



2009

# HCVA in Can Tho



Hazard, Capacity & Vulnerability Assessment in relation to Climate Change

Prepared by

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## Abbreviations

ACCCRN	The Asian Cities Climate Change Resilience Network Mạng lưới Chống chịu với Biến đổi Khí hậu của các Thành phố Châu Á
CBDRM	Community-based Disaster Risk Management Quản lý Rủi ro Thảm họa dựa vào Cộng đồng
CC	Climate Change Biến đổi Khí hậu (BĐKH)
CCA	Climate Change Adaptation Thích ứng Biến đổi Khí hậu
CFSC	Committee for Flood and Storm Control Ban Chỉ đạo Phòng chống Lụt bão
CtC	Challenge to Change Thử thách Thay đổi
CT	Can Tho City Thành phố Cần Thơ (TPCT)
CTAPCC	City Target Action Plan for Climate Change Kế hoạch Hành động Mục tiêu Thành phố về Biến đổi Khí hậu
CTU	Can Tho University Đại học Cần Thơ (ĐHCT)
DM	Disaster Management Quản lý Thiên tai
GDP	Gross Domestic Product Tổng Sản phẩm Nội địa
HCVA	Hazard, Capacity and Vulnerability Assessment Đánh giá Thiên tai, Khả năng Thích ứng và Tình trạng dễ bị tổn thương
ISET	Institute for Social and Environmental Transition Viện Chuyển giao Xã hội và Môi trường
MD	Mekong River Delta Đồng bằng Sông Cửu Long (ĐBSCL)
MPI	Ministry of Planning and Investment Bộ Kế hoạch và Đầu tư
PC	People's Committee Ủy ban Nhân dân (UBND)
RF	Rockefeller Foundation Quỹ Rockefeller
SEDP	Socio-economic Development Plans Kế hoạch Phát triển Kinh tế - Xã hội
SPDM	Strategic Plan for Disaster Management Kế hoạch Chiến lược về Quản lý Thảm họa
SC	Steering Committee Ban Chỉ đạo
VND	Vietnamese Dong Đồng Việt Nam (ĐVN)

## **1. INTRODUCTION**

### **1.1 SUMMARY OF ACCCRN**

The Asian Cities Climate Change Resilience Network (ACCCRN) in India, Vietnam, Indonesia, Thailand, was initiated and supported by the Rockefeller Foundation in 2009. It aims to create robust models and methodologies for assessing and addressing climate risk in Asian cities, especially building resilience among poor and vulnerable communities. By 2012 cities in the network will develop robust plans to prepare, withstand and recover from the predicted impacts of climate change.

The ACCCRN Program in Vietnam is supported by the Institute for Social & Environmental Transition (ISET), and Challenge to Change (CtC), and the National Institute for Strategy and Policy Studies (NISTPASS). One of the first steps of ACCCRN in Vietnam is the Hazard, Capacity and Vulnerability Assessment in the three cities. This is a participatory process engaging all levels of the city, focusing on the needs of highly vulnerable communities. The activity is coordinated and facilitated by CtC in collaboration with key City partner institutions.

### **1.2 CAN THO CITY AND DISTRICT PROFILES**

Can Tho City is a biggest city in the Mekong River Delta (MD), once known as Tay Do (Western Capital). Its natural area is 1,401 km<sup>2</sup> (Statistical Office of Can Tho City, 2007). Located beside the western bank of the Hau River (10° 2' 0" N, 105° 47' 0" E), Can Tho borders An Giang and Dong Thap provinces in the north, Hau Giang province in the south, Kien Giang province in the west, Vinh Long and Dong Thap provinces in the east (Figure 1).

By the water way, Can Tho City is 75 km far away from East Sea. By the national road, it is 1,877 km from Ha Noi Capital in the north and 169 km from Ho Chi Minh City in the west-south direction. Can Tho is connected to the rest region of the country by National Road 1A, Cai Cui Port and Can Tho Airport. The Can Tho Bridge crossing the Mau River is under construction. The city has a dense system of rivers and canals serving for agriculture, aquaculture, navigation and water supply for the region.

Can Tho lies in a tropical and monsoonal climate area with two separate seasons: rainy, from May to November and dry, from December to April. Average annual humidity of the whole city is about 83%, rainfall amount changing among 1,500 - 1,800 mm per year (occupying more than 90% in the rainy season) and yearly average temperature 27 °C. Total sunny hours are about 2,300 - 2,500 hours per year. As one of the typical lands with plain terrain features in the Mekong Delta, Can Tho City is accumulated by alluvia from the Hau River in the flooding periods. Each year, the Hau River in Can Tho carries more than 210 million m<sup>3</sup> of freshwater from the upstream of the Mekong River to the sea. In the period of September – October, the average water flow in Hau River may reach 15,000 – 16,000 m<sup>3</sup>/s. As an impact, flooding seasons are always linkage with the bank erosion. However, in the dry seasons, the flow is still down to 1,600 – 1,700 m<sup>3</sup>/s leading a serious shortage of water.

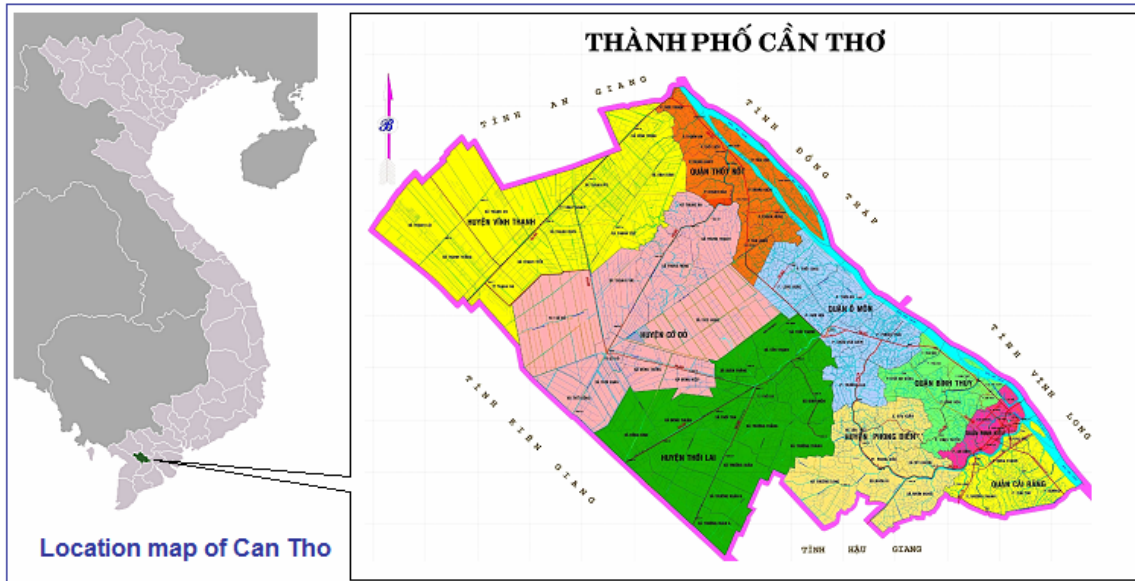


Figure 1. Location and administrative map of Can Tho City

After 120 years of development, Can Tho City is considered as a political, cultural, scientific and economical centre of the region. Can Tho is one of five cities under the Central Government since January 2004. Administratively, Can Tho has four urban districts (i.e. Ninh Kieu, Binh Thuy, O Mon, and Cai Rang) and four rural districts (Phong Dien, Co Do, Thot Not, and Vinh Thanh). Can Tho has 1,159,008 people (Statistical Office of Can Tho City, 2007), in which 65% among them living in rural and suburban areas. The average population density for the whole Can Tho City in 2007 was 827 person/km<sup>2</sup>, in which the highest density was in Ninh Kieu district (7,392 person/km<sup>2</sup>) and the lowest density was in Vinh Thanh District (376 person/km<sup>2</sup>). The amount of population at labour age in 2007 was 735,158 persons (occupying 63.42% of the total population). As statistical data in 2007, about 35.63% of labour forces in Can Tho City were working in agriculture, forestry and fishery sectors and the remainder were in non-agricultural sectors (Table 1).

Table 1: Population and labour distribution in Can Tho City

Distribution	Population			Labour		
	Total	Male	Female	Total	Male	Female
Can Tho City	1.159.008	571.166	587.842	735.158	367.841	367.317
Ninh Kieu District	214.379	104.102	110.277	147.527	73.291	74.236
Vinh Thanh District	154.225	75.974	78.278	92.426	46.248	46.178

Source: Statistical Office of Can Tho City, 2007

If compared the GDP growth in three periods, 4.99% in 1976 – 1985, 9.42% in 1986 – 2000 and 13.5 % in 2001 – 2005, the development of Can Tho was promising. In 2007, its economic structure included 15.15% of agriculture, forestry and fishery; 41.23% of industry and construction and 43.62% of commerce and service. In present, Can Tho's economic structure is reforming towards industrialization and urbanization. The changes of economic sectors are leading many challenges to social structures and poverty.

During the first Shared Learning Dialogue (SLD) in Can Tho City under the ACCCRN programme in February 2009, a broad range of participants from local government, technical departments and civil society engaged in ranking the hazards facing Can Tho and the vulnerabilities of the city's Districts. Results were as in the tables below.



Hazard	Ranking
Flood	1
Tide	2
Storm	3
Drought	4

Most Vulnerable Districts	Ranking
Vinh Thanh (rural district)	1
Co Do (rural district)	1
Binh Thuy (urban district)	2
Phong Dien	3
Thot Not	3
Cai Rang	3

One highly vulnerable urban district and one highly vulnerable rural district were selected for carrying out this hazard, capacity and vulnerability assessment: Binh Thuy (urban) and Vinh Thanh (rural).

### **Binh Thuy District**

Binh Thuy District, a suburban district in Can Tho City, covers an area of 69 km<sup>2</sup>. In 2007, the district had the population of 94.871 with the average population density of 1,336 persons/km<sup>2</sup>. Binh Thuy is divided into 8 wards such as Tra Noc, Tra An, An Thoi, Bui Huu Nghia, Thoi An Dong, Binh Thuy, Long Tuyen and Long Hoa.

Bui Huu Nghia ward which was chosen for survey implementation in Binh Thuy District (Figure 2) covers an area of 637,12 ha. Statistically (in 2008), there were 11,102 local habitants with 2,180 households and **782 temporary inhabitants** with 201 households.

The household survey was implemented in Section 3 and Con Son in Bui Huu Nghia.

- Section 3 is located on Cach mang Thang 8 Street on the way from Ninh Kieu district to Binh Thuy Bridge. The majority of households in this area are poor and average, and they are landless; their living mainly relies on manual labour and small business.
- Con Son, which is a small islet, is located on the right bank of Hau River, nearby Binh Thuy ward. Con Son which belongs to Section 1 in Bui Huu Nghia ward has approximately 90 households. Typically, most of local people are poor farmers who have farming land, and infrastructure is deficient, which is difficult and limited since local people have to commute by boat.



Figure. 2: Survey location map in Binh Thuy and Vinh Thanh, Can Tho City

## Vinh Thanh District

Vinh Thanh which is a rural district is located in the northwest of Can Tho City (Figure 3). Vinh Thanh District was established in May 2004 based on Decree No. 05/2004/ND-CP, with an area of 410 km<sup>2</sup>. According to the population report in 2007, the district had the population of 154,225 with average population density of 376 persons/km<sup>2</sup>, and it is categorized as the district which has the lowest population in Cantho city. District People's Committee is located Thanh An town. The district consists of two towns such as Thanh An and Vinh Thanh, 9 villages including Vinh Trinh, Vinh Binh, Thanh My, Thanh Quoi, Thanh An, Thanh Tien, Thanh Thang, Thanh Loi and Thanh Loc.

Thanh An town has a natural area of 11,768.3 ha. The town has four hamlets with 2,515 households (14,271 people). The town has 3 main canals with the road system that is: Thầy Ký canal with asphalt road on one side and concrete road on the other side. Cai San along National highway No 80 and canal 16 with road system. Small canals such as D has the concrete road of 3 meters wide. Canal E has had a road system planned leading to the Food and Foodstuff processing zone which will be built on an area of 49.2 ha. Main characteristics are the local people are living two sides of the canals. Where the roads along the rivers/canals are earthen made, fewer people are residing. Total number of temporary houses of the town is 503 (with 3,013 people). In the centre of the town, there is one building for the People's Committee, secondary school, one semi boarding school, 1 primary school and 1 high school. There is one Health station near the school. Main market is located on National Highway no 80 and there is one flood resettlement cluster for 262 households, which was built in 2002.

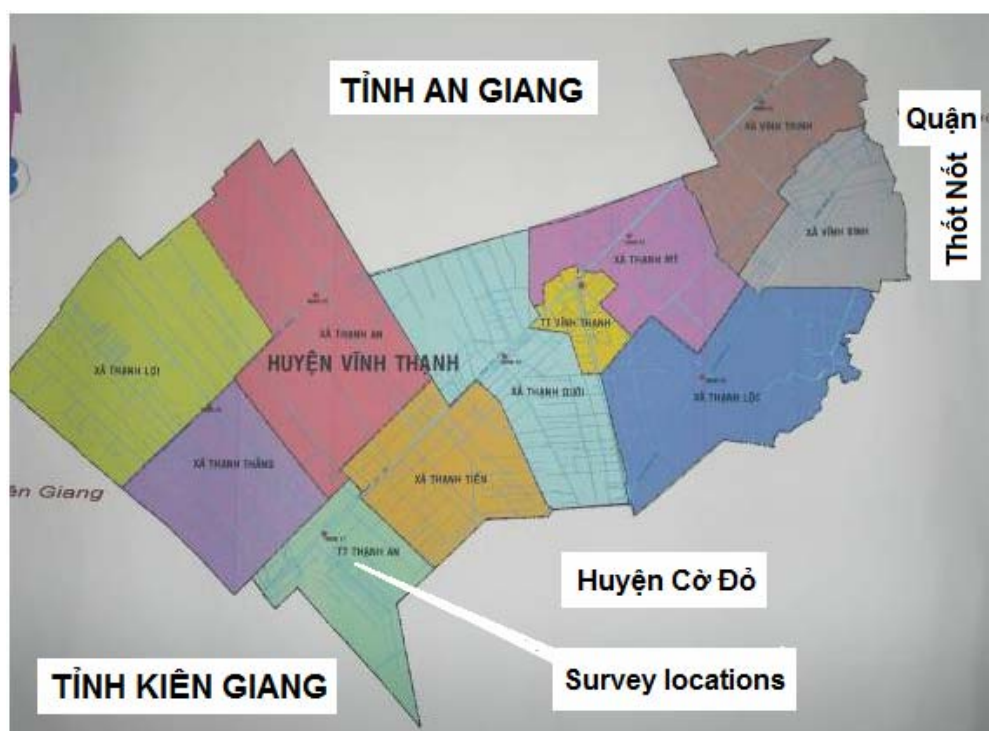


Figure 3: Vinh Thanh District and surveyed areas

Bo Bao and Phung Quoi A hamlets were chosen for household interview. It is more convenient to transport in Phung Quoi A hamlet than in Bo Bao because there is a concrete road to the town in Phung Quoi A whereas local people have to transport by boat in Bo Bao. Local people mostly earn their living on farming and pig raising. Their life is rather difficult

since they have to cope with environmental pollution, lack of garbage collection system; especially clean water as well as agricultural sanitation are still poor in Bo Bao.

Bờ Bao is located in the southwest of Thanh An town with Bo Bao River alongside the hamlet of 8km. There are 9 units in the hamlet with 326 households, including 28 poor and 28 near poor households (government criteria). The whole hamlet has 90 temporary leafy houses from the most difficult households. Most of these households made their houses on the side of the river as they do not have land ownership. Around 120 houses have toilets. Only around 28% of the households have clean water as there is one clean water supply station for 87 households. Rice cultivation is the main livelihoods in Bo Bao hamlet.

Phụng Quới A hamlet is located in the centre of Thanh An Town. The hamlet has the natural area of 550 ha, of which 530 ha is for rice cultivation. Main livelihoods activities of the local people in the hamlet are agriculture and trading (market area: trading, services such as fertilizer agencies, vet agencies, 3 pharmacies. All the poor households who often do not have cultivation area have to work as hired labour. The hamlet has 24 units with its head, vice head and secretary. The units are divided based on production arrangement. The hamlet has one flood resettlement cluster, 3 schools near the People's Committee office. The town health centre and the main market are located in the hamlet too. In the hamlet there is one church and one pagoda as rescue areas for the families during big floods. Most of the local people reside mainly along CAi San river alongside the town and others such as D, C, E, 16, 18 Thay Ky and 15.5 (Sau Hau).

## **2. METHODOLOGIES**

### **2.1 OBJECTIVES**

As a part of project objectives, CtC applies a participatory approach to conduct Hazard, Capacity and Vulnerability Assessment (HCVA) to:

- Identify the most vulnerable communities and most vulnerable households/groups within targeted communities in Binh Thuy (urban district) and Binh Thanh (rural district) of Can Tho City.
- Provide sufficient samples from which pilot projects according to programme criteria, can emerge;
- Contribute to the identification of necessary city research issues for the program of Institute of Social and Environment Transition (ISET) and for the preparation of Phase 3 investment.
- Form information base to facilitate Community-based Disaster Risk Management (CBDRM) and Climate Change Adaptation (CCA) and resilience planning in the selected area, which can be integrated within Socio-economic Development Plans (SEDPs).

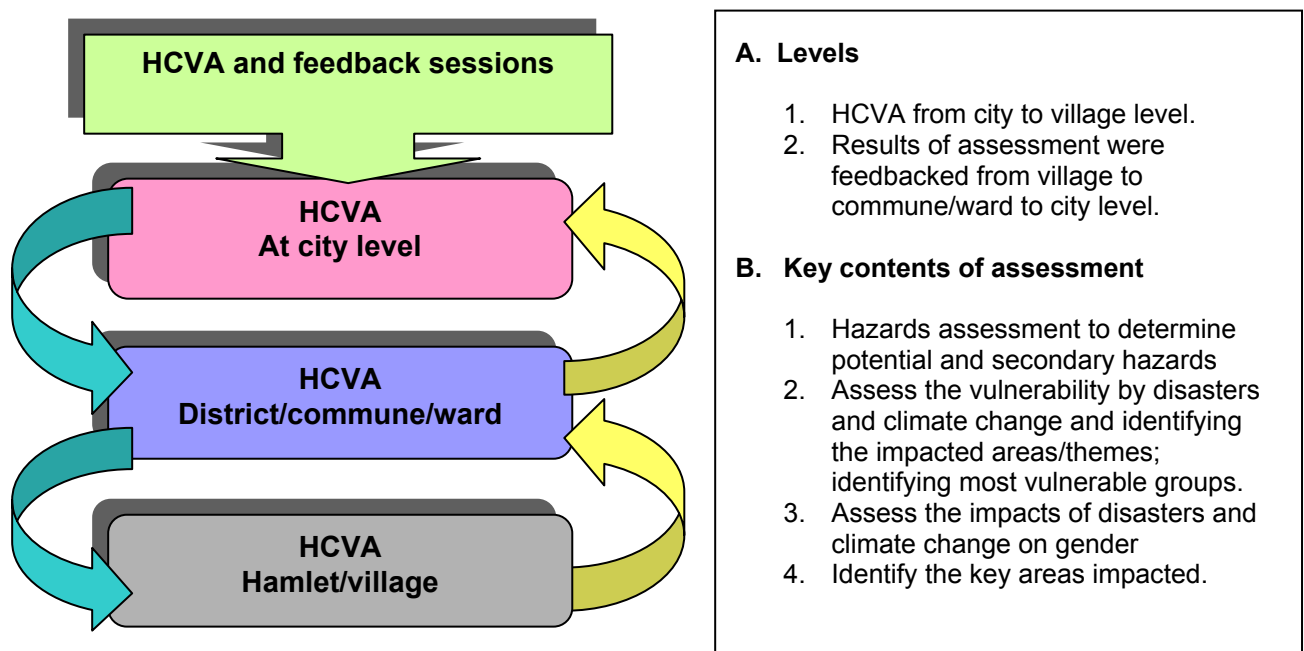
International experiences have shown that one important feature of good planning is integration. A plan which has been done in isolation tends to serve limited purposes with narrow interests and a small number of people. On the contrary, an integrated planning is likely to yield more impacts, minimize risks and avoid unnecessary waste and losses.

As one of the purposes of the HCVA in Can Tho is to lay foundation for appropriate future planning to respond to climate change of the city, the overall objective of the governance assessment is identifying how disaster management and climate change resilient planning can be best integrated into the mainstream socio-economic planning of Can Tho City. Thus its specific objectives for the governance analysis are four-fold:



- Review the socio-economic planning, urban planning processes from the city to ward levels. This includes identifying the timing, contents and local capacity for conducting the planning.
- Assess to which extent the disaster management and climate change responsive aspects have been integrated in the current planning processes.
- Identify any constraints on the planning process, issues in implementation of the current planning with regard to incorporating disaster management and climate change responses into the mainstream planning processes.
- Make recommendations as to how disaster management and climate change related aspects can be integrated in the future planning processes.

## 2.2 PROCESS



## 2.3 STEPS

### Preparation:

- Development of conceptual framework: based on international and local sourced literature views, practical experiences of CtC Staffs and review discussion with other NGOs staff of Climate Change working group (Care, Oxfam, Netherlands Red Cross), Gender, Governance, Disaster Management specialists, staff from Can Tho University (Dragon Institute and Mekong Research Institute), staff from Hue Agriculture-Forestry university and staff from Hue University. One day team work was spent on briefing of the scenarios of CC on Mekong Delta, and Can Tho, and sharing the key tools and purposes for different groups such as livelihoods, environment, health, education, Disaster Management, gender and governance.
- Developing specific assessment plan of HCVA with the key partner of the city, DONRE to organize the field work.
- Local facilitators were key assistants of assessment team/project from city Gov agency and mass organization of ward/commune. Local facilitators come from the City Red-Cross, DONRE, staff of people's committee offices, women's union, farmers' union, health, education departments at district and commune/ward level, and land survey officer at town and ward centres.

- Briefing of climate change scenarios for the city with supporting document provided by ISET and Can Tho Dragon Institute.
- Orientation session of HCVA process, methodology, expected results and specific plan for representatives' city divisions, and people committee and mass organization of ward/commune.
- Lessons learned from HCVA are consolidated after the HCVA has been completed.

### **Conducting HCVA:**

- At city level (1 day): hazard assessment to identify potential hazards, most vulnerable ward/communes, most affected sectors and issues/concerns/needs assessment responding to climate change, coping experiences and good practices for disaster mitigation of the city
- At ward/commune level (2.5 days): hazard assessment to identify main hazards/secondary hazards, most vulnerable ward/communes, most affected main economic activities and problems analysis responding to climate change, coping experiences and good practices for disaster mitigation of the ward/commune, priority of adaptation options.
- At section/village level (2 days): hazard assessment to identify main hazards/secondary hazards, most vulnerable ward/communes, most affected main economic activities and problems analysis responding to climate change, coping experiences and good practices for disaster mitigation of the ward/commune, priority of adaptation options.

### **Feedback session during field work:**

- Daily feedback among members of assessment team for further improvement of the tools usage, and information collected.
- Feedback session was organized right after completion of assessment for each level from section/village to ward/commune, to city. The main purpose of the feedback sessions are reporting the results of HCVA from section/village to ward/commune and to city level, validating the main source information collected, most concern problems, needs and solutions, and generating more ideas on Climate Change adaptation of city.

## **2.4 TOOLS AND METHODS**

**Secondary data** from participants, related organizations, departments and agencies: collecting information on topography, climate, population, infrastructure, environmental sanitation, natural resources and local documents of resources management, urban plan, disaster management and cfsc and SEDP reports.

**Focus group discussion:** General issues were discussed in mix groups. However, discussions on needs for assistance were done in sex-disaggregated groups in order to ensure that the needs of both men and women were voiced up.

### **Some PRA tools:**

- *Historical profile:* used to get information on types of disaster, types of losses, reasons to losses and the most affected zones in community and information compilation of potential hazards
- *Seasonal calendar:* used to record change of weather, time of disasters and working calendar in the year, methods and capacity of community to cope with hazards.
- *Mapping:* maps drawn by local people are useful to get information related to vulnerable areas, areas at risk of erosion or deposition, places for use as shelters, livelihoods activities.

- *Transect Mapping*: used to collect information on distribution of resources, landscape, current utilization of resources and advantages as well as disadvantages of topography based on direct observation and interview local people along the path across an area.
- *Ranking*: used to i) rank the disasters and their impacts to find out the most dangerous disasters, ii) rank the affected zones by disasters to identify zones at high risks to climate change scenario, iii) rank suggestions and needs of community to cope with climate hazards
- *Problem tree*: to analyse the environment issues and poverty in the assessment
- *Wealth ranking*: to analyse the characteristics of the poor and non poor in the areas.
- *In-depth interviews*: During survey, gender balance is a requirement in group discussion and household in-depth interviews.

## **2.5 STAFFING AND ORGANISATIONS**

Joining HCVA activities are 4 staff from Challenge to Change, 3 staff from Mekong research Institute, 3 staff from Dragon Institute, 1 gender specialist, 2 governance specialists, 1 staff from Hue University, 1 volunteer staff from Hue agriculture and forestry university, an educational volunteer, a Tuoi Tre newspaper photographer and staff from Department of Natural Resources and Environment of Can Tho City, staff from city Red Cross, key staff from of the Provincial and District's People Committees and other related Offices, staff from mass organizations in Binh Thuy and Vinh Thanh and the town and wards.

## **3. DISASTER MANAGEMENT**

### **3.1 STRUCTURE**

The 2<sup>nd</sup> Vietnam National Strategy and Action Plan for water - related disaster mitigation and management in the period 2001 - 2020 adopted a key strategy of preparedness and mitigation to the Mekong floods in general and Can Tho in particular, while harnessing their environmental benefits, as "*Living Together with Floods*". The motto "Four on-sites" (i.e. On-site command, On-site force, On-site materials - means and On-site finance - logistic) is applied as an integrated solution for adaptation and protection of human life and property, to maintain safe and sustainable housing for local people, and to maintain social security.

Strengthen the organization on the Steering Committee for Flood and Storm Control in each departments and locals (wards and communes). It is need to increase public awareness on the implementation the natural disaster preparedness following Steering Committee guidelines.

Actually, Can Tho is not an effected natural disaster area if compared with other places of the whole country. However, changing weather and potential climate change are impacting local livelihoods, especially to the poor who are easy getting the vulnerabilities due to the change.

In Can Tho, the Steering Committee (SC) for Flood and Strom Control has been established under the People's Committee of Can Tho City. The organization structure is following the top-down layers as in Figure 6. Under the Steering Committee are the representatives of the Departments, Army, Police Forces and other social organizations, people in communities are in final way of information. On March 2009, the People's Committee of Can Tho City has established the Steering Committee for Climate Change and Adaptation in order to coordinate all climate change concerned activities.

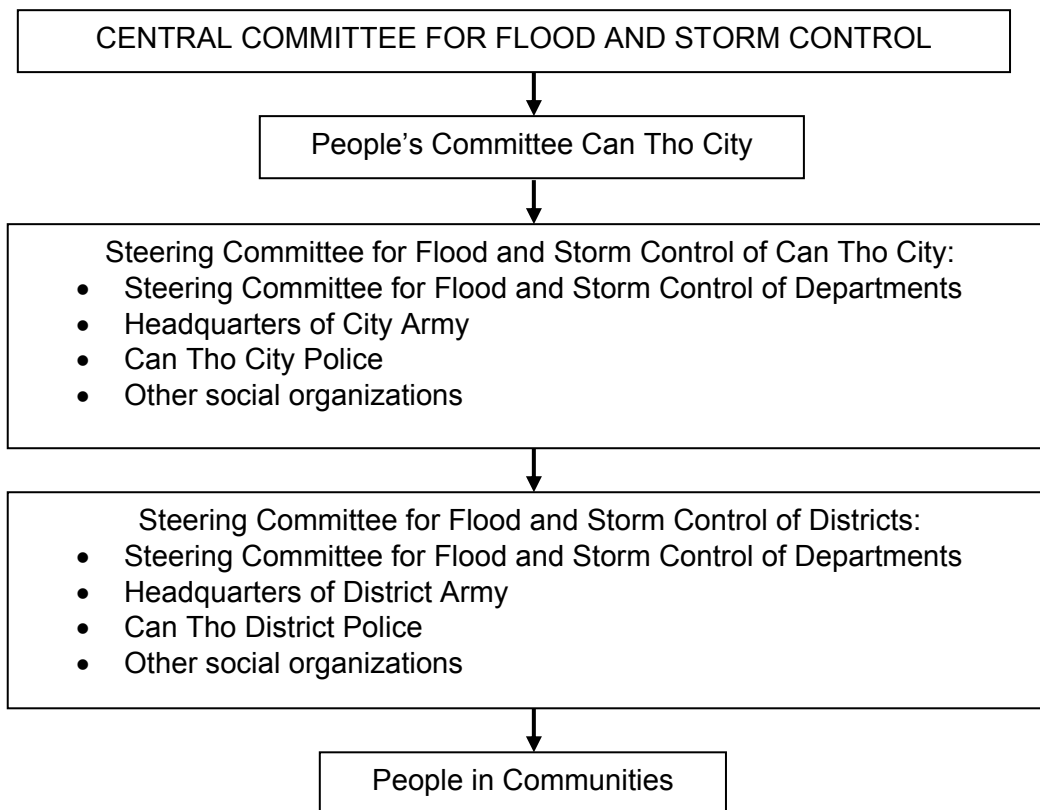


Figure. 4. Organization structure of the SC for Flood and Storm Control of Can Tho City

### 3.2 DISATERS MANAGEMENT IN BINH THUY DISTRICT

#### *Structure*

The DMSC of district is established and strengthen each year under the guidance policy of directing the implementation of the City People's Committee of Can Tho. Vice chairman of the District People's Committee (DPC) is the leader of DMSC, and head of department of economic is deputy of Steering. The other members of the Steering are responsible people of each section of the DPC. In 2008, the DMSC of Binh Thuy District, which includes 23 members (7 of them are women). Standing division of DMSC are: leader, deputy and a members of irrigation station. Other 20 members were responsible for the DM at 8 wards of the district. Besides the DMSC and district's plan, departments of the district must have their plans to coordinate the functions of each year to the prepared response and disaster emergency rescue.

According to 4 local preparedness principles (local commands, local forces, local means and local logistics), wards and their sections are established DMC at each level. Ward's DMSC including 15-20 members and the number depending on the their situation and practical needs. The Ward People's Committee Chairman works as head of DMSC. At section level, the Section Unit of Disaster Management consists of 5-10 people. All members of the Steering and section unit of Disaster Management are equipped with personal facilities such as lifebuoy, life vest and torch.

Annually, the Economic Department of District, under the guidance of DPC create a DM plan with 2 main contents include: i) to build the dry season irrigation plan in January and implemented from January to May; ii) to build the disaster management and rescue and relief plan in May. These plans will be approved by District Council and People's Committee

after carefully reviewed the experiences of these actions in previous years and the all year weather forecast.

Based on two of the district's plans and the actual situation, each DMSC of ward also create a DM plan. This plan then approved by chairman of Ward People's Committee and report to the District DMSC. The District People's Committee will assign officer with professional accountability disaster management to collaboration with ward review the entire plan to unify and make suggestions priority to district People's Committee for approval. Normally, 2 officers (one come from economic department and the other is head of Irrigation Station) keep watch in the Son and Khuong islets for technical support to local people on reinforce dikes before the rainy season.

### *Expenditure*

Based on the guideline of disaster prevent fund collection of City People's Committee, the DPC will collect this fund from local people and the productive companies in the area of district. In 2008, this fund was 346 million, of which 60% is submitted to disaster prevent fund of the city level and the remaining 40% used for disaster preventing activity at district. At general policy, the district People's Committee shall regulate this 40% based on actual activities and the specific needs of each local, ward or section.

### *Coordination*

The coordinated implementation of DM plans is throughout the district to wards and all sectors, organism and association with the human and facilities support from each others and army force. With 4 local principle and first priority is to ensure safety of lives, especially the children and the elderly, to people not being hungry or helpless when disaster occur. Wards have to imitative the equipment, means, food, medicines to use if necessary. Checking depots of materials, chemicals; take a survey and set up a coping plan for the households in the vulnerable area, focus on the people who live in wattle houses and on the bank of rivers; reinforce the irrigation system, dike and implement measure to protect crops and fruit gardens. For the urban wards, checking and partly cutting the urban trees; cleaning drainage system. The wards with the agency, enterprise, companies need to address are planning work closely, calling support upon these agencies to increase the means and force of DM at local.

The departments in DPC work closely with wards and have their own DM plan. For example, economic department regularly check the vulnerable areas, especially the islets in the Hau river to plan to overcome in time in case of damage by disaster; steering set up the suitable seasonal calendar and ensure that the main crop will be harvested before flooding time; planning the fund for the DM activity of district and ensure that the fund will be used for correct terms.

Department of Cultural and Sport, district's Radio Station strengthening the propaganda, give basic knowledge of coping hazards and disaster mitigation measures to the local people, timely give the meteorological and hydro graphic situation and DM policy of all level to people to have highly efficient results.

Labour, Wounded and Social Department of district monitor the DM activities and measure of overcome after the impacts of flood. This department tightly coordinate with the DMSC of district and the Unit of Campaign for Flood Relief to consult the District People's Committee in order to give the in time measures and financial supports to local areas and help people to overcome soon.

