

At that time, when we went to register land, I only registered my name on the land certificate, not my wife's name as it was my land - (male, farmer, in charge of the Commune Farmers' Association, No. 05).

Inheritance still belongs to men, who are believed to continue family lines.

The land is registered in the name of my parents-in-law. They gave it to their children. Because my husband has two sons, he inherited more land (700 square meters) than his younger sister living next door who was given only 300 square meters just because she has two daughters - (female, small business, making traditional rice wine, No. 16).

According to Arruzza (2016), in the family, women only play the role of child-giver and housekeeper and depend on men, so decisions depend on their husbands (Arruzza, 2016). In this division of labour, women often have few opportunities to communicate with outside society.

I'm more interested in social relationships. In contrast, my wife often stays at home to do chores as she also has few outside contacts - (male, farmer, planting coconut, No. 10).

This has affected the voice and decision-making power of women in the family. Even when both husband and wife are retired state employees, the patriarchal element remains unchanged in mindset and behaviour, even if the man shares housework with his wife. When talking about money expenditure, a woman said:

I am in charge of keeping money but, if my husband wants to spend, he can make decisions and I cannot stop him - (female, retired and a farmer, No. 25, FGD 02).

When women overcome barriers and social stereotypes or make contribution at least equal to that of men, they will have the opportunity to be recognised in their roles and decision-making rights:

My husband used to work as a tour bus driver. And I opened a small business (pho) in front of my house. When he was having a hard time driving, I suggested we start a coffee shop next to the Pho shop. I then asked him to take care of that coffee shop and make decorations for it. He also undertook building the house and taking care of the garden around the house as I wanted. Though he was like the head of the family, he listened to me in most things - (female, catering business, No. 12).

Research by Sellers (2016) shows that, when men have to take on work away from home, women play the main role and make all decisions in the family related to changing livelihoods to cope with climate change (Gender & Alliance, 2016). This study also shows that decision-making power is found in cases where men work away from home while women shoulder the burden on behalf of the breadwinner.

There were very few drivers back then. He ran a dump truck. There was only me and my children at home... He worked on construction projects and only came home once a week. Therefore, I made all the decisions at home and he had no ideas - (female whose husband is a driver, small business, making traditional rice wine, No. 16)

- **Social positions**

Data on the proportion of women in senior and middle-management positions around the world shows that, globally, women are underrepresented in high-profile, better paid jobs. Vietnam is one of the countries with a low percentage (15.5 percent) of female workers in leadership positions. Data from Ben Tre province also reflects this. This shows that women tend to hold lower social positions than men (Ortiz-Ospina & Roser, 2019). In Vietnam, women have gradually asserted their position and affirmed their role. However, in many cases, this is down to the effort of each individual, especially when choosing a career. Societal prejudice persists about women having the right to be independent and do business instead of following the traditional path of marriage and children.

My parents don't do business but they do farming, so they don't support me. My parents just want me to grow up, go to school, then work for a company and receive a salary, not having to open my own business like that - (female, owner of a small business processing coconut products, No. 21, FGD. 01).

In general, social prejudice still weighs heavily. Although women have more opportunities for personal development, they are still not considered equal to men in all aspects.

Speaking about inequality, in general, women in society today are generally not very equal to men. If I compared us to Western women, of course our women are limited in our rights - (female, head of the Ben Tre province Women's Union, No. 03).

- Education

In our research, according to the respondents, men are still considered the mainstay in family decisions, especially those related to technology and assets. However, there are cases in which women retain greater decision-making power over investments in family livelihoods, especially if this investment concerns a female-owned business. For instance, we met a young household in which the wife had the opportunity to achieve a high level of education. As a result, she considered herself more "civilised" than her husband. They invested in a homestay, restaurant, and apartment for rent, all run by the wife. The husband is a policeman and only gives his opinions and provides technical support for the family business.

My husband is good in the technical field but not in the civilised field, probably because he has little access to those things. At that time, he also studied in the countryside (he didn't go to a university in a large city like Ho Chi Minh City). From level 1 to 3, they study in the countryside - (female, owner of a homestay, restaurant, and apartments for rent, No. 18).

