



## Factors Affecting the Agricultural Restructuration: A Case of Cham Community in Chau Phu District, An Giang Province, Vietnam

Van Huynh Thanh Pham<sup>ab\*</sup>, Cam Thi Hong Lam<sup>c</sup>, and Nghia Ngoc Nguyen<sup>d</sup>

<sup>a</sup> Faculty of Agriculture and Natural Resources, An Giang University, Long Xuyen City, An Giang, 90000, Vietnam

<sup>b</sup> Vietnam National University, Ho Chi Minh City, Vietnam

<sup>c</sup> Chau Phu Culture and Sports Center, Vinh Phuc hamlet, Cai Dau town, Chau Phu district, An Giang, 90000, Vietnam

<sup>d</sup> People's Committee of Khanh Hoa Commune, Khanh Phat hamlet, Khanh Hoa commune, Chau Phu district, An Giang, 90000, Vietnam

### ARTICLE INFORMATION

#### Article history:

Received: August 2020

Revised: December 2020

Available online: February 2021

#### Keywords:

Livelihoods, agricultural restructuration, Cham community, fruit development, the Mekong Delta

#### Correspondence:

Phone: +84 908164171

E-mail: [phtvan@agu.edu.vn](mailto:phtvan@agu.edu.vn)

### A B S T R A C T

The national policy of agricultural restructuring plays a vital role in adapting to climate change's effects and economic development in the Mekong Delta of Vietnam. Unproductive areas have been converted into other crops with higher efficiency. Drawn by the sustainable livelihoods approach, this article explores the current situation and factors challenging the Cham community in implementing the agricultural restructuring. The mixed method included in-depth interviews, focus group discussions, and a questionnaire survey. The results showed that the Xuong Com Vang *longan* (*Dimocarpus longan*) variety has occurred in Khanh Hoa commune for a long time as an indigenous fruit tree of this area. In terms of the farming system, the polyculture system combining fruit trees and upland crops brought more income sources than the monoculture system. The asset abilities of the Cham farmers are various from one to the others. Soil and weather conditions are appropriate for planting. But farm size is small, which is one of the difficulties of developing fruit areas. Human and social assets were good since farmers had enough knowledge to manage the gardens, and a close connection existed among the Cham community. It was not a case of the financial status since a lot of money needs to be invested in the starting year. Therefore, the private loan still exists as one of the farmer's choices. For better future development, land management and financial resource should be considered for better agricultural restructuring aims. To increase farmers' incomes, create production chains helping enterprises and farmers work more efficiently for the better life of Cham gardeners in An Giang province in Vietnam.

@2020

### INTRODUCTION

The Vietnamese Mekong Delta (VMD) locates at the end of the Mekong River. It borders Cambodia in the North, the Pacific Ocean in the East, the Gulf of Thailand in the West, and Ho Chi Minh City in the North East. The Delta has a

tropical monsoon climate and covers 4 million hectares. The region is a vital agricultural zone contributing to 18% of the country's GDP (MONRE-Ministry of Environment and Natural Resource), 2017).

The Delta is also well-known for ethnic diversity, with four main groups of people named Kinh, Hoa, Cham, and Khmer. The Cham population in Vietnam is 178,948 people (in 2019), ranking 14<sup>th</sup> in population crowd among the ethnic communities of Vietnam (General Statistics Office, 2019). An Giang is known as the only province in the VMD where Cham people live (Rang, 2016). The Cham community in An Giang province has a close relationship with the Muslim communities in Southeast Asian countries. They have their own language and writing. The requirement to learn Arabic words and recite the Qur'an to pray together with a pilgrimage to visit Mecca Holy Land, is one of the five core groups of Muslims. That has given the Cham people in An Giang province a tendency to expand relations with Muslim communities outside the country (People Committee of An Giang, 2018).