Army force and police of district create the rescue teams and always ready to help people go to evacuate before and event during disaster occurs. These agencies also have plan to assign tasks to the self-defend force, youth in rescue team to work as standing force to protect people's properties and ready joint into rescue activity when disaster occur.

The Health department assign tasks to the commune health stations, health centres to ensure preparing enough the medicines for first aid in case of emergency; enhance the activities of sanitation and preventing disease before, during and after the rainy and typhoon season. Direct the district hospital setting up a mobile first aid team and ensuring that emergency medicines, medical equipment, ready to go rescue when a disaster occurs.

#### *Early warning system and communication*

The district has equipped radio loud speaker system in all wards. Just only a section I of Bui Huu Nghia ward have no loud speakers system because there is no electricity. In addition, each ward is equipped with the necessary facilities such as hand loudspeaker, life vest. Each section have 1-2 hand loudspeakers, life vests, lifebuoys, torches, rain coats. And nowadays, the members of DMSC in all levels mainly contact and guidance directly via mobile phones.

*Rescue team:* The standing forces can work at any time includes:

- 1 team of military pre-encouragement : 110 people
- 3 teams of military mobility force (90 persons) of 3 wards: Binh Thuy, Long Hoa, Tra Noc, prepared to carry out rescue operations for Son and Khuong islets.
- 3 teams of military mobility force (90 persons) (An Thoi, Long Tuyen, Thoi An Dong wards) directly lead by the Chairman of ward DMSC.

#### *Facilities*

The vehicles and boats can be used for DM activities includes:

- Boats: 06 large boats, each can carrying 60 – 80 people and 4 smaller boats with capacity of 10 people.
- Bus: 06 buses (30 seats each)

The shelters for the evacuated people are arranged in the centre district, including district building of Communist Party Committee, People's Committee, Police Station headquarter and military station, branch of the Military area 9 and Nam Nha Duong pagoda.

#### *Techniques and skills*

Because Binh Thuy District have low foundation, especially the lower land areas in the islets and along rivers, often inundated in flooding season so they have a good skills to cope with flood, such as annually *dry season irrigation* activity.

However, the prevent and coping as well as doing rescue and relief in extreme case like tropical low pressure or tropical typhoon do not pay enough attention because this area have no directly typhoon before. Although there were some training and exercise on prevent floods and typhoon, but just in small-scale at the islet areas and not yearly activity (Son and Khuong islet, the most recent time is 6 years ago - in 2003). Therefore, both government officials and local people lacking skills in disaster prevention, especially to cope with typhoon.

#### *Experiences*



Have imitative plan before flood season, reinforce the dikes and implement the dry season irrigation showing the effective in mitigation of natural disasters. Scraping off the canals, drainage systems and doing dry season irrigation are implemented in dry season in good conditions of weather, materials to help enhance the ability against flood and high tide in rainy season, mitigate the damage when a flood occurs in the rainy season. Often checking and monitoring the dike protective activities in the islet areas and ensure taking 24 hours per day of standing teams during flooding season to get timely information and have suitable actions. However, there are still lacking good propaganda on tropical low pressure and typhoon (some people in the survey area is confusion between the typhoon and monsoon) and awareness of people still subjectivity in coping with typhoon.

### 3.3 DISASTERS MANAGEMENT IN VINH THANH DISTRICT

- The District DMSC have 15 members (these members come from District People's Committee, representatives of the function organizations; only one member is women).
- The district rescue team has 30 member (Youth self-defence, standing member of RC Association).
- Bobo (machine boat) can carrying 809 people.
- Loud speaker system covered all district area.
- 20 life vests and lifebouys for rescue team
- DMSC organised the excersie for government staffs and local people on typhoon coping.
- DMSC at commune level can preparing boat for rescue team. The CPC also mobilizes the boats of local people for rescue activity
- The local people have more awareness on typhoon and they do reinforce their house before rainy season .
- Some household have initiative idea when use their hard woody table to creat a small in-door shelter when hearing an anoucement of typhoon coming. The DMSC propagendized this idea to the people and asked each household should have a small in-door shelter.

#### *Experiences*

- District has established 8 floods resettlement residential areas (over 100 households per area)
- Each commune has a resettlement plan and locations/destination for resettlement for the local people who live in the disaster prone areas, and informs the local people in advance of the floods season of the plan and people in charge when the local people need to resettle.
- Some households who do not go into the residential areas during their fishing work in the flood season know how to bring plastic cans as life buoys.
- Households have plan to store their food, yet the reserves depend on the household economy. ACcoridng to the assessment of the Red Cross, around 30 % of the households can store enough food during the rainy and flood season, and these are those with cultivated land. Around 20% of households have capacity to store food for 10 days during 3 months of floods. These households are poor and without agriculture land and work as hired labour. Those with agriculture land can prepare food over 10 days.
- With experiences of flood in 1978 when lots of children were drowned, the district set up the kindergarterns during the floods seasons for those with small children.
- Dykes built to protect the third crop of 10,995 ha and 'lung' dyke for 1,065 over the last 10 years. There is around 983 ha of land adjacent to An Giang province with the total of 9,000 ha are not protected by dykes.

- Local people are more aware of reinforcing their houses before floods and rainy season
- Some local people make tanks to hide from storms
- Every year cfsc directs, communicates and organize the rehearsals
- The district has disaster management fund of 40% of the total fund that is contributed by the hamlets and communes and the rest is sent to the City Disaster Management Fund.

## **4. INTEGRATION OF SOCIO-ECONOMIC PLANS**

### **4.1 OVERVIEW SOCIO-ECONOMIC PLANNING PROCESS**

#### **➤ Five-year planning and Annual planning**

Group discussions and interviews with informants at city, district and ward levels showed that the socio-economic planning cycle of Can Tho does not differ from the national planning cycle. It means that the socio-economic development of Can Tho is based on two major platforms, the five-year socio-economic development plan (SEDP) and the annual socio-economic development plan which is devised from the five-year plan.

It should also be noted that the orientation and contents of a province or city SEDP is primarily decided by those of the national SEDP, according to current planning practices and regulations. The Ministry of Planning and Investment (MPI) is the agency which issues guidelines for provinces and cities to formulate their own SEDPs. At provincial or city level, or in the case of Can Tho, the Can Tho City department for planning and investment is responsible for devising further the guidelines prescribed by MPI for the planning process to take place at different administrative levels of the city which are city, district and ward levels.

A five-year SEDP, at any administrative level from city to wards, is formulated based on the following prerequisites and steps:

- 1) In accordance with the approved master plan.
- 2) Based on the conclusions of preceding meetings of the Party and People's Council.
- 3) Data collection at local level which covers the implementation of SEDP for the last 5 year period and orientation for the next five years.
- 4) Collate data and draft SEDP based on a provided template.
- 5) Review and finalise the 5-year draft SEDP.
- 6) Submit to People's Council and Committee for approval.
- 7) Send to departments and agencies for implementation.

Likewise, an annual SEDP is formulated with a similar procedure as mentioned above plus taking into account the orientation which has been defined in the five-year SEDP of the respective administrative level. While a new five-year SEDP formulation process starts at the end of each five year planning cycle from the national level downward or upward, for example from around 2010 for the 2011-2015 SEDP, an annual SEDP exercise usually starts from July or August of the preceding year with an approval around November for the following year's SEDP. Interviews with officials in Can Tho City and both districts showed that the new five year planning exercises for Can Tho at different levels may start earlier than 2010, probably already in late 2009 which will coincide with the assessment of Can Tho City five years after becoming a city under the direct management of the Central level.

#### **➤ Urban planning in Can Tho – vision to 2020**

One important factor that has influenced the recent planning and development orientation in Can Tho was the Prime Minister decision at the end of 2003 which classified Can Tho as a city directly under the central management. This new clarification has implications for accelerating the urbanization process in Can Tho. With this upgrade of the city status, the city of Can Tho in 2006 developed the Master Plan for socio-economic development with vision to 2020. Taking the orientation of this city master plan forward, the two districts of Binh Thuy and Vinh Thanh have also completed their respective district master plans for socio-economic development.

According to both districts' master plans, by 2020 population of the two districts will double that of 2005. The GDP structure of both Binh Thuy and Vinh Thanh will mostly consist of industry and services. For Binh Thuy District, agriculture which made up 13% of the 2005 GDP structure, will only account for less than 1% of the district's GDP by 2020. The corresponding figures for Vinh Thanh are 75% and 29.33%. With this vision, the speed of urbanization is scheduled to move very rapidly in Vinh Thanh given that the proportion of agriculture-forestry-aquaculture is expected to shrink from three-fourths of the GDP composition to only one-third.

As a result of the urbanization process, there have been quite a number of urban development projects or ideas planned for the city since 2004, however, many of these projects or ideas are only on paper. For example, in Binh Thuy District, there have been 23 projects planned for urban development since 2004. Most of these projects are to build residential or urban clusters. However, as of mid 2009, only 3 projects have been completed, 6 projects are under implementation and the remaining 14 projects are still waiting for investors. The district has not finalized and publicized its master urban planning and land use planning, irrespective of the approved master plan for socio-economic development.

For Vinh Thanh District, although the urbanization planning has not taken place at the same pace as Binh Thuy District, the district has for the past years planned and implemented 13 relocated areas for houses suffering from floods.

## 4.2 CURRENT INTEGRATION ISSUES IN PLANNING

### *Rigid planning targets*

As discussed in section 5.1.1, an overall process of socio-economic development planning in Can Tho can be illustrated in the below diagram (Figure 5)

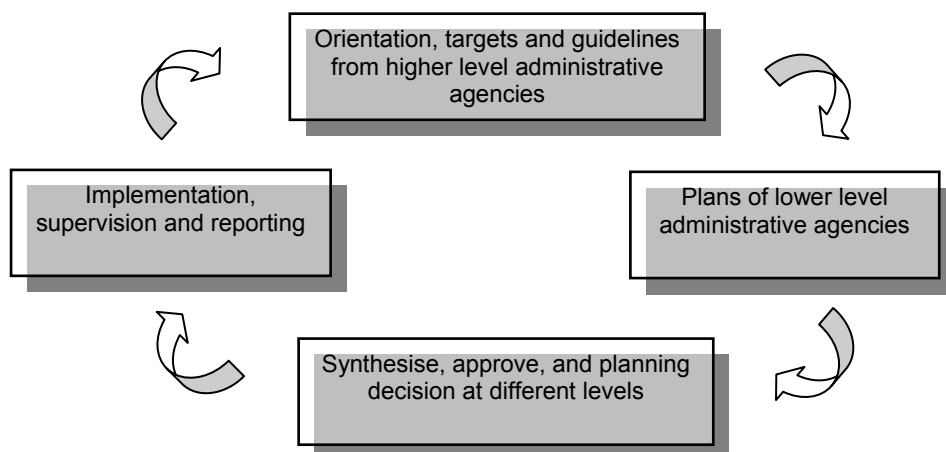


Figure.5: Overall process of socio-economic development planning in Can Tho

As the diagram illustrates, socio-economic planning at lower level agencies in Can Tho City depends very much on the targets and orientation set at higher level authorities' SEDP, not the other way round. The diagram shows that implementation, supervision and reporting of the different plans can of course influence the planning process. Yet group discussions in both districts Binh Thuy and Vinh Thanh revealed that the extent to which planners can and are ready to change the planning targets allocated from higher level agencies is limited due to shortage of time and resources for planning. And even if local planners see that the targets or indicators allocated for the SEDP of their respective-level authorities unrealistic. According to one head of residential area in Vinh Thanh District:

*'The ward's People's Committee assigned me to collect 8,801,000 million dong for the storm and flood prevention fund this year. I don't know where this figure came from, I just have to do it'.*

#### *Limited participation and awareness of local people, especially the poor*

Group discussions in residential clusters of Bui Huu Nghia and Thanh An wards indicated that planning exercises did not take place at residential areas or if they did, they were just nominal through the meetings of the people council's members of the wards with household representatives. Participation of local residents in planning processes is very limited. The poor are the most vulnerable people but poor households usually are not aware of the residential areas' meetings or if a meeting's invitation reached them, they did not go because the meetings' contents were not of interest to them and attending residential area meetings would affect their chances for earning livings.

*Constraints of the local people in the new Residential areas (floods residential area):* Key constraints are limited access to basic services such as schools, markets, and opportunities to generate new incomes sources. Although there have been support from the government for vocational training but the capacity to gain new livelihoods remains limited. The concern of livelihoods and children's education are the most prominent ones for those resettled households.

*Limited awareness and understanding of climate change among the related stakeholders:* Group discussions and interviews with key informants, whether they are local officials or ordinary citizens confirmed our assumption that 'climate change' is quite a fresh term in the localities. The term does not exist in any of the major development plans or reports of the city, the two districts and wards.

Both the master urban planning document and the master socio-economic development plan, with vision to 2020 of Can Tho City slightly touch upon some disaster related aspects such as the planning of residential clusters for households threatened by floods but this is primarily from the view point of disaster risk reduction. No what so ever climate change responsive planning was referred to in these master documents. This is understandable as the issues of climate change were not widely spoken at the time these two master documents were formulated in 2006.

Likewise, the master plan for socio-economic development of Vinh Thanh District only mentions about the development of residential clusters for flood-prone families in the district, no reference was made to climate change. The reciprocal document of Binh Thuy, on the contrary, does not even refer to any disaster risks. Thus no preparedness plan for disaster risks was spelled out in the master plan of Binh Thuy District.

All interviews with planning officers at the city, districts and wards showed that their awareness on climate change threats to the city planning was very limited. Most of them

have heard once or more about the term from the television, radio or read in the newspapers recently, all the people interviewed confirmed that their understanding on climate change impacts is very low.

With regard to disaster preparedness planning, group discussions with the local officials and members of the flood and storm control committees at district and ward levels indicated that disaster preparedness planning is still done in isolation with the socio-economic development planning of the city, districts and wards. Interviews with planning officers of both districts and both communes showed that there are 17 targets in the template of the ward-level socio-economic development plan to be filled at the ward but none of the 17 targets is related to disaster management, let alone climate change. Likewise, the template for a district-level socio-economic development plan in Can Tho provides 31 targets to be filled, none of these targets is specifically about disaster risk reduction. Upon a review of the annual plans for flood and storm prevention at the two districts and especially the two wards where preparedness and controlling measures for disasters or climate change related events should rest, the governance team is of the opinion that these disaster prevention plans are still prepared in an in-active manner and information is mostly about mobilising contribution from local sources (households and businesses) for the disaster prevention fund. There seemed to have no detailed analysis or critical assessment for the implementation of the plan for one particular year to feed information for the next year plan. Also key information such as financing for the implementation of the plan which will be important for assessing the feasibility and practicality of any plan is not at all part of the plans the team reviewed.

The review of the annual plans for flood and storm prevention also confirmed the segregation of disaster preparedness planning with the mainstream socio-economic planning. While the city or district SEDP of any existing year is already prepared from the previous year, the annual disaster management plan is only prepared around mid of the existing year which is just prior to the rainy and flood season.

## **5. GENDER AND CLIMATE CHANGE**

### **5.1 NEEDS OF WOMEN'S GROUPS TAKING CHILDREN TO SCHOOL**

The challenge for women in the Section 1 (Con Son island), Bui Huu Nghia ward, Binh Thuy District: Women who have children at school age mentioned the difficulty of getting their children to school. The isolation of Con Son island from all of the public service (school, hospital, public administrative offices and major employers) is difficult for even adults to access and more challenge for children to go to school. Although there is a ferry running between the island and in-land, the ferry is far away from the Section 1. Most of better-off families living in this area have a "pirogue", while other families paid for transportation by these pirogues. In the Section 1, there were two pirogues in services which charged 5,000 dongs each way per person. However, a group of families who have children at school age organized themselves to hire a women to ride a pirogue to school every day and take these children to school.

#### **Women would like to have support for a pirogue to take their kids to school**

We have a small pirogue to take kids to school. There are seven of them, all are going to primary school. Every morning they come to my house, I take them cross the river and walk them to school because they are too small to go by themselves. Their parents give me 60,000 dongs a month for one kid to cover the cost of diesel. There are two piroques in this area that takes group of kids to school. Some other families manage to take their kids to school on their own. I am very concerned about taking kids to school by pirogue: they are too small, only two of them can swim. I have to ride the pirogue and keep my eyes on them at the same time. If there is any big wave, I have to stop and wait until it safe to continue crossing the river. Once when we were in the middle of the river, the screw of the pirogue

was broken and we had to call for help. The last hurricane number 9 in 2008, we heard from the forecast that the hurricane would hit us the following day, so we took the kids to school on the previous. But the hurricane came right on that day. When we arrived at school and learned that school was closed due to the hurricane, we could not return home any more since the wind and the water had turned very strong. We were all scared and worried. Fortunately, a man who ran “xe om” (motorbike taxi) at the ferry knew our crew as he saw us every day offered us food and accommodation at his place.

*(Nguyen Thi Tuyet Nga, Section 1, Bui Huu Nghia ward)*



Nguyen Thi Ut is the head of Area 1, and also is the chairwoman of the women’s union Area 1, Bui Huu Nghia ward, Binh Thuy District. Ms Ut told us that there were 47 children from the area attended school in year 2008-2009: 14 primary pupils, 25 secondary pupils and 8 high school pupils. According to her, it is an urgent need of support for transportation to go to school for these pupils. All families want a regular means of transportation to take their kids to school on time. With the current hired pirogues, children usually miss their class as they have to wait until the pirogue are full with passengers.

The above fact has raised some thoughts as:

- Organizing groups of pupils to go to school every day, especially for small children (grade 1-2) is a good initiative by families. However, so far this is done spontaneously by some families. The organization of such groups could have been better with support from local authorities to ensure the best conditions for children going to schools.
- Organized group transportation for pupils will reduce the cost of sending children to school for poor families. Instead of having to pay 5,000 dongs each way per child (at least 10,000 dongs per day), each family could pay from 60,000 dongs per month (for a small child going to primary school) and to 100,000 dongs per month (for a bigger child to secondary or high school).
- It takes a lot of time if the family has to take their kids to school twice a day everyday as they cannot afford the cost of meal and day care at school. Some mothers mentioned that they would have to follow their child until the child finished primary school, which meant they could not work full time. Organizing group transportation for children to school will save more time for mothers so that they can have more time for work.
- It should be noticed that transportation by pirogue, however, is not safe (as reflected through the discussion with the local women). Pirogues are not built strong enough and too small for active/naughty children.
- Both children and the pirogues rider do not have any knowledge or skills on safety on boat or in case of accident. Training on these knowledge and skills for both children and the pirogue rider would equip them with skills to react on a risky situation (high wave, accident etc) and reduce the risk to travel on these pirogues.

Local women participated in the group discussion and the head of Section 1 mentioned that they expect to get support to buy a pirogue as the means of transportation for children to go to school. They said local families would cover the cost of diesel, oil and hiring a rider. If a pirogue is provided, it is crucial to have an agreement on the use of the common pirogue and the contribution from local people to ensure that it will sustain properly and will not generate conflict of interest within the community.



**5.2 WOMEN'S GROUPS NEEDS FOR CHILDCARE DURING FLOOD SEASON** – the great concern of mothers in Thanh An township (Vinh Thanh District): The discussion among women who have small children in Phung Quoi A ward (Thanh An township) pointed out a critical need for child care during the flood season. Even though Thanh An township has a kindergarten, poor families could not afford the expense (300,000 VND per month for a child). Four years ago, the ward started “flood season” child care groups with financial support from the government. This model was highly appreciated by local mothers. However, by the time of this assessment, only one among 3 child care groups in Phung Quoi A ward sustains due to the suspension of the government support.

Mothers who have small children at the child care group 1, Phung Quoi A ward insisted on having the child care group re-open. In addition, there are proposals on building the fence or surrounding walls for the school, paving the school yard (currently it is a sand lot); providing toys, clean water supply, mats, cooking utensils etc.

Through discussion with women in Thanh An Town, it is found that the child care models are very necessary in the flooding seasons. Some benefits can be seen:

- Poor women would be able to work without much worrying about their children.
- Poor women would have more time to earn more income from fishing during the flood season from August to October. Without child-care group, they would have to stay at home to take care of their children.
- Children were kept safer at child-care groups, particularly for children at pre-school age as they were kept away from the water. Child care teachers at Bo Bao group (the child care group which sustains until now) mentioned cases of children drown in the flood season before the establishment of these child care groups. With the child care group, there was no more drowning case reported.
- Children were kept safer at child-care groups, particularly for children at pre-school age as they were kept away from the water. Child care teachers at Bo Bao group (the child care group which sustains until now) mentioned cases of children drown in the flood season before the establishment of these child care groups. With the child care group, there was no more drowning case reported.



**Sharing from mothers and kindergarten teachers about child care groups in the flood season**

A few years ago, Phung Quoi A ward had three child care groups during the flood season. Each group with 20 children was subsidized with 3,000 dong per child for food supply and cooking facilities (gas or fuel). Teacher in these groups received an allowance of 300,000 dong per month. These groups located in a dry location above the flood level. One group used a classroom of Thanh

An primary school. These groups only operated during the flood season (from January to May) with subsidy from the government and could accommodate up to 20 children. Many families wanted to send their children to these groups, but only kids from the poorest families who did not have agricultural land were accepted. Meals given at these groups were very basic due to limited budget. However, these groups were running for only two years and were terminated two years recently due to the suspension of the government subsidy. Mothers had to stay at home to take care of their children. They are worried as the flood season is coming. (*Group discussion of mothers with small children and child-care teachers at child care group 1 – Phung Quoi A ward, Thanh An township, Vinh Thanh*)

Mothers who have small children at the child care group 1, Phung Quoi A ward insisted on having the child care group re-open. In addition, there are proposals on building the fence or surrounding walls for the school, paving the school yard (currently it is a sand lot); providing toys, clean water supply, mats, cooking utensils etc.,...

Critical problems reflected through both the group discussions and our observations were:

- **Sanitation:** All child care groups do not have toilet. According to a teacher, they took the children to the river – like local people here who mostly did not have toilet.
- **Nutrition** as the subsidy was limited compared to food price.
- **Safety** as the surroundings of the child care location was also flooded or going to the river for instead of having a latrine implied a risk to the safety for children.
- **Sustainability of childcare groups:** At the moment, many of the childcare groups are not functional due to the lack of finance for the teachers and the children expenses. External dependence instead of community reliance or local initiatives causes the disruption of the model.

### 5.3 POOR WOMEN AND MEN HAVE LOW ACCESS TO CREDITS/FINANCIAL INSTITUTIONS

It was brought up in the discussion with local women and staff of the women's union in both Thanh An township and Bui Huu Nghia ward that it was difficult for the poor – especially poor women – to access to available preferential- interest credit. Poor people do not have land or any significant property to put in security or mortgage as required by all commercial banks. Poor people or households usually access to governmental credit through the Vietnam Bank for Social Policies – which offer loans guaranteed through local mass associations such as the Farmer's Union, the Women's Union, Veteran's Association or Youth's Union. Thanh An's Women Union managed three programmes:

- Programme for poor households offers a maximum loan of 10 million VND and minimum of 2 million VND in two years, with an interest of 0.65 % ;
- Programme on Water Supply and Sanitation offers a loan of 8 million VND in five years with an interest of 0.9 % for building water storage and latrine; and
- Education loan for students in 4-5 years offers a total of 22 million VND (6-8 million VND per year per student).

However, both poor men and women informed the assessment team that many people could not get these loans since funds were not available.

#### Women and men are in need for loans



The family of Nguyen Van Nam and Truong Thi Tuyen living by the Canal 16, Phung Quoi A ward is classified as a poor household. Tuyen received a two-year loan of four million Vietnamese dong from the Vietnam Bank for Social Policies with the guarantee of the local Women's Union. Every quarter, she pays an interest of nearly 80,000 dong. The head of the local Women's Union collects this interest from Tuyen.

Tuyen raised two pigs for 6 months and could sell 200 kg of pork for 6,750,000 dong. She spent 5 million in raising these two pigs, which means she earned 1,750,000 dong from them. Last year she sold two other pigs and got a million. Her family spent that amount of money for an electricity meter to start an electricity

account for their own – they used to have to pay a higher price for sharing electricity with their neighbors.

After selling the second pair of pigs, Tuyen paid back four million dong to the Bank of Social Policy. The couple wanted to get another to continue raising more pigs. But Tuyen is not sure if she can get another loan, she knows many poor people lined up for a limited funding. She wants a loan of 10,000,000 dong. One million to repair and enlarge the pig case, 4,200,000 to buy six small pigs and the rest will be for raising them. Tuyen has never been trained in raising pig.

The assessment has pointed out the following findings related to credit access:

- The government's credit provision for the poor does not meet their demands. In some cases of refusal, the bank and/or local associations did not provide guarantee for some households as these organizations did not see the possibility of paying back these loans or if the household would not be able to generate income from the loan. However, a number of local women said the process of screening and approval was not really fair as some households got the loan, while the others in similar conditions did not.
- Loans from the Vietnam Bank for Social Policies are relatively small, from 5 to 7 million dong. However, due to a large demand, these loans are separated into smaller loans (4 millions). The duration of the loan is also considerable short (one year) which is not efficient. Local people proposed a larger size and longer duration of loans – up to three years – for the poor.
- According to local authorities and staff, loans were given in a package with technical training or household economics (e.g. training on raising pigs). In fact, some households participated in the assessment did not attend these trainings. They met difficulties in dealing with pandemic. Some households said they could not attend those trainings as the venue was too far. Other households said they were not invited as the number of participants in each training course was limited.
- A low awareness on sanitation was observed among households asking for loan for livestock (mostly for raising pigs) in Phung Quoi A ward (Thanh An township) and Con Son island (Bui Huu Nghia ward) – where local people live mostly on agriculture. As most people do not have much land, they build the cage for pigs next to their house and the sanitation was not proper.

The head of the Women's Union in Phung Quoi A ward described a model of '*capital accumulation group*' running from February 2006. This model did not require mortgage or guarantee like loans from the bank. This model of self-help group also strengthened the connection among the local women. However, the size of the fund accumulated through this model was relatively small compare to the demand for livestock (e.g. raising pigs). In addition, if this initiative will be multiplied, it should be complemented with the technical trainings and coaching and could be emerged with other activities by the Women's Union such as raising awareness on women's rights besides providing loan.

#### **Capital accumulation group (Tổ hùn vốn)**

There are 11 participants, each person contributed 200,000 dong per month (totally the group has 2,200,000 dong per month). On the 25th every month, the group will organise a lucky draw. The lucky person will get the fund of the month. Participant can use the loan for buying a small pig, send their children to school or repair the house etc.

#### 5.4 CHALLENGES FOR MIGRANT WORKERS, ESPECIALLY FOR FAMILIES WITH SMALL CHILDREN

**Tran Thi Hong Xuan, a woman of age 29 from Soc Trang Province is married to a man from Dong Thap province.**



She has two children, one is nice years old and the other is eight months. The couple moved to Can Tho in 2008. Her husband sells sweet breads at O Mon district, about 25 km from the centre of Can Tho. She used to serve as a domestic maid, but now Xuan stays at home to take care of the small child. They rent a tiny room which does not have enough light: they had to carve two holes on the wall of the room and leave a hole on the roof to get some sun light. Their income is chancy at around one million

dongs per month. They have to pay 350,000 dongs for rent. The coming school year for their first child will cost about one million to start (school fee, books and stationery, uniform, pupil insurance, etc.) Xuan told us that during the three months of the rainy season, they did not have enough food. She borrowed 500,000 dongs from the landlord for a month and had to pay back 600,000 dongs. These recent months, the small baby got sick. It cost 400,000 to buy medicine and take the baby to the hospital three times. Her baby does not have the ticket (for small children to get free health care) because their household is registered in Soc Trang. The couple have never been invited to any meeting of the local community.

Xuan wants her first child to get school fee waiver as other poor households could have, and the second child to get free health care like other children under six years old.

*(Tran Thi Hong Xuan, rental house range, Area 3, Bui Huu Nghia ward)*

The case of Xuan implied challenges and vulnerability that migrant workers are facing:

- Lack of access to public services such as health care and education due to without household registration at the local administrative unit of the destination. The migrants have to return to their home province to get a verification and recommendation to forward the patient to the hospitals in the destination. However, they could not afford these expenses including traveling cost. This leads to the fact that even though the government has the policy on providing free health care for children under the age of six, in fact these migrant households do not benefit from this policy.
- Migrant households often do not have secured jobs or employment. They work as vendors or manure labour with very low income. These are poor households do not benefit from any of the government's social policies for the poor as these policies do not address migrants as a target group. They often have to pay a higher price for utilities as set by landlords.
- Local authorities said they are not responsible for migrants; only local police keep track on the number, the list of full name and origin (as reported by landlords) for security control in the area. In fact, migrants' concerns or problems are not "scope of responsibility" by local authorities where they migrate to.
- Migrants do not participate in any of those activities organized by the local people. This separation restricts access to information of these migrants and their opportunity of participating in the local life and community events as well as accessing important available local resources and increasing social capitals.
- Women who have small children face more challenges as they do not have any support from their families who live far away.

## 5.5 CHALLENGES FOR SINGLE WOMEN AS HEAD OF THE HOUSEHOLDS

### Why haven't women as head of poor households got grant to build their houses?



Tran Thi Huong is 47 years old. Her husband died in 1999 from a sickness. She now lives with her two daughters, one is at ninth grade and the other is at seventh grade. Huong does not have land to plant rice. She washes dishes for a local restaurant for 30,000 dongs per day. Her house is tottering, the earth floor is chappy, the roof made of leaves is full of holes. "Rain often comes through my dilapidated house", she said.

During the flood season, water came up to her door. Without a pirogue, she and her two children had to wade 300 meters in water up to their waist to the main road to go to school or to work.

Huong said, once a staff from the ward mentioned to her that the government would support poor households like hers to build a new house, but she had to pay 3 million in advance to a fund which was not clear for her what for. She said, it was hard for her family than other poor families (with a man as the head of the household). A man could socialize more and handle relations with local authorities better.

The assessment showed that the most vulnerable groups among the poor people are single mothers and elderly. They share common characteristics as almost other poor people such as landless, having unsecured employment, low income, having health problems... In addition, single poor women have very limited social capital which affects their capacity and opportunity to participate in and benefit from the government's programmes for the poor. While the demand for such programmes is very high for both the poor and nearly poor groups, it's usually done in the way that local authorities and social associations make a list of poor people, which is discussed in the village meeting and then finally submit to higher level for approval of the list (who will benefit from the government's policies for the poor).

### Needs from the group of women

- (i) Provide water supply or support to build wells.
- (ii) Support finance to resume child care groups during the flood season
- (iii) Have a pirogue to take children to schools
- (iv) Provide more loans or microcredit
- (v) Clean up pollution and water source

## 6. HCVA IN BINH THUY DISTRICT

### 6.1 HAZARDS IN BINH THUY DISTRICT AND IMPACTS

At Binh Thuy District, the disasters were identified and arranged with the force of the effect to local livelihood. The result was showed in the Table 2.

Table 2: The disasters and their effect strength ranked by local authorities

No.	Disasters	Ranking			
		District	Bui Huu Nghia	Section 1	Section 3
1	Flood and High tide	1	1	1	2
2	Landslide and erosion	2			
3	Environmental pollution			2	1
4	Hot air/ unusual rainfall		2		

No.	Disasters	Ranking			
		District	Bui Huu Nghia	Section 1	Section 3
5	Cyclone	4	3	3	
6	Storm	3	4		3
7	Lighter and Thunder		5		
8	Fire	5			

The results on the Table 2 give that when the flood comes and combines with high tide would cause the heavy impacts to area and local livelihood. At the flood season, although the water level is higher than other time but it has not caused the damage. When the flood time combines with high tide, the high water level will be higher and higher and make the waterlogged. Fortunately, the areas near the Mekong River will not be waterlogged for long time because of the effect of semidiurnal tide - when the low tide the water will be driven out. The maximum period of water logging would be about 6 hours per day if that area was covered by water. The water logging could cause the damage to the agriculture particularly to orchard and gardens and then to lose the household income, that would be the first and largest damage.

The landslide and erosion would result in the loss of some land and cause damages to the area. So the damage of landslide would consider the disaster with the second potential harm.

The environmental pollution is considered to be the main harmful source because it causes the damage to survival environment including the resources especially the water resources is used for domestic consumption. At section 3 of Bui Huu Nghia ward, waste from the enterprises and manufactory around affects the local people's lives. According to the local community, currently they perceive that environment pollution in their area cause the most damages to their lives. At section 1 (Son river islet), there are no water supply system, the local community has to use water on Hau river for domestic use. Water pollution from intensive Pangasius catfish aquaculture is considered to be the second source of water pollution in the area.

The hot air and unusual rainfall is considered to be more the harmful source to the lives and livelihoods of the local people.

Cyclone and typhoon can be arranged the third or fourth damage depending on the particular area. All of the informants agreed that although the damage of cyclone and typhoon is heavy but their probability is low and in short period so their damages are not much. The local authorities and community's assessment explained that their experience on the typhoon and cyclone prevention is very low. This is one of the unprepared situation of the Mekong delta people because the climate change would cause the irregular changing on the climate and weather, and that cyclones and typhoons will appear more often too and then the people would suffer from further damages when they are hit unprepared.

Thunder and fire are ranked the lowest damage level because their damages are small scale.

According to the discussions at each authority level, disasters happen as in figure 6. In any month of the year, there are incidences of damages caused by disasters but in the flood season the damage will be multiplied many times for example, in September there are not only flood with high tide but also cyclone and typhoon.