Other studies have shown that women are very sensitive to the environment and, therefore, can understand and grasp changes in livelihood transitions very quickly (Resurrección, 2013; Arora-Jonsson, 2011; Khalil, Jacobs, McKenna, & Kuruppu, 2019). Our study echoes this, and also shows a deeper cause from the opportunity to access more knowledge.

Things such as what materials to use, such as environmentally-friendly materials, are up to me to decide. I find that young people, who know English, are more interested in knowledge from the civilised world than those who do not know English. My husband doesn't know English either... For example, about things like toothbrushes, I choose paper packaging while my husband prefers plastic packaging. I always choose paper, because I think the pieces of torn plastic are very polluting - (female, owner of a homestay, restaurant, and apartments for rent, No. 18).

All of the above opportunities have created conditions for women to have a voice, role, and decision-making power in business related to livelihood transformation.

Yes, I decided everything. I decided first and then asked my husband's opinion... The land for building the apartment

belongs to my husband. When I first graduated, my husband bought land and wanted to build a house there. But I said no because I don't like the neighbours there. Then my husband asked me to build a motel, but I refused. I want to build an apartment for rent - (female, owner of a homestay, restaurant, and apartments for rent, No. 18).

For livelihood transitions, decision-making is a process of considering the information and resources available to the household before making a decision. From a gender perspective, this process is influenced by various factors. The greater advantage still belongs to men. However, today, women also generate income and have qualifications and social positions. Therefore, they have a more decisive role in the family. This is also common in Vietnam. Besides, in light of the negative impact of climate change on livelihoods, an important factor affecting livelihood transitions is the information and resources on which families make their decision.

The unique point about livelihood transformation due to climate change is that decision-making power is closely related to the duties of men and women in the family's common livelihood, especially in agriculture. During livelihood transformation, the primary breadwinner will have a more important voice. Especially in agricultural activities, jobs that are considered heavier in the garden and field often belong to men. Therefore, men will lead the transformation. However, they also need support from female family members. In certain situations where women are the main breadwinner in business or agricultural activities, they are also considered to have the same ability to work as men. While they might not have the same physical strength, they compensate for this by hiring people to do the heavy work.



Small household business, photo by Pham Thi Bich Nga

5.5. Access to resources in livelihood transformation

In the livelihoods approach, resources are referred to as 'capital' and often categorised into five or more asset types owned or accessed by family members: Human capital (skills, education, health); physical capital (produced investment goods); financial capital (money, savings, credit); natural capital (land, water, trees); and social capital (networks and associations). These asset categories are, admittedly, a little contrived, and not all resources that people draw upon in constructing livelihoods fit neatly within them (LSP, 2004). The access to and control of resources at the household level is also influenced by gender roles and an individual's status.

a. Access to natural assets, physical assets, and financial resources

Land and gardens are important sources of food for households. Households carrying out agricultural production activities often have large areas in which to invest in growing trees such as coconuts, grapefruit, and bananas or to build barns for livestock. Under the impact of climate change, farming conditions and agricultural production may change. However, these types of assets allow households to adapt by adjusting crop types and farming methods to maintain market supply, creating a source of income for the family. Households with a lot of land or good financial resources will have more opportunities to transform their livelihoods against the impacts of climate change. These financial resources can be created by households themselves or with support from family members. One woman mentioned a small loan she got from her family:

We borrow from my family [and] my husband's family. But they are not big loans. Our capital was our labour/ hard work. In the first phase, we had to do everything by ourselves without hiring employees. We just hired some staff this year... The initial capital source was from me and my husband, then we started slowly. Then we also did real estate business. I got this restaurant from real estate profit while I haven't received any return from the homestay business yet - (female, 28 years old, owner of a homestay, restaurant, and apartments for rent, No. 18).

In the meantime, another woman said that her husband received some money from his parents after they sold their land:

My husband's parents have a lot of land and then they gave it to their children though they did not transfer to them the land ownership certificates. Later, because the piece of land was by the main road and had high-value, my parents-in-law sold it and gave the money to their children. Given the money, my husband bought two excavators in 2015 - (female, 50 years old, selling land to change occupation from agriculture to non-agriculture).