An Giang province, located in the South-Western part of the VMD, covers an area of 3,536.7 km<sup>2</sup>, equating to 1.03% of the national area. It borders Dong Thap province to the East, with Kandal and Takeo provinces of Cambodia to the North and Northwest, Kien Giang province to the Southwest, and Can Tho province to the South (CNEE-Center for Natural Resources - Environment Monitoring and Technology Center in An Giang, 2019). The province has been affected by a number of climate change effects such as temperature rise, floods, droughts, riverbank erosion, saltwater intrusion, and thunderstorms (Estellès, Jensen, Sánchez, & Vechiu, 2012; People Committee of An Giang, 2017, Anh, 2018). The internal development of the region and the construction of upstream hydropower dams have also had an impact on the provincial agricultural development (People Committee of An Giang Province, 2016; Tuan, 2017).

In response, local farmers have changed their agricultural practices and techniques to adapt to the negative effects of climate change (Tri et al., 2011; Quang et al., 2017; Van et al., 2017). An Giang has restructured its crop structure to link value chains, applying safe production processes and advanced technologies to adapt to the actual situation and meet economic development demand. In the Cham community in Khanh Hoa commune, Chau Phu district, some farmers have difficulties with living conditions<sup>1</sup>. Crop structure has been shifted from ineffective rice or mixed garden<sup>2</sup> to Xuong Com Vang *longan* farms by applying high technology to promote the efficiency of local resources and create sustainable livelihoods. There is little understanding of what extend the process has been

<sup>1</sup> Compared to other communes in Chau Phu district, the ratio of poor households of the Cham people in Khanh Hoa commune is still high (5.36% poor households (75 households) (People Committee of Khanh Hoa Commune, 2018a).

implemented, and the advantages and limitations challenging to Cham people. The paper aims to explore the present circumstance of cultivating *longan*, and the factors affecting the agricultural restructuring process of the Cham community in An Giang province.

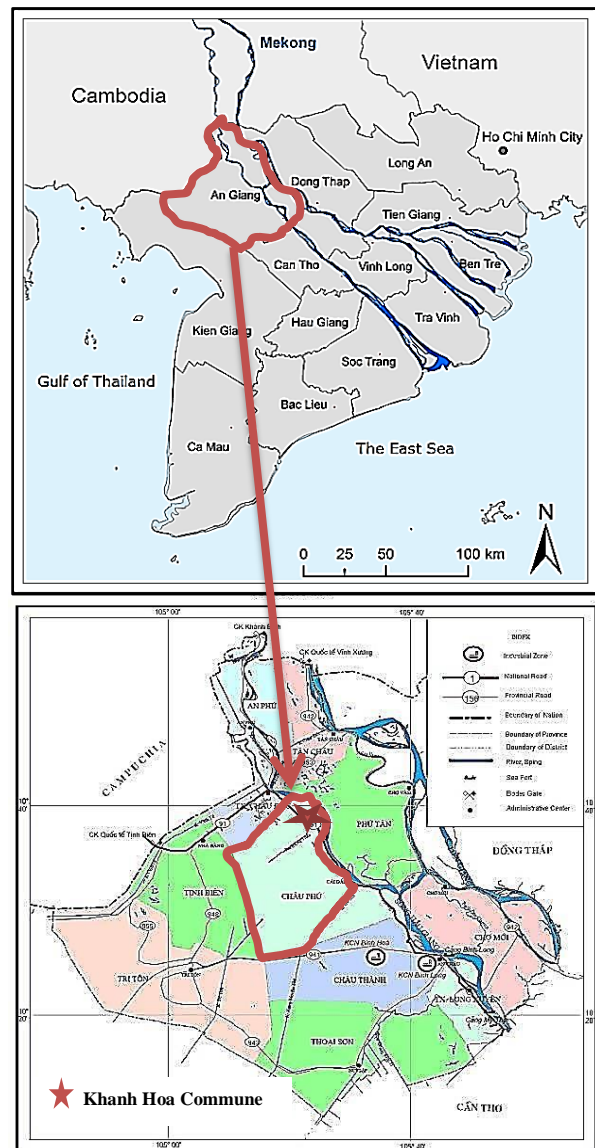


Figure 1. Illustrating Location of Research Site - An Giang province map (Above); Chau Phu District and Khanh Hoa Commune map (Below)

(Source: the maps available from <http://ussavage.homestead.com/MekongDelta.html> and <http://angiang.ban-do.net/2018/01/huyen-an-phu.html>, the first author drawn indication)

<sup>2</sup> A mixed garden is a garden that grows many varieties of fruit trees to improve nutrition in the daily diet of the family.