Landslide/erosion in the islets or other places do not happen in the flood season, it might show that flood is not the main cause for the erosion and landslide in the area. There should be further research on this to provide appropriate measure to prevent this happening.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Disasters												
Flood and High tide												
Cyclone												
Storm												
Landslie/ Erosion												
Lighter and Thunder												
High temperature												

Figure. 6. Disaster Calendar  
In Binh Thuy (Red band) and Bui Huu Nghia (Blue Band)

Environment pollution is not one of the natural disasters but it is causing a lot of problems for the local people in Binh Thuy District. There are three pollution sources in Binh Thuy: i) industrial activities ii) water and domestic waste water iii) water and waste from aquaculture activities along the rivers. According to the group discussions at all levels, industrial areas such as Tra Noc 1, 2 although they claimed to have a waste water treatment but this either does not work regularly or ineffectively therefore the waste water comes into the river and pollutes the river. Domestic water also goes straight into the rivers and canals without any treatment. The percentage of the households without latrines is quite high, around 30% in the whole district, especially in the outer areas, and this also makes the pollution worse. Areas along Hau River have favourable conditions for raising river fish, and the main fish is catfish all year around. The fact that waste water from fish raising ponds goes straight into the rivers without any treatment causes serious water pollution for the local people, especially the pollution in the small rivers/canals, directly affecting water sources and hygines of local people living along the rivers.

### Main damages in Binh Thuy

According to historical profile, from 2004 up to now, main hazards have happened in the district include river erosion, floods combined with high tide, cyclones and storms. Due to the natural nature of the area with weak earthen foundation, with Hau River and busy canals systems, during the flood season, water level rises up high with the strong currents can cause erosion, affecting the lives and production of the local people.

In table 3, the damages related to agriculture production, and lands of the areas along the rivers are considered to be the main ones in most of the wards in the district. Most serious damages are in Son islet, Khuong islet of Bui Huu Nghia ward.

Table 3. Disasters happened in Bui Huu Nghia since 2004

Year	Disasters	Affected areas	Damages and causes
2004-2007	River erosion	Bùi Hữu Nghĩa (Cồn Sơn) ward	50-70 m long and, lún sâu vào 3-5 m width, due to Hau River flow, high speed boats, sand exploitation, sand fill-up areas

Year	Disasters	Affected areas	Damages and causes
2004-2008	Floods with high tide	Phường Bùi Hữu Nghĩa, Trà An, Bình Thủy, Long Tuyền, Long Hòa, Thới An Đông	Wide scale, damaged vegetables and fish ponds
2005	Cyclones	Khu vực 1, 2, 5 (phường Trà Nóc); khu vực Bình Yên B (phường Long Hòa)	Damaged 15 houses, roofs blown away 76 houses, 1 class room, 3 people injured, total damages of up to 700 million
2006	River erosion	- Bờ sông Trà Nóc, - Cầu Rạch Cam	10 collapsed houses 2 collapsed houses due to poorly constructed, highspeed boats and currents
2006	Storm no 9	Phường Bình Thủy, Trà Nóc	Collapsed 9 houses, blowing roofs of 135 houses, and damaged more than 1,000 fruittrees. Damage cost up to 1,014 million Dong
2008	River erosion	Trà An ward	Four houses damaged

Ranking results of the damages show that river erosion causes the loss of production land, affecting the houses of the local people. Breaking the dykes is considered as the most serious in the district (the local people say that this happens very often, for many years especially during flood season). Collapsed houses and roofs blown away are the second impacts due to the fact that those people who live on the islets are normally poor households with very temporary conditions which can be easily damaged by storms or low pressures. Damages of fruit trees gardens, one of the main income sources of the local people on the islets are considered to be third serious damage, and lastly the damages related to infrastructure, and transportation in the district.

Table 4: Damage assessment of the natural disasters in Binh Thuy

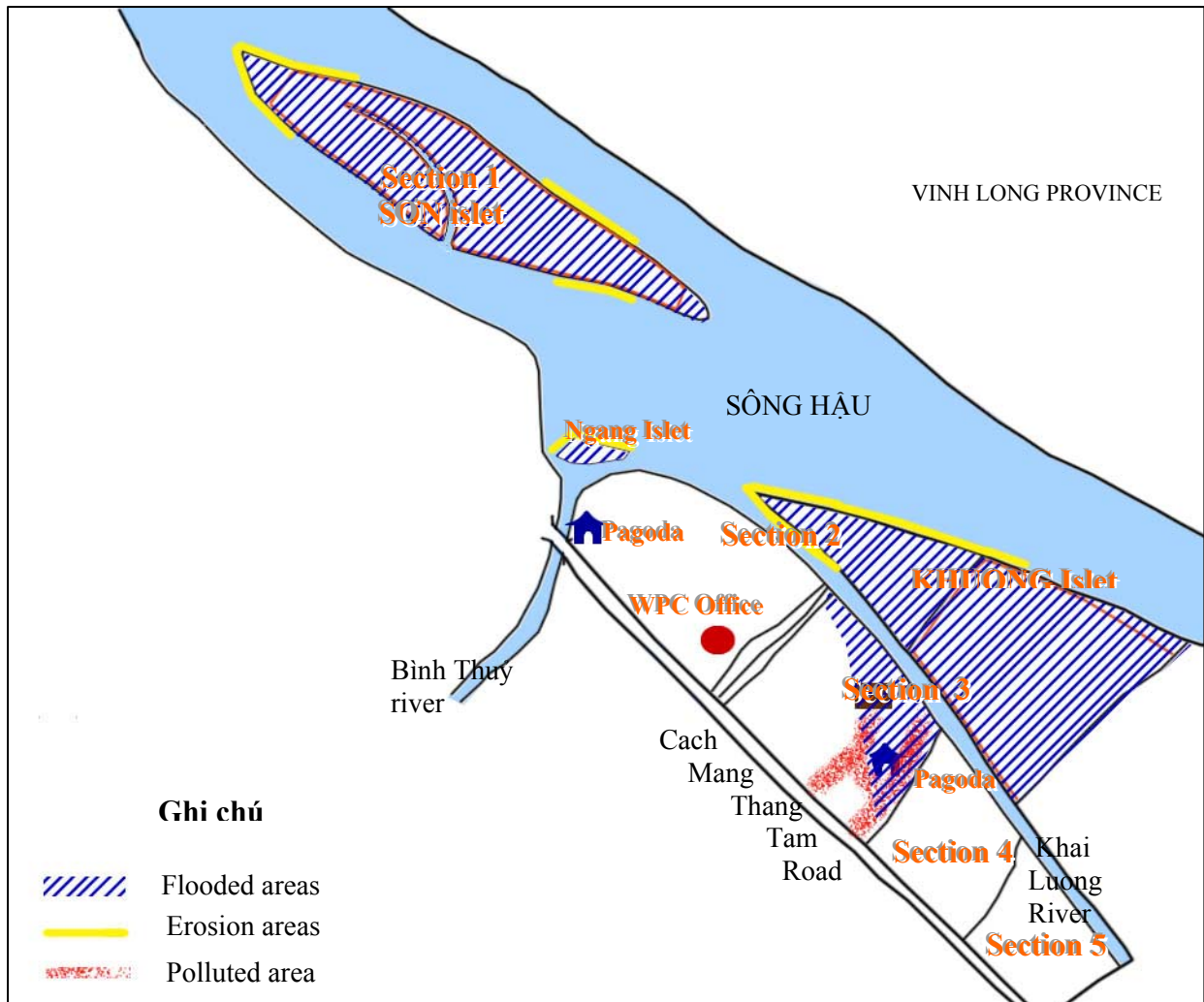
Damages	Ranking
River erosion, dyke erosion	1
Collapsed houses and roofs blown	2
Fruit trees	3
Public works	4

**Most vulnerable areas:** According to historical profiles and mapping, the most vulnerable areas of Binh Thuy focus on wards along Hau River including Trà Nóc, Trà An, Bình Thủy và Bùi Hữu Nghĩa, in which Bùi Hữu Nghĩa ward is considered the most affected area by main hazards: river erosion and floods together with high tide. All the area of section 1,2 and some part of section 3 are on islets, with low and weak foundation therefore they are constantly eroded as well as affected badly by floods and high tide. The remaining areas of the ward also encompass some low areas along Hau and Khai Luong Rives.

**Most vulnerable groups:** Based on the information of hazards, hazards damages and most vulnerable areas, the most vulnerable groups by hazards and climate change in Binh Thuy are those who live on agriculture on islets, low land along the river, poor and single people who live in temporary houses in the city and those who do not have access to clean water sources.

➤ **Bui Huu Nghĩa Ward**

Figure 7. Hazards map of Bui Huu Nghia Ward



Bùi Hữu Nghĩa ward has 2,303 households. Son and Khuong islets are part of Bui Huu Nghia and are separated from mainland, therefore the traveling of the local people on those islets depend totally on boats, which are quite dangerous during rainy season.

There is not much infrastructure on the islets therefore the access to public work remains limited and constrained compared to other areas of the mainland areas. There are 6 kinds of hazards every year happen in the ward (table 5) : Flood with high tide, long period high temperature together with irregular rains, storms, cyclones and lightening. Of which floods together with high tide is ranked the most serious. There are three other secondary hazards which are river erosion, environment pollution, and human plagues/diseases.

Table 5. Hazards in Bui Huu Nghia ward

Main hazards	Rank	Secondary hazards
Floods and high tide	1	River erosion, environment pollution and infections disease
Long period of high temperature	2	Environment pollution
Storm	3	
Cyclones	4	
Lightening	5	

These hazards since 1978 have been causing a great deal of damages to the local people and areas. In which storms, floods with high tide and long period of high temperature happen more frequently, at the same time causing large scaled damages. Impacts from storms are mainly from 'hoan luu' of other storms at low levels. Based on group discussions, sofar there is no main storm hitting the areas. Therefore it can be said that the main hazards here are watershed floods together with high tide, causing flooding., based on the opinions of the local people.

Due to the characteristics of the ward being along the river with islets of low land, the damages in the surveyed areas mentioned repeatedly are inundation due to the high level of water in the flood season. Out of 5 sections of the ward, section 1,2 and 3 are the most vulnerable ares by this hazard due to the total land area of these section are low, and there are many households who are working on agriculture, or non farm such as selling lottery or petty trade in the streets. Other areas are higher and the local people are mainly government staff with stable jobs.

Assessment in section 1 and 3 shows that floods and high tide are the main concern of the local people wth the main impacts such as breaking the dykes, eroding the soil, causing flooding leading to crop loss, and many households losing their cultivated land or residential areas.

Table 6 Historical profile of Section 1, Bùì Hữu Nghĩa

Year	Hazards	Damages
1977-1978	Floods with high tide	Breaking the dykes built by the local people Flooding the gardens of fruitrees, reudicing their yields Losing fish in the fish ponds The whole islets was under the water of more than one metre
2001	Floods with high tide	Breaking the dykes built by the local people Flooding the gardens of fruitrees
2000	Cyclones	- 2 houses collapsed - roofs of 3 houses blown away - Damaged 1 house - Broken fruitrees
2003	Floods with high tide	- Breaking the dykes built by the government (while making the dykes) - Under the ware of 0.5 m, - Loss of fish in fish ponds - Fruitrees died of rotten roots (due to the water)
2006	Environment pollution from Cat fish raining	105 people of 20 househodls along Vam Ho canal cannot use the water from the canal for domestic use Children and adults suffer from skin diseases Women suffer from gygeology disesase/infection

➤ **Section 1 (Cồn Sơn)**

Section 1 (Cồn Sơn) from before 1947 was a barren land, later on people came and reclaimed to grow rice. Following is the map of hazards in the section 1 as in Figure 7.



Figure 7. Hazards map of Section 1, Bui Huu Nghia ward

Due to the low foundation of the land which is constantly inundated since 1958, the local people have made small dykes to protect their crops. Before 2003, there were around 100 households living there. However due to the inconvenient/disadvantaged location, constantly suffering from floods and erosion, some of the local people migrated to manland, currently there are only 85 households with 450 people living on islet area of 75ha.

Since 2003, the government invested in dykes around the islet (the local people often call this government dyke or national dykes) with the foundation of 2.8m, 8m wide at the foundation and 2,5-3m surface wide. Since then, the dykes are continuously improved by the local people every year during dry season. According to the local people, the high level of floods in recent years reaches as high as the dyke surface. And this is a constant main threat to the production as well as living conditions of the local people here.

### ➤ Section 3 (Khuong Islet)

Similarly to Son islet, Khuong islet also has dykes invested by the government. The islet is also easily affected if the water level rises 20-30 cm, directing affecting the area of 27ha of land with 30 households living here (Table 7).

Not only in the islets areas, due to the fact that the rest of the other areas of Ward (section 2,3,4) are lying along the Hau, Binh Thuy and Khai Luong rivers, floods and high tide can lead to flooding/inundation in small roads/lanes and residential areas. Different from islet areas, they are not protected by dykes, river water will go into the residential areas, together with waste water from urban drainage system and cause most serious pollution and affect badly the traveling and lives of the local people.

Table 7. Historical profile of Section 3- Bui Hũu Nghĩa (Group discussion)

Year	Disasters	Impacts/damages
1978	Floods	- Broken dykes (built by local people) under the water of 1-

Year	Disasters	Impacts/damages
	together with high tide	1.5 m all over Khuong island 100 % houses were under the water (30 hhs) Main land areas were 0.7 m inundated. Crops, veg, rice and fruitrees were affected: 50-60 %
1997	Storm no 5 with heavy rain	- Water flooding the islet > 1m, mainland of over 0,7 m - 15-16 houses with blown away roofs
2004	Environment pollution	River water and local areas were polluted due to 35 households raising catfish discharging their waste water straight inot the river and Concete Company of Phan Vu made the drainage system (lane 370, 364) which was higher than drainage system in the lanes, resulting in polluted waer in the residential areas (the company is located right on the river of Khai Luong)
2006	Storm no 9	- trees fell down - Broken electricity poles - Roofs of 10 hhs blown away

Apart from the direct impacts, it is noted that the irregular weather conditions in the recent years have been affecting the health and production of the local people. Accoridng to the local people, from 1950 to 1970, the average temo is around 31-32<sup>0</sup>C , but over the last 10 years, the common temperature is ranging from 33-36<sup>0</sup>C. the temperature increase has been causing considerable impacts negatively to the agriculture production. Although there is no lack of water or drought in the areas, the local people claim that the increased temperature has contributing to the increases in dieases, pests development (more insects and pests), increasing their watering cost and affecting the yields of the crops. The rainy season in the recent years is longer than before, causing damages to the Than Nong crop (havesting in November and December), and to those who grow vegetables, and bonsais for New Year festival. According to historical information from 2007 to 2009, following are the key damages in Bui Huu Nghia ward.

Table 8. Key damages in Bui Hũu Nghĩa

Damages	Ranking
Loss of agriculture land	1
Damages of secondary crops	2
Health of the local people (infections and non-infectious disease)	3
Collapses of houses and roofs blown away	4
Damages to fruitrees gardens	5
Loss and damages of the assets	6

Agriculture is the most vulnerable sector affected by the hazards in the local area, and agriculture remains one fo the main livelihoods activity in the ward.

Impacts on health of the local people are due to the effects of floods together with high tide and high temperature. There are also other causes to impact the health such as the level of awareness as well as the poor economic conditions of the local people. Industrial enterprises and fish raising enterprises discharge directly the waste water into the river without treatment. The drainage system is not working well with lots of dirty water accumulated for a long period of time, 95 % of the local people on the islets do not have latrines and human waste goes straight into the river, and the habits of using river water for consumption are also main causes for more secondary hazards such as more respiratory dieases, skin infection, gyeocology and intestine infections.



Polluted water sewages with bad smell and breeding sites for mosquitoes in section 3



“Fish pond latrines” – popular one in section 1 (còn Sơn)

The vulnerability by hazards and climate change in Bui Huu Nghia are not only natural but also human induced. According to the local people, there are other causes for soil erosion during rainy season such as sand exploitation in the Hau river near the islets, and continuous operation of big boats, high speed boats creating stronger waves, resulting in more damages.

Most vulnerable groups of Bui Huu Nghia are: Those who are doing agriculture on islets of Khoung and Son, poor people who do not have stable jobs and live in temporary houses in main land, and local people who live in the low land area of Hau and Khai Luong Rivers.

The vulnerability is going to be enhanced based on the forecasts of global climate change. According to the scenarios of ISET or IPCC, sea level rise in the future will make the current dykes run out of their uses, due to the water level is higher than the dyke surface. Besides, lengthened high temperature and increased rainfalls in the floods season will affect more to the agriculture production. Can Tho in general and Binh Thuy in particular are entirely vulnerable to the direct impacts of tropical storms and with the current capacity to cope with storms, the damages are expected to be very significant.

## 6.2 DISASTER MANAGEMENT

### ***Bui Huu Nghia Ward***

The ward DMSC has 14 members (including 5 women), lead by Chairman of Ward People's Committee, Deputy is officer responsible for traffic and irrigation. The remaining members are leaders of the sections and officials responsible for the other units of WPC and head of associations in ward.

DM plan created at the beginning of the year (usually in March) with the suggestions of withdrawal and the experience and oriented SEDP. Each other sections and agencies in the area of ward also have their own plan.

Budget for operating of DM activity get from DM fun. Annually, DMSC of ward collect money from people and the companies in ward, this fund about 30 million will submit to the district. The use of this fun based on the actual disaster situation or area of ward. In the case of severe damage, more fun will support by the district and city.

Besides the force of the wards, each section has a unit of DM, consists of 5 to 7 people and some others from self-defence force (4 people), the self-security force (4 people). This team is arranged in different positions in the area at high risk damage by hazards, the



communication between them by the contact directly or via mobile phones. In case of emergency, they can mobilize 20 other local people or over 100 people from the other sections of ward.

Facilities for the ward's DMSC are normal basic equipment such as life vests, hand-held loudspeakers and lifebuoys. At the section level, each Unit of DM are provided about 5 (section 2, 3, 4, 5) to 10 (Section 1) life vests depending on the location of the section, 40 lifebuoys, 1 handset speakers. The isolated areas like two islets have pre-contract with local people to hire 5 to 10 tons capacity boat and use in case of disaster or to bring people to go evacuate. Each section in mainland have 2 radio speakers to give early warning information to the people.

DM activities and coordination: Every year, normally in March, 4 wards start to implement dry season irrigation, checking and reinforce the islet surrounded dikes. Some local people set the stakes to get the data on highest level of water in the year then use this data as evidence to heighten the dikes. In dry season irrigation activities, the local people work as main force and WPC call upon companies in ward area to contribute by support money to hire boats and excavators. Before rainy season, DMSC direct the health station to preparing the first aid medicines, assign people responsible for each vulnerable area; Signed the contracts with local people to hire big boats (5-10 tons in capacity) to bring people from islets to mainland, usually to two pagodas: Nam Nha Duong and Hoa Linh. In case the flood water rising too high, some solid building with 2 ore more stories can use as shelters for people: schools, office of WPC, military stations. In the other hand, the DMSC also asking people to store food and ready for joint in rescue team.

During typhoon or severe flood, wards mainly used local force to perform the rescue and relief. If you have big problem such as dike broken will call for assist from the army force in ward.

Work to overcome the impacts of natural disasters is done after assessing the extent of damage. Generally, the small damage just to use the funds of DM. In case of serious damage, ward level will call for support from higher level and campaign the support from the production and other organizations. For example, reinforce the dike, the fund for renting will supported by government (budget of ward have for dry season irrigation and flood prevention actions is 9 million VND/year); the other expenditure will supported by donors; local people and army forces will participate in contributing mandates

The annually DM activity of ward assessed by staff and local people are effective. Through many years of implementation, they found that in disaster impact mitigation in wards with the professional staff responsible for the directing and standing 24/24 in the flood time, catching the forecast information in time, guidance on the level of active help reduce damage significantly. Implementation of irrigation in dry season and preparing preliminary evacuation, exercise for prevent floods and typhoon help raising awareness of people and also create consistency in the implementation of coordination between the participation.

***The limitation:***

- Ward DMSC still lacking knowledge and skills to cope with typhoon.
- Lackinh of fund in some emergency cases.
- The big boat (with capacity of 10 or more) not available at any time (no boat own by ward).
- The supporting and coordinating in DM of production companies are not regular.
- Some companies exploit sand in river not in rule and right place but ward has no measure to cope with.

- The manufacture, companies in ward area raising the foundation but not follow the guidance of urban plan makes some residential areas become inundated.
- The associations/organizations have not enough close contact with local people (especially the people in two islet).
- There are still not close collaboration in DM between WPC and other associations.
- Rarely organize to planning in emergency cases and there is no fund to do exercise on DM.

### **Section 1 (Sơn Islet)**

#### **Facilities:**

- Life-vests : 5-10
- Lifebuoy: 40
- Hand loudspeaker: 1
- 2 radio speakers (each section on mainland)
- Contract with local people a boat 5-10ton in capacity
- The local people set the stakes to get the data on highest level of water in the high tide on 14<sup>th</sup> -15<sup>th</sup> and 29<sup>th</sup> -30<sup>th</sup> (lunar month) then use this data as evidence to heighten the dikes.
- Ready to collaboration and contribute mandates for dike reinforce.
- They pump water and let water out themselves when the dike broken.
- They heightening the dike themselves .
- Close-knit community and ready to cope with disaster whenever.
- The people live on two islets often reserve food for at least ½ month
- After national dike built, the agriculture activities in these islet is more stable.

#### **Limitation:**

- There are some household live outside of surrounded dike, these have high risk of lost live land, farm land and cannot to growth fruit trees.
- Since 1960s, there were 60hhs completely lost the farm land
- Low living condition: no health service, no roads, no electricity, no school.
- No clean water source
- Most of them (95%) using “cau ca”-a type of natural toilet
- The dike low and erode with time
- No early warning system, the main communication ways are person to person and mobile phones.
- Lacking production plan, lacking guidance on farm activity
- In some cases, the local people asking for the money of “hiring dike?”.
- Lacking knowledge on DM
- The house of people is rather far with other
- The organizations (RCA, CCB, FA, EA) pay less attention to people living
- There are about 5 wattle houses.

### **Section 3 (One part in mainland and the other in Khuong Islet)**

- The Unit of DM: have 8 life vest, most of them keeping in the Khuong islet; head of the section is leader of unit; 15 people of self-defence force, in which 8 are DM force), 01 hand loudspeaker; 03 radio speakers.

- Yearly, the unit of DM in section 3 have participate the training on DM, organized by District DMSC (from 2005: 1 - 3 training: first aid, to cope with high tide, flood, typhoon,...; Efficient: very good, they can realise their important role in DM).
- Unit of DM: 5-7 people, self-defence force: 4, security force: 4, local force: 20, in emergency case: more than 100 people (from mainland).

### **Constraints**

- 1-1,5m inundated in all area of Khuong islet; 0.7 m in mainland
- 100% house of the people (30 hhs) are flooded.
- Vegetative production were damaged 50-60%.
- The local people have to use polluted water from river (especially in Khuong islet).
- There are still 5 dam not to closed.
- Most of houses of people are out side of national dike (this dike just protect the farmland area only).
- Some hhs put the living waste not in order
- More than 35 hhs are rearing fish (one of the pllution points);
- The Phan Vu Concrete Company have its drainage system higher than residential area, so the water logging in and makes pollution in the residential area.
- Thed people lacking the awareness on disease prevent and natural disaste, so they still live out side of dike “people can run but the trees cannot, so the tree should be protected”.
- Some companis, manufacture pay less attention to the local people.
- Some social association are not close enough to local people.
- The main warning means is television
- hhs have wattle houses.

### **6.3 EDUCATION**

Group discussions in Binh Thuy District found that climate change and disasters have some impacts on pupils and schools as below:

- Impacts of health and study results.
- Constraints in travel of pupils
- Risk of causing accidents when traveling by big boat (Thoi An Dong, Bui Huu Nghia)

#### *Coping experience:*

- 100% primary schools and 90% secondary schools have staff being in charge of health (Level of Elementary and diploma, from the beginning of this year, depending on the size of schools, to serve for emergency, to inform the department of Health of wards and districts.
- Establishing the groups undertaking gymnastics, hygiene, controlling the storm flood disaster, led by the school principal and participated by teachers.
- Health centre have cooperated with Department of Education in organizing the training course in knowledge of safe food for the school kitchen
- Department of Education has cooperated with Department of Sport in organizing swimming course for children.
- Carrying out the linking between school and family to control diseases, especially denger fever
- Integrating specific knowledge of disasters into some subjects (social and natural subject). In fact, there is no activity publicizing the management of disasters for children

- 2 years ago, pupils started the new school year in August, instead of the national starting time in September.
- Teachers participated the training in fire control.

### **Bui Huu Nghia Ward**

#### *Climate change impacts*

Bui Huu Nghia Ward is a new administrative unit that just splitted form An Thoi Ward. It lies nearby the river, therefore Bui Huu Nghia Ward has no school. Pupils in ward area have to study in An Thoi Ward's schools.

According to Mr Le Van Van – Principle of Binh Thuy Primary School, there are many occasions in the year, especially during the hot months and changing weather when children often have stomach ache, fever, sore throat and cough. For example, in March, 2009, there are 57 pupils had fever and other diseases. According to the data of school, during flood season in September, many children in school had some accidents (such as falling down into the water (40 children) and about 45 children with stomach pain, cold and headache..

Discussion with the groups of pupils of Primary School and Secondary School Bui Huu Nghia found that children were impacted by different disasters (Table 9):

Table 9: Impacts of hazards to children in Bui Huu Nghia

<b>Hazards</b>	<b>Impacts in children</b>
Hot weather	<ul style="list-style-type: none"> <li>- Many pupils were affected by flu, cold, and having high fever so that they cannot to go school.</li> <li>- In class, the pupils become more thirsty, but they cannot drink water because it is not allowed during class time.</li> <li>- It is easy for the children to get flu, headache, or get dizzy. Therefore they have to go to the Health corner of School for medicine or stay at home in case of sickness.</li> <li>- Number of children suffering from high fever due to the increased temperature in May increased dramatically.</li> </ul>
Typhoon followed by heavy rain	<ul style="list-style-type: none"> <li>- Tree falling, house destruction, especially small houses made from leafy materials were easy to be swept away by typhoon.</li> <li>- Most of pupils are afraid of being in the middle of typhoon or storm when going to school and going home due to being afraid of getting injured.</li> <li>- House damages result in local people spending more for rebuilding houses, which affect badly to family economy. There are a lot concerns from children for their parents.</li> </ul>
High tide	<ul style="list-style-type: none"> <li>- The tide water makes houses dirty. Therefore children have to spend a lot time to help their parents cleaning up. They have to put more heavy bricks to lighten the cupboards and clean their houses when the tide is gone.</li> <li>- It causes burnt skin, scabies especially skin infected disease for children who always play with the tide water.</li> </ul>
Heavy rain	<ul style="list-style-type: none"> <li>- The children can not go to school.</li> <li>- There are 87 households in zone 1, and the number of children who have to go to school is around 100 (including Côn Khương và Côn Sơn). The schools are on the other side of the river in Binh Thuy and An Thoi 2 schools, therefore the traveling is very difficult especially during the flooded time. The children go by boats with limited safe life</li> </ul>

Hazards	Impacts in children
	vests. - It makes house leaking, furniture wet. The children have to help their parents clean up the houses. - It costs more money for repair houses. - Heavy rain prevents parents from buying food. Due to the lack of food reservation, family members have to eat instant noodle. Children like playing in the rain which is easy for them to catch a cold. - Heavy rain makes academic materials and aids wet. - It makes it more difficult for children to travel to school.

It is pointed that rainy season impacts strongly to local children's psychology, health, and life, based on the case of Nguyen Hoai Nho as follows:

**Nguyen Hoai Nho, 12 years old, a student of Primary School An Thoi 2, Bui Huu Nghia Ward, Binh Thuy District**



There are four people in my family: parents, 16 year-older sister and me. Before 2002, my family had lived in a small leaf made house in Narrow Street called "Hem 300" badly affected by the polluted 'black water' canal stretching from the beginning to the end of that street. When rainy season and tide comes, as all neighbor do, my family rushed to move all our furniture to higher position, in a half-meter water in the house and had to clean up the house when the sun appeared. I was just a little boy at that time so that I couldn't do anything to

help my parents. I only sat around. " – A child kept looking at his father who was sitting besides me and reminding of the period they lived in small leafy house when he confided as above.

"Every morning, Dad rides me to school by bicycle and picks me up after school in the afternoon, having his lunch in a hurry and takes me to school again in the afternoon.. I love my dad so much, especially during those days of high tide, he has to pull up his trousers, wheeling the bicycle slowly with me on the bike to school so that I do not get wet. I think I have no trouble, but I feel so sorry for my dad working hard during those days. In two or three years time I can go to school by myself without troubling my dad. I have no trouble when the rainy season comes, but Dad would have to work harder because he is a lottery ticket seller."

"Since I have been to school, I have got fever 5 times when the weather changes in April and May. Hot weather, heavy rain, sudden weather change make not only me but my friends get fever, sore throat and cough. Each time I am sick, my dad has to spend his money to buy western medicine in the pharmacy or I have to get injected at Doctor Trung's nearby, which is quite costly for him. My family often goes to see Doctor Trung's house when someone gets sick. When I grow up, I want become a good doctor like Doctor Trung to treat for my parents, my friends and everyone who needs help. "I wish it was not too hot or the rain was not too heavy. The children would feel much more comfortable in going to school during the cooler days".

Among 5 sections in Bui Huu Nghia ward, section 1 is the area which has most difficulties. There are 87 households and about 100 students in this area (include Son and Khuong islands). Most of the students have to across the river by boat to the Primary Binh Thuy and An Thoi 2 School to study. It is dangerous for the children to travel, especially in flood season.

**Nguyen Thi Kim Khanh, a third grade pupil of the Primary School Binh Thuy**



There are 6 people in my family: parents, oldest brother, older brother, twin-sister, and me. My father is a welder. My mother works as fruit picker for other fruit gardens (because my family has no fruit garden) so that Mum's income is not stable; Mum can earn money only in fruit season. Therefore our life depends on income of father."

The school is on the other side of the river, which is so far away from Khanh's house that everyday she and local children

have to cross the river by motor-boat and take a walk to school. According to their parents, due to the fact that most of the motor-boats are not equipped with enough life-jackets, it's very dangerous for their children when flood season comes. Moreover, for those local children who can not swim, it becomes easier to have serious accidents. According to Khanh's mother, everyday, she or her husband has to take 2 daughters to school and picks them up. It costs 5,000VND per person in one turn to cross river by motor boat. For people of low income it is a

large amount of money!

"I am afraid of rainy season due to difficult transport to school even though I cross river with my Mum and my twin-sister. Heavy rain makes our leafy house leaking, our furniture wet so that we have to clean up the house when parents go out for work. I wish that the weather was not so rainy so that we would go to school more conveniently. I also wish there was a school on the island, so that we could go to school by ourselves and of course we will not spend money everyday for motor boats." - Khanh said.

*Coping experience*

- Learning citizen education subject and Geography in school, and children can understand general information of disasters: cause, consequence, prevention and method but all of the knowledges provided are not in details. At school, the children can learn environment protection with citizen education, such as the children should not damage the plants, throw the rubbish anywhere, and they should clean up the schools and classrooms...
- Organizing "Friendly school, active student" movement in order to prevent accident in school, especially in flood season.
- Schools have been well-built (by concrete)
- Children always see weather forecast on TV, teachers always remind children of not throwing rubbish, and cleaning the classroom and planting trees in school.
- In the school programmes, the contents of the subjects such as social, natural subjects and science of grade 4<sup>th</sup> and 5<sup>th</sup> include lessons such as environment sanitation, climate. The schools always provide information and teaching on how to avoid accidents and natural disasters. Every week the contents are integrated into the meetings by schools, health staff, redcross, especially the environment and sanitation. These are implemented based on periods in the year and based on movements such as the Traffic Safety

movement where the schools will invite the district police to schools to have discussions with children.

- Organizing swimming courses for children. The number of school boy who can swim is higher than the number of school girls.

#### **6.4 HEALTH IMPACTS IN BINH THUY DISTRICT**

##### *Health impacts*

*Irregular weather conditions* such as high tides which caused flood and heavy rains during the Eighth – Tenth months in the Lunar calendar, or irregular hot weather from 2004 (for instance, at the time of Tet, day time temperature was around 34-35°C but it was felt cold during the night) affected people's health conditions. At the district workshop, health workers reported the prevalence of diseases such as:

- Inflammatory diarrhea, other bowel conditions (e.g. infectious diarrhea), dengue, typhoid fever, and food poisoning. Particularly during the flood season, the prevalence of these diseases increased by 150%.
- Respiratory diseases, bronchitis, pneumonia, sore throat, digestive disorder, viral symptoms etc. These diseases were highly prevailed among elderly people and children at a rise of 100-150%. For instance, 36 pupils at two schools in Thanh An Dong had fever or chicken-pox and rash occurred among children at primary schools and kindergartens.
- Cyclone caused damages such as in the Hurricane No. 05

The most affected group was children, particularly those who lived in the suburban, islands and river banks or agricultural areas due to a poor hygiene condition and water quality (water was from the river and streams). Gynaecological diseases among women were found at a prevalence of 120-150% than the average. The poor were the most vulnerable for health conditions due to poor hygiene. They could not afford health examination or health care.