However, this also creates challenges in practice. Households with abundant resources often invest more to expand production and business scale, so they also face many risks. Under the impact of climate change, some households that invested large amounts of capital and focused on a fixed source of income suffer heavy losses when risks occur, which seriously affects their livelihoods and household income. A woman talked about the losses of her grapefruit garden:

That year I invested in 700 grapefruit trees per acre and they all died. The salinity-sustaining level for grapefruit trees is only from 3%-5%, but at that time the salinity level was upto 20%. The coconuts were very small though they did not die. The impact lasted for two years - (male, farmer, No. 10).

The salinity from the river also caused heavy damages to homestay businesses, as one woman described:

The historic saltwater intrusion of Ben Tre City in 2019 resulted in a situation where the city water supply was salty. We had to queue in long lines to receive fresh water. The salinity of river water was then 11‰ and that of tap water 3-4‰. The city was like bathing in sea water. The furniture in the homestay was all damaged. After that period, most of the furniture had to be replaced as it looked so worn out - (female, owner of a homestay, restaurant, and apartments for rent, No. 18).

For households that are not primarily dependent on agricultural production, in addition to farming, land is also used for other income-generating activities. These might include businesses such as shops or commercial premises or bungalows for tourists. In addition to available financial resources, households can now access micro-finance from the state bank.

From a gender perspective, the ability of men and women to access material resources such as natural assets, physical assets, and financial resources is also influenced by social conventions and personal abilities. These factors come down to who will have greater access to and control over these resources. As discussed above, the ownership, use, and inheritance of land and other assets still favours men because of enduring social beliefs. However, the ownership and use of valuable family assets, such as money and land, in the livelihood transition process often does not entirely belong to men or women but comes down to family consensus. This is also partly influenced by social conventions (for instance, that women hold the family purse strings), and the division of labour in the household determines who is the direct user of land or other assets. In addition, from a policy perspective, the current regulations on consensus about the rights to marital assets and the responsibilities of both wives and husbands when borrowing capital for business has created opportunities for equal control of large family assets.

b. Social capital and support institutions

There are many ways to understand social capital. Here, we analyse it from the perspective of networks and associations. Social capital plays an important role, facilitating households' actions and adaptation efforts in transforming their livelihoods.

Households whose main income is from non-agricultural activities have access to social networks and relationships such as personal and family relationships, communities, businesses, or associations. For business households in the non-agricultural sector, social capital can create business and employment opportunities through business relationships and social networks. The households in the same area can work together cooperation and association of households in the community in the same geographical area to develop value chains of specific products to improve their incomes or build cooperatives to work together. A woman shared about her relation with a close friend who supported her in her business:

Yes, I have high-school and college friends. Those who are happy for my success will be very helpful... Besides, I also have a Chinese friend, in Vinh Long, who used to run a coffee shop there and I came to help her. That female friend is also very good... She went to economics school and she does business in a more systematic manner. Every now and then, I come to ask for her advice - (female, owner of a homestay, restaurant, and apartments for rent, No. 18).

A male farmer told about relations to households in the areas who he co-operates in development of agri-tourism models:

The travel companies in the city support us to promote the agri-tourism model. Once they find the products valuable, they will sell them to customers... We have to associate with appropriate families and think of how to co-operate and how to invest and how to distribute profits... And if the number of customers is stable at the end of this year, we will start to develop the association model. The cooperative has been established but it is not the right time to expand - (male, farmstay, No. 19).

Meanwhile, agricultural households use relationships in the community mainly to share knowledge and experiences, and to learn from each other how to adapt to climate change through relationships, community systems, or social organisations. Farmer groups share knowledge and experience in dealing with issues such as drought, salinity, pests, clean water, agricultural techniques, etc., mainly through men. Community associations, such as the Ornamental Plant Association and the Grapefruit Association, operate semi-professionally, including members of the Farmers' Association. At a higher level, farmers often participate in Farmers' Associations – channels to provide technical guidance to people.

However, only in specialised rural farming areas can these associations play their role effectively. In urban areas, where people have easier access to information and technology, the network of businesses and small traders selling agricultural products acts as a more effective consulting channel for households.

Whatever kind of fertilizer I used, I just went to the shop where they sold it, then I found out about the fertilizer and that goat manure, I applied it to my garden by myself, and then I studied its effectiveness. I didn't even wait for them [the Farmers' Association] - (female, 63 years old, coconut farmer, retired, No. 06).