## METHOD

### Research site

Khanh Hoa commune was selected as a research site since it is an area where Cham people live crowdedly in Chau Phu district (Figure 1). On the word of the Representative Committee of the Islamic Community of An Giang province, the Cham people in An Giang have more than 16,000 people living in 11 villages located in some districts of Chau Phu, Tan Chau, An Phu, Chau Thanh, and Long Xuyen and Chau Doc Cities (Rang, 2016).

Chau Phu is a rural district lying along the banks of the Hau River, with 13 communes and towns. The district has a natural area of 45,693 km<sup>2</sup>, and the agricultural production land is 37,948 hectares (ha), used land 2,913 ha, and homestead land 1,406 hectares (Statistic of An Giang, 2019). The natural conditions of the district are favorable for agricultural activities (People Committee of Chau Phu District, 2018a). In Chau Phu district, Cham people live in Khanh Hoa commune (Khanh My hamlet) with 1,406 people in 317 households (People Committee of Khanh Hoa Commune, 2018a).

Khanh Hoa is an island commune located along the Hau River. The natural area is 2,215 ha. The total population is 25,464 people, with 6,054 households. Khanh Hoa commune consists of 9 hamlets, in which Khanh My hamlet concentrates the Cham people. Khanh Hoa has the strength of agricultural production. The annual cultivated area is 3,774 hectares, of which 701 hectares of rice, 2,693 hectares of upland crops, and 380 hectares of fruit trees. The production value of agricultural land reaches 169 million VND<sup>3</sup> per ha (People Committee of Khanh Hoa Commune, 2018b).

### Research method

The Sustainable livelihood framework from Development For International Development (DFID) was applied to the research to understand the status and factors affecting the agricultural restructuring of the Cham community (Figure 2).

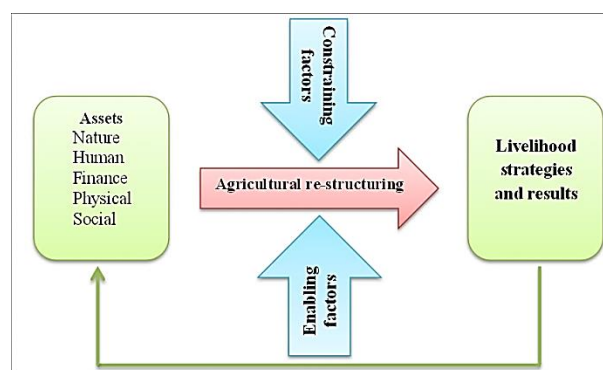


Figure 2. The Sustainable Livelihood Framework to study the agricultural restructuring in the Cham community

(Source: Adopted from DFID, 2001)

This approach is based on thinking about how local people act within the political environment to formulate development activities. The framework consists of the four components named livelihood assets, factors (*enabling and constraining factors*), and the livelihood results used as the research guideline. The content of the asset in the study is described in Table 1.

Table 1. Explanation of Assets in the Study

	Type of asset	Content
1	Natural asset	Soil quality, farm size, water resource, and plant variety
2	Human asset	Employees (quality and quantity), age, experience
3	Social asset	Participation in mass organizations, the relationship of members in the community
4	Physical asset	Irrigation system, transportation.
5	Financial asset	Income; loan; investment

The research was conducted from October 2019 to February 2020 using a mixed method of qualitative and quantitative data collection. The secondary statistical data and yearly reports collected together with studies of Cham people in the VMD. The primary data was collected through KIP interview (five meetings), focused group discussion (one meeting), direct observation and questionnaire survey of 30 respondents.