##### *Coping measures*

- Education and communication for behaviour changes were mentioned as one of the effective means to increase the capacity of people to cope with the situation. Recommended practices were brochure distribution, trainings, communications with groups of households, radio broadcasting (e.g. provide guidance for covering water containers, mosquito and parasites controls etc).
- The Health Care and Disease Prevention had two on-call teams on disease prevention, while the district general hospital had two emergency teams available 24/24. Ward clinics established two teams to distribute medicines and provide emergency services in cases of flood and storm.
- Surveillance by the Centre for Population and Family Planning and the Children and Maternal Care team; collaboration with mobile service groups to provide maternal care timely with medicine and professional care.
- "Four-side collaboration" during the flood season: Department of Health Care, Centre for Health Care and Disease Prevention, District General Hospital and the Centre for Population and Family Planning
- Collaboration between the education sector and public health services on organizing communication activities for pupils: plenary meetings, classroom activities, school radio programs (during break times) on health care.
- Planning on disease prevention and preparedness: promotion of vaccination for children and cleaning up living

##### *Constraints*



- Lack of basic facilities for school health workers to perform their tasks (primary care such as measuring blood pressure .. ) . Lack of medicines as only dressing/bandages, mercurochrome or berberine were available
- Facilities for health care at schools was limited as “health corner”, there was no health care station or health care room
- A low coverage of health insurance among pupils existed.
- School health care needed more improvement (on health communications and capacity building etc)
- Ward clinics did not have equipments and facilities for health emergency situations without support from the district level.

### **Bui Huu Nghia Ward**

Buu Huu Nghia Ward is a new administrative unit that was separated from An Thoi Ward from October 2008. The Ward **has not had health care station and schools**. Thus, the authority could not provide any data on primary health care at schools. Local people come to An Thoi Ward health care station if they are in need for health care.

According to the head of the ward’s health care station, dengue fever occurs in the area with higher prevalence than the neighbouring wards. There was yet no death caused by dengue fever. Children and elderly are among the most affected group. In groups 2 and 3, there were 25 cases of dengue fever in 2008. Other diseases such as diarrhea, flu or food poison prevailed in group 1 (the island) but did not develop to epidemic.

*Coping measures:* Health workers from the ward’s health care station shared solutions to cope with the situation:

- Clean up the living environment, dredge ditches and sewage; mosquito spray; mosquito controls;
- Mobilise people in the ward to implement mosquito control in all five area of the ward (from October to December)
- Establish a mobile team equipped with medicine and other primary health care equipments;
- Organise communication campaign on the “10 health care programmes”; organise trainings on hygiene and food safety for 100% of dining services.

*Constraints for the health care service at the ward:*

- Lack of human resource: the health care station has only five staffs who implement various governmental programmes. The lack of human resource is even more significant during the flood season when health workers have to split into two teams for emergency response.
- The major function of the ward’s health care station is to participate in disease prevention, hygiene promotion, maternal and pediatric care and family planning. The operation and capacity for health examination and primary health care is very limited, besides providing first aid
- Lack of transportation. In case of emergency, transportation is lent from the People’s committee.
- Capacity of the health workers needs improvement. Some staff are not trained to provide immediate health care (e.g. having pharmacy background). These staff need training on first aid (to deal with injuries such as bone fractures, burn, drowning, or bleeding). Competencies of these staff are varied and they lack of skills to perform general health care services.
- Lack of equipments and tools for immediate health care (splints for bone fracture cure, litter-carry, etc.,)

- Health workers are not updated with information about pandemics and diseases, in particular diseases related to climate change. A number of health workers responded that they had never heard about the impact of climate change on public health.
- People complained about the quality of health care with health insurance, that waiting time to get examination or service is too long and insurance bearers were not treated equally as paid services.

### Diseases

Table 10. Diseases related to Hazards and Climate Change

Hazards and Climate Change	Common diseases	Treatment	Challenges
<b>Changing season from the dry season to the monsoon</b> (April – May to December)	<b>Flu</b> (more common among children)	- Buy medicine at the drug stores (do not come to the health station as it was a waste of time)	- Hospitals are crowded and clients always have to wait. Health insurance is only used in case of emergency or long term diagnose needed.
Year round, though it used to be only in the rainy season, it is now <b>all year round</b>	<b>Dengue fever</b> - Before 2008: common among children - From 2008 – now: occur among both children and adults.	- Home care by traditional treatment: clean the body by hot water, drink lemon juice. If there was not any improvement after 2-3 days, the patient would be taken to hospital for blood test.	- Health insurance does not cover enough medicine (only some basic drugs are covered)
Year round. <b>July to September (flood period), as the water gets dirtier</b>	<b>Gynaecological diseases</b> , mostly among women living in the island (as they earned their living by working in the water such as agricultural work or catching snails etc., ) as water source was polluted	- Go to the hospital (employed people and workers who have health insurance covered by with their employment are registered for primary health care at different hospitals)	- Clients who pay service fee (without health insurance) are given priority. Wealthy people do not use health insurance since they would have to wait for a longer time to get health care and covered drugs are not as good as purchased drugs, or drugs from the prescription are not available
Year round, but <b>more common during the dry season</b> , hot temperature	<b>High blood pressure</b> (common among elderly)	- Go to the hospital	

( discussion of mixed group of men and women, Area 3, Bui Huu Nghia Ward)



The group discussion by both men and women from area 1 of Bui Huu Nghia Ward showed the impact of climate change on the increase of disease prevalence. Participants noticed that these diseases occurred before, however there is a rise of these diseases in recent years due to irregular changes of weather conditions.

**(i) During the dry season:** fever and flu raise during long periods of dry and hot weather, especially for children and elderly; **(ii) During rainy season,** dengue

fever raises; (iii) Gynaecological diseases are common due to polluted water.

Findings on challenges for people in Area 1 are:

- Transport between the island and the city is one of the most challenges for people in area 1 to access health care. Local people said they did not use the ward's health station as it was even further than the district general hospital – they go to the district hospital in case of illness.
- Water is polluted. Most people in the area 3 use water from river which is contaminated by fish farms. The head of the area noticed that only two households among 85 households in the area have wells. The surrounding area characterised by channels and ponds scattered in household gardens is often flooded during the rainy season. In addition, most households use very simple latrines built from a plank above fish farms, which worsen the hygiene condition
- In general, awareness of people on the relation between hygiene or sanitation on health remains limited. Most of people who were asked stated that environment did not have any effect on their health. This was the main problem regarding health condition of local people.

## **6.5 CLEAN WATER SUPPLY AND ENVIRONMENT**

Binh Thuy is located adjacent to the centre of the city. There are 14 water supply points and private wells. About 70% of households can use tap water and 95.5% has electricity. Surface water is plenty so there is always enough water for irrigation. With the development and urbanization, Binh Thuy is getting polluted. There are 3 majors' polluted sources: waste water, solid waste, smoke.

The most serious pollution source is waste water. It comes from Tra Noc Industrial Zone, aquaculture, slaughter houses, markets and households (Figure 17). Wastewater treatment systems at these companies are very poor. They are not big enough to treat all the waste. In addition, the system is not standardized so the water after treatment is not purified enough to be discharged into the environment. Moreover, the cost to run the system is higher than the fire. Thus, some companies accept to be fired rather than run the system. Some wait until there are some environmental auditor coming and checks, then they run the system. Besides, aquaculture nowadays also pollutes the water resource severely since they dismiss all the effluent directly to the canals and rivers. There are not any punishments or regulation for them. Binh Thuy Slaughter house also gives a hand to contaminate the water. Many households near by complain but it is under planning, they need to wait. Furthermore, there are 3 markets (Binh Thuy, An Thoi, Tra Noc) in the district which produce much wastewater also. With the development and population bloom, there are about 3 times of the people than 15 years ago. Therefore, they cause more pollution. Now there are still not any solutions for wastewater. The suggestion is that there should be more serious legislation for those companies.

The second major pollutant is solid waste coming from the 3 markets, 3 waste collection substations and households. The locals complain about the smell coming from the 3 substation because they keep the waste there some days before taking away. For the households, they waste garbage every where behind or next to their house. We may think about their awareness. However, they complain that no one come and collect their waste because of narrow or rough lane or because they live far away. Therefore, they litter and then burn later. The problem is that, when high tide, wastewater and solid waste spread everywhere.

The third pollution they mentioned is smoke coming from industrial zones, vehicles. There is still not any solution for this problem.



*Some suggestions for environmental solutions:*

- Building a centralized waste water treatment plant for Tra Noc Industrial Zone.
- Equipping for environmental labs for supporting on waste control capacity production units in district area.
- Having an effective solution on environmental management in production zones, processing units, mechanical bases... in Binh Thuy District area.
- Researching pollution solutions for catfish rising including the feeding processes fixed with environmental protection and local conditions.

➤ **Environment in Bui Huu Nghia**

**Section 1**

Con Son is an islet (Figure 18), where there is no electricity, no road, no hospital, no school and no clean water. The local use river and canal water for domestic use and drinking. Then some people from other places come and feed fish, they discharge wastewater directly from the ponds to canals and river. People who live inside the canal, called “Vam Ho” does not have clean water to use. The effluent cannot get out of the canal because of the tidal. When the tide is low, wastewater runs out. However, the canal is deeply inside the islet, the effluent has not gotten out absolutely. Then high tide comes and then water from river gets into the canal (Figure 19). For a long time, the waste still exists inside. The local complain about this but it has not been solved yet.

Besides, the owners of these ponds often pump out the mud inside the pond after harvesting to disinfect their ponds (Figure 20). This mud is smelly and dirty since they are the waste of the food and fish. However, it is rich of nutrient and suitable to fertilize fruit gardens. Thus, the local suggest the owner should pump the mud into their garden form them. Then both of them get benefit, the gardener does not complain about pollution and they can live in harmony with each other.



Son Islet landscape.



Stream in Son Islet at low tide



Mud pumping out from fish pond to river.



### Section 3

Pollution in this area is mainly at Lane 300 (Figure 21), An Thoi market and Betong Lane. Betong Lane, polluted by Phan An Company. Its sewer is higher than the households sewer so water gets stuck inside.

In Lane 300, during an interview of a group of local people (both men and women) at this polluted area, they complained about its smell, mosquitoes and no fish. In this lane, the road is rough and long. It is by a small canal, which is contaminated now.

This canal is polluted because of several reasons. Firstly, wastewater pipes and sewers from An Thoi Ward and other areas in Bui Huu Nghia Ward are connected to discard wastewater directly into this small canal. Secondly, people inside the lane litter freely because no one comes to collect garbage. The city garbage collection does not come inside to collect because they could not pull the big and heavy cart inside the long and rough lane. The local said if they come to collect they will be willing to pay for collection free. Another reason they do not save the environment is that it will be upgraded and put a 1500 sewer in the canal soon as the town plan. Therefore, they try to stand the smell and mosquitoes.

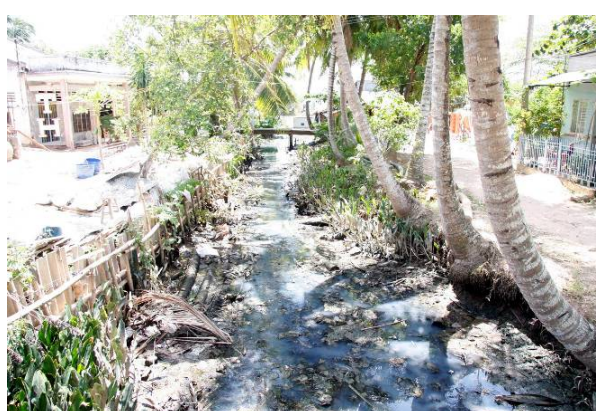
About 10 years ago, people could come to this canal to take a bath, do the washing and children swum freely since it was bigger. About 8 years ago, people started to build more factories and the population increase rapidly so the pollution has been more serious. They said that the population in the lane itself has taken off 3 more times than 10 years ago.

In dry season from January to June, the water gets dark and smelly. People have denger fever because of mosquitoes. In flood time from August to October, water raises up about 0.5 meter above the road surface. Water together with garbage floods the houses, which cause very unhygienic conditions. Some years ago the local organised some campaigns to collect garbage. However, it did not work because they picked up these waste and put by the bank of the canal. Then the wind blow them away and on to the canal again. Recently, there has not been any solution to solve the problem since they are waiting for the town plan.

Lane 300 at high tide



Lane 300 at low tide



## Environmental pollution



## 6.6 LIVELIHOODS

As Bui Huu Nghia ward is the inner city ward, it has a diversity of income generating activities by different groups of people. Impacts on various groups and its economic activities are explored.

The table below show the most important economic activities, disarrageted by sex and poverty level and the impacts of the disasters and climate change accordingly.

Table 11 below highlights the variety of livelihoods in Binh Thuy District

Main livelihoods	Rich/Poor	Sex	Location	Change	Causes	Diasters and climate change	Trend
<b>Agriculture</b>							
Catfish raising for exports	Better-off Rich	Men	Unit10	Increase	Prices were high from the beginning, and now have to continue	High tide affecting the production	Stabilise all the areas for fish raising, adn this area can be reduced if there is a eco-garden and housing model of Nam Long company
Rice (Summer-Autumn)	Average-better off	Men	Unit10	Decrease	Change into fish raising (sell or hire the land)	Irregular weather conditions affecting yields and diseases	Stabilize as this is located within the dykes.
Gardens (chôm chôm, longan, mango, and durians)	Average-better off	Men	Unit10	Stabilise		High tide, extreme weather such as cold spells or heat spells, heavy rainfalls affecting the yields, tree roots and diseases	Increase due to the eco project
Vegetables and secondary crops	Average	Men and women going to sell	Unit10	Decrease	Rice and Vegetables- Decrease	Pests and disease due to heat	
<b>Non-farm</b>							
Small trading	Average	Women	Units of 1,2,3,4... selling in An THói market	Increase Mothers Chidlren Sisters	Urbanisation	Rains reduce the sale	Reduction due to planning activities of the city
Enterprises	Rich		Unit 6	Increase	Industrialisation		No space available
Factories	Rich		Units 6,7,8	Increase and stabilized			No space available
Internet shop owners	Rich		Unit 6	Increase	Serving the needs	Rainy days reduces profits	



Main livelihoods	Rich/Poor	Sex	Location	Change	Causes	Diasters and climate change	Trend
Café	Better off-Average	Women	Unit 1 -10	Stabilised		Rainy days reduces profits	
Guest houses	Better off-Rich		Units 1 – 9	Increase			
Workers	Better off and average		Unit 1 – 9	Increase	More factories and enterprises		Higher education level; Urbanisation
Hired labourers	Poor	Men	Unit 1 – 10	Increase		Rains, extreme weather such as heat or heavy rains affecting the health and work availability	
Housemaids	Poor	Men and Women	Unit 2 – 10,	Decrease	Old people cannot work any more, young people go into factories	Irregulation weather conditions/ Rainy days or hot days, people will not hire them, fewer hours of work	
Hired Motorbikes drivers	Poor-Average	Men	Units 2,3,4,5,6	Stabilised		Rainy days and storms	Reduction, and there is no more three wheeled vehicles.
Motorbikes fixing	Average	Men	Unit 7	Stabilise			
Hairdressers	Average-Better off	Women	Unit 1	Increase	Urbanisation	Rainy days affects profits	
Lottery tickets sellers	Poor	Women and men	everywhere	Stabiliser		Tired during hot and rainy days	
Rubbish collectors	Poor	Men/Women	Unit 1			Affecting health during too hot or cold days or heavy rains, work profits reduced due to the harsh weather.	

Table 12. Livelihoods in Bui Huu Nghia Ward

Livelihoods	Who	Location	Climate change and disasters	Changes/causes	Constraints	Future trends
<b>Agriculture production</b>						<b>Reduction</b>
Rice production	Poor and average	Sections 1,2,3 (islands)	High tide, cyclone, storms	Before more rice was cultivated in section 1,2, now there are some rice areas in section 2 Reduction of areas due to expansion of fish raising, gardens and houses development	<ul style="list-style-type: none"> <li>- 'Hanging' plan from 2004</li> <li>- Difficult for rice farmers to borrow loans</li> <li>- Irregular weather conditions</li> <li>- Diseases</li> <li>- Limited cultivated areas with large families.</li> </ul>	Limited areas, maybe residential planning will take over.
Secondary crops	Poor	Section 1,2,3 Cồn Sơn	High tide, cyclone, storms	Reduction	Similar difficulties like rice plantation Low yield varieties Not intensive farming Unsafe dykes Change into fish raising ponds	Reduction and tend to convert to housing areas Future development of eco tourism in Con Son island
Cat fish	Better-off and Rich	Section 1,2,3 (cồn)	Industrial raising, not much affected		Diseases (from polluted water flowing down) Low and unstable prices Difficult to borrow loans as loss of money from the bank	Reducing Converting to services.

Livelihoods	Who	Location	Climate change and disasters	Changes/causes	Constraints	Future trends
					High interest rates with private lenders Difficult to find markets for sale	
Fruit trees	Average-better off	Sections 1,2,3 (island)	High tide, cyclones, storms, hot weather, irregular rains	Over the last 5 years, the prices of fruits have gone down so much, Change into new varieties (poor knowledge and experiences)	- Low prices, the government does not compensate for the prices. Low yields Irregular rains affect the roots of the trees Cold spell and irregular rainfalls affect the fruits. Change of varieties with low understanding and techniques, more diseases. Many farmers sold off their land.  Some people keep their land and go over to the main land to work to earn a living	Decrease and conversion of land into residential lands
Caged Fish raising on the river (Rô Phi, Rô, Điều Hồng)	Average-better off		High tide (polluted water causing diseases for fishes, storms and cyclones	Few cages left	- Causing pollution to water sources, the government banned end of	Disappearance due to the ban

Livelihoods	Who	Location	Climate change and disasters	Changes/causes	Constraints	Future trends
					2008 Small areas of water, and lots of investment to repair the cages Feed is wasted Fish are more prone to diseases	
Bonsai (flowers and plants)	Average	KV2	Rain, irregular temperature		Limited	Decrease as it is not traditional work
<b>Services and trade</b>						
Petty trade	Average-better off	Section 2,3,4,5				
Restaurant/cafes	Average-better off		Weather: rain and hot days			
Enterprises	Rich					
Street traders (lottery sellers, fruit sellers, breakfast and dinner food sellers)	Poor	Khu vực 2,3,4,5	Storm, cyclones, heavy rains affect their sales and work	Increase low investment, higher demand, door to door services	Irregular weather conditions Unstable incomes	
Trading in markets	Average-better off		Weather conditions			
Hairdressers	Better off-Rich					
Pharmacies	Rich					
Fixing motobikes	Poor- better off					
Hired motorbikes drivers	Poor		Weather conditions, heavy rains, high tide	Decrease due to local people have more and more motobikes, taxi from the City	Cheaper fares from buses	
Hired labourers	Poor		Extreme weather	Increase, more	Poor working	

<b>Livelihoods</b>	<b>Who</b>	<b>Location</b>	<b>Climate change and disasters</b>	<b>Changes/causes</b>	<b>Constraints</b>	<b>Future trends</b>
			such as heat or cold spells affecting their health and work availability	domestic helpers are needed, women as domestic helpers and men work as manson assistants or doing heavy work	environment, poor working insurance Unstable incomes	
Hotels and guesthouses	Rich					
Waste traders	Poor		Rainy days and hot days, affecting the health	Decrease, people do not collect their home waste for sale (for example old bottles), change the job and work as domestic helpers.	Hard working During rainy days peopel do not sell things	
Workers in factories	Average					
Governmental officers	Poor and average					

Below are a few casestudies of the local people with the impacts of disasters and climate change on their income generating activities, either farm or non farm ones.

**Mr. Bui Minh Luy (62 years old), lane 300/31/1, tomotorbike taxi driver, mason, wounded soldier, immigrant**



Mr. Luy has 4 children. The first girl, who was born in 1978, was married and lived next door with him, on his land. The second girl (1979) works at Biti's company. The third girl (1982) was married and lived with her husband in Tra Noc Industrial Zone. The youngest son (1991) has been mad since he was 4 years old. He goes out whole day around the market.

Mr. Luy was born in Ha Noi. He joined the South East battlefield from 1970 to 1975. Then he got married in 1976. After the war, they stayed in Ho Chi Minh City for work. He used to be a deputy director of a soap company and his wife worked as a secretary at a fixing motorbike shop. Then in 1980, they moved back to his wife hometown, Cantho and have settled there until now. His wife

stopped worked to take care of her parents because they got sick. He worked as a mason by day and a motorbike taxi by night.

His wife died in 2001. Since then, he lives with his second girl and his son. Every day he can earn 100,000VND and about 40,000 to 50,000 VND in the evening, which is enough for the whole family. His house is a level 4 house with metal roof and concrete wall. There is electricity and water, a toilet and a tivi.

As a wounded soldier, he is affected seriously by the weather. When it is hot and then cold or rain, he often feels hurt and cannot get to work. Then he stays at home and uses the veteran's salary. His health care is free. When it is cold, he feels hurt deeply in his bone. When it is high tide, his house gets flooded. He needs to bail out water. He wishes to upgrade the floor but he does not have enough money. About 20 years ago, the climate was not cold like these years. It is the cold which affects his sinutisis. He gets hurt in his nose, headache and runny nose. His wound hurts him again and agin. However hot the weather is he can stand but rain.

Now he is nearly 70 years old. He hopes his daughter can get married because she worries for her father and brother so she decided to stay single. Now he tries to work as long as possible so that he can save some for the rest of his life and for his mad son.

**Homeless, Stay in boarding house: Mrs. Tran Thi Sau (1944), selling vegetable**



Mrs Sau lives in Lane 300 for more than 30 years. She has 2 sons and 3 daughters. Recently, she has to take care of the oldest son who has liver cancer and 2 grandchildren whose father died. Their mother needs to do hired works. Mrs.Sau's children are all poor. She spent her own money to help them last year. As a result, they sold her house to pay for their debt. Then she lives in a boarding house in lane 300 with 150,000VND/ month and if include electricity and water it is about 200,000 VND/ month.

She sells vegetables in the market. If it rains, she cannot sell much because her stall is in the

very end of the market. If it is getting too hot, then her vegetable withers quickly. Every day she starts selling early in the morning and about 8 or 9 in the evening she goes back her boarding house. She stays as late as possible to sell for some customers. If she stops early, there is nothing for her to work. The vegetables she gets from one coming from Cantho market. After selling all the products she can pay money for him later. If she cannot sell all she cannot get profit. However, she is old and sick so she is always in debt.

Every day she needs to pay 6,000VND for her place and 120,000/ month for renting the sitting floor. Now she is still in debt with high interest (1 million, pay 40,000 VND/ month). Her children do hired work such as washing dishes, cleaning house, etc. Nevertheless, they always tell her that they do not have money and sometimes live on her money. In the future, if she can be supported some money she will buy more things to sell.

### **Mrs. Hoang Thi Phuong (1964), House number 292/1/Area 4, selling vegetable**



Mrs. Phuong's hometown is in the North of Vietnam. She went here to study at highschool. Then she studied middle ranking of Hydraulic Engineering and worked at a small ward. After getting married, she and her husband worked with each other. Then she has children and stopped work. Her husband was an electrician. He died in 2006 in his duty. Since then, she has to take care of the two children by herself. One girl studies grade 9 and a boy studies grade 11. She hopes they can study at university to get a good job. The government support 400,000 VND/ month

for them until they are 18 years old.

Every day if she can sell all she can earn 25 to 30 thousands VND. She sits inside and hardly for customers to come and buy so she cannot sell much. When it rains, she almost sells nothing because noone walk further inside. The area inside the market, where she stays gets flooded. It is smelly and solid waste comes up and floats around their seats. When it is sunny, she can sell more vegetable. However, vegetables wither faster than normal and she cannot sell at high price. It is even smellier than normal. In the future, she still keeps selling because she does not know what to do. Now she is old and no one wants to hire her.

### **Selling lottery tickets, living in other places**

#### **Mr. Le Hoang Duy (25 years old), Binh Minh, Selling lottery tickets**

Mr. Duy left school at grade 2. He started selling lottery tickets 15 years ago. Every day, at 7am he walks from Cantho ferry to Binh Thuy Bridge and walks back at about 4pm. He can earn 100,000VND or more. If it rains, he cannot get as much the money because not many people get out in the rain to buy lottery tickets. In flooded time, water comes up above his knees so he cannot enter all the smaller lanes to sell. In dry season, he gets tired and cannot walk very far and lose some clients. Sometimes, if he does not sell much he must try his best to walk as far as possible. In the past with 2,000VND lottery ticket, he can sell easier because the poor can buy as well.

In his family, his mother also sells lottery tickets like him to feed his 3 younger siblings. Now his 15-year-old brother and 18-year-old sister are working at Biti's shoe company. The youngest bother, 12 years old, is studying at junior highschool. Mr. Duy tries to feed his brother until he can finish university. His father works as a farmer in the countryside to take care of his grandmother. When he has some money, he sends some to them.



Mr. Duy wishes to be a motorbike repair man. He plans to save some money so that he can study. His desire is that his youngest brother can get to university.

Table 13: Coping measures of the local people in the area for rice production and gardening

Disasters/damages		Coping measures	Adaptive Capacity
High Temperature	- Withering plants, lack of water	- Have to water the plants and trees more	
Heavy Rain	- Roots of trees in the gardens will be bad, giving low yields - Those who work as hired labour have less work - Less profits for lottery and other small food traders	- Wait for the water to recede - stopping the work  - Diving in the rivers to get river things for eating such as crabs - Finding other work to do (lane300).	
Flood /High tide	Rice	Rice is used for raising the cattle	
Hot days	Rice plants get burned, lowering the yields  Trees in the gardens affected	Water the rice crop by pumping machine, but the rice plants are still withering; Local people use straws to cover the earth to keep the moisture.  Watering by pump to keep the fruits. Dredge the channels to keep the water for irrigation Since 2004, some investors came into the areas to buy land, so the farmers do not invest in gardening.	
Inundation	Rice-Gardens with lowering yields  Working in the markets, affecting small traders	Choose the right rice varieties, avoiding the flooding times Pump out the water when the tide is lowered. Dredge the drainage systems	Urban improvement project Constant dredging of the drainage system

*Key livelihoods issue in Bui Huu Nghia Ward area*

- Excessive number of general labourers

*Main Causes:*

- People lack capital: just moved from agriculture
- Limited level of education and lack of training
- People have recently relocated and lost another livelihood/trade
- Poor awareness of labour market

## 6.7 HOUSING IN BINH THUY DISTRICT

Losses relating to house damage show that in spite of being affected slightly by circulation of typhoons, people's houses were also damaged considerably because of unsolid construction. Observation shows that in mainland areas most of houses are concretized, but few of them have stable roofs or are tied up carefully to improve their stand against the storms (fig.26). On Khuong and Son islets, unsolid houses with leafy-roof or thatched houses are popular (fig. 27). Some of poor households in mainland areas also have only temporary houses. It is not possible for these kinds of houses to stand against the typhoons, the loss will be severe if typhoons hit directly.



In recent years, there have been some programs supporting poor households to build 12 houses. In 2009, the program keeps supporting funds for 14 households through projects and associations: (i) Great Unity House; (ii) Women and Veteran Associations and (iii) Ngoc Thach church and benefactors as well. However, the number of poor households living in thatched houses is still high. Every year, each poor household has to spend about 500, 000 VND up to 1 million VND on repairing house after flood or cyclones, which makes households poorer and poorer.

The reasons for living in thatched houses of poor household are:

- Not enough money for building solid house (many children, lack of farming land, illness, unemployment, bankruptcy, no funds for business)
- Saving money for children to school, so they cannot build solid house.
- Unstable jobs (hired labour) lead to uncertain income.
- Living style and inhabitants' perceptions of houses are simple.
- Houses are not carefully reinforced before cyclone and flood season because of being short of propaganda and guide on technology in strengthening houses (propagandists did not have knowledge on hazards and coping methods as well as propaganda skills).

Semid solid houses are not cyclone resistant due to the lack of techniques and local people do not tie up their roofs before rainy season.

Local people still build their houses at the edge of the river which are prone to being eroded (lack of knowledge, lack of land for housing)

## 6.8 MOST VULNERABLE GROUPS

As the most vulnerable groups have been identified as the poorest, the elderly, children and women in the city, a wealth ranking exercise of 559 households in Zone 3, Bui Huu Nghia ward was carried out providing the following information on the poorest group. Table below shows the approximate characteristics of different income groups.

Table 14: Characteristics of different income groups

Rich/Better off (30% households )	Average (60% of houses)	Poor (10% houses)
<b>Characteristics</b>		
<ul style="list-style-type: none"> <li>▪ Beautiful well built houses-multistories</li> <li>▪ Motobikes worth more than 20 million</li> <li>▪ TVs</li> <li>▪ Aircon</li> <li>▪ Fridges</li> <li>▪ Washing machines</li> </ul>	<ul style="list-style-type: none"> <li>▪ One storyed houses</li> <li>▪ Motobikes around 10 million, bicycles</li> <li>▪ TV less than 2 million</li> <li>▪ Fans</li> <li>▪ No aircons</li> <li>▪ No fridge</li> <li>▪ No washing machines</li> </ul>	<ul style="list-style-type: none"> <li>▪ Temporary houses, with steel made walls</li> <li>▪ Houses were built with the support of charity or government</li> <li>▪ Some have motorbikes</li> <li>Some have TVs, some do not</li> </ul>
<b>Job occupations</b>		
<ul style="list-style-type: none"> <li>▪ Enterprises owners</li> <li>▪ Officers, staff (many people in the houses have jobs)</li> <li>▪ Houses for rent, or space for shop rentals</li> <li>▪ Raise cat fish</li> <li>▪ Farmers of over 4 thousand ha</li> </ul>	<ul style="list-style-type: none"> <li>▪ Government workers with small children</li> <li>▪ Petty traders (selling vegetables in the market)</li> <li>▪ Workers such as motorbike drivers, carpenters, and mason workers</li> <li>▪ Workers from factories</li> <li>▪ Raise animals/cattles and doing agriculture</li> </ul>	<ul style="list-style-type: none"> <li>▪ No land</li> <li>▪ Work as hired labour with limited and unstable incomes (three days a week of work, 10 days per month, many days off)</li> <li>▪ Unemployed</li> <li>▪ Running tricycles</li> <li>▪ Mansion workers</li> <li>▪ Lottery sellers</li> <li>▪ Poor but always drunken</li> </ul>
<b>Monthly average income per person per month</b>		
<ul style="list-style-type: none"> <li>▪ 600,000 – over 1,000,000</li> </ul>	<ul style="list-style-type: none"> <li>▪ 400,000 – 600,000 đ</li> </ul>	<ul style="list-style-type: none"> <li>Less than 250,000 – 400,000 đ</li> </ul>

Some characteristics of the poor:

- Many dependents, one person working supporting three or four other people in the families
- Unemployed for a long period of time
- Lack of awareness on savings
- Long periods of sicknesses
- Single without people to support
- Disabled
- Homeless
- Landless for homes as well as for cultivation
- Drunkenness

Following are a few casestudies of the poor people impacted by climate change, disasters and other exerbating factors.

**Mr. Dang Van Dang (1932), Lane 300, House number 300/44/5, Area 3, Bui Huu Nghia Ward, Binh Thuy District, Cantho City**



Mr Dang is living with a 28-year-old single son. The son is a mason whose salary is 40.000VND/day. Every day they live on this little money. This work is not stable at all. If it is rainy, he could not get to work because no one hires him. Then, he needs to stay at home and cannot do anything, even a motorbike taxi because he does not have a motorbike. When it is cold Mr. Dang feels hurt on his legs and whole body.

Mr. Dang used to be a stevedore at a factory. In his free time he cut grass, worked as a mason, carried mud out of canals and did whatever people hired to feed his 3 sons, 3 daughters and a wife. Now all of his children but his youngest son have their own family and live near his house. About 20 years ago, he had 3ha of ricefield in Khuong Islet. Every year he grew 2 crops of vegetable, 1 crop of rice and did some part-time jobs which was enough for the whole family. Since 1985, the National Damp was built and he lost 3 ha of ricefields. In 1992, Mr. Dang's wife got a serious sickness and lied on bed without moving anywhere else. She could not eat, get to toilet or do anything for herself. Thus, he stayed at home to take care of her. At that time, they did not have the book for poor family, so they could not take her to hospital for treatment. In 2007, his wife died. Since then, he was not strong enough to do any hired work but staying at home and wait for his son.

After his wife death, some sponsors provided some money for him to build a house, upgrade the floor. Therefore, every high tide his house is not flooded any more. He also has his own sanitary toilet, tape water and electricity. He has a book for poor people and health insurance. Every year on some holidays such as Tet holiday, he can receive 10kg of rice and 100.000VND. His parents were poor; they did not have a lot of money or land to inherit. As a result, when he had his own family, he had to start at the beginning. In addition, no one in his family get high education so they could not have high position in society. His married children have to earn their living which is just enough for them. Therefore, they cannot take care of him. Sometimes, they have a little money for them. Besides, his wife was sick, so they spent money and time for her and got poorer and poorer. Their land was taken away when they built dams so their major income no longer existed. His son does not have a stable job. Therefore, their situation gets worse.

Mr. Dang's desire is to be supported a sum of money. However, he does not know what to do with the money. Then he said that he would save in the bank and get the profit for daily meals.

Many immigrants in the city are considered poor. Stories of their lives also veal the constraints they face in daily life, including impacts of disasters and climate risks.

**Mrs. Dam Thi My Le (46 years old), Area 3, Son Islet, no number (Living in Mr. Nam land).**



Mrs. Le was from Rach Goi, Hau Giang province. After divorcing, she took her baby to Cantho and work as a mason. Then she met her recent husband and has been living with him for 13 years. Her recent husband's family was from Soc Trang. 8 years ago, his parents and a mad sister went to Cantho to earn a living and all of them lived at Mr. Hai Be's land. Then, Mr. Hai sold his land so they did not have any place to live. Mr. Nam, a neighbor, lent them a place by the canal to build a temporary house there. If he sells the land, they must move again.