From the perspective of agricultural households, the role of local socio-political organisations is not being effectively promoted. The Women's and Farmers' Unions – the two organisations in which most interviewed families participate – have yet to fully promote their roles in supporting households to access resources during the livelihoods transition process. Most households can participate in and access the activities of these organisations. However, their activities are still very formal, mainly serving as emotional support and developing some skills. Material support is lacking due to limited and fragmented resources, so they have not had a widespread effect. In particular, the financial resources of associations are not sufficient to create sustainable livelihoods for members in financial difficulty. For households in the non-agricultural sector, the role of associations is also not greatly appreciated.

Joining the Women's Union makes no sense and costs extra money. I joined for a few years and then got away. It's useless and a waste of money. When you go to a meeting, you have to contribute several hundred thousand to a fund. Then we also have to pay for festivals and travel. We have to spend a lot of time while we have to make ends meet - (female, small business, making traditional rice wine, No. 16).

However, joining the Union is useful in this sense:

The Women's Union will only intervene if there's domestic violence or the like. There is also a free one-month cooking class and the Women's Union pays for it all - (female, small business, making traditional rice wine, No. 16).

The Farmers' Association has provided support to farmers in the form of finance and techniques. But, as salinity has destroyed agricultural products, the association has become less effective.

There is support from the Farmers' Association. Periodically, members of the association contribute tens of thousands (VND) to create a fund. If anyone needs a loan, he or she can borrow from that fund. If someone

needs technical support, they can also ask for support from the City Farmers' Association. But now all those activities are over and the Farmers' Association is no longer working. The pomelo-planting association has disintegrated though the provincial authority has given it full support - (male, farmer, No. 05).

Unlike material assets, which are often decided at the household level and have complex dependencies between male and female family members, social networks and organisations (social capital) belong to individuals, and men and women have different levels of social capital during the livelihood transition process. In our research, for agricultural households, men will participate more in groups and organisations related to agriculture because they are more responsible for farming than women. This includes relationships related to the production chain such as agricultural material and seed suppliers and traders.

For non-agricultural occupations, the supply chain and the consumption of goods is quite important, and the network is built on the work of individuals regardless of their gender. This network supports them in transforming their livelihoods, especially in business and service sectors related to the agricultural value chain.

From the perspective of social organisations such as the Farmers' Union and Women's Union, agricultural guidance activities are organised for households, regardless of gender, and involve linking associations together through activities related to agriculture. Furthermore, the expansion of Women's Union activities, although there is no specific support for livelihood transition, still helps women have easier access to information on policies and loans.

c. Human resources

Human resources play an important role in minimising negative impacts and enhancing resilience to the impacts of climate change. For interviewees, education helps equip them with knowledge and skills to understand climate change and make informed decisions or appropriate adaptation measures. It also helps to open up job opportunities and diversify family finances. Households with highly-educated spouses are often able to take better measures to protect themselves and their families and improve their livelihoods when there is an external impact. This can be seen through interviews with households operating in the non-agricultural sector.

Changing to growing mushrooms was my idea. I thought of many ideas but I hadn't done them yet. My wife is a teacher. Whenever I wanted to invest in something, I told her my ideas. My wife usually supported everything I did. As for my children, they are young, so when they know my new idea, they easily agree - (male, growing mushrooms, No. 23, FGD. 01).

High levels of education often come with broad knowledge and understanding in many different fields. This helps individuals have a more comprehensive overview of changes in the socio-economic situation and seek new business opportunities. Besides, in urban areas, many households do agricultural work alongside other jobs such as business or government work. They have a certain social position, so they have many opportunities to access information about techniques and markets, thereby also supporting them in their agricultural livelihoods.

I can handle those technical things without any help. I am the head of a branch of the Farmers' Association and have been a member of the commune authority since 1983 - (male, No. 05).

A man who owns a farmstay business shared his experiences in starting this business model:

Before that, I used to work in the field of tourism in Saigon... Then I came back here. From the beginning, I planned to do something with Western guests. At that time, in Vietnam, there was no concept of "farmstay". Few people knew our model of farmstay in which agriculture was combined with tourism. After a few years, around 2017, the farmstay model began to appear. By 2018, the model became popular. My model was much earlier. - (male, farmstay, No. 19).