The KIP interview with Khanh Hoa commune officers and local farmers aims to understand the current situation of shifting in the agricultural sector and appropriate livelihood solutions suitable for the Cham community. While the purpose of the focused group discussion is to

<sup>3</sup> (1 USD = 23,165.00 VND, currency exchange rate date 22/03/2021)

identify the advantages, difficulties facing local farmers, and future solutions for Cham farmers. During the fieldwork activities, researchers have spent time to conduct a direct observation to take photos of relevant activities, understand agricultural change, and listen to the farmers' thoughts and aspirations. The questionnaire survey is then conducted to gather information on current livelihoods circumstances, livelihood strategies, and enabling and constraining factors emerging in the shifting process. The questionnaire was tested before it was widely used. The total number of interviewed households was 30 farmers involved in *longan* cultivation.

## RESULTS AND DISCUSSION

### *Agricultural Restructuration: Gaining more from less*

Due to the negative climate change impact and the need for economic development, there was an urgent need to promote the restructuring of agriculture for strong and sustainable development in the VMD. The agricultural restructuring was part of the overall restructuring of the Vietnamese national economy (PSAVA, 2018). The plan approved the agricultural restructuring project<sup>4</sup> towards raising added values and sustainable development for the whole country (MARD, 2013). It aims to increase farmers' incomes while ensuring a market for the new crops and their profitability as well as public consensus (Anh, 2018, Vietnam News, 2018).

After five years of implementation (2013-2015), farmers in the VMD had switched 77,885 hectares<sup>5</sup> of low-yield rice area to growing other crops with high yields. Focus on the production of hi-tech vegetables and fruits in advantaged areas and encourage household gardens. Therefore, fruit crops' contribution to growth in crop production increased from 12% in 2012 to nearly 32% in 2017 (PSAVA, 2018). It has achieved positive results because farmers earned a higher income of VND 17,718 billion (\$764.7 million), including profits of VND 10,672 billion (Thanh, 2019). Fruits bring a turnover of over VND 607 million per hectare, while rice brings VND 386 million per hectare (Thanh, 2019). In addition, by switching to growing another crop in ineffective rice fields, farmers have saved irrigation water and the cost of pumping, equipment, and labor (Thanh, 2019).

An Giang province plays an important role in socio-economic development in the VMD, particularly in the agricultural sector for rice, aquaculture, and fruit (People Committee of An Giang, 2017). The Decision No. 1884/QD-UBND dated October 28, 2014, was approved by the

People Committee of An Giang planning for the development of the high-tech fruit areas in An Giang province. It aims to restructure the province's fruit production towards gaining more from less "Tăng giá trị, Giảm đầu vào" to promote fruit products of the province to the domestic and global distribution market. As a result, the fruit's area increased rapidly from 2015 (9,209 hectares) to 16,307 in 2019 in An Giang province (Statistic of An Giang, 2019). In Chau Phu district, there were 897.45 hectares of fruit trees (Chau Phu District People's Committee, 2018b).

In the case of *longan* production, Figure 3 shows that the areas in An Giang grew rapidly in some districts (Tinh Bien, Cho Moi) in the eight years from 2010 to 2018. Chau Phu was of great significance among other districts, especially in 2018.

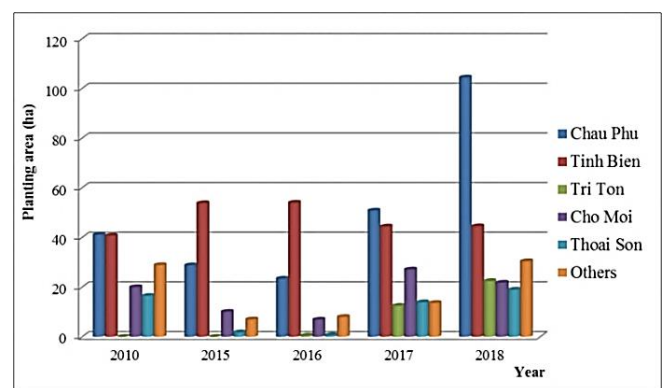


Figure 3. The area of *longan* raised rapidly in some districts in An Giang Province from 2010 to 2018

Source: (Statistic of An Giang, 2019)

Some advanced technologies have been introduced using sustainable agricultural models to adapt to climate change effects to produce safe agricultural products meeting VIETGAP<sup>6</sup> standards (Anh, 2018). This had been implemented in Khanh Hoa *longan* area, Chau Phu district through Decision No.77/QD-UBND dated January 14, 2019, approved by the People Committee of Chau Phu district. Its goal was to build modern *longan* cultivation to produce safe products for domestic and oversea markets.