Recently, Mrs. Le's father-in-law, 81 years old, gets sick and he can not go anywhere by himself. Their daily expenses have to be covered only by her husband. He can earn 60.000VND/day. Mrs. Le cuts grasses, goes fishing, harvests rice for other family or does some farm work for them to earn some more for her family. She grows banana, lemeon grass around the house. Every

week she goes to mainland to wash clothes, clean up house for some family, each family she can receive 20,000 VND.

Their house used to be flooded, so her husband dived to get mud in the canal to reinforce the banks. There is not any bed and not enough space for so many people. They took some woods, matched them together and enlarged the space on the canal (haft of the house is on the land, haft on canal). They sleep there. There is no electricity, no tap-water. They used canal water for domestic use and drinking. Without a toilet, they use one, about 200 meters from their house belonging to other household.

Settling an unstable life, they have many difficulties when it rains. The road gets dirty, split which is hard to travel. At that time, noone hires so they all stay at home. These years, it gets hotter and hotter. They often feel headache and sweats because of metal roof and wall without covering anything on the ceiling. These years there are more insects and sickness on trees in the garden. The gardens' owner gets less profit than before so she has less work to do.

The elderly people are also more impacted by extreme weather events and climate risks. A story below illustrates the impacts.

**Mrs. Dang Thi Dung (60 years old), House number 10/5 Son Islet**

Mrs Dung, nickname is Mrs lonely Hai. She lives alone on his father's land. He went away and lived with other woman after her mother's death. It is 2.5 ha of garden including longan, rambutan that her father grew when she was born. Now these trees are too old to produce fruit. Her father used to build a concrete house. When the government makes the national damp in 2003, they broke the house and compensated 500,000VND.

Sometimes, she sells some banana and gets money to buy rice. One neighbour, whose

son is abroad, sometimes gives her 200,000VND to buy food because she is poor. When she is broke, she borrows some money from her neighbors and pay back later when she can sell banana or coconut. Mrs. Dung has some sisters but they are away from her. The nearest one is living with her husband in Thot Not. Sometimes she visits her and gives her some money.



Last month, it rains heavily and she got flu, headache, tired. She went to doctor alone in the mainland. The doctor asked her to hospital and did not get any money though he gave her some medicine. Noone know she was sick. Luckily, there is a neighbor of her sister, she visited her relative in the hospital and saw Mrs.Dung. Then she went back and told Mrs. Dung's sister in Thot Not. Therefore, she could come and take care of her. This was the first time she got such a serious sickness. She was in hospital for a week.

Living alone, she has many difficulties. When it is going to rain, she must use a wooden ladder to reinforce the proof of the house by bricks or rocks. Her house is far away from the others, if there is any problem, noone can come to help her immediately. In 2003, the damp broke; all of her fish went away. If there is strong wind, rain or storm, it may destroy some big babana. Then she cannot sell at all.

She is poor because she is getting old, sick. Last year she had a heart operation and needed to borrow a sum of money from her parents' friends. Now she can pay back only if she could sell something. She is not strong enough to improve her garden. She does not have money to do either. She cannot loan money from the bank because they need to pay back in a short time. For garden, it takes a long time to have fruits. When asked why she stayed alone, she said that she stays mainly in the islet and seldom gets to the mainland. Therefore, she did not meet anyone and decided to stay single.

Her wish is to have electricity, clean water and some money to take medicine.

## **7. HCVA IN VINH THANH DISTRICT**

### **7.1 HAZARDS IN VINH THANH DISTRICT**

In Can Tho City, Vinh Thanh is first district which receives water source from riverheads. The main occupation of people in this district is agriculture.

During flood season, the water level of river(s) slowly rises from beginning (time) and gets peak in the period of 15/9 15/10 and then goes lower down slowly. Sometimes, a typhoon coming at the time of highest water level in the river, the flood will occur on a lager scale in the district. According to the reports of district disaster management, cyclones have been occurring more often in Thanh An, Thanh Thang, Thanh Phu, Trung Hung communes and some other areas in the some recent years.

During yearly rainy and flood season, when the storms occur, causing damage the roof of the house and there were some house collapsed. In the recent years, thanks to the rice price are more stable and in trend of increasing, some households could build the firm/stronger houses, which could stand the strong wind of cyclones. However, there are 6,730 households with 35,312 people still living in their wattle/temporary house. Most of these houses lying at the banks of *level II* canals, in the open field and can not resist strong cyclone. Thereis no strong

typhoon hit the district before, this actually makes the local people and the disaster management staff become less alert to the typhoons. They have experience on prevention of flood, storm and cyclones but no experience with the tropical typhoon at all.

Vinh Thanh District is identified as one of highly vulnerable areas to hazards in Can Tho City. Hazards, which cause a risk of harms, are both nature and human induced factors. District officers listed and ranked the following hazards into order of importance (most to least important) to local people: (1) cyclone, (2) abnormal floodings (high and low level), (3) environmental pollution, (4) abnormally hot air temperature, (5) erosion of canal banks, (6) lighting, (7) tropical typhoons, (8) out-break of human, animal and crop diseases, (9) abnormal rains, (10) salinity intrusion into inland canal from estuaries in the dry season, (11) frosts and (12) abnormally cold air temperature. The hazards, except for big floodings in 2000-2002, have commonly occurred and become more severe since 2007.

The types of main hazards and secondary hazard were synthesized and ranked based on the fact and extent of the damage affects each different level to make the results of different ratings. Remarkably concerns of participants are discussed and a notice of the harmful effects of natural hazard and the impact of human activities cause called secondary hazard comes as very dangerous and be assigned to high-rate interest. Flooding is an annual hazard affecting the major production and life of people on a large scale, thus at the town, flood is ranked as most interested. However for hamlets, flood ranked as third because local people have more experience than others. People were know that the problems of environmental pollution (mainly water pollution) is so dangerous hazard so that Phung Quoi A hamlet ranking as first and Bo Bao hamlet as second. The weather change as hotter in dry season or soon and unusual rainfall also ranked as second priority concern (Table 15).

Table 15: Potential hazards and their importance perceived by local officers (1 = most important)

Hazards	Distict	Thanh An commune	Phung Quoi A hamlet	Bo Bao hamlet
Flooding	1	1	3	3
Cyclone	2	2	4	8
Environmental pollution	3	3	1	2
Hot air temperature	4	4	2	4
Canal bank erosion	5	5	8	5
Lighting	6	6	6	8
Typhoons	7	7	7	7
Disease out-break	8	8	9	9
Abnormal rains	9	9	5	1
Salinity instrusion	10	10	0	0
Frost	11	11	0	10
Cold air temperature	0	0	10	0

Cyclone is a natural hazard which occurs on average 3-5 time per year. Cyclone usually occurs in the afternoon or at night. It often occurs in the early rainy season and happens to be unusually unpredictable. When the cyclone occurs it is often accompanied by thunder. Five years ago, it often falls in May and June, but in recent years it appears earlier in March and April. In recent years, the number of cyclones tends to increase, in 2007 more than six cyclones occurred in the area of district. Especially, in 2006 with eight cyclones 15 houses were destroyed in the district, in Thanh An, Thanh Thang, Vinh Trinh, Thanh Quoi and Thanh My communes. In 2007 and 2008, each year, these were 7 to 27 cyclones, making 27 houses and 4 classrooms collapsed, damaged 33 house roofs, broken 8 medium tension poles, 3 low tension poles and 1 antenna broadcasting pole.



Vinh Thanh has never been directly hit by a typhoon, but the impact of typhoon will be very dangerous as the local people have no experience to cope with typhoon. In 2006 and June of 2009, when the tropical low pressures hit the district, they made heavy rain and damaged many wattle houses of poor households. Region were damaged by the impact of the tropical low pressures were Thanh Quoi, Thanh An, Thanh Loc and Vinh Trinh communes.

Flood is a natural hazard with regular annual cycle from July to November, within three months. Time of flood peak is in October. Cause of flood is that water comes from the headriver combined with 2-3 continuous heavy rain days making water level rise of about 2 to 3 decimeters per day. The flood in 1978 was largest flood, where water level rose so high in a day so people have to move their property to the higher places 2-3 times per day. In a month, flood cycle is described as follows: (i) Strength tidal (high tide) on the full moon or at the end of lunar month (29<sup>th</sup>-30<sup>th</sup>) and (ii) Less water is water withdrawn on 10 lunar extended five days. Especially, if flood time (high water level) accompanied with heavy rain will cause great damage and the rain less that the damage less.

There are two distinct seasons, rainy season last long in six months (from May to October), and six month of dry season (from November to April next year). Mr. Son (district Red Cross Association) who have live 35 years in Vinh Thanh said in recent years weather fluctuations so there are not two seasons any more, especially:

- Higher temperature in the dry season. Before 1990, the temperature in the sunny days often under 35<sup>o</sup>C, but in recent five years the temperature regularly reaches at 35<sup>o</sup>C and higher at that time.
- Rain out of rainy season: the Lunar New Year it has never rained before, but in recent years rain occurs in this time. In 2009, earlier rain, much rain than the previous year and extend over several days happend. this type of rain usually fall in April but now, it can occur in February and March.

All communes of district are flooded, but the communes are located in lowlands and close to main canals flooded more often such as Thanh Thang, Thanh An (along vacant land area of the agricultural Co Do company), Vinh Trinh, Vinh Thanh, Thanh Loc, Thanh An communes, and Bac Thanh Quyen Town (north Cai San close to Cai San river), Thanh My and 1/4 area of Vinh Thanh town, 1/3 area of Vinh Trinh, in which Vinh Thanh close to An Giang is the lowest. A special attention is the residential areas often along the main channel with roads, so when the flood of water rise fast, it will have lasting impact of people in these areas.

Flood water during rainy season can cause great damage to the third rice crop (Autumn-Winter crop, harvest from June to October). In 2005, about 8,819 hectares of third rice crop were flooded and 65 hectares were completely lost. Specially, in 1978, the flood killed five people, including four children. Children died because the carelessness of parents. The parents left their children at home and went to work during flood time while the house was too simple (leafy wall), so the children fell into the flood water. Some other cases were boats being sank. The flood water also makes the national road No 80 (the district's main roads) inundated and causing traffic congestion.

Cyclone caused the wattle houses of poor households collapsed. Sometimes the cyclone also damaged (or blow off) the roofs of semi-solid houses (with corrugated iron sheets roof). It has broken poles of electricity, antenna. The damages of cyclone are overcome soon, but sometimes the information during the cyclone was interrupted. The main losses by cyclone were vegetables production like peanut, sesame, corn in Summer-Autumn crop and reduction of Summer-Autumn rice crop production because the cyclone occurs in the right stage of flowering.

### Experiences in coping with hazards

- Since 1997, government have had a program to make conditions for households to get a loan for raising the foundation of their house out of flooding. Thus, only fields were flooded.

- In hamlets, there were 2 rescue stations (borrowed inhabitants' houses on crossroads that had convenient river traffic for rescue transportation and gathering rescue transports of hamlet)

Through group discussions, district officers identified and assessed impacts of the hazards on major livelihood activities of local people as follows (Table 16):

- Abnormal floodings: big flood water inundates pond dikes, causing farmed fish losses but brings more silts to enrich rice soils and kills harmful pests, hence better rice harvest. Big floods result in more abundant fish resources and hence bring more benefits to resource-poor households, whose livelihoods highly rely on fishing during flood periods. In contrast, small floodings bring less alluvial and flush out less toxics from acid sulfate soils, making rice soils less fertile. Small floods give less favourable conditions for aquatic resources growth and reproduction. Big floods had occurred frequently before 2002, while small floods have occurred in recent years.
- Extreme hot and cold air temperature: hot temperature would damage rice plants at early productive stages of the wet season crop. In contrast, abnormally cold temperature would be unfavourable for the dry season crop at the flowering stage, which occurred in 2008 and 2009. Extreme hot and cold temperature also cause stresses on farmed fish, little feeding or non-feeding, and break out diseases on livestock and human.
- Off-season rains: abnormal rains in the dry season would result in rice lodging and unfilled grains, and hence lower yields and grain quality of the dry season crop. For fish farming, off-season rains would flush acidic substances and other contaminants from dikes into ponds, polluting pond water and killing fish. Off-season rains occurred in the dry season in 2009. However, off-season rains would increase opportunities of poor people to find jobs related to rice harvesting.
- Salinity intrusion: salinity intrusion occurs mainly by the end of the dry season in communes adjacent to Kien Giang province. The salinization would kill young rice and thus farmers must resow their wet-season rice crop many times. In 2009, salinity intrusion damaged about 60 ha of rice in Thạnh Lợi commune.

Table 16: Impacts of hazards on livelihoods, coping and adaptive measures of local people (+ positive or – negative impacts)

Hazards	Major livelihood activities					Coping measures	Adaptive strategies
	Rice	Aqua-culture	Livestock production	Fishing	Wage labour		
Abnormal floodings	+/-	-		+/-		<ul style="list-style-type: none"> <li>- Dike/embankment construction</li> <li>- Fencing to prevent fish losses</li> <li>- Residential cluster/lines construction</li> </ul>	<ul style="list-style-type: none"> <li>- Improving sanitation conditions of residential clusters/lines</li> <li>- Appropriate cropping season, farming techniques and</li> </ul>

Hazards	Major livelihood activities					Coping measures	Adaptive strategies
	Rice	Aqua-culture	Livestock production	Fishing	Wage labour		
						- Appropriate cropping season, farming techniques and systems	systems - Creating job opportunities for poor people in flood periods
Extreme hot/cold air temperature	-	-	-		-	- Appropriate farming techniques - Crop irrigation, making deeper ponds - Appropriate nutrition regimes	- Appropriate cropping season and techniques - Adaptive cultivars - Upgrading capacity for agricultural extension workers at local level - Standardise clinics at commune and hamlet levels
Off-season rains	-	-			+	- Selecting strong-stem cultivars - Implementing 3 gains – 3 reductions - Liming, water exchange in fish farming	- Establishing early warning systems - Upgrading capacity for agricultural extension workers at local level
Salinity intrusion	-					- Leaching solidity from rice soils, resowing and increasing phosphorus fertilisers.	- Establishing early warning systems - Selecting cultivars tolerant to and designing appropriate cropping season

The following coping activities have been implemented under local circumstances:

- Constructing flood-control dike systems to safeguard the harvest of the first and second wet-season rice crops, and heightening pond dikes to avoid fish losses;
- Constructing residential clusters or lines to secure livelihoods of poor households from floodings; totally 11 residential clusters or lines existing within the district;
- Implementing appropriate farming practices for rice and aquaculture such as right cropping season, farming systems and other farming techniques

However, above coping measures are perceived not sufficient and in short term mainly. Adaptive strategies in the long run for the future are suggested as follows:

- Improving sanitation conditions in residential clusters/lines, diversifying livelihoods and creating job opportunities for resource-poor people during flood periods;



Flood is a natural hazard that occurs every year. Flood water goes up and down slowly. In 24h, water level rises about 0.3 to 10 cm only. According to local people experience, when the *bong lau* (a kind of tree) flowering, it is the right time of flood. Flood begins in September and ends in November. It takes 45 days from beginning to peak (water level about 1m - 1.2m) and the same period for withdraw gradually. Flood can make serious damage for freshwater fish ponds, the people usually can not anticipate the water levels rise suddenly when flood coming with heavy rain, so in estimated, about 20% of poor households do not have money to reinforce the pond banks before flood time may completely lost their fish. For agriculture, flood often causes great damage to third crop in the area of 5-10/1,525 hectares when it comes at the right time of harvest. In addition, flood also damage vegetables farmers' gardens.

Cyclone often occurs suddenly and passes very quickly within 5 minutes. There were very strong wind reported which have carried away water pumps. People fear cyclones as they are unpredictable. It often occurs in the late afternoon and influence concentrated in an small area not as large scale as flood. Damage caused by cyclone are mainly: collapsed, blow off or damaged roofs of the houses, especially the roofs of poor households.

In recent years, rain out of rainy season occurs more often. The rainy season often begins in May to the end of October before, but from 2007 to 2009 rain came in February and April yearly. During this period of time, usually there is no rain before, but now in a month there can be 2-3 times of rains, sometimes there are very heavy rain which lasts 2-3 days. This kind of rain causes damage of rice in Winter-Spring crop. Heavy rains in 2009 have completely damaged 352ha of Winter-Spring 2008-2009 crop. Some households have to replant. The other people have received the support (petrol for water pumping machine) from government to resow.

Previously, in April and May temperature on sunny days only from 32-33°C, but in recent years the temperature of the sunny days often up to 35-36, some days up to 37°C. Approximately 8-9 am, it started hot and especially when going out outside it is hotter than before.

Pollution often occurs in dry season, when farmers use more pesticides in fields. Cause of pollution are (i) No garbage collection, and household garbage are disposed of indiscriminately, especially in markets (ii) Livestock waste from fish, pigs, cattle moves into river directly and some households rearing ducks on river, and (iii) Pesticide used in agriculture. Consequences of environmental pollution make the increase in disease (cancer disease more than before) and disease in cattle, poultry and fish more as well.

### **Hamlet Phung Quoi A**

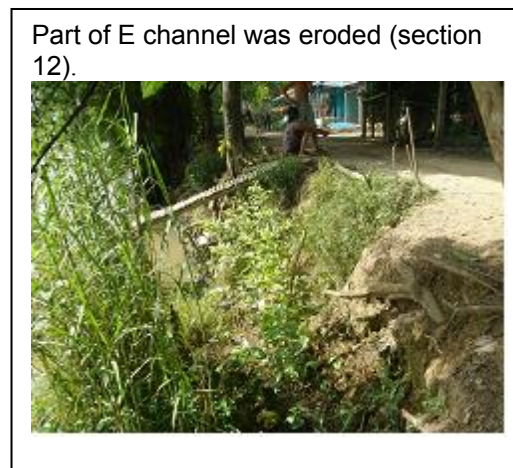
Although flood water level goes up and down regularly, flood water rises up only 0,3 – 10cm during a day and night. Every year flood season begins in September and ends in about October. According to local people, when *Bong lau* trees were flowering, flood water started to spread over the town. Peak of a flood can reach up 1-1,2m, and processes of flood up as well as down often take 45 days.

Cyclone usually happens suddenly and very fast, only in 5 minutes. Whirlwind is so strong that it can sweep a water pump to another position. Cyclone usually occurs in the afternoon and affected area is not large, just focus on a small region. But cyclone becomes dangerous because it cannot be predicted, so people cannot anticipate to prevent. In accordance with Mr Le Van Tinh, 64 years old, in Section 12 (North Cai San river), only 3 strong cyclones have happened for 40 – 50 latest years, but weak cyclones occur more frequently with 1 - 3 times every year.

Environment pollution is mainly due to (i) spraying pesticide in rice fields to kill medium-sized edible snails, then let the water run into waterways that polluted water source for living of

households along channels; (ii) breeding castle, fish and eliminating sewage directly into channels; (iii) Straw which are thrown in the fields beoames rotten and follows current of water into channels; (iv) People throw garbage and sewage into channels. Environment pollution affect on all hamlet, especially residential areas along two sides of channels (Fig.11).

Through fact-finding survey along Cai San channel line and E channel, many parts of channels were eroded , some parts were 3-4m long and deep, some parts almost encroached pathways (section 12) (Fig.12).



Rain tends to happen irregularly and out of season. Before, rain season was from May to October, but in some latest years (2007-2009) rain occurred in February and April when it never rained, but in recent times there has been 2-3 rain times in a month and lasted 2-3 days with higher rainfall, which has damaged new sowed rice fields. In 2009, 352 ha rice seedling in Winter-Spring crop was lost. Government had to support petrol expense to pump water into fields for re-sowing.

Temperature used to be under 35<sup>0</sup>C in sunny days in April and May, but recently it is getting hotter and hotter, people feel weather hotter at 8 or 9am when going out. In continuous hot days, following weather forecast on radio and TV, temperature in the daytime of up to 36-37<sup>0</sup>C, it causes rice seedling in Winter-Spring crop to die. In 2009, about 30-40% blooming rice fields in Summer-Autumn crop was burnt leaves by sunlight, which decreased harvest productivity. It was so hot that it cause poor health of children and older people, especially hired labourers. In recent years, people have planted more green trees to get the shade. However, number of trees is not enough yet, so a large number of people are expected to be supported with mango and jack-fruit seedlings for growing.

According to result of group discussion (including staff of People's Committee and Vietnamese Fatherland Front of Thanh An town), Phung Quoi A and Bo Bao hamlets are two hamlets that are the most likely to be affected by flood, cyclone and environment pollution. These hamlets were chosen for survey because (i) these hamlets are affected by many kinds of hazards; (ii) they have high rate of poor households; (iii) livelihoods are diversified there; and (iv) there are many children, older people, women and disabled people.

➤ **Bo Bao Hamlet**

Bo Bao hamlet, located in southeast, is a remote hamlet of Thanh An commune. Bo bao hamlet is highly affected by annual floods. The hamlet measures 340 ha, of which about 97% is used for growing 2 rice crops a year. Double rice cropping has been practiced since 1989, before that one crop of traditional rice per year had been grown. Main livelihoods in the hamlet include: (1) mono-culture of 2 crops of rice per year, (2) pig farming (about 210 households), (3) field-scavenging duck farming (about 140 households), (4) vegetable production (about 70 households), (5) snakehead fish farming in rice fields during flooding (30 households), (5)



farming wage labour (rice sowing, transplanting, fertilization, pesticide spraying and harvesting, earth digging, etc.), (6) workers in industrial zones, (7) locally peddling, and (8) fish catching during flood periods.

Average population density is 96 persons/km<sup>2</sup>, mostly dwelling along main canals such as Bo Bao and KH canals. There are 28 poor households, accounting for 9% of total households, and 28 marginal-poor households. Among the poor and marginal-poor households, about 40 households have lived for 20-30 years without agricultural land, a household certificate, fishing equipments, lacking income generating labour, with a temporary house on other people's land, and without a toilet. The hamlet has 90 poor and marginal poor households, accounting for 28% of total households, who have a small nippa house on canal banks. In the hamlet, there are about 38% of households having a toilet and about 28% of households accessing to clean water from a community water supply station for domestic uses.

According to local people, important hazards include (from high to low importance): (1) abnormal rains, (2) environmental pollution, (3) cyclones, (4) extremely hot air and (5) canal bank erosion (Table 15). Unlike Phung Quoi hamlet, flooding was not considered as important hazard while abnormal rains were perceived most important. Since 2000, local government and people have upgraded Bo Bao dike and internal roads, people having heightened their homestead. In addition, rice production is the most important activity here, so abnormal rains causes have negative impacts. Like Phung Quoi A, environmental pollution is considered most. Impacts on livelihoods of hazards will be given in details in following sections.

## **7.2 DISASTER MANAGEMENT**

### **Thanh An Town**

- CFSC established
- Rescue team of the Red Cross in three locations of the Town
- Has a plan to rescue people annually (destination, locations, people in charge-of clean water, living of the local people)
- Every year cfsc are trained and demonstration/rehearsals are organised to prevent cyclones and rescue work according to district plan, once every 2 or 4 years.
- The town collects 2,000 dong per person per year from local people. Hamlet submits the fund of 100 % to the town, town 100% to the district and district 60% to the city. The district will use the funds to support the town in emergency work when disasters happen and provide equipments for the town based on the needs of the town.

### **Phụng Quới A and Bo Bao:**

- Hamlet also has a rescue team of 11 people including young people and the army
- Local people in the hamlet pay annual cfsc fees but the rate is not high

### **Communications**

- The town has a loudspeakers system to the hamlets to communicate and advocate to local people.
- During the rainy and flood season, if there is no electricity, they will use 'people' to send messages to local communities.
- Around 80 % of the households in each hamlet has TV and each hamlet has 2 loudspeakers which are working well.

### *Experiences in disasters management*

#### **Thanh An town**

- Since 1997, there is a programme of loans for heightening the floors of the houses.
- Support oils for running the water pumping machines during the flood 209 to rescue the rice from too much water.
- Dredge canals in Unit 7 of Bo Bao
- Support in terms of money to poor households to repair their houses if they are collapsed or damaged.

#### **Ấp Phụng Quới A và Ấp Bờ Bao:**

- Around 80% households have rice during the flood season
- In 1978 when the historical floods happen, local people have used banana trunks, water containers to make boats to move people and things to safer locations.
- Households borrow money to raise the floors levels. Bo Bao hamlet has 100 households who have borrowed with low interest rate from the government programmes to raise their floors three times compared to the previous level to ensure that flood water does not come into their houses.
- Neighbours help each other during the accidents, supporting the difficult households
- Use the pumping machine to take out the flood water
- Build houses with traditional roos of slope of over 40 % to resist the storms. Many households in Bo Bao hamlet use steel strings to reinforce their house roofs or use nylon to cover their houses before the floods and rainy season.
- New houses are built using steel .moc to connect the house poles and roofs.
- Local people have some experiences in managing floods

#### **Constraints**

- Lack of rescue equipments for all hamlets (engined baots, buoys, vests)
- Town and hamlets do not have enough funds/reserves for disaster management
- Rescue teams of hamlets lack first aid skills
- Knowledge on DM and CC for local staff as well as people is limited
- Lack of experiences and techniques for storm resistant houses.

### **7.3 IMPACTS ON EDUCATION IN VINH THANH DISTRICT**

Schools and teaching/learning materials have been upgraded and hence educational attainment has been improved. According to an evaluation report of the district People's Committee in 2008, the proportion of children/pupils going to school at right age were 72% for the pre-elementary and 90% for elementary school programs. However, school infrastructure was poor. About 67% and 18% of schools were considered semi-concrete and "nippa" schools, respectively, higher than those in other districts in Can Tho. The proportion of pupils with higher educational level is decreased, by 9% for elementary and 19% for secondary schools (CSO, 2008).

Through focus group discussions with district officers, natural hazards cause following negative impacts:

- Cyclones and typhoons cause damages and sweep away school roofs and big floodings inundate school yards, resulting in increased maintenance costs of educational infrastructure. About 10 % of annual educational budgets is devoted to school maintenance without additional sources supplied from national budgets. Thus, local schools have to save from all their annual activities to compensate for those extra costs.
- Vinh Thanh District have totally 200 school sites, of which 10% have not had toilets, causing negative sanitation problems, particularly with rainy or hot days and flooding periods;
- Abnormally hot or cold days cause negative impacts on health of pupils and teachers.

- Children face to risks of drowning during flood periods. Pollution of canals limits swimming excercises of local children. Fewer female children can swim than male ones.

#### *Coping experiences*

- Schools have been upgraded and shading plants have been grown.
- Hazard controls have been integrated into in the educational curriculum as informal subjects through discussions with pupils. However, these activities have not been practiced frequently with sufficient time.
- School clinics or health centres have been established for pupils'health care.

#### *Main constraints*

- Local budgets devoted to school maintenance and teachers'salaries are still low. They have to find extra-work for their subsistence.
- Teaching materials and methods are poor and out-of-date.
- Flood control and adaptation are much focused mainly while other hazards and climate change have not been given sufficient attention.
- There are not enough swimming teaching programes for elementary pupils/

### **Thanh An Town**

#### *Climate change impacts*

Discussions with the school teachers, local authorities, children, and parents in the local areas in Thanh An town as well as the two hamlets of Ba Bao and Phung Quoi A show that disasters and climate change causes some negative impacts to the lives and study of the children and teachers.

#### **Mr. Tran Van Thanh, principal of Thanh An III primary school inform of the impacts:**

Our school has corrugated iron roof, previously there was a storm, which blew off roof of 4-5 classrooms in the school. We had to make new roofs. If there is another big storm or cyclone, our school is surely affected again

Now although the school is equipped with lights and fans in the classrooms for the pupils but when the summer comes with stronger heat, and the frequently blackout, the pupils and teachers learn and teach with a greater difficulty because it is often too hot. Many pupils faint in the school and we have to give the first-aids before sending them to the commune health care station. In the rainy season, the power is often off. With no lights and darkening condition, the learning and teaching in the classrooms become more difficult.

To cope with the flood here, now the school often starts the new school year earlier than other schools in the country, around the 15th of August. This is to take into account the high level of floods which cause more days off from school and to give teachers more time to fulfill their teaching program as required.

#### **Climate change affects the health as well as study of the pupils and teachers in Bo Bao hamlet.**

According to Ms. Bui Le Thuy, the senior head of the 1st grade in one of the 3 schools of Thanh An 3 secondary school, in the flooding season, the pupils often have some days off. The teachers will then give extra classes on Saturdays. According to her, the weather is getting

hotter and changes unexpectedly. The pupils and teachers in the school are very tired in the summer. Many pupils got sick with flu, high fever, and even suffer from denger fever, which makes them drop from school.

In school, there is only one toilet for 80 children and 3 teachers. In rainy days or hot summer days, the toilet stinks and is often in unhygienic condition. When it rains, the toilet is overflowed and becomes much more polluted.

Ms. Thuy said: 'now the school still has corrugated iron roof. Some years ago, it was blew off by the cyclone; the children were frightened and cried a lot'

Apart from the weather and flood as the reasons for the school dropouts, some pupils in the poorest families in Bo Bao hamlet met some other difficulties which interrupted their studies. According to Ms. Thuy : 'The children are all from the poor hired labour families, Group 7 has the most poorest families. The parents often go far away to work as hire labour for harvesting rice and take the children out of school for half or one month to go with them. When coming back to class, the children can not master the knowledge. Their parents are often illiterate, therefore they can not teach them either. In class of 30 children, 10 out of which always quit class and even do not sit for exam'.

Floods cause dangerous travel to schools for the children especially those in the remote areas

The pupils fear to go to school most in flooding season There have been years with high flood level, which flooded roads and rivers. Before the bridge was constructed, pupils had to pass the river by canoe in the flooding season which was very frightening. Now with bridge, the little children still need to be careful because they often indulge in playing and it is easy for them to fall into the river.



According to one girl in the group, in summer with hot weather, many pupils faint in school, even the older ones.

**(The discussion of the group of children in group 7)**

Climate change makes it even more hardwork for the children who live in the northern bank of Cai San river

The discussion with the group of pupils in the North Bank of Cai San river shows that they also face many difficulties in traveling in the flooding and rainy season. Because there is no school in the North Bank of Cai San river, all pupils have to go by boats. The little girls as in the 1st grade need father, mother or adult to take them to school. The job of taking children to school by boats cause money for each one, father, mother, or the adult.



According to the children, there are many difficulties in the flooding season such as:

- The children are afraid of the rising water because travelling by boats across the river is very dangerous and that they are afraid of falling off. Sometimes the small children playing near the river edge also fall off.

- When the storms come, the teachers will give 2-3 days off, and they will have to study for compensated lessons on Saturday or Sunday.
- With heavy rain, it is very difficult for the children to hear what the teacher say in classroom.
- When the books and notebooks are soaked in the water, they will have to dry them in sun and use them again.
- If it rains the whole night, the schoolyard would be inundated, but this would not be dried for several days, making it difficult and dirty for the children to go into.
- Some children still go to school by boats. This is considered to be dangerous in the strong current water.
- In flooding and rainy season, more children suffer hunger because their parents' work as the hired labour who do not have much work then; they do not have enough money to buy food.

**(group discussion and drawing by the children of Cai San river area)**

#### *Other constraints*

Apart from the above difficulties, some pupils in poor families by Cai San also quit school one year or allow dropouts. In the group discussion, 2 children quit class one year because their mother had the third child and no one took them to school. According to the Chairman of Farming Association, up to 30-40% of children in the children group by the North bank drop school permanently because their parents can not take them to school. Their parents who are usually very poor, have to go far from home and work to earn a living.

Some pupils in North Bank, Thanh Quoi A hamlet, and in group 7 and group 6 of Bo Bao hamlet have not got birth certificates. This also affects their official school enrolment.

#### *Coping measures*

- In the interview with the teachers, and pupils, it is clear that the school has incorporated some related subjects on natural disaster prevention during the morning flag salutation such as: the pupils are warned to be careful in the flooding season, they have to go with parents to school or wear hat in hot sun. Besides, in the secondary school, some subjects are combined into Geography, e.g., some subjects on natural disaster and talks: fire fighting and fire prevention, dengue fever prevention.
- Every school still has the plan to strengthening their schools.
- School tree planting
- There are specialized health staff to treat pupils' sickness and diseases at schools.

### **7.4 IMPACTS ON HEALTH IN VINH THANH DISTRICT**

According to the district health officials, the irregular changes and disasters has significant impact on the health of local people:

#### *Health impacts*

**Flood and cyclone:** common related diseases are diarrhoea (due to polluted water), fungus diseases in hands and feet among the adults, dengue fever among children under 15, and increased gynaecological diseases among women.

**Irregular weather conditions:** respiratory diseases rised – especially among children. Dengue fever occurs at a high prevalence as local people store uncovered rain water for use which creat breeding sites for mosquitoes.