Educational attainment is one of the most important factors facilitating understanding, application, and participation in activities and processes related to climate change. People with higher levels of education often have a deeper understanding of science and the impacts of climate change. Moreover, highly-educated people are able to analyse and evaluate climate change. In doing so, they can realise the extent of the problem and how climate change and different factors interact. Likewise, high levels of education often promote creative thinking and the ability to create new, more effective solutions to improve livelihoods in the face of climate change. This can be seen most clearly through in-depth interviews with households that have non-agricultural business activities and where spouses have a lot of understanding or knowledge and can come up with effective ideas.

At that time, my idea was to build a bungalow. So, I built it. But then I got stuck for two years of the epidemic. Then, I got discouraged. I didn't want to do that anymore. I realised what we did in tourism was too affected by external factors such as climate, epidemics, and people... Then I found that, in Ben Tre, there were Thai, Korean, and Japanese restaurants, but no European restaurants. There was only one restaurant selling European food, but it did not create a European space yet. So, I thought there was an opportunity and a market for me and I came up

with the idea. My restaurant is actually called Steakhouse where I sell beef dishes. Pizza is just a side dish for kids who prefer pizza - (female, owner of a homestay, restaurant, and apartments for rent, No. 18).

Health also plays an important role in household livelihoods. In most agricultural families, because of their strength, husbands often play a leading role in livelihood decisions and other tasks. Meanwhile, wives tend to be less interested in technical work so they are less proactive in learning new technology to support their husbands or come up with ideas to change their livelihoods. This is also proven through a report by the European Institute for Gender Equality which argues that although women are more likely to participate in learning than men, they cannot involve themselves in lifelong study because of their family responsibilities. Women tend to indicate somewhat lower confidence in their digital skills and use of technologies. Besides, women also tend to be less informed than men about new technologies which may contribute to their greater mistrust of them (EIGE, 2020). Particularly, in animal husbandry and farming, men play the main role in irrigation or horticulture. However, because there is no physical advantage in agricultural work, in some cases, women prefer to hire workers.

This saltwater purifier system was my husband and son's idea. I just advised them what to buy such as tanks and accessories and how to build up this system. For example, at first, they intended to set this saltwater purifier system outdoors, but I warned them that the system could be damaged by wind and rain. Afterwards, I had it built indoors - (female, coconut farmer, retired. No. 06).

I see many women who are very hard-working, men may not be able to work like them. In some families, in which there are no men, the women do all the work. For heavy work that those women don't have the strength to do, they hire workers. I think that is very effective - (female, coconut farmer, retired. No. 06).

Household size also contributes to diversifying income sources when adapting to climate change. For instance, large households are more likely to work in different jobs and have multiple income streams.

In general, the main resources for livelihood transformation in agricultural households are land, barns, trees, water, and capital. In deciding to change livelihoods, a consideration of resources is fundamental. Investing heavily in technology to cope with drought and salinity, and to what extent crops and livestock should be changed, is still an economic consideration for families. Households that depend on agriculture will need significant investment to grow high-value produce such as shrimp, pigs, and fruit (grapefruit and durian). As for those whose livelihoods do not depend on farming and

who have little agricultural land, often in urban areas, they seem to invest in things that require little care and have lower market value (coconuts, bananas, or grass).

From a gender perspective, the ownership and use of valuable assets for livelihood transformation is influenced by societal and family conventions and must be reached by agreement among members, including women. Women also have a decisive voice depending on their position in the family. Meanwhile, among the resources, social capital will help people strengthen their decision to transform their livelihoods. For instance, it can help them to access information on crop varieties, fertilizers, and hired labour or to develop a new type of business or service.

6. DISCUSSION

Gender roles in livelihood transformation towards climate change adaptation in the context of medium-sized cities

A fairly common feature of medium-sized urban areas is that agricultural and non-agricultural livelihoods are intertwined and land, including agricultural land, is high-value real estate. Therefore, livelihoods in these areas are diverse and people do not depend entirely on agriculture. When climate change impacts urban areas, such as Ben Tre City, agricultural livelihoods are also affected. However, people have a more flexible transition from farming to non-agricultural jobs or can do both non-farm and agricultural work at the same time. As such, when deciding whether or not to transform their livelihoods, household results are partly due to the impact of climate change, and partly reflect the trends of the market and state policies (agricultural area planning).