### **Shifting to Xuong Com Vang *longan* farming: monoculture vs. polyculture**

Khanh Hoa commune has the second-largest fruit-growing area in Chau Phu district. Xuong com vang *longan* has been grown in Khanh Hoa commune for many years. It is very popular since the fruit has a thin shell, thick and sweet pulp.

<sup>4</sup> The project was approved by the Prime Minister in Decision No. 899/QD-TTg dated June 10 2013.

<sup>5</sup> Around 64,523 hectares are for growing vegetables, approximately 12,593 hectares for growing orchard and 768 hectares for breeding aquatic species (Thanh, 2019).

<sup>6</sup> VIETGAP is the abbreviation of the Vietnamese Good Agricultural Practices, which means that good agricultural practices. It is the application to produce clean and safe products (mainly for fresh fruit and vegetable).

*Longan* was bought and sold by traders inside and outside An Giang province and also exported to Cambodia (Khanh Hoa committee, 2018b) (Figure 4).



Figure 4. Harvesting Xuong Com Vang *longan* (Above) and Selling *longan* along the 91 Highway with a board showing the product's origin (Below).

There are two types of *longan* farming systems in Khanh Hoa commune: monocropping<sup>7</sup> and intercropping (Table 2). Table 2 shows that the area of *longan* in Khanh Hoa commune raised from 29 hectares in 2015 to 62.43 hectares in 2018. Both monocropping and intercropping systems of *longan* have been developed well since 2016. From 2015 to 2018, the intercropping farms increased from 8 hectares to 22.03 hectares, and the monocropping system increased from 5 to 18 hectares. Khanh Hoa commune has converted ineffective rice areas to fruit trees to the target that the cultivated area of *longan* in Khanh Hoa will arrive at 200 hectares.

<sup>7</sup> Monocropping is the agricultural practice of growing a single crop year after year on the same land (also known as monoculture). Intercropping is the cultivation of two or more crops simultaneously on the same field (also known as polyculture).

Table 2. Types of *Longan* Farming Systems in Khanh Hoa Commune from 2010 to 2018

Types of farming systems	2010-2015		2016 - 2018	
	House hold	Area (ha)	House hold	Area (ha)
Monocropping	2	5	11	18
Intercropping ( <i>longan</i> -vegetable)	34	8	41	22,03
Mixed garden ( <i>longan</i> and other trees)	88	16	76	22,40
Total	124	29	128	62,43

(Source: Khanh Hoa commune Committee, 2018c)

In the Cham village, the *longan* monocropping system was an older system than the polyculture one (Figure 5.).



Figure 5. Two Types of *Longan* Farming Systems: Monocropping System (Above) and Intercropping (Below)

Cham farmers with small pieces of cultivated land chose the monoculture by taking advantage of blank land around the housing area (Box 1).

**Box 1: Longan brought more income to local farmers**

Mr. SLM., 40 years old, said that his brother lent him 1000 m<sup>2</sup> of a mixed garden a long time ago. His family did not have any plan to use this land. Two years ago, the commune official came to guide him to improve the garden. The official has suggested replacing ineffective trees in his land with *longan* trees. The official has also informed him how to borrow money from the bank to buy the seedlings. In 2019, turnover was about 17 million VND, and profit was about 11 million VND. He announced that he planned to rent more land to grow *longan* so that we could have more money to take care of his kids.

(In-depth interview, 2019).

Some households that started to grow *longan* after 2015 have either chosen monoculture (Figure 5, above) or polyculture (Figure 5, below). By adopting the polyculture system, they had taken advantage of the empty land between the *longan* roots to grow more vegetables such as herbs and lettuce to increase their income. This system is a suitable farming method because it helps growers earn more money while reducing investment costs (for pest management). In deep, the integrated farming to combine *longan* and vegetables is a sustainable agricultural practice because it enriches the soil and limits pests and disease damage. Polyculture can prevent a situation of "Mất trắng-All loss." If one fails (*low yield or low market price*), the others help growers maintain the households' income.