#### *Coping measures*

a) Preparation: stocking medicine, organising communications campaigns before the flood season, meeting with mass organisations and local authorities for cooperation on communication campaigns, cleaning up neighbourhoods and spraying mosquitoes. For H1N1: prepared masks and medicines.

b) Health care delivery:

- Free health examination and health care for the poor and elderly are organised 2-3 times per year
- Gynaecological check with free medication are delivered twice a year.
- Children under 6 years old could enjoy free health care and use pupils' health insurance.
- Health insurance is provided for poor households and households classified as near – poverty line (2008-2009)

c) Implemented national health programmes and other programmes:

- The programme on nutrition includes quarterly weight and nutrition checks, and nutritional supplements (the current malnutrition rate in the area 16 %)
- There were two deaths because of dengue fever in 2004, which made later efforts on communications on dengue fever prevention more serious.
- The district Health and Disease Prevention Centre conducted a study on knowledge, attitude and behaviour on primary health care.
- There are several programmes which provide loans for building latrines and improves households water supply

#### *Constraints*

- Activities are mostly to cope with pandemics during the flood season, there was no study on diseases related to climate change
- Local people lack of information on climate change.
- There is no study on climate change and related diseases
- Lack of financial resource for health care services at commune level.
- Lack of doctor at commune clinic.
- Lack of health care facilities and equipment for new established communes.
- Households need support to build latrines and water supply

#### **Thanh An Town**

Thanh An clinic has six staff (3 male and 3 female), including a doctor, a mid-wife, a pharmacist and three physicians. The clinic serves 13,893 residents of Thanh An township.



Major tasks of the clinic are to implement the following:

- Public health programmes. Every year, there are two free deliveries of gynaecological diseases examination and family planning (with free medication). The clinic also provides

health examination for poor people, people under social programmes and children under six years old.

- Vaccination
- Programmes on mental health
- Communication on hygiene and environment
- Communication on food safety
- Family planning services
- Labour services and post-delivery services.
- Primary health care (for common health problems)

According to doctor Bui Van Day – the Head of Thanh An clinic, climate change observed as increased temperature and irregular weather conditions causes a rise of diseases such as flu, respiratory diseases (especially among children), coughing, red eye (conjunctivitis), dermatitis and diarrhea. These conditions prevail during the peak temperature in the summer and the beginning and at the end of the flood, when the water is most polluted. The clinic's records showed that most of visitors came for these conditions. Dengue fever and malaria are priority in the clinic's agenda, however no case on these diseases was found in the record books.

(in-depth interview with Doctor Day- Head of Thanh An Town Health Clinic)

#### *Coping measures*

- Controlling dengue fever and malaria are the priority of the clinic's public health programmes. Health workers spray the site before the flood, control mosquito larvae in households' water storage and deliver talks at schools and communities through public speakers, mass organisations and public health collaborators. They also follow up with people who move from areas where these diseases are prevailing.
- The clinic delivers communications to schools with various themes on disease prevention, food safety and hygiene.
- Health workers also mobilise community clean – up campaigns in public office and schools.

#### *Constraints for health care services at commune level:*

- Most of health workers do not have a solid knowledge on the impact of climate change on public health or the relationship between climate change and the rise of related diseases in the future.
- The clinic is built in a small area, roofed with metal panels. The roof was destroyed once in 2005 and the current facility is in the threat of cyclone – the common weather condition in the area.
- With regard to human resource, the clinic needs one more mid-wife to serve a high volume of clients in need for maternal health check and delivery.
- Reproductive health care for both men and women is limited. Currently it only focuses on women.
- Capacity to handle health emergency and accident is limited.
- Due to the shortage of financial and human resource, health communication campaigns for community are limited.
- Limited awareness of common diseases and prevention among local community: Discussions with groups and in-depth interview with families indicated a low level of knowledge about common diseases, their symptoms, prevention and treatment within the local community – in particularly transmittable diseases that can easily develop into pandemic such as dengue fever, chicken pox or diarrhea, which tend to be on an increase in the areas. Residents at the north bank of Cai San river mentioned chicken pox was transmitted from families to families in the area early this year. Local people and health



workers listed some causes for this lack of knowledge as: a) It is difficult for public health campaigns to reach communities live away from the centre, where there is no public speaker or electricity; b) there are too few volunteer health collaborators to cover the community and c) means of communications are poor due to a lack of finance. A story below shows that local people still lack knowledge on the common diseases:

**Nguyen Thi Kim Phung** is 24 years old. Phung finished primary school. Her husband, Dang Van Toan finished second grade. They have a daughter. The couple has no household registration and no agricultural land. Phung works as hired labourer for a local rice husking enterprise. Her husband does manual labour in construction work or rice harvesting.

In December 2008, their daughter was sick with high fever. Phung bought some medicine by herself to reduce the fever for her daughter but it did not work. After three days, she brought her daughter to the town health clinic and got another prescription for three days, which also did not work. They went to a private doctor, who said her daughter might have dengue fever and told her to go the district hospital for blood test. Her daughter did a test and got result only after 7 days with some other medicines. After a few days, both Phung and her daughter got very sick, they went to the emergency room at the district hospital and got a second lab test. This time they learned that they had dengue fever and were hospitalised. Her daughter had to inject the fluid, took medicine and injections during those 5-6 days. The daughter has free health care as she was less than six years old. But Phung herself had to pay for her treatment as she had no health insurance. The sickness cost her a big amount of money for both of them to recover. They had to take a loan from their neighbours and an advance of payment from Phung's employer, which she would pay back when she can go back to work.

#### *Other health care services in Thanh An Town*

Discussion with women groups and health workers show that there are various services in Thanh An town, including the following:

- Traditional health care: There are traditional health practitioners in canal G, E, Cai San Long Xuyen and canal 7, and two church-based health care practitioners at canal B and Bo Bao church. These services provide cheap or free basic medicines and do not require health insurance. Many people who do not have access to public health care (or do not recover after treatment at public health services) come to these places. Old people usually come to these services for treatment of high blood pressure. The church at Bo Bao village is supported with medicine and the priest gives these medicines to people in the area.
- The District's general hospital: local people consider that the District's hospital has more doctors, offering more medicines and they can use health insurance there.
- Private health care: private clinics and pharmacies are available at every commune. Local people have better access to these near by services with flexible hours and can easily cure common health conditions such as flu, headache or backache. Private health care becomes more popular, but the medicines are often more expensive than commune clinic.
- Provincial hospital: is more expensive and far away. Local people go to the provincial hospital for complicated delivery, injury or serious health conditions.

#### *Village health workers network*

Currently, there are four voluntary health collaborators for four villages – which include Phung Quoi A with double size of population compare to other three villages. The major task of these collaborators is to support health workers from the clinic in disease prevention, delivering public health care, reporting to the clinic on diseases in the village and supporting campaigns on family planning. Community campaigns and health communications are limited due to the limitation of both financial and human resource.

The common constraints for the village health workers are: as volunteers, they are poorly equipped and financed, competency is low, and their commitment is not stable.

*Impacts of climate change and disasters on community health*

*Drowning and injury*

There are cases of drowning – with both children and adults – especially during the flood season. According to commune staff, as communication on safety has been improved, the number of drowning cases has been reduced significantly (a case of drown child would take away the annual reward of the commune authority). However, cases were still reported by local people in meetings and group discussions during the assessment.



According to staff of the Flood and Storm Steering Committee of the District, parents and pupils, common cause/risks of drowning among children are: small children in households living along by the river are at high risk; as the river is getting more and more polluted, parents do not want their children to learn how to swim from the river; and falling off the boat in the rivers.

According to the head of the commune clinic, many injuries are caused by cyclone and hurricanes.

*Diseases*

It was discussed among women from Phung Quoi A and Bo Bao village that changing weather conditions and flood rise and fall affect people’s health condition significantly, especially for women, children and old people.

Table 17. Common diseases and climate change and disasters

<b>Disasters and climate change</b>	<b>Common diseases</b>
High temperature	Dengue fever in children and adults Fever, sun sickness High blood pressure, coughing, nose running, headache, sinusitis.
Flood – at the beginning and the end	Diarrhea Rash in fingers and toes, scabies Gynaecological diseases, eyes infection
Irregular rains	Flu, fever Coughing Bronchitis for children Joint pains

*Discussion of women from Phung Quoi A*

Table 18: Common diseases and climate change and disasters

<b>Disasters and Climate Change</b>	<b>Common diseases</b>
High temperature (February to June: dry season)	Sore throat, flu, sun sickness, viral symptom, dengue fever, malaria, gynaecological diseases, rash and scabies, chicken pox
Rainy season (May to September) Irregular rain/sunny	Eye infection (October, when flood season ends), diarrhea

Disasters and Climate Change	Common diseases
weather	
Flood season (July to November)	Gynaecological diseases/infections (70% of women), rash and scabies, backache, flu
Rainy season (August – September) Cold spells (October – December)	Flu, coughing, bronchitis

*Group discussion in Bo Bao village*

**Women’s health – gynaecological diseases/infections – worsened by disasters** Poor women earn their living as hired labour in paddy fields – a common employment in Thanh An. They suffer more frequent health problems such as chronic headache, chills and sun sickness, especially with the very hot weather. “As we harvest rice, we work with water up to our knee in the autumn. If it is sunny and hot, the water becomes muddy and hot. It makes us more tired, we easily catch sun sick and faint”, said Nguyen Thi Phung, Phung Quoi A village. Gynaecological diseases (women’s infected diseases) were mentioned as a critical health problem during the flood season, especially at the beginning and the end of the flood period as water is most polluted at these periods. As the water starts to flood the field, agricultural chemicals, pesticides and waste overflows and pollutes the river. When the flood season ends, water is polluted once more with waste and mud left by the flood. Local women use polluted water from the river for cleaning and face high risk of infections. “We are too busy earning our living. We heard about gynaecological exams at the clinic but we could not come. Just leave it ” (a woman from Group 7, Bo Bao). Gynaecological diseases are also common during the dry season as the water gets dirtier during this time. As there is no need for hired labour on rice fields during the flood season, many women earn their living at this period by fishing days and nights. A half of 350 households in Bo Bao village fish during the flood season. 60% of these households fish at day time and the rest fish at night. They are exposed to more risk of gynaecological diseases: “We are poor and we cannot afford a boat. My husband and I stand in the water from 10pm to 3am, we have to stand the tiresome and rashes”, said Ms. Tran Thi Ha, Bo Bao village.



Old people mentioned their problems with joint pain, fatigue and increased blood pressure were related to irregular change of weather conditions during the day and through seasons. Heart problems were also reported to rise.

According to interviews with teachers, commune health workers and village health collaborators, common health problems among children during the rainy season are fever and coughing. During the summer children often have headache, dizziness and faint. There were some cases of dengue fever reported at school.

#### *Health insurance*

The government has a policy to provide free health care for children under the age of six. According to the head of the farmer’s union, many children of 1-5 years old in Phung Quoi A village and in the group of north bank of Cai San river have not received their certificates to get

free health care, as their parents did not have household registration or the child did not have birth certificate. Another reason as stated by the head of the farmer's union was that parents did not know the procedure to get such certificate.

Can Tho is also implementing the policy of health insurance for the poor families and most recently in 2009 for the near poor households. However, the needs are much higher than the actual support. Many poor households and households classified as near poverty line in Phung Quoi A and Bo Bao have not had access to free health insurance. Among these households, many do not have household registration because they do not have any land, and most of them live on other people's cultivated land, river dyke or illegal land on the river side. Many of these people migrated from other provinces to the local areas and their registrations are still in other provinces. Without households registration, they cannot get free health insurance. In Bo Bao village, according to the record from the Women's Union, only 30 poor households and 2 near – poor households received free health insurance sofar.

#### *Adaption measures at household level*

- Many interviewd people said they controled mosquito larvea to prevent dengue. Most of rain water storages arecovered. All families have mosquito nets.
- Women use traditional health care to treat common disease, for instance herbal medicine to cure cold. Most women or families seek health advice and medication from local pharmacies.
- Many families built their latrines with a loan from the programme on rural water supply and hygiene.
- Local people can also have access to some local traditional health care and other health care services where medicines are given for free.

### **7.5 WATER SUPPLY, DRAINAGE SYSTEM, SANITATION AND ENVIRONMENT**

Thanh An commune has two clean water supply stations: one installed in Phung Quoi B hamlet to supply water to Phung Quoi A, Phung Quoi B and Thay Ky hamlets; and another one in Bo Bao hamlet. These two stations meet the requirement of 44% of total households in Phung Quoi A hamlet, 26% of ones in Bo Bao hamlet and on average of 45% of households in the whole Thanh An commune (Table 19). The remaining households have to use water from deep wells (80-120 m deep), canal water (with alluminum sulfate treatment) or rainfalls (with storage tanks). In Bo Bao hamlet, about 41% of households directly take canal water for domestic uses. Previously, local people took canal water for domestic uses directly but currently theo have to treat the water with alluminum sulfate or other chemicals supplied by governmental or non-governmental organizations during flood periods, or boiling water before use. Water from rainfalls is considered the source for domestic uses of 26% of households in Phung Quoi B hamlet. There, local people store rain water with cement tanks made from a favourable credit programme implemented by the government. In Bo Bao hamlet, however, very few households take use of rain water for domestic purpose, due to lacking storage tanks. Clean water supply for domestic uses of local people therefore needs to be paid sufficient attention there.

Table 19: Current status of domestic water supply and sanitation of the study areas in 2008 (% of households)

Hamlets/commune	Sources of domestic water				Septic tanks
	Tap water	Deep well	Canal	Rainfalls	
Phung Quoi A	43.7	19.2	11.4	25.7	52.7
Bo Bao	25.6	38.9	41.3	0.0	66.9
Thanh An commune	45.3	32.0	19.7	3.0	69.7

*Source: Statistical data from hamlet and commune*

In residential areas had built since 2002-2003 to overcome flood, drainage system had been designed and built for requirement of planing new residential area. Remaining residential lines along waterways without drains, thus, sewage from life activities and breeding farms was eliminated directly into waterways and fields.

Local government had program to support expense for households to buy water container and build latrines, but poor households cannot borrow with interest because they cannot afford to return their loan, so they didnot still have latrines yet.

About 70% of households have hygienic latrines, which thanks to loan progam (8 VND millions/household with interest rate 0,9%). Since 2008, the decision households which can get a loan rely on selection through discussion in sections and associations such as Women and Youth Associations following the plan of People’s Committee. In section 10, 18/54 households got a loan from this program to build latrine, 10 households built latrine by their savings. In section 11, over 50% households have latrines. Only 10/50 households in section 9 have latrines, which thanks to this program (make up 20% households with latrines). In section 12, 30% households donot have latrines but noone of them borrow with interest from this program yet. Table 13 showed the problems and suggestions.

Table: water supply and sanitation in 2008 (% households with usage)

Town	Sources of water supply				Latrines
	Tap water	Well water	River water	Rain water	
Hampplet Phụng Quới A	43.7	19.2	11.4	25.7	52.7
Hampplet Bờ Bao	25.6	38.9	41.3	0.0	66.9
Thành An Town	45.3	32.0	19.7	3.0	69.7

Over-canal latrine should be a big problem in Thanh An commune, both environmentally and socially. On average 70% of households in the commune have used septic-tank toilet, while the corresponding figures are 67% in Bo Bao and 53% In Phung Quoi A hamlets. The remaining proportions of households use over-pond or over-canal latrines mainly.



During participatory discussions, hamlet officers and inhabitants perceived that poor sanitation and environment causes negative consequences of people’s livelihoods. Environmental pollution types include: surface water pollution, air pollution and land dump (Figure 22). Hamlet officers and communities suggested that surface water pollution is the mot important problem



influencing local people's livelihoods. Air pollution is mainly caused by local rice mills and brick ovens. According to them, six pollution sources or causes of surface water pollution are (from most to least important):

- **Agricultural pesticides:** farmers apply pesticides to control insects and snails on rice. A quality of pesticide applied in rice fields is discharged into surround canals through field water exchange. Recently, farmers have tended to apply a larger quantity of pesticides because of severe occurrence of brownplant hopper and golden snails. Severe pollution periods are between November and January 11-1 (winter-spring rice crop) and between April-June (early summer-autumn), when rice plants are in productive stages and farmers need to apply a larger amount of pesticides to control pests (Figure 9).
- **Livestock wastes:** Raw wastes from livestock, particularly pig and duck, are discharged to adjacent canals. Very few pig farmers have applied biogas diesters to treat the wastes before flushing them into the surrounding environment. Moreover, in the hamlet field-scavenging duck farming is commonly practiced, polluting canal water, mostly in the dry season when river water flows are low. The pollution occurs year-round, except for flood periods when flood water dilutes and flushes the pollutants to downstream areas.
- **Domestic wastes:** over-canal latrines and raw sewage are important sources. The pollution is more severe in populated areas in the centre of the commune and along Cai san canal, where sanitation conditions are still poor. Like livestock waste-induced pollution, the pollution occurs year-round, except for flood periods when flood water dilutes and flushes the pollutants to downstream areas.
- **Effluents from intensive fish farming:** Raw effluents from intensive intensive pond- or cage-Pangasius catfish culture are discharged into surrounding canals through daily water exchange, mainly along Cai San canal. The pollution incidence is year-round, most severe pollution occurring during the dry season as low river water flows.
- **Raw wastes from non-agricultural sectors:** non-agricultural sectors polluting the environment mainly include: rice milling, seriously from February to March, and brick ovens, mostly from April to September annually.
- **Low flows:** annually in the dry season, from March to May, surface water becomes more polluted than in the wet season, due to lower flows to dilute and flushing out pollutant.

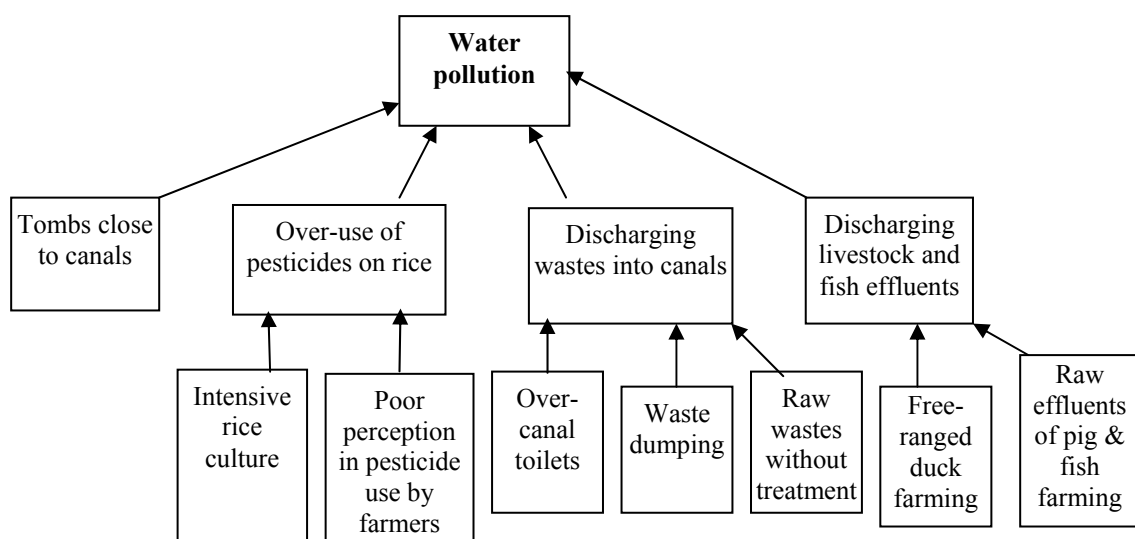


Fig. 10: Causal relationships of problems in surface water pollution in Thanh An commune

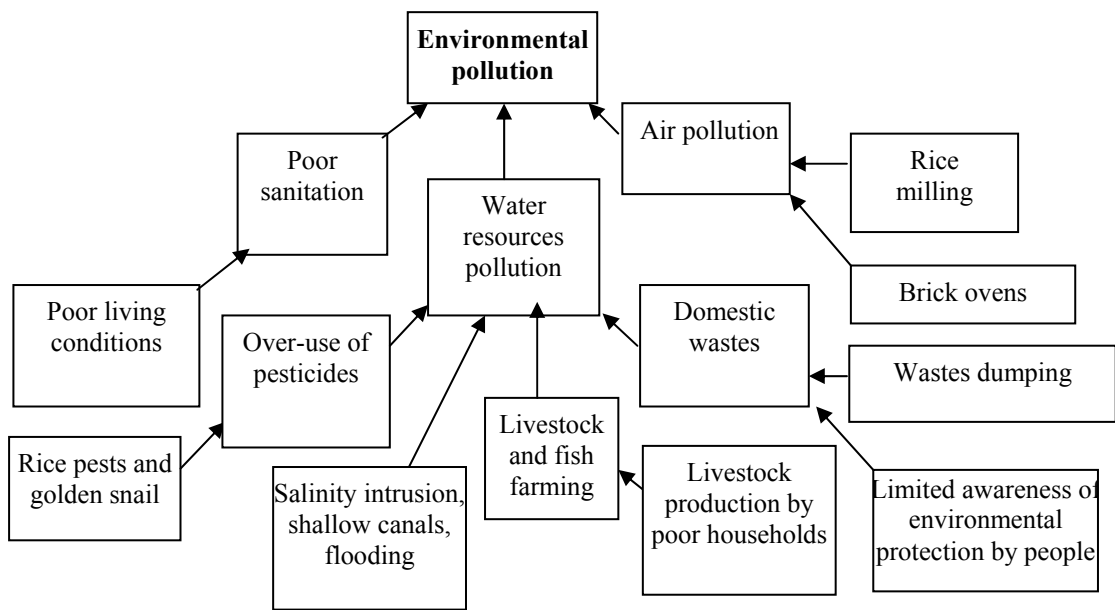


Fig. 11: Causal relationships of problems in surface water pollution in Phung Quoi A hamlet

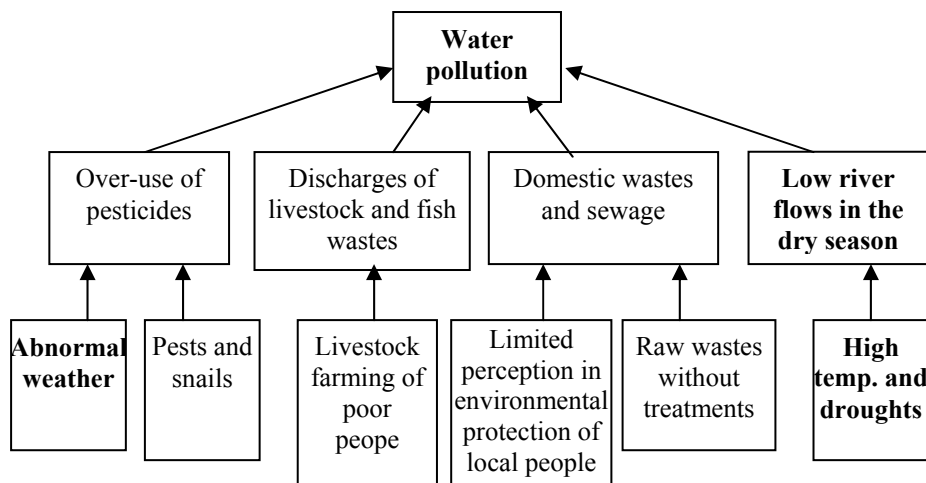


Fig. 12: Causal relationships of problems in surface water pollution in Bo Bao hamlet

Pollution sources	Months											
	1	2	3	4	5	6	7	8	9	10	11	12
Pesticides	Orange				Orange	Orange					Orange	Orange
Domestic wastes	Grey	Grey	Grey	Grey	Grey	Grey					Grey	Grey
Fish effluents	Green	Green	Green	Green	Green	Green					Green	Green
Livestock wastes	Orange	Orange	Orange	Orange	Orange	Orange					Orange	Orange
Rice milling and brick ovens		Purple	Purple	Purple	Purple	Purple	Purple	Purple	Purple			

Fig 13: Seasonal calendar of serious pollution causes by pollution sources in Phung Quoi A hamlet (Source: group discussions with people in Phung Quoi A hamlet)



### *Impacts on livelihoods*

- Water pollution directly impacts human health and income creating activities of local people. Commonly water-related diseases are found: malaria, dengue, diarrhea, itches, woman's diseases, etc. According to participant people, dengue and itches have tended to increase, due to the stagnance of polluted water.
- Water pollution causes negative effects on livestock and fish production, resulting in disease incidence and harvest losses of farmed animal and fishes. The effect has become more severe in recent years.
- Natural aquatic resources have declined, resulting in lower fish catch and income of fishery households.

#### **Effects of water pollution and climate change on raising egg ducks of a poor households in Phung Quoi A hamlet**

**Mrs Mai Thuy Hang (32 years old, passed primary school)** and her husband, Mr. Le Van Nhieu (38 years old, 3 years in primary school) are living in Phung Quoi A hamlet, Thanh An commune). They are poor (landless). They have earned money through egg laying ducks production since 1999. She said, although raising ducks for egg production was hard, her family could earn more money than working as hired labour and water-melon production that they used to apply from 1995 to 2005. However, raising ducks for egg production is more risky in recent years due to frequently occurrence of diseases. In her opinion, the diseases may be related to water pollution (insecticides), abnormal climate changes and disasters (more frequently occurrence of storm and tropical low atmosphere, hotter weather and cold spell in Christmas time).



Due to rice production (Winter and summer crops), the water in river has been more polluted with pesticide (snailcides and insecticide) since 2005. Therefore, ducks would get diseases or die (flu, indigestion) if they feed in river. That resulted in decrease egg production by 20 to 30%. In addition, storm and tropical low atmosphere occur more frequently compared to 2 years ago. Ducks often feed on feathers of other ducks when storm and tropical low atmosphere occur. That causes in loss of ducks' feather and consequently the egg production was

reduced by 20%. To make the matter worse, egg production was also reduced by 10% when the temperature falls abnormally, for example at the Christmas time 2008. When the water pollution and abnormal climate change occur, ducks are often kept in duck-house and fed with special diet, including vitamins to prevent opportunist pathogen. At that time, her family was usually lack of investments for feed and medicine in raising duck. She could not borrow money from government because of being landless. Therefore, she often borrows money from the duckling hatcheries with a interest rate 3%/month and she has to sell duck eggs to the creditors with a price lower 50-100 VN dong per egg compared to the market prices.

She will continue to raise egg laying ducks and rent land for rice production. However, the number of ducks will be decreased because of water pollution, abnormal climate change and lack of ratoon ricefields (due to Thu Dong rice crop). In the period of water pollution (early Dong Xuan rice crop) her family will cultivate water-melon for Tet holiday instead of raising duck.

### *Capacity and coping measures*

Local authorities and inhabitants have dealt with environmental pollution as follows:

- Investing clean water supply stations at the two study hamlets; however, not all local households can access to clean water supplied;
- During flood periods, particularly in flood years, governmental and non-governmental free distribute water treatment chemicals to local inhabitants. Local people would use water treated with alluminum sulfate or boiling water;
- Increasing the use of water extracted from deep wells in the dry season;
- District Department of Natural Resources and Environment should enhance regulations of environmental protection like monitoring, informing, warning and even fining for environmental pollution caused by livestock and intensive fish farming; these activities have been implemented but not effective so far;
- Local government should implement micro-credit programme for clean water supply (i.e. rain water storage) and sanitation (i.e. septic tank toilet, biogas digester);
- Implementing measures to avoid out-break of epidemic diseases on human and animal like spraying chemicals, killing ill animals, banning livestock production in disease-out-break areas, etc.;
- Applying best farming practices like “3 reduction – 3 gains” and integrated pest management (IPM) on rice culture, waste treatment using biogas digesters, fish culture with low effluent discharge rates, ...

These coping measures are considered short-term and not sufficient. Thus, in the long run more adaptive activities are needed.

## 7.6 IMPACTS ON LIVELIHOODS

Main livelihood activities of inhabitants in Phung Quoi A and Bo Bao hamlets are: (1) intensive rice production with two crops grown per year, (2) pig or duck farming, (3) pond fish culture integrated with livestock production, (4) vegetable farming, (5) pond or fence-fish farming (intensive snakehead fish or catfish culture) and (6) non-farming activities. Rice production, pond fish culture integrated with livestock farming or vegetable production are considered most important (Table 23), for the majority of households, from the worse-off to the better-off, within the study hamlets. Non-farming activities are usually manual and non-professional jobs, which are mostly engaged with resource-poor households. Local communities have not only opportunities but also constraints in their livelihoods. The opportunities and constraints are similar between the hamlets. Alluvial soils, year-round freshwater availability, abundant natural nutrient sources for livestock or farmed fish during flood periods are considered major opportunities for rice, livestock and fish production. Problems limiting local people’s livelihoods, however, are environmental pollution, abnormal weather, harmful pest out-break, high prices of farming inputs and low prices of farming outputs. Poor households, particularly for who are living on wage labour or fishing, face a lot of problems like: (1) less opportunities for rural job creating from agricultural mechanization, (2) lacking professional knowledge and skills, (3) declined natural fishery resources and (4) unstable jobs and low income rates.

Table 17: Major livelihoods’ activities of inhabitants in Phung Quoi and Bo Bao hamlets

Main livelihoods	Importance		Groups	Advantages	Disadvantages
	Phung Quoi A	Bo Bao			
Two rice crops	1	1	Rich, medium & marginally poor	Alluvial soils, irrigation, extension, advanced techniques	Pests, high input costs, unstable output prices
Pig/duck farming	2	2	Rich, medium & poor	credits, integrating with vegetables or fish farming to recycle wastes	Environmental pollution, diseases, high feed prices, unstable output prices

Main livelihoods	Importance		Groups	Advantages	Disadvantages
	Phung Quoi A	Bo Bao			
Integrated pond-livestock system	3	5	Rich, medium & poor	Reusing wastes and lowering input costs	Unstable livestock production
Vegetables	4	3	Medium & poor	New varieties, stable output prices	Pests, abnormal weather
Snakehead fish/catfish	5	4	Rich/marinally poor	Stable output prices, abundant natural food sources in flood season	Lacking capital and farming techniques, water pollution, increased disease incidence
Non-farming	6	6			
Small bussiness			Medium & poor	Increased consumption needs	High competition
Farming wage labour			Medium & poor		Fewer and fewer job opportunities, low and unstable incomes
On-farming wage labour			Rich, medium & poor	More opportunities for jobs	Limited professional skill, low and unstable incomes
Fishing			Poor		Declined wild fish resources, sentitive with flood status

Natural hazards as aforementioned have impacted most of livelihoods' activities of people in the study hamlets so far (Table 10). According to local communities, the hazards would be occurring more frequently in the future. Local government and inhabitants have had activities dealing with the hazards. More adaptive strategies, however, are needed in the future.

**Abnormal flooding:** Abnormal flooding is meant extremely big or small floods. Extremely big floods occurred in 1966, 1978, 1994, 1995, 2000 and 2001. Floods in 2003 and 2007 were considered extremely small. Flooding has two sides: benefits and losses, if not well managed. Big floods usually bring more alluvial, soil enrichment, flushing out toxic substances from acid sulfate soils, killing rice pests while damaging infrastructure and causing rice and human losses, if not well managed. The contrary occurs with small floods.

*Impacts:*

- Big floods benefit rice, vegetables and fish crops, through soil water body enrichment, and resource-poor households, through opportunities for wage labour (earth digging) and fishing.
- Big floods innudate and consequently constrain livestock farming and non-agricultural activities.
- Small floods, in constrast, limit rice, vegetable and fish production and other jobs such as earth digging and fishing.

*Capacity and coping activities:* Local government and inhabitants have experienced dealing and living with floods through structural (residental areas and flood-control structure) and non-structural measures (institutions, agricultural development, education, health care and social security):

- Local inhabitants in the study hamlets said that they contributed to construct flood-control dikes to protect the wet-season rice crop, and heightening ground level to minimize harvest losses of livestock and aquaculture;
- Growing rice varieties with short-growth duration and early establishing the rice crop to avoid rice losses by flooding;
- Establishing security team in each hamlet with “4 - on-site – principle”;
- For small floods, farmers growing ratoon rice as the third crop, farming ducks during the flood season, applying pesticides to manage diseases on the rice.

*Adaptive measures:* even though investment and policies of the central government, and experiences of local people of “living with floods”, more adaptive strategies are suggested by local communities:

- Appropriately planning and constructing flood-control dikes to produce rice safely in areas without embankments;
- Improving effectiveness of residential clusters, particularly for sanitation, environment, education, health and commerce; enabling local people to improve their livelihoods;
- Improving and maintaining irrigation systems in good conditions to flush out acidity and supply enough water for crops in small floodign;
- Applying adaptive farming techniques (short-growth duration, applying phosphorus fertilisers, cropping season, intercropping/rotating/integrated farming systems) and mechanization to maintain high yields and increased income.

*Abnormal hot/cold air temperature:* abnormal hot or cold air temperature has occurred in recent years. For instant, local people said air temperature used to be extremely hot (38-39 °C) in March – April, the transition between the dry and wet seasons. This phenomenon has been found to happen continuously since 2006. Extreme droughts have also occurred in July. Abnormal cold temperature (18-19 °C) also occurs in December of 2008 and between January – February 2009.

*Impacts:* Extremely hot or cold temperature would cause negative effects on agricultural or non-farm activities:

- Extremely hot temperature would cause lacking water for rice in early summer – autumn crop and increasing soil acidity and hence limiting rice growth in tillering stages. Abnormally cold temperature occurring during boosting and flowering stages of rice plant would result in unfilled grains;
- Abnormally hot or cold temperature would result in out-break of diseases on livestock and cause ceased feeding in fish.
- Extremely hot temperature would bring out lower work yield and health problems of people selling farming labour.

*Capacity and coping activities*

- Irrigating rice fields, change pond water, shading or bathing livestock to minimise effects of high temperature and soil acidification.
- Avoiding going to fields during highly sun shining, eating and drinking appropriately to stimulate the resistance of body;
- For low temperature, warming up young livestock.