From an infrastructure and technical perspective, in urban areas, infrastructure is better funded. Dykes and sluice systems prevent saltwater intrusion, there is access to clean water, and good water filtration techniques. Therefore, people are better prepared for climate change adaptation in urban than rural areas.

From a gender perspective, gender roles are regulated by social norms and cultural imprints in each country and region. They manifest themselves in all areas of families and communities, including livelihood transformation. In medium-sized urban areas in Vietnam, such as our typical research area of Ben Tre City, there is a mixture of traditional and modern cultures. Women and men continue to maintain their traditional roles, especially in agricultural livelihoods, despite changes such as women's increased education and unrestricted access to information. At the same time, women also have rights to common properties and have more say in family decisions.

Looking through a gender lens, the process of converting a household's agricultural livelihood reflects the state of family harmony regarding their financial situation. Converting agricultural livelihoods requires consensus between men and women in deciding whether to invest (money and labour) in converting crops and livestock and continuing to work in agriculture. A 2013 study found that women are starting to have more say. In other words, it is becoming more popular for husbands and wives to discuss and make decisions together (Vu Manh Loi, 2013). Our findings show that men will make the final decision in the process of decision-making, partly because they are in charge of the main and heavier work in farming, the rest is down to each family's culture, which is also

somewhat influenced by national and regional culture. For households working in non-agricultural occupations, there is no clear representation of gender roles in the process of transforming livelihoods to adapt to climate change. In this case, men and women have a certain independence in terms of their careers and income sources, that is different from the way family members share responsibilities in farming.

Gender in accessing and controlling resources and livelihood opportunities at the community level.

Power and gender roles are not just expressed at the household level. They are also active in the community. Social capital plays a role in livelihood transformation to adapt to climate change through connecting with professional, technical, and support service networks for agriculture. However, in urban areas, farmers can access information and techniques from a variety of sources. As agriculture gradually becomes less important in the household economy, so do state organisations such as the Women's Union and Farmers' Union who combine activities related to livelihood transformation and call for the participation of both genders. Therefore, the ability of men and women to participate in state organisations and access information is quite similar.

The livelihood transition is reflected in household decisions. However, it is also influenced by market factors and state planning and policies.

People change crops, livestock, and services partly due to market demand. When grapefruits and oranges sell at good prices, many people switch to growing them. However, when prices fall, people do not want to continue investing, along with the strong influence of saltwater intrusion and harsh weather. Similarly, people no longer want to continue investing in garden restoration when incomes are no longer high and agricultural input prices rise. The orientation of the province's agricultural and service areas also partly affects the type of work that people choose. Like services, agriculture-based production is also one of the province's orientations. So, homestays and farmstays have been developed in some areas in recent years, although they are also directly affected by climate change.

The role of the state: Farmers and small traders are very sensitive to the market and to climate change. Their experience and knowledge are important livelihood assets, as they have many years of experience in storing rainwater and improving land contaminated with alum. Livelihood transformation stemming from people's experiences is sustainable. However, people do not have the ability to predict trends or the consequences of

climate/weather change, new technologies, or new varieties. Therefore, a combination of state policies and planning (Espagne E. (ed.), 2021) is needed to increase livelihood capital at the community and household levels.

Results of livelihood transformation adapting to climate change and gender roles: Although men and women assess the impacts of climate change on themselves and their role in the transition from their own perspectives, the outcomes are aimed at maintaining the common livelihoods of households. Whether the results of livelihood transformation are sustainable or not needs to be reassessed over time. Table 5, below, shows a summary of the impacts of climate change, the role of each gender when deciding to transform their livelihoods, and the resources they have. The results of the transition largely stem from the economic characteristics of the household and the resources it has at its disposal. For example, agricultural households have large land holdings and their livelihoods depend on cultivating the land. They are the ones with the greatest efforts in converting agricultural livelihoods.