**Factors affecting agricultural restructuring**

In the Cham community, shifting from ineffective rice areas or mixed garden to *longan* farming have been affected by the livelihood asset sources (see Annex 1).

**Natural asset**

It is favorable since Khanh Hoa Commune localizes in a tropical monsoon region. Locating along the banks of the Hau River, soil, weather, and water resources in Khanh Hoa commune are very convenient for Xuong Com Vang *longan* variety. However, the farm size per household is small, average 0.33 ha/household<sup>8</sup>, negatively affecting the expansion of the *longan* garden.

Table 3 shows that 96% of households growing *longan* in Khanh Hoa commune own less than 1 hectare of land. The case of Khanh Hoa commune conforms with the report of

<sup>8</sup> In Khanh My hamlet commune, there are 115 households with an area is about 38.8 ha

Work Bank (2016) announced that Vietnam household has only 0.34 hectares of land per member of its agriculturally active population, which is about half (0.6 to 0.8 times) of farming households in Cambodia, Myanmar, or the Philippines. The agrarian structure in Vietnam is most like in Indonesia. In Indonesia, there are about 30 percent of farm households have less than 0.2 hectares, 26 percent have between 0.2 and 0.5 hectares, 18 percent between 0.5 and 1 hectares, 15 percent between 1 and 2 hectares and 12 percent more than 2 hectares (Work Bank, 2016).

Table 3. *Longan* Farm's size Khanh My hamlet, Khanh Hoa commune, Chau Phu district

Land ownership	<1 ha		1-2 ha		>3 ha	
	HH*	Area	HH	Area	HH	Area
Owning land	69	10.5	6	8.5	3	9.8
Hiring land	35	8	2	2	0	0
Total	104	18.5	8	10.5	3	9.8

(\*): HH: Household

(Source: Khanh Hoa committee, 2018c)

**Human asset**

Farmers participating in *longan* farming are relatively young (31-40 years old). The time of growing *longan* varies from 4 to 10 years (average six years). There is about 2.59 labour per household. The number of male workers accounts for a higher rate than females (66%; 44%). Human asset is good enough for *longan* farming. Khanh Hoa commune has focused on training Cham farmers to develop labor quality. Training courses provide knowledge, experience, and technical skills in *longan* cultivation (Box 2).

**Box 2. Leaning Techniques from the Agricultural Extension Services**

Mr MHM expressed that he has 2000 m<sup>2</sup> of monoculture *longan* farming. After attending the training course provided by the agricultural extension service at the district level, the old system had been replaced by polyculture farming (mixing *longan* and vegetables). He planted leafy vegetables such as water spinach, lettuce in the bank between two *longan* hills. *Longan* grew well due to the stable soil pH. It got fewer diseases and pests. His family earned daily income from these vegetables while waiting for the *longan* harvest time.

(In-depth interview, 2019).

### Financial asset

The investment in the first year was about 60 million VND per ha. It is a significant source of money. Only 30% of farmers could manage to pay, while the other 70% needed to borrow from the bank or other sources (*relative people or private business*). In general, farmers have difficulty in economic conditions to invest in *longan* farms.

### Social asset

The Cham people have very high community characteristics. Mutual help is a popular way in the daily life of Cham farmers. Farmers receive help from friends and neighbors, such as lending land to grow *longan* without paying interest and exchanging experience and labor for harvest. Joining mass organizations is a factor that brings many benefits for Cham farmers (*training in growing longan, doing business, getting credit from the bank*). The main unions are Farmer's Union, Women's Union, Veteran's Association, and Youth Union. - Physical asset: The irrigation system (irrigation and drainage, water supply and storage) are appropriate for cultivation, and traffic status within the community is also good.