*Adaptive measures*

- Improving irrigation systems to provide sufficient water for agricultural production during hot, cold or drought periods, when river flows are usually low.
- Applying adaptive farming techniques like varieties resisting to extreme temperature or drought, and other appropriate farming technologies;
- Planting more trees surrounding homesteads and along canals;
- Training local people to apply best crop management and health care to adapt to abnormal temperature;

- Mid- and long-term weather forecasts so that line departments and local inhabitants to have sufficient preparedness..

Abnormal rains in the dry season: Abnormal rains occur in between December and March. In the last two years, abnormal rains brought about negative impacts on agricultural and non-agricultural sectors.

*Impacts*

- Winter-spring rice crop is lodged, resulting in lower yields, in poor quality of rice grains and in higher harvesting costs.
- Late winter-spring or early summer-autumn rice crops are damaged;
- Livestock disease incidence.

*Capacity and coping activities*

- Manual rice cutting is practiced, increasing opportunities for jobs of poor people living on wage labour.
- Resowing the rice crop, draining, shading vegetables and fish ponds.

*Adaptive strategies*

- Applying appropriate irrigation and fertilization techniques to minimise rice lodging;
- Mid-and long-term weather forecast so that local authorities and farmers have effective preparedness.

Frost:

*Impacts:* Frost has occurred frequently in recent years, causing disease out-breaks, flower and grain losing on rice and vegetables. This hazard, however, is perceived not important.

*Capacity and coping activities:* farmers would apply fungicides or chemicals to control diseases and grain losing, and harvest crops by machine to minimise crop losses.

*Adaptive strategies:* appropriate fertilization techniques would be advisable for rice and vegetable production.

**Impacts of abnormal weather on rice production of a Khmer household in Bo Bao hamlet.**

Now, my family has two children and migrated from the Co Do State farm into here living for a long time ago. Villager's settlement ranks my family to reach nearly poor household category. My livelihood activities are 3 main components: (1) rice farming, (2) raising pigs, and (3) seasonal hire work. My family has 0.3 ha of rice and pig raising (3 heads), but my family also encountered many difficulties in livelihood activities with many reasons. Each year, the family must borrow money to buy rice for home consumption in during 2-3 months. First, land for rice farming is still limited and we are having difficulties due to weather changes. The flooding season is not affected so much on rice production because of time for rice harvesting, but if the small flooding is affected too much by bringing alluvium into rice fields and could affected the next rice crop. Especially, the low water level of flood does not take away all diseases in the field and leading to the potential disease for next rice crops. Next, the changes of rainfall from 2006 to now have a lot of impacts on farm activities such as increasing cost inputs and reducing rice yield and pigs. The weather changes usually make rice and pig's diseases increasing so I have to spend a lot more money for treatments. Now, it does not rain much which badly affects rice sowing and rice harvesting. At the time for rice sowing, if it rains in December (Winter-Spring rice) it is difficult for rice germination, even to be sowed again (year 2008). And changeable rain from February to March makes rice plants fall down on the side causing rice yield reducing and cost input increasing. This is a similar impact to rice harvesting in Autumn-Summer. Too much rain also involves more work, especially rice transplanting and weeding. More particularly, I find the recent hot weather the rice also gets a lot of bacterial leaf streak and pigs eat less that lead to lower yields. I do not understand reasons why there have been more diseases for pigs since 2006, I think that the irregular rains are the cause and that the weather has changed so suddenly too often. My family has tried to find ways to cope and to adapt gradually such as we take care of rice better, spray more pesticides to cope with insects and

disease on rice. In the future, my family intend to switch to short-term rice varieties instead of Jasmine variety to reduce diseases. For raising pigs, I have to pay attention to vaccination for pigs, constructing a new cage for raising pigs.

As a family with many children I has been going to work too many hours in field that affects my health such as legs and headaches when the weather changes.

Month	1	2	3	4	5	6	7	8	9	10	11	12	
<b>Agricultural activities</b>													
Rice	DS crop			WS crop									
Vegetables													
Watermelon													
Pig													
Pond snakehead fish													
Fence snakehead fish													
Egg duck													
Meat duck													
<b>Off-farming and non-farming activities</b>													
Off-farming													
Earth digging													
Fishing													
Non-farming													
<b>Natural hazards</b>													
Flooding													
Early rains													
Hot temperature/ droughts													
Cold temperature													
Frost													

Figure. 14: Seasonal calendar of livelihood activities and natural hazards in the study hamlets (DS = dry season; WS = wet season)

Figure 15 and Figure 16 give respectively the profiles of the resources systems, advantages, problems and opportunities in Phung Quoi A hamlet and Bo Bao hamlet.

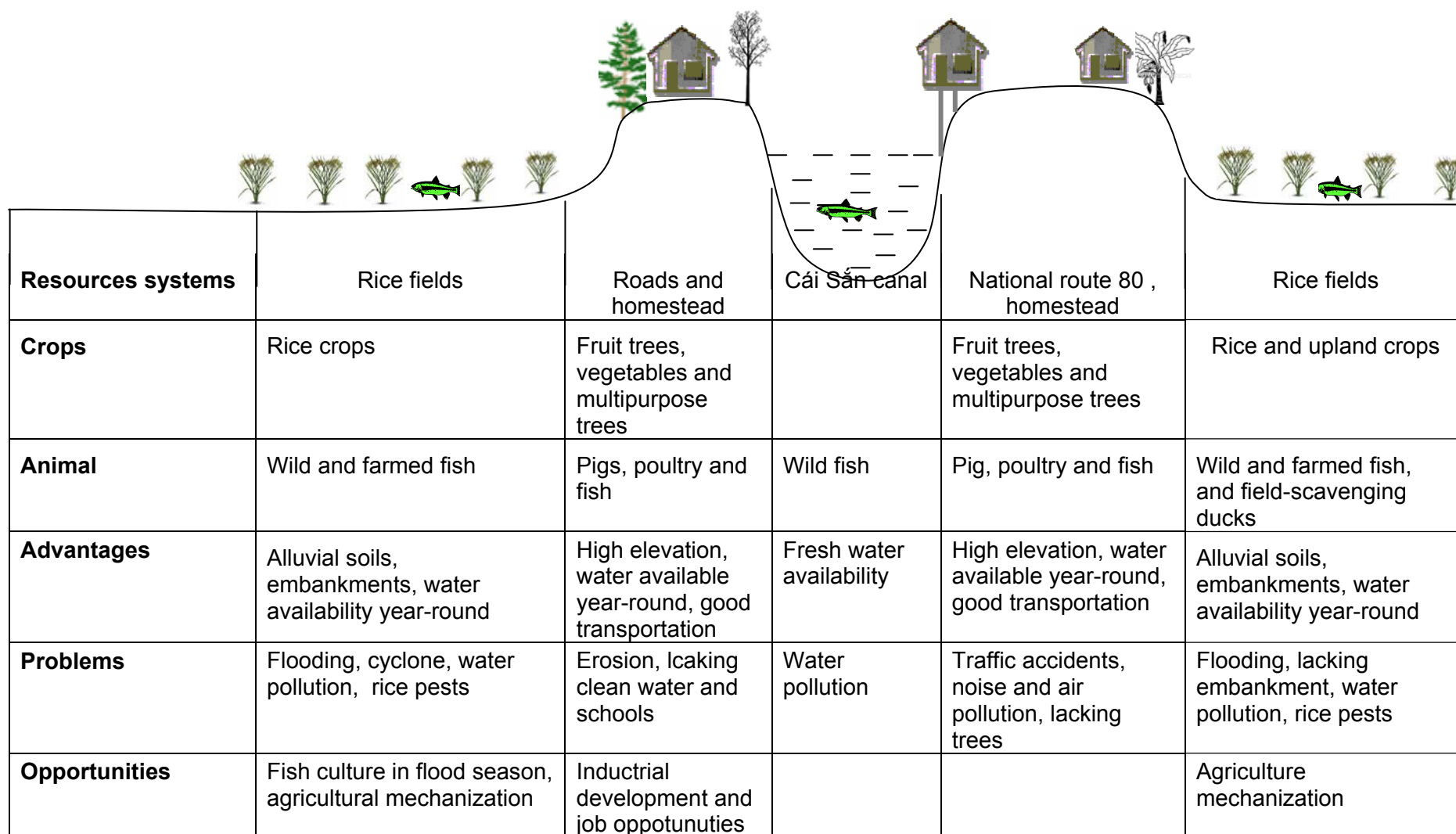


Figure. 15: The transect map showing the resources systems, advantages, problems and opportunities in Phung Quoi A hamlet



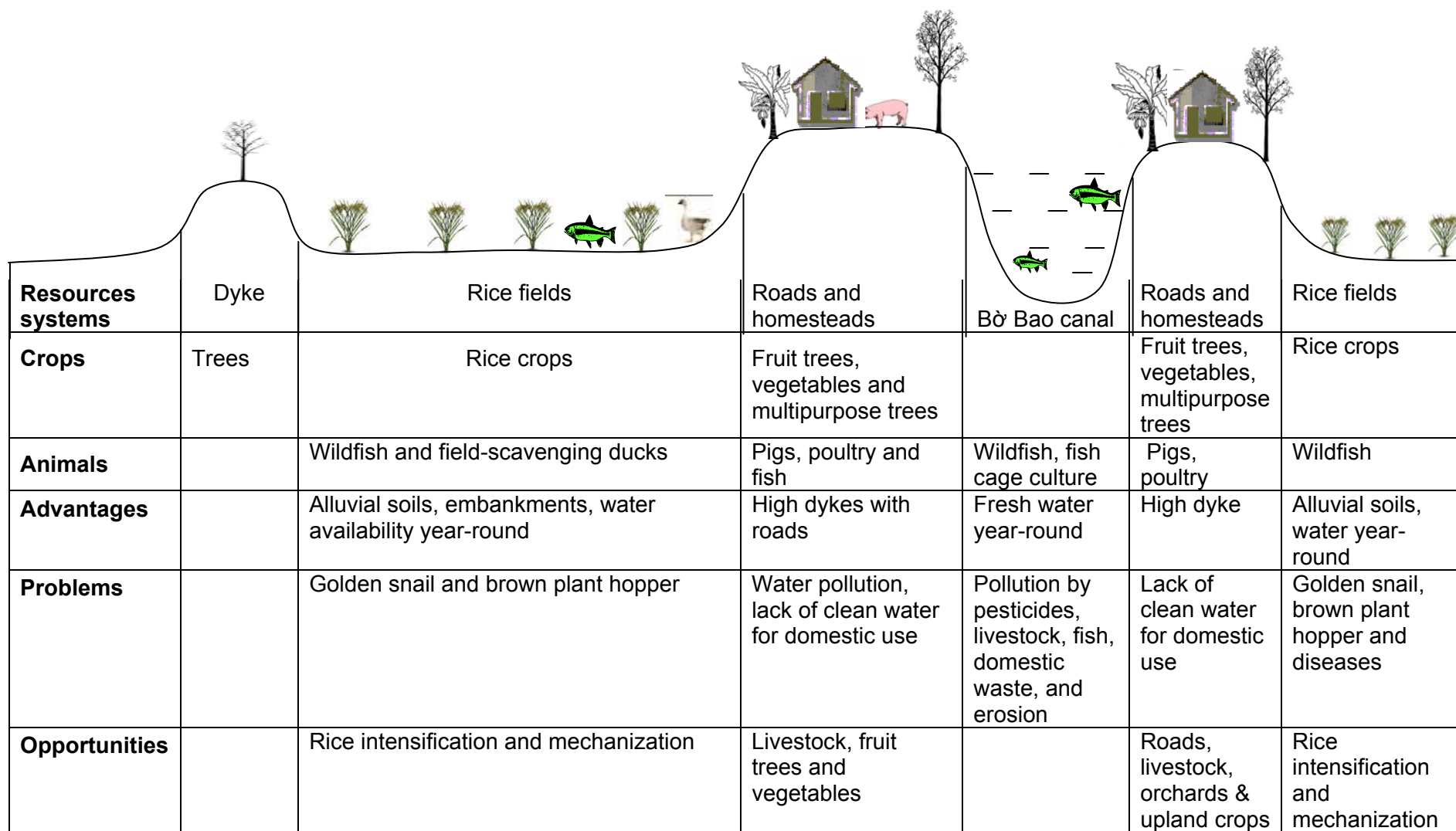


Figure 16: The transect map showing the resources systems, advantages, problems and opportunities in Bo Bao hamlet

### Livelihood Problems

During participatory discussions with local people, causal relationships of problems that negatively impact agricultural activities were identified (Figure 27 and 28). The diagram below shows that the impacts on rice production, the main livelihood activity of the local people are serious. Various climate risks affect the rice plants stages, including harvesting as detailed as in the diagram.

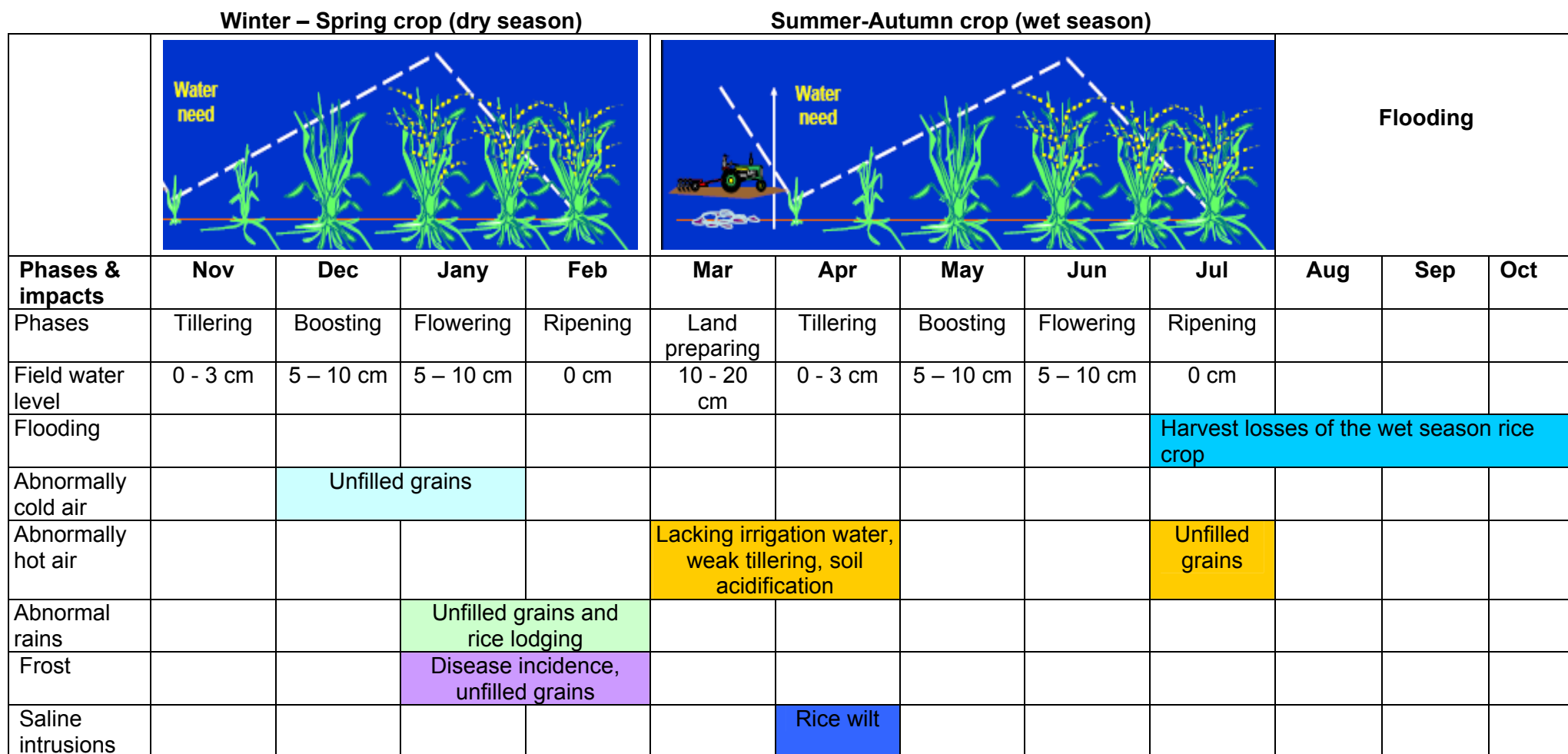


Figure. 17: Impacts of major hazards on rice farming in Vinh Thanh District

In addition to the impacts by climate risks, there are also other factors affecting the rice production and incomes of the local farmers such as: Low prices at local markets, high input costs and low yields are key problems resulting in low economic return of rice in the study hamlets. Low output prices at local markets are resulted from poor product chains, processing and exporting, which are out of reach of farmers. High production costs are due to continuously increased prices of farming input materials, rice supplementary transplanting due to damage by golden snails and other pests, and rice lodging. Original causes of the problems are lacking capital, purchasing farming inputs on credits, incomplete planning and flood-control structure, lacking rice cultivars resistant to major pests and having good quality grains, and negative effects of abnormal weather.

Previously, rice input (materials, labour and credit) and output (marketing) services were improved. Farmers applied new farming technologies from governmental agricultural extension, mass media and agricultural material companies. However, those interventions have not been satisfy real needs of farmers. Local communities suggested further improvements as follows: (1) upgrading embankment systems to well manage crop establishment for minimizing crop losses by early flooding, (2) improving comodity and value chains for increased value of products, (3) favourable micro-credit supply and (4) supplying rice varieties resistant to pests and abnormal weather while having good quality of grains.

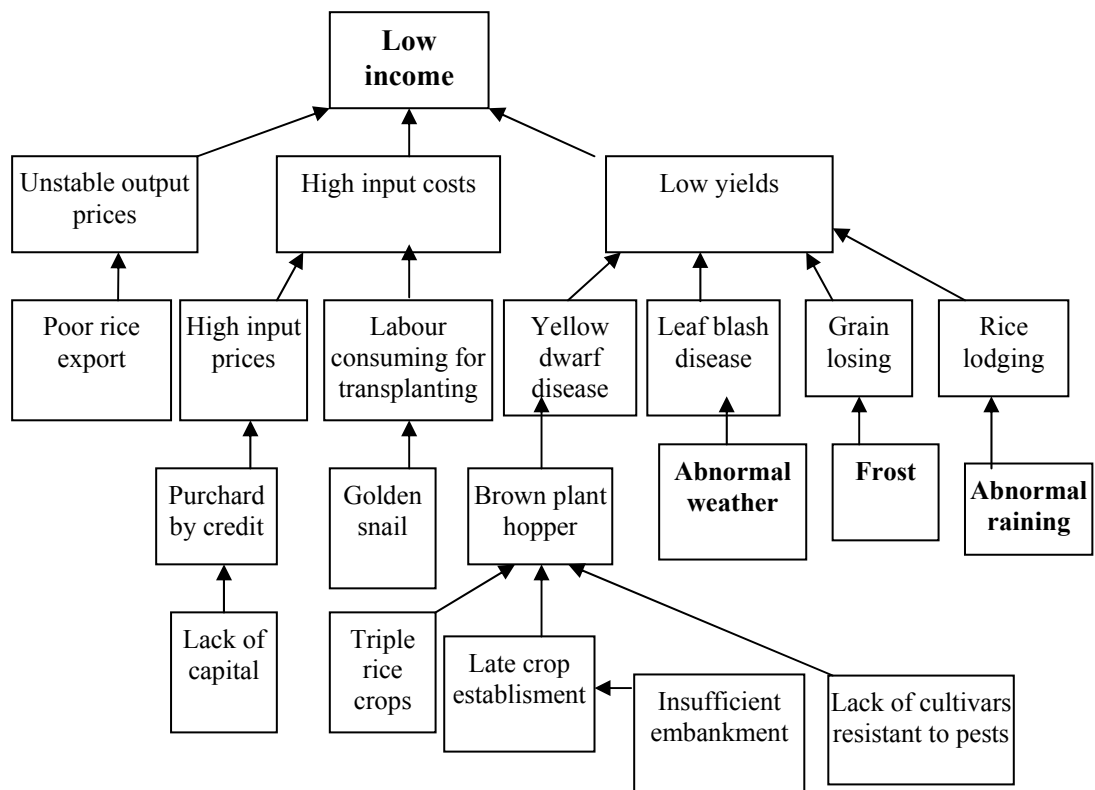


Figure 18: Causal relationships of problems in rice production in Phung Quoi A hamlet

Table 18: Impacts of natural hazards on livelihoods, coping and adaptive activities

Major hazards	Livelihood activities									Coping activities	Adaptive strategies
	Rice	Livestock	Pond-livestock	Vegetables	Aquaculture	Small business	Farming wage labour	Non-farming	Fishing		
Extreme floods	+/-	-	+/-	+/-	+/-	-	+/-		+/-	<p><i>Big floods:</i> constructing residential clusters and flood-control dikes, using short-growth duration cultivars and early crop establishment, hightening ground level, applying “4-on-site-principle”</p> <p><i>Small floods:</i> growing ratoon rice, farming duck during flooding, applying pesticides on rice</p>	<p><i>Structural measures:</i> planning and constructing embankment/irrigation systems, improving residential clusters;</p> <p><i>Non-structural measures:</i> applying appropriate farming techniques and season, adaptive farming systems and mechanization for maintained yields and income</p>
Abnormally hot and cold air temperature	-	-	-	-	-		-			<p><i>Hot:</i> irrigating rice fields, applying phosphorus fertilizers, shading/bathing livestock, pond water exchange, avoiding going to fields during burning hours, appropriately nutritious regimes for improved resistance of human body;</p> <p><i>Cold:</i> warming up livestock</p>	Upgrading irrigation systems, applying adaptive cultivars and farming techniques, planting more trees surround homestead and along canals, training farmers on adaptive farming techniques, health care, and mid- and long-term weather forecast
Abnormal rains	-	-		-	-	-	+			Supplementary transplanting/sowing, draining, manual rice cutting, shading vegetables and fish	Appropriate irrigation/draining and fertilization, and mid- and long-term weather forecast
Frost	-			-						Applying fungicides, reducing nitrogen fertilizers, spraying irrigation to wash-off frost on vegetables	Training farming techniques and using adaptive varieties of crops

*Pig and duck farming:* Main problems of low and unstable economic return in pig and duck farming are high input costs, high mortality and unstable market prices of outputs. (Figures 29 and 30). Principal causes of the problems are local farmers lacking capital for farming investments, poorly accessing to favourable credits, poor technical knowledge and farming management, surface water pollution, disease out-break, small-scale farming and insufficient market information.

Recently, farmers have tended to intensify pig farming through upgrading pens, applying commercial feed and periodical vaccination. Intensive farming, however, results in high production costs, which account for 70-80% of output value; the farming would be lost if output market prices drops. Pig farmer have till turned around or gambled: accepting and rejecting farming according to fluctuations of market prices of farming inputs and outputs.

Local participant people suggested the following adaptive strategies in the future: (1) providing more farming technical and management trainings, (2) supplying favourable and mid-term credit supply for improving pens, (3) creating new breeds with high-quality meat and reasonable costs, (4) providing market information and spreading markets for stabilised prices of output markets.

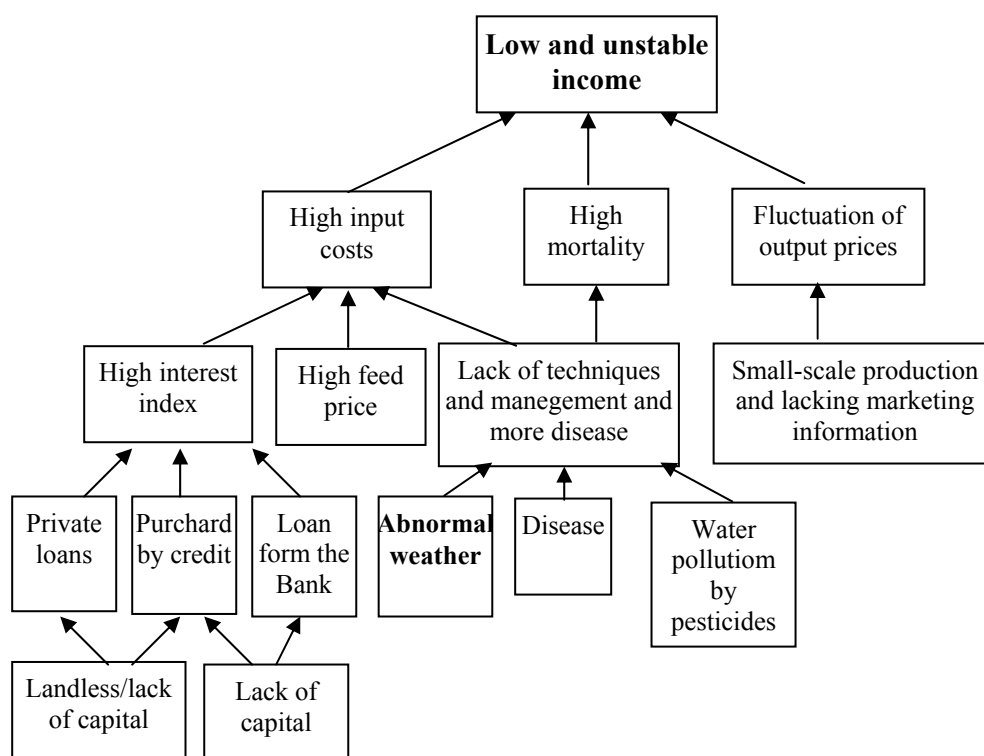


Fig. 17: Causal relationships of problems in pig farming in Phung Quoi A hamlet

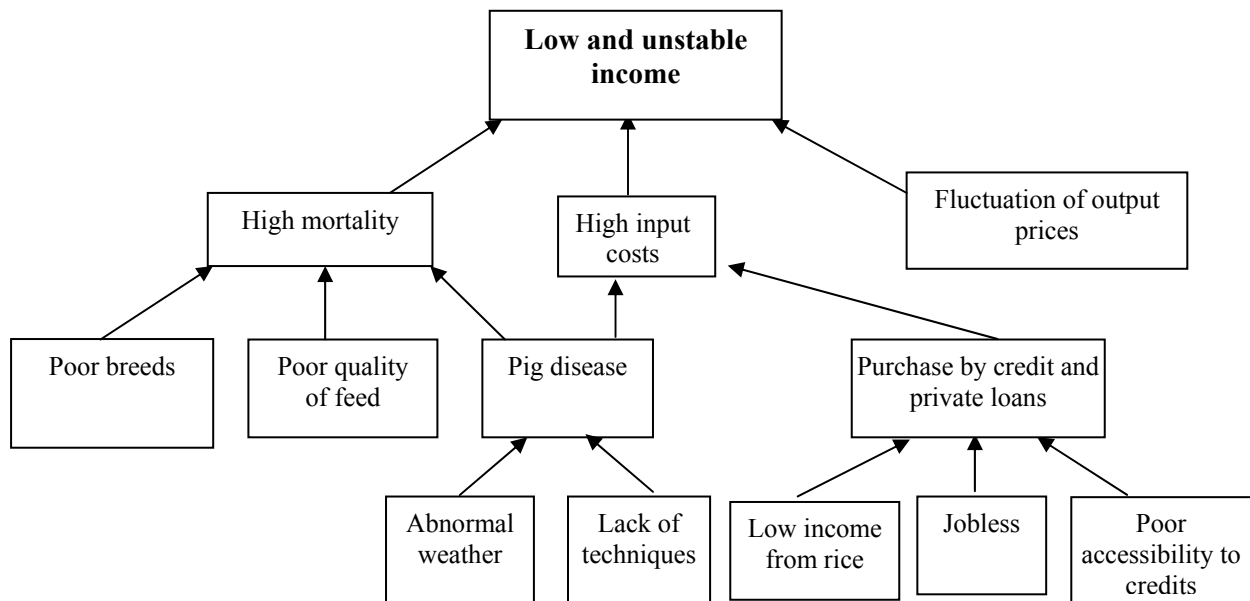


Fig. 18: Causal relationships of problems in pig farming in Bo Bao hamlet

#### Pig farming status of a poor household in Phung Quoi A hamlet



**Mrs Nguyen Thi Le Thuy (54 years old, illiterate)**, her husband, Mr. Nguyen Van Son ((54 years old, passed primary school), their son and daughter in-law are living in the north Cai San canal, group 12, Phung Quoi A hamlet, Thanh An village. More than 10 years ago, her family earned money through rice production (1.0 ha) and rice threshing machine. In 1997, her family sold ricefield and threshing machine because of poor crops, accident and debts. In present, her family is poor, with limited land (200 m<sup>2</sup>), and unstable incomes. Her husband is a porter in a factory but he was out of

work 2 months ago. Her son is working for small building material shop but his wife is unemployed. Due to spine disease, Mrs Thuy has not worked hard since 27 year olds. Therefore, she earn money by fishing (electric gear) in river (dry season) and ricefields (flooded periods) and glean rice. Her family income is equal the household expenditure.

She has raised pigs (2-4 pigs/crop) since 2007 and reduced catching fish by electric gear. She explained the change in her livelihood as following two reasons. Firstly, flooded level has reduced since 2006. In addition the water becomes more and more polluted with pesticides. Therefore, wild fish have been reduced over the years. Secondly, catching by electric gear was banned by government. Whereas, the government helped her in buying piglets (credits: 3-5 million VN dong/crop) through the Farmer Association and Women Union. However, she has to face other problems that are investment for pig feed and techniques. Due to having no cultivated land, she can not ask more money from the bank (government). She had to buy pig food on credit from the shop with higher price. Therefore, the pig production got lower benefits. At the end of 2008, rain occurs out of season and association with high temperature (April and May) resulted in pig disease as anorexia. Indeed, this time she raises 4 pigs. Ten days ago, one of them was dead without any syndrome.

When we asked her about the future she said: she and her husband become older, therefore

they would continue to raise pig, both in fattening and sow. Now, she is following the training course of raising pig that is organized by Women Union and extension station. She wishes, if she can borrow more money from government for pig food the benefits from pig production will increase.

### **Pig farming status of a poor household in Bo Bao hamlet**



**Mr. Nguyen Van Be (62 year olds, first year of primary school)**, his wife and their daughter (10 years old) are living in Bo Bao hamlet (group 7), Thanh An village. Their household area is about 105 m<sup>2</sup> but it is illegal, hence they do not have family-registration book. Before 1994, his family owned 1.0 ha of rice production in Phung Quoi hamlet. In 1994, he was sick (tai biến) therefore, he was deep in debts. Consequently, he sold ricefield and changed to trade in "ve chai" and became employee in agriculture. His family has been in Bo Bao hamlet since 2004. He has five children but four of them

were married. Recently Mr. Be earns for living by working as an employee in agriculture, glean rice and fishing in flooded period. His wife was also sick (high blood pressure), therefore she works at home (raising fattening pig). His family is poor with low and unstable incomes. He faces with many problems in life and raising pigs.

Due to living in bad accommodation and lack nutrition he and his wife are often suffering from illness. Headache, running nose, "lên tăng xông" usually happen as temperature increases and in rainy days. His wife and daughter sometimes catch a cold because of their house with leaky roofs and draught. Pig are also sick (anorexia, typhoid fever, cold in 2008 and 2009) because of primitive pigpen and lack of sun light. Besides, water from the river is used for household consumption and raising pigs. However, it is usually polluted with pesticides in Dong Xuan and He Thu rice crop. In 2008, they had serious diarrhoea because of using that polluted water. To prevent that danger, he had to collect clean water from well or other river. Another problem is lack of money for household expenditure and pig food as they are sick or lack of jobs (flooded periods). Due to being landless, he can not borrow money from the bank (government). He had to ask money from private creditor for pig production with a high interest rate.

When we asked him about his livelihood in future he and his wife answer that they would continue to raise pig and look for work (employee). Now, the government gives him some materials to rebuild his house therefore, his house and pigpen will be improved. His wife is going to participate in training course of pig raising. They wish, they can borrow money from government for pig production.

*Snakehead fish farming:* Main problems of low income in fish farming are low yields, high production costs and low marketing prices (Figure 26). Causes of low fish yields are inappropriate feeding, water pollution, disease infection and abnormal variability of weather. The decline of natural nutrient sources, applying commercial pellet feed and borrowing money with high interest rates result in high farming costs. Farmers farming fish in rice field during flood season have to harvest the fish as the flood recedes and right before winter-spring rice crop establishment, when fish prices at local markets are usually low.



Pond or fence-snakehead fish culture in the flood season have been developed recently, as a way of creating jobs and hence improving income of worse-off households. Local farmers culture fish based mainly on their own farming experience, from self-learning or from technical exchange with neighbors or from mass media, and on natural fish food resources. Farming technical and management training, high quality of fish fingerlings and favourable credit supply are further needed.