Meanwhile, households with little land resources can have other non-agricultural jobs. Besides, for non-agricultural households, the transformation of livelihoods to adapt to climate change is more favourable if they themselves have abundant financial resources, knowledge, and good business networks. In our study, the results of the transition may not represent the strengths and weaknesses of men and women in the livelihood transition process, but our analysis covers resource factors and the interaction of the roles of men and women in the household in the context of needing to transform livelihoods to adapt to climate change (table 5).

Table 5. Comprehensive analysis

Livelihoods transition	Roles and tasks based on which men and women have a decisive voice		Resources	Outcomes of transition
	MEN	WOMEN		
A. Agricultural Transition				
Group 1: Farmers whose income mainly comes from farms while doing other temporary jobs				
<ul style="list-style-type: none"> ▪ Often change species of trees due to weather or economic changes. ▪ Keep only new coconut trees after intercropping fruit trees with poultry. ▪ Upgrade irrigation systems (auto-watering, embankments, sluices, wells, and water filtration). ▪ Update information on farming techniques from local associations. 	<ul style="list-style-type: none"> ▪ Intercrop and keep testing new species of trees and flowers. ▪ Build concrete containers to store rainwater, install sensor-based watering, prepare soil for the garden, and other technical issues. ▪ Sell fruit directly to traders in certain locations. 	<ul style="list-style-type: none"> ▪ Sell fruits left over from the harvest at local markets, or run a small business. ▪ Help with horticulture, harvesting, and husbandry. ▪ Collect money after the harvest and balance the family finances. ▪ Take out a joint loan at the bank. 	<ul style="list-style-type: none"> ▪ Land (men are more likely to own and inherit land in their name). ▪ Money is saved and used together in the family. ▪ Men usually have the strength to do heavy work, meanwhile women can hire workers to do this for them. ▪ Access to information is similar between men and women. 	<ul style="list-style-type: none"> ▪ Maintained agricultural livelihoods adapted to the impacts of climate change.
<ul style="list-style-type: none"> ▪ Sell parents' land after moving many trees and/or intercropping with poultry. ▪ Shift to non-agricultural jobs. 	<ul style="list-style-type: none"> ▪ Find non-agricultural jobs. 	<ul style="list-style-type: none"> ▪ Find non-agricultural jobs. 	<ul style="list-style-type: none"> ▪ The farm was sold. ▪ There is some independence in income between male and female family members. 	<ul style="list-style-type: none"> ▪ Completely switched to non-agricultural occupations.

Livelihoods transition	Roles and tasks based on which men and women have a decisive voice		Resources	Outcomes of transition
	MEN	WOMEN		
Group 2: Farmers' income is independent of agricultural production				
<ul style="list-style-type: none"> Parallel farming and non-agriculture jobs. Keep farms as gardens for the next generation. 	<ul style="list-style-type: none"> Men and women work together in their garden. Men and women do all farm activities such as weeding, watering, and packing fruits, and some small poultry-based activities. Sometimes women need to hire labourers to help in harvesting and transporting agricultural produce. Men still help with technological tasks, such as setting up irrigation systems, practising safe fertilization, and testing new species. Both men and women usually have other non-agricultural jobs and income 	<ul style="list-style-type: none"> Land is kept for the next generation and for gardening after retirement. Men and women divide tasks in horticulture and hire workers to do some gardening for them. 	<ul style="list-style-type: none"> Land is kept as an asset and an additional source of income from the garden. 	
B. Non-Agricultural Transition				
Group 1: Labour related to farming agricultural production				
<ul style="list-style-type: none"> Related to farming and agricultural production chain (purchasing and processing, agriculture-based services) change due to unstable agricultural products and farms being degraded due to extreme changes in weather and water sources. 	<ul style="list-style-type: none"> Change businesses more quickly according to market needs. There is more or less support or no support from female members in the family that influence men's decisions in livelihood transformation 	<ul style="list-style-type: none"> Change the businesses according to market needs. Pay more attention to the environment and ecosystem. There is more or less support or no support from male members in the family that influence women's decisions in livelihood transformation 	<ul style="list-style-type: none"> Men's social networks and market information are somewhat wider than women's. 	<ul style="list-style-type: none"> New types of business are suitable to the changing context of agricultural products due to climate change. Investing more leads to increased costs.
Group 2: Labour independent of agricultural production				
<ul style="list-style-type: none"> Other non-agricultural industries (homestays/ restaurants/wine-making/small traders, rental housing business, etc.) increase spending on equipment and energy because of drought and salty water. 	<ul style="list-style-type: none"> Change the way of doing business more quickly according to market needs. There is more or less support or no support from female members in the family that influence men's decisions in livelihood transformation 	<ul style="list-style-type: none"> Change businesses according to market needs. Pay more attention to the environment and ecosystem. There is more or less support or no support from male members in the family that influence women's decisions in livelihood transformation 	<ul style="list-style-type: none"> Men's social networks and market information are somewhat wider than women's. 	<ul style="list-style-type: none"> New types of business are suitable to the changing context of agricultural products due to climate change. Investing more leads to increased costs.