### CONCLUSIONS

The sustainable livelihood framework works effectively in the analysis of the livelihoods of Cham farmers in the process of agricultural restructuring. The restructuring of agriculture for strong and sustainable development in the Mekong Delta has been created urgently. It has achieved positive results. In the case of *longan* farming, both monoculture and polyculture have been adopted. However, the intercropping system shows its benefits in terms of creating more income sources for local farmers and ecological advantages. The natural asset has many favorable conditions in terms of soil, climate, and water sources, but the lack of cultivation area is an obstacle that requires solutions to expand the *longan* growing area. The human asset has the advantage of quantity and quality. The financial asset is a large difficulty for the Cham community. Creating conditions for farmers to access loans for farming activities is necessary. In the future, it is better to establish a chain of links in the supply and sale of products between growers, cooperative groups, and *longan* consumers, ensuring output for *longan* products and creating confidence for Cham farmers. Land management also is taken into account to build larger farms. On the farmers' side, they should proactively and fully participate in training courses on planting techniques to achieve a safe and high standard of agricultural production.

### ACKNOWLEDGMENT

We would like to express our sincerely thanks to Cham farmers and the officers in Khanh Hoa commune for their enthusiastic support to complete this study.

### REFERENCES

- Anh.P. (2018). *Agricultural restructuring in response to climate change*. VOV5 – The Voice of Vietnam. Available from <https://vovworld.vn/en-US/economy/agricultural-restructuring-in-response-to-climate-change-608083.vov>.(Access 10/03/2021).
- CNEE- Center for Natural Resources - Environment Monitoring and Technology in An Giang. (2019). *Report on results of environmental monitoring in An Giang province - November 2019*. Natural Resource and Environment Department in An Giang.
- DFID (Development for Livelihood Development). (2001). *Sustainable Livelihood Guidance Sheets*.2001. London, UK.
- Estellès, P., Jensen, H., Sánchez, L., & Vechiu, G. (2012). *Sustainable development in the Mekong Delta*. University of Aarhus, Denmark: Center for Environmental Studies.
- General Statistics Office. (2019). *Completed results of the 2019 Vietnam population and housing census*. Statistics Publishing House. Ha Noi. 2020.
- MARD. (2013). The urgent need to promote the restructuring of agriculture for strong and sustainable development in the Mekong Delta. Available from <https://www.mard.gov.vn/en/Pages/mekong-delta-urged-to-restructure-agricultural-sector-963.aspx> . Access 20/03/2021.
- MONRE (Ministry of Environment and Natural Resource). (2017). *Plan for land use to achieve economic and social sustainable development in the Mekong Delta*. Paper presented at the Conference of Sustainable and Climate Resilience Development of the Mekong Delta of Vietnam. Can Tho, September 26-27.
- People Committee of An Giang Province. (2016). *Decision on Promulgating the five-year socio-economic development plan 2016-2020 in An Giang province*. No. 228 / QD-UBND, January 29, 2016.
- People Committee of An Giang Province. (2017). *Speeches - Views on development orientation of the upper provinces of the Mekong Delta in the context of climate change*. Paper presented at the Transforming Models for Sustainable Development