Source: Authors

7. CONCLUSION AND POLICY IMPLICATIONS

The transformation of livelihoods to adapt to climate change in any form is based on a consideration of household resources and in this process men and women express their roles differently depending on the type of work they do and their dependence on it.

Climate change has had a negative impact on the lives of people in Ben Tre, whether farmers or businesspeople. Gender characteristics have been expressed through this livelihood transformation. There are not many differences between men and women in terms of the impacts of climate change. However, gender roles in decision-making and access to resources in livelihoods transformations to adapt to climate change are expressed due to cultural norms in family life and production as well as community activities.

One striking difference in how men and women behave when converting their livelihoods to adapt to climate change is their concern during the transition process. In general, farmers – especially in urban areas and small businesses – are very responsive to the market and quickly grasp changes in demand. When this happens, women prioritise converting their livelihoods to meet market needs and to have higher incomes from agricultural or business activities. Meanwhile, men are more interested in the technical aspects and maintaining production on the land. Currently, policies on livelihood transformation and climate change are implemented according to household size and do not discriminate by gender. However, bearing in mind these differences, the government can pay attention to priorities by gender to make policy implementation on livelihood transformation and climate change faster and more effective.

State policies support gender equality through the activities of the Women's Union. Indeed, women participate more in social activities and, therefore, have more voice in family life. In education, statistics show that the school attendance rate of girls is roughly equal to that of boys. Likewise, the rate of women participating in the labour market is similar to that of men. However, in current social norms, women are still not considered equal to men in terms of property rights or land inheritance. So, when converting agricultural livelihoods, their voice will be weaker and they will face more difficulties. Gradually changing these social norms is an ongoing challenge for the Women's Union.

In towns and cities, livelihoods are also affected by urbanisation, especially those that rely on land. Many families want to continue their agricultural activities, while others only do so in order to retain their land as an asset. This creates differences in their desires and

technical investments in converting livelihoods to adapt to climate change. Therefore, in agricultural or livelihood transformation support programmes, it is crucial that technical solutions align with different natural conditions (weather, temperature, water sources, soil, etc.); ecological characteristics and crops suitable for each area; and the negative impacts of improper crop conversion or husbandry practices on the ecosystem. This will ensure that people can prepare and make appropriate choices for their households.

In general, norms still play an important role in the assignment of responsibilities between men and women in the family, community, and society. This can be evident in rural or newly-urbanised communities, preferably where women's educational level, social positions, and earning capacity are limited. However, on a brighter note, research has shown that women's level of education has increased while their social and economic positions have risen. These factors have played an important role in creating more voice and decision-making power for women in the family and in society. As a result, qualified and skilled women participate in more social activities and decision-making processes and can even be the final decision makers in the family, even in livelihood transformation due to climate change.

In the context of climate change associated with its serious impacts, such as saltwater intrusion, people are forced to make an important livelihood transformation. This requires greater participation of women, or in other words, their roles and power in making decisions on livelihood transformation become especially important. This has been demonstrated through this study as well as in previous studies, particularly when confronting environmental events. Thus, we can conclude that education is necessary to enhance women's role and power in the family and society, as it helps them gain more knowledge and skills, achieve a high social position, and become a high-income earner in the family. At that time, their voice and role are very important in the family and contribute to the process of livelihood transformation in the context of climate change. In addition, the State's responsibility to enhance the role of women in the family and society - through policies to encourage, support, and create opportunities for them to access the market and participate in political and social activities - is very important.

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