- of the Mekong Delta in Adaptation to Climate Change, Can Tho, September 26-27, 2017.
- People Committee of An Giang Province. (2018). *Report on the state management of ethnic groups and religions in An Giang province in 2018*.
- People Committee of Chau Phu District. (2018a). *Chau Phu district socio-economic report 2018 and strategy for 2019*. (No. 87/ QD-UBND Chau Phu).
- People Committee of Chau Phu District. (2018b). *Report on the results of implementing the agricultural development project with high technology application in Chau Phu district in 2018*. (No. 101/ QD-UBND Chau Phu).
- People Committee of Khanh Hoa Commune. (2018a). *State management report on religious ethnic groups in Khanh Hoa commune in 2018*. (No. 99/ QD-UBND Khanh Hoa).
- People Committee of Khanh Hoa Commune. (2018b). *Report on Khanh Hoa socio-economic situation in 2018*. No. 101/QD- UBND Khanh Hoa.
- PSAVA (Partnership for Sustainable Agriculture Vietnam). (2018). *Review on the five years implementing Viet Nam's agricultural restructuring*. Available from <http://psavard.org.vn/a-review-the-five-years-of-vietnam%E2%80%99s-agricultural-restructuring.html>. Access 20/03/2021.
- Quang, P.V., Lan, T.H.P, Thuy, T.N. Phu, P.X., Hieu, T.V, Tien,P.D., Van, P.H.T., Duc, H.N., Dong, L.T.P. (2017). *Impacts of sedimentation on agricultural production and people's livelihoods in the Mekong Delta*. Proceedings of the Regional Scientific Workshop at An Giang University June 27.
- Rang, N. (2016). Cham people in An Giang, journey to a new land. *An Giang Online News*. Available from <https://baoangiang.com.vn/nguoi-cham-tren-dat-an-giang-ky-i-hanh-trinh-den-vung-dat-moi-a116970.html>. Access 25/02/2021.
- Statistics of An Giang province. (2019). *An Giang Statistical Yearbook*.
- Thanh, N. (2019). Farmers in Mekong Delta earn more thanks to agricultural restructuring. *Sai Gon Giai Phong online*. Available from <https://sggpnews.org.vn/national/farmers-in-mekong-delta-earn-more-thanks-to-agricultural-restructuring-84103.html>. Access 15/03/2021.
- Tram, B.D. (1985). *Hydrological characteristics of An Giang province*. An Giang Science and Technology Committee.
- Tri, N.H, Thanh, V.D. Thong, T.A. (2011). *The importance of alluvial and natural fisheries in the Mekong Delta and its consequences from the Mekong mainstream hydroelectricity: A case study in An Giang*. Report for Vietnam Rivers Network.
- Tuan, L.A. (2017). *Responding to climate change related to water resources in An Giang*. Report on workshop on Climate Change & its impacts on environment and agriculture in Mekong Delta. An Giang University.
- Van, P.T.K, Uyen, N. T (2017). *Solutions to sustainable agricultural development with rice-shrimp models in the Mekong Delta in the direction of adaptation to climate change – A case of An Giang province*. Proceeding of the workshop on Climate Change and its impacts on environment and agriculture in the Mekong Delta. An Giang December 8, 2017.
- Vietnam News. (2018). Agricultural restructure a success. Available from <https://vietnamnews.vn/economy/467039/agricultural-restructure-a-success.html>. Access 20/03/2021
- World Bank. (2016). *Report of development in Vietnam. Transforming Vietnamese Agriculture: Gaining More from Less*. Ha Noi.



## Annex 1. Household Assets and Effects on the agricultural shifting process

Types of asset	Explanation	Effects	
		+	-
<b>Natural asset</b>			
Location and resources (water and soil quality)	Locating on the banks of the Hau River, the area has rich alluvial soil and fresh water all year round.	+++	
Climate factors (temperature, rainfall)	The climate is stable. Rainfall is large enough for agricultural demand.	++	
Indigenous <i>longan</i> variety	The variety has been grown for a long time since it is suitable for local natural conditions.	+++	
Farm size	Farm size is not large enough extending garden.		--
<b>Human asset</b>			
Having long experience	Most farmers experienced more than 6 years. They own knowledge to cultivate the tree.	++	
Family labour	Labour is large enough and they have been trained by agricultural extension services.	++	
<b>Financial asset</b>			
High cost	Large investment in the first year ( <i>land preparation, seedlings, fertilizer...</i> ), around 60 million Dong /ha). It is difficult for those farmer having little self-finance.		--
Access to banks	Some farmers have limited access to the banks.		--
<b>Social asset</b>			
Links among community's members	Close relation among community members ( <i>supporting each other in terms of technical advice and labour sharing</i> ).	++	
Taking part in organizations	Joining in several organisations ( <i>Farmer's Union, Women's Union</i> )	+	
<b>Physical asset</b>			
Infrastructure condition	Road is good for carry products to markets.	++	
Irrigation system	It has been invested to water for the agricultural production.	++	

**Note:** +++: Very Positive; ++Positive; +: Little Positive

---: Very Negative; --: Negative; -: Little Negative