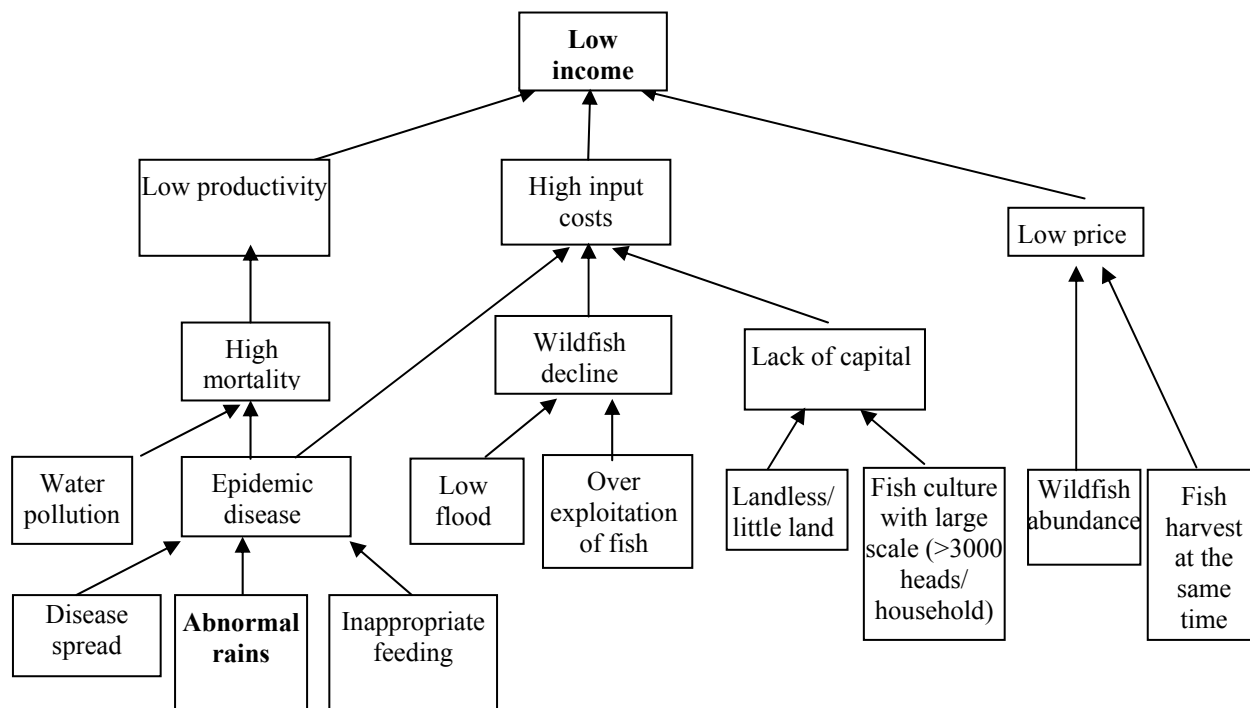


Fig. 19: Causal relationships of problems in snakehead fish culture in Bo Bao hamlet

### Snakehead production status of a poor farmer in Bo Bao hamlet



**Mr. Huynh Van Nuoi (36 year olds, passed primary school)**, his wife, Mrs Luong Thi Duc (29 years old, ethnical Khome group) and their children (3 daughter, primary school) are living in Bo Bao hamlet , Thanh An village. In 1997, he was in possession of 0.26 ha ricefield from his father in-law. His family was ranged in poor class (certification). To support the poor farmers and ethnical Khome group, the government gave him some money to build a new house and water container in 2007. Due to having numerous children (one of them has been sick, asthma), the rice income is lower than his family expenditure. Therefore, he and his wife have to search for other jobs (agricultural employee) and raise snakehead in flooded period. He said, in the agricultural region with two crops per year, he could not find any jobs in the flooded period. That is the main reason why he raises snakehead in hapa. Snakehead production was quite unstable, in 2006 and 2007 he cultured about 3000 fingerlings and got approximately 5 to 6 million VN dong for each year. In 2008, he raised 5000 fingerlings and harvested about 2000 snakehead for market but he lost about 8.5 million VN dong.

In his opinion, the negative benefit of snakehead production in 2008 was related to the following reasons. Firstly, he raised too many fish. When fish grew up (200-300 g fish-1) they ate a large amount of trash fish. However, in 2008 the flooded level was low whereas,

too many farmers caught trash fish in ricefields. Therefore he caught a few trash fish that was not enough to feed his snakehead. It resulted in low survival and grow rate of snakehead. Secondly, he had to buy more marine trash fish to feed snakehead. However, the quality of marine trash fish was usually low (not freshness) that resulted in disease in snakehead (indigested). Thirdly, snakehead was more infective with disease such as Enteric red mouth, furunculosis, thrush, hole in the head, fungi disease ... because of too much rain and tropical low atmosphere and high temperature after bad weather periods. The disadvantage of raising snakehead in hapa is easy infectious with disease if the upstream areas have pathogens. Therefore, he used a lot of medicine to protect his fish. Consequently, his fish grew slowly and the investment increased. Fourthly, to prevent the effects of pesticides from He Thu rice crop, he stocked fish in late (in early July). For this reason he harvested fish in late (in early November) to get market size. Unfortunately, the market price of snakehead reduced from 25,000 to 20,000 VN dong because there were many wild fish harvest at that time. In addition, all of raising snakehead had to be sold to avoid the dangerous pesticide (Winter –Spring rice crop). Finally, he could not borrow money from the government for snakehead production therefore; he had to ask money from private creditors with high interest rate (3-5% /month).

Based on his experience, he suggests as follows. To improve the benefits of snakehead production in flooded periods, farmers, who are as poor as him, should not raise more than 3000 snakehead per crop. The snakehead production should be start early (June) in pond or tanks then transfer to rivers in late July (without pesticide trace). Fish should be sold early (15th September to 15th October) to get higher price. Beside that farmer should be trained in fish culture technologies, especially in using medicine.

*Agricultural input services:* During group discussions at the hamlets, local people identified important actors in agricultural input services and ranked them in order of importance (Table 25). According to them, local agricultural material traders, agricultural or policy and social affair banks, and farmer association are perceived highly important. These actors provide farmers credits and are reachable by farmers. In contrast, actors related to supplying farming techniques are considered less important.

For technical training, farmers sometime participated in training courses given by the district agricultural extension station. The training courses, however, have not been widely organised for real needs of farmers. Local farmers suggested that they have farming experiences through trials and errors, learning from their neighbours, mass media, local veterinarians or agricultural material traders.

Local farmers can get credits from governmental banks (i.e agricultural, policy and social affair banks; with submitting farming planning or returning both capital plus interests from previous borrowing), mass organizations, local agricultural material shops or neighbours. For credits given by governmental banks, the amount of money borrowed depends on owned land area or assets. For credits given by local mass organizations, interest rates would be low, due to special programs of policy and poverty reduction supports. In addition to agricultural sectors, farmers can also access to 3-year credit programs devoted to sanitation and clean water supply (about 4 millions/household for constructing toilets or drilling deep wells)..

Table 19: The importance of supporting actors in agricultural production in Phung Quoi A

Actors	Kinds of supports	Importance rank		
		Rice farming	Pig raising	Snack-head fish
Agriculture material shops	Loans, materials supply and technical advice	1	1	1
Banks	Credit supply	2	3	
Farmer association	Opinions collection, technologies training & credit	3	4	2
Agricultural Extension station	Technical training	4		4
Plant protection station	Technical training	5		
Veterinary station	Technical training		5	
Aquaculture extension station	Technical training			3
Women Union	Opinions collection, technologies training & credit		2	

*Net spreading and fishing of poor households in flood season.*

Among total of 350 households, households earn their living by fishing accounts for 50 %, of which 30 % go fishing in day time and about 20 % of households go fishing in night time and those are the poor households. When the flood comes, many poor households living in Bo Bao village or other area catch fish with nets in the fields. Since, they don't have enough money, they only buy poor quality nets, which cost from 200.000 VND to 300.000 VND. For those low quality nets, they can only be used them 1 time. The money earning from this work is just enough for buying rice and food in flood season. If poor family has boat they can go out for fishing and earn their living during flooding. Because they don't have enough money to buy boat, they have to soak into water for fishing.

In the evening, households go catching fish by nets from 10 pm this day until 3 am next day. There are 2 common methods they used: the first one is soaking in water for hours using nets to catch fish. This is done by both husband and wife. The second one is that 5 or 6 people pull the large net (about 5.000.000VND to 6.000.000VND) which is bought by a group of 5 or 6 households. After 3 months of fishing, the benefit will be shared among the share-holders.

In the sunny days, normally less fishes moving, therefore, fishermen have to spread nets for more times than normal day without sunshine that causes more effort and money spending on netting. Moreover, quantity of fishes caught is less than normal days.

Moreover, heavy rain and cold water affects quality of moving fish too. Due to heavy rain and typhoon, fish will not move near the riverside so that it is difficult to catch fish. Big water pressure impacts on the safety and psychology of fishermen.

Other non-farm work and the impacts: a Case below of the man who is collecting the waste from the river also shows how his health and incomes are affected.

### The case of gathering wasted materials in the rivers



The husband collects recyclable waste from the river. He dumps himself into the river the whole day. The sunnier it is, the more tiresome the work is for him. He knows that the river is polluted and he is worried, but this is their living. There are about 20 people doing this job in Thanh An township. When the husband finishes his work in the river, the wife comes with a cart collect the waste.

When the husband picks wasted materials, the wife pushes tricycle to receive that. They earn about 50.000 VND each day, but that income is not stable. If they have other job, they will give up this job rightaway, he said because this is really a hard work to earn living.

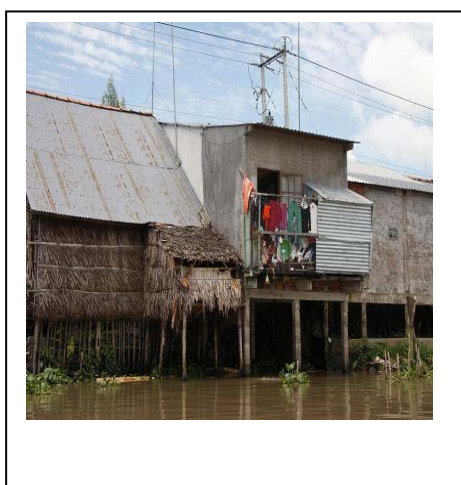
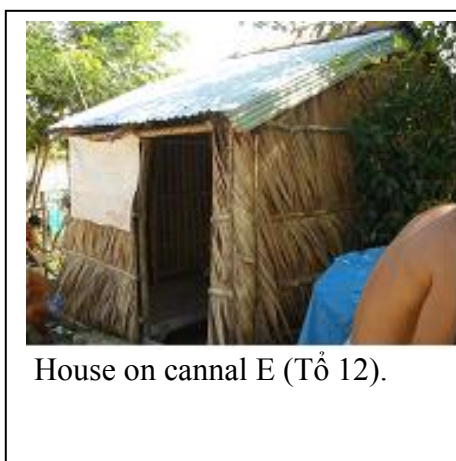
## 7.7 HOUSING IN VĨNH THẠCH

Houses of the households in the hamlet centres along Thay Ky river/canal were built semi-solid with brick walls, high steel roofs, sloping, which are very effective in standing the heat and cyclones. Although houses are old, the roofs are rather stable. In hamlet, there are still 90 houses made of leaves and plants, particularly those of 28 poor households and 28 near poor households living along Thay Ky and Unit 7. Most of the houses here are temporary, made of leaves. One of reasons why they built unsolid houses is that these households migrated here and built houses on illegal land (despite living here over 30 years but they do not own that land). Furthermore, most households do not have farming land, live on hired labour, with low and unstable income and therefore they cannot afford to make better houses. At the time when the assessment group came to visit unit/section 7, all households are very nervous because they will have to take down their houses and make new ones, because the road on the dykes where their houses are is being heightened and made. However, most of them voiced that they could not afford to do so, as they do not have money, and they have not heard much of the compensation money from the government. In fact, as the road is being raised, they will have to build new houses with higher foundation, otherwise their houses will become flooded.

As poor households in Bo Bao hamlet, houses of poor households in Bac Song Cai San were also built from trees and leaves, some households had houses with iron-sheet roofs but wall was from trees and leaves. Annually people have to spend 500000 VND up to 1 million VND to repair their houses after being damaged by cyclone. That is vicious circle of poverty. Households which have unsolid houses do not have right of land use, they built their houses on other people's land to stay temporarily because of their kindness (fig. 28, 29). (There were about 70 households building houses like that along the edge of E channel).

Similarly to the poor houses in Bo BAo, the poor houses in Bac Cai San are also made of leaves, plats, some with iron-sheet roofs but walls are made of plants and leaves. Annually people have to spend 500,000 VND up to 1 million VND to repair their houses after being damaged by cyclone. That is vicious circle of poverty.

Many poor households with unsolid houses do not have right of land use, and they built their houses on other people's land to stay temporarily because of their kindness (There were about 70 households building houses like that along the edge of E channel).



## 7.8 MOST VULNERABLE GROUPS

Most vulnerable groups are resource-poor households, children, women and elders. Vulnerability factors include: income, professional knowledge and skills, health, physical ability, social connections, infrastructure and service accessibility and hazards (see details in risk management, education and health sections). Among these groups, in general, poor households are considered the most vulnerable. As aforementioned, poverty and marginal-poverty rates of are about 15% in Thanh An commune, 12% in Phung Quoi hamlet and 8% in Bo Bao hamlet. Poor households are landless, who are living on wage labour, peddling or fishing. They own small nippa house and reside temporarily along canal banks, where is considered most unsafe. Poor households, who are being landless and temporarily residing on other's land, usually move from a place to another to find job for their daily subsistence.

Causal factors of poverty in Phung Quoi A and Bo Bao hamlets are described in Figures 19 and 20 and in Table 20. The main reasons of poverty are: (1) owning no or little land, (2)

ability of low income creation and (3) indebtedness. They own no or little land because they inherited no land from their parents or they sold their land from illness or unseccessful businesses. Poor households usually own less than 0.2 ha of land. Low income creating ability would be due to lacking (professional) labour and facilities, unhealthy family members, fewer opportunities for jobs from agricultural mechanization. Risks associated with illness, crop losses and borrowing money with high interest rates would be reasons of indebtedness (Cases 3 and 4). Poor households usually contact with hazards like flooding, cyclone, lighting, water pollution, etc. while their capacity to cope with and adap to the hazards is limited and hence risks and resultant damages would be high. They are therefore not only most vulnerable but also least adaptative and resilient.

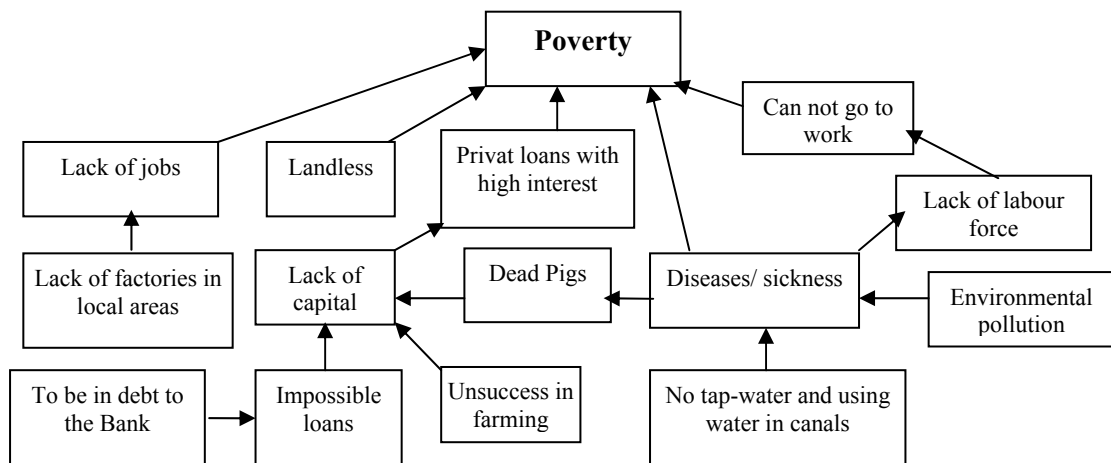


Fig. 19. Causal relationships of poverty in Phung Quoi A hamlet

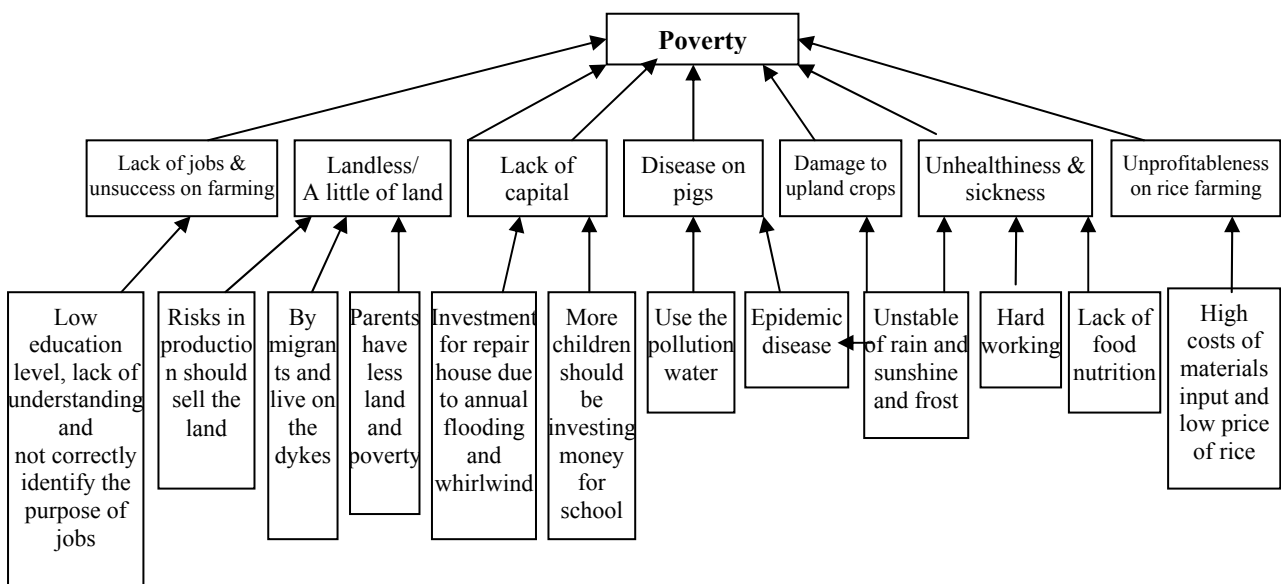


Fig. 20. Causal relationships of poverty in Bo Bao hamlet

Table 20: Livelihood and vulnerability factors of resource-poor households in the study hamlets

Livelihood factors	Vulnerability factors
Landless	Low and unstable income, poor accessibility to credits
Small house, temporal	Human and material losses by hazards



Livelihood factors	Vulnerability factors
residence on other's land, dwelling in advantaged areas	
Poor human resources and livelihood facilities	Poor planning of household economic management, low and unstable income
Poor social participation	Limited accessibility to public services

A case study of a poor household in Bo Bao hamlet illustrates the poverty worsened by climate change and disaster impacts.

**Nguyen Thi Xiem – a poor woman from Bo Bao village, Thanh An township.**

Xiem grew up in a family of 8 children and has never been to school. She is married with two sons; one is at the first grade and the other three years old boy who stays at home. Both Xiem and her husband work as hired labourers for just enough food every day. During the flood season, as nobody hires labour for rice planting, they do not even earn enough for food. They have to skip meals, buy rice on credit and borrow money. From January to March the couple are hired to plant rice, do weeding and spray pesticides. By mid-March they collect left over rice on the harvested fields. From January to March the couple are hired to plant rice, do weeding and spray pesticides..



By mid-March collect left over rice on the harvested fields. The second crop comes in May to July, they learn their living by preparing the field, sowing rice, and harvesting. Xiem often faints during her work in the field when it is too sunny and hot. The flood season starts in July, then Xiem and her husband start fishing in the field. As they do not have a boat, they have to stand in the water up to their chests for four to five hours a day. They fish for food and also to catch to sell, enabling them to buy rice. If it rains or there is strong wind, they have to stay at home, so have no food that day. If their rice yield is high, Xiem gets a good wage. But if the crop is lost, Xiem could earn very little. When the crop is not good, the owner might pay her late, and it's more difficult for her to be hired. Recently, many field owners started using machines and they hire less labour. It has been more difficult for Xiem and her husband to find work.

Elderly people are also one of the most vulnerable groups to climate change and disasters. A few stories below can illustrate the case of the poor elderly who is affected and copes with its risks.

**Mrs Nguyen Thi Ut, 78 years old, who is living in section 6, Bo Bao hamlet**



She used to live in O Mon ward and now she moves to live in Bo Bao Village alone because her 6 children grew up and live far from her. Everyday, she picks up firewood and does housework by herself. Because of living alone and being unable to earn money, she is frequently given rice by neighbors. She wants to go to the Commune's People committee to ask for her poor household book but due to sickness, she cannot do it.

Living alone in the leaking and dilapidated hut, she often takes nylon to cover herself when it rains. When typhoon comes, she is so afraid of her house



being collapsed. During May, June and July the weather is very hot, it is really difficult for her to sleep at night since she does not have electric fan in her house. Recently, in Lunar New Year 2009, her house was on fire as she had forgotten to stamp out the cooking fire. She only realized her house on fire at mid-night and called her neighbours for help. In addition, the house is made of thatch, therefore it is easy to be burnt.

She wants to have the poor household book to receive more supports and get Health Insurance book which is free for medical examination. She wish to have support for repairing her house that can reduce rain and sunshine impacts.

**Mrs Nguyen Thi Tam is 71 years old.** She is living with her son's family of 3 grandchildren. She had lived in Co Do Ward before, but because she did not have farming land for cultivation, she moved to this area to work as a hired laborer and settled down. In her generation, she had no land possession. It is, therefore her sons have no inheritance to have farmland neither. Because of having no farm land, they have to work as hire laborers. Their house is built on illegal land without land use certificate or family record book. When her son and his wife go out to work, Mrs. Tam does all housework by herself, such as cooking, taking care of 3 grandchildren. The first grandchild is 13 years old in the sixth grade, the second one is 6 years old, and the third one is 4 years old. As she has to stay at home to take care of the youngest one, she cannot take the second child to school, so second granddaughter does not attend school at the moment. Her son and daughter both study law at Phong Dien Ward of Can Tho City which is far way from her home, so they only come back home once a month for a few days. Therefore, Mrs. Tam has to care for all grandchildren, though she is too old to work now. Sometimes, when she gets sick, but there is nobody to take care of her, it makes her feel so sorry for herself.

During flooding season, she is afraid of her grandchildren falling down the water. The oldest nephew can swim but the others still can not swim. Her family has to make a fence for preventing her grandchildren from going out of edge of the river. In 2006, there was a big flood inundated lots of houses and roads. At that time, she had to evacuate to other safer places by using plank for a few days. She could not go to the market to buy food so all family had to eat rice soups/porridge in those days.

When the summer comes, the weather becomes hotter, it is very easy for her grandchildren to get fever, flu and cough. When they are sick, it costs a lot of money to see doctor for medicine or get injected.

She herself is having aching joints in her knees, especially during changes in the season but she does not get treated as she does not have much money. Moreover, she has poor knowledge about health service in area. She wishes to have a poor household book to receive more supports.



#### *Capacity, coping and adaptation*

Local government has implemented a strategy of living with floods engaged with socio-economic development. Development policies for poverty reduction include moving poor households living in vulnerable areas into safe residential clusters, free health care in public system or health insurance, free educational tuition, and free contribution to locally social welfare, access to favourable credits from bank for policy and social affairs or from local mass organisations, and getting subsidy in special cases. Practically, the implementation of these policies for poverty reduction is still problematic. Poor households usually pay more

attention to daily subsistence rather than long-term options while resources and integrated solutions of local government have still been not sufficient.

## **8. RECOMMENDATIONS**

### **8.1 INTEGRATION OF CLIMATE CHANGE AND DISASTERS MANAGEMENT INTO SOCIO-ECONOMIC PLANS.**

Can Tho City should act as a catalyst or a pioneer in this nation-wide exercise to respond to climate change by incorporating climate change aspects and the results of this HCVA into the whole planning processes of the city. Timing is also good for Can Tho to be the catalyst for change with the next 5 year SEDP coming up in 2010. That also coincides with the milestone assessment of Can Tho City after five years of becoming a class 1 urban setting, as interviews with local officials suggested. In order to do this, it is proposed that some short-term and longer-term interventions should be as noted below. These recommendations are applicable to not only the city but also the district and ward authorities:

#### **Short-term/Immediate actions**

- Awareness raising activities on climate change impacts for all local officials at all agencies of the city, districts and wards. This is important because sensitization of climate change issues amongst policies makers and planners are key to a climate change integrated planning.
- Feed climate change and disaster preparedness information as well as socio-economic development plan into meetings of sub-groups of the mass organisations and of residential areas.
- Revise the planning targets for next year socio-economic planning in order to include climate change related targets in the planning template. Climate change related targets should be present in all groups of targets and not necessarily limited to education, health, environment and agriculture. For the time being, awareness and preparedness are important, initial targets could possibly be number of people, teachers, health workers, private businesses that are sensitized to climate change, later on are targets for adaptation and mitigation measure that these groups of people have taken.
- Review all current urban development projects in the city, districts and wards with a view to (1) Removing all 'hanging' investment projects in order to reduce the vulnerability aspects of households in the planning zones, and (2) Factoring climate change vulnerability aspects into all current urban development and investment projects.
- Constantly build capacity for local planning officials on climate change integrated and participatory planning. A full-blown climate change integrated and participatory planning will certainly require many changes in the whole planning regulations, the planning structure and institutions which may be well beyond the scope of the project. The team however recommends only simple actions for this planning by attending to the needs of all segments of the society, in particularly those of the poor and the most marginalised groups (women, elderly, children, disabled). This HCVA already provided background and initial practices for such planning and the exercises should be regularly repeated.

#### **Long-term actions**

- Review all master plans for the city, districts for socio-economic development and urban planning by 2020.
- Integrate climate vulnerability aspects into these master plans.

- Develop a city action plan to respond to climate change, addressing all vulnerability aspects and constraints of fragmented planning.
- Climate-proof all investment projects and construction in the future.

## 8.2 NEEDS, FURTHER ISSUES AND ADAPTATIONS RECOMMENDATIONS FOR BINH THUY

Table 21: Concerned problems and recommendations of/for Binh Thuy District

Section 1 and 3, Bui Huu Nghia Ward	
Concerned problems	Proposed adaptation measures
<b>1. Disaster mitigation</b>	<ul style="list-style-type: none"> <li>• Fairy from Cô Bắc to Vinh Long should stop at the communication house of Con Son for villagers can use the fairy for safer transportation.</li> <li>• Concretize the surface of national dyke system about 1 to 1,5 m wide for safer transportation for villagers of Con Son during rainy and flood season.</li> <li>• Engine rescue boats</li> <li>• Life-bouys, life jackets for rescue teams</li> <li>• Organize more demonstrations for CFSC and the most vulnerable sections.</li> </ul>
<b>2. Women's needs: taking the children to school across the river</b>	<ul style="list-style-type: none"> <li>• Organising groups of pupils to go to school every day, especially for small children (grade 1-2) is a good initiative by families. The organization of such groups could have been better with support from local authorities.</li> <li>• Organised group transportation for pupils will reduce the cost of sending children to school for poor families. Instead of having to pay 5,000 dongs each way per child (at least 10,000 dongs per day), each family could pay from 60,000 dongs per month (for a small child going to primary school) and to 100,000 dongs per month (for a bigger child to secondary or high school)</li> <li>• It takes time if the family has to take their kid to school twice a day everyday as they cannot afford the cost of meal and day care at school. Some mothers mentioned that they would have to follow their child until the child finished primary school, which meant they could not work full time. Organising group transportation for children to school will save more time for mothers so that they can have more time for work.</li> <li>• It should be noticed that transportation by piroque, however, is not safe (as reflected through the discussion with local women). Piroques are not built strong enough and too small for active children.</li> <li>• Both children and the piroque rider do not have any knowledge or skills on safety on boat or in case of accident. Training on these knowledge and skills for both children and the piroque rider would equip them with skills to react on a risky situation (high wave, accident etc) and reduce the risk to travel on these piroques.</li> </ul>

<b>Section 1 and 3, Bui Huu Nghia Ward</b>	
<b>Concerned problems</b>	<b>Proposed adaptation measures</b>
<b>Needs from the migrant people especially poor migrant women and small children</b>	<ul style="list-style-type: none"> <li>Local women participated in the group discussion and the head of Area 1 mentioned that they expect to get support to buy a piroque as the means of transportation for children to go to school. They said local families would cover the cost of diesel, oil and hiring a rider. If a piroque is provided, it is crucial to have an agreement on the use of the common piroque and the contribution from local people to ensure that it will sustain properly and will not generate conflict of interest within the community.</li> <li>Local authorities and organizations should pay attention to the migrant groups especially the poor households with women and children so that they can access the basic services such as health, education, housing. The income generating activities by these groups are mostly affected by hazards and climate change especially to their health and incomes.</li> </ul>
<b>3. Education</b>	<ul style="list-style-type: none"> <li>To solve the difficulties in flood season, Government has to repair sewage system of highway in order to prevent the school yards from being flooded with water, which strongly impacts to school especially with regards to children's hygiene and health.</li> <li>Training of first aids for Health Staff and teachers, especially training for health staff at school in children diseases (as the health staff have been trained in general knowledge rather than the specific children diseases)</li> <li>Conducting more swimming courses for children, reducing course fees for students who are in poor families (Now, swimming cour fee is 50,000VND/course and once a week)</li> <li>Organizing out door activities on environment polution issue, organising competitions to help the students enhance their understanding on environmental issues.</li> <li>Making the banners, notice-board hanging over in the school yard to make a direct and visual impacts on the students to enhance their knowledge about Climae change, environment protection.</li> <li>Organising a group of youth (local youth) who are in charge of taking and picking up students from the rivers to school by motor boat equipped with life jackets. The students will gather at the boat station at fixed time in order to go to school together under the guide of local youth.</li> <li>Designing the specific diaster management and climate change program which are detailed and easy to undestand to integrate into the subjects at schools. And this will be consistant in all the educational system.</li> <li>Provide drinking water for the children especially during the hot days.</li> </ul>
<b>4. Health</b>	<ul style="list-style-type: none"> <li>Increase monthly supported fees to the local health workers</li> <li>train more health workers who can be specilised in disaster/climate change impact related diseases treatment.</li> </ul>

<b>Section 1 and 3, Bui Huu Nghia Ward</b>	
<b>Concerned problems</b>	<b>Proposed adaptation measures</b>
	<ul style="list-style-type: none"> <li>• Provide more facilities to Health clinics of the wards.</li> <li>• Organize Health team with better equipments for Con Son.</li> <li>• Provide first aids techniques trainings to the local emergency rescue teams of Con Son, which is normally isolated from the urban areas.</li> <li>• Emphasize on education and communications for flood preparedness. Continue campaigns on disease prevention during natural disaster and daily communications on improvement of hygiene conditions.</li> <li>• Improve school-based health care and health communications: increase the frequency of classroom activities on these topics; send school health staff to attend trainings, follow-up sessions etc in collaboration with the Centre on Health Education</li> <li>• Increase dredging sewage sludge.</li> <li>• Provide facilities and equipments for local public communications (public speakers), systems for forecasting climate changes; develop curriculum and training materials for local health workers on impact and preparedness for disasters and climate</li> <li>• Train health workers to have focal point on disease prevention, disaster preparedness and coping with climate change (at least at district level). Provide trainings for health workers on flood preparedness and flood-related diseases.</li> <li>• Support equipments and materials: boats and junks, health care equipments and medicines for emergency.</li> <li>• Conduct further in-depth studies on the impact of climate change on health and diseases.</li> </ul>
<b>5. Water supply, sanitation and environment</b>	<ul style="list-style-type: none"> <li>• Sewage treatment of Tra Nooc industry zone.</li> <li>• Provide facilities/equipments for the Environment department to better environment management and controle.</li> <li>• Improve environment management and controle of the industry zone in the ward (enginnering, processing enterprises).</li> <li>• Sudy to set up environment friendly fish raising model to minimize environment pollution.</li> </ul>
<b>6. Livelihood</b> <ul style="list-style-type: none"> <li>• Emplyment for hired labourers</li> </ul>	<ul style="list-style-type: none"> <li>• Develop local enterprises to employ more local people and get them trained.</li> <li>• Develop industry to attract more foreign investments</li> <li>• Resettlement programs for a stable life of the poor households living in legal land.</li> <li>• Study to improve policy for compensation for private land taken for urban plan.</li> <li>• Provide training on business/tourism services in new Eco-tourism development areas.</li> <li>• Create mor income generation for women who can work</li> </ul>

Section 1 and 3, Bui Huu Nghia Ward	
Concerned problems	Proposed adaptation measures
	when being free from housework.
<b>7. Housing</b>	<ul style="list-style-type: none"> <li>• Education on hazards and coping methods (through media, propagandists, posters, and training courses).</li> <li>• Disseminate technology on consolidating houses for households with unsolid houses.</li> <li>• Support poor households funds for building.</li> <li>• Organize training courses on hazard knowledge and coping methods (cause, loss and coping experiences) for staffs and local people.</li> <li>• Train communication skills for trainers in associations and organizations.</li> </ul>
<b>8. Urban planning</b> <ul style="list-style-type: none"> <li>• Electricity</li> <li>• Resettlement program</li> </ul>	<ul style="list-style-type: none"> <li>• Provide electricity system to Con Son</li> <li>• Conduct a study of the resettlement programs that have been completed to draw out lessons-learnt to implement the coming resettlement programs.</li> <li>• Review all urban programs in the ward to prevent urban plan from creating inimplicable programs.</li> <li>• Capacity development on mainstreaming climate change adaptation in planning process of socio-economic strategic development plan to 2020, disaster preparedness plans.</li> <li>• Provide trainings for local specific department officers on climate chnage cause and impacts, that can be applied into planning of particular departments.</li> <li>• Institutionalize climate change issues, disaster management in any planing (annual disaster preparedness plan and five-year socio-economic plan).</li> </ul>
<b>9. Land erosion</b>	<ul style="list-style-type: none"> <li>• Organize sand exploitation activities under well-controlled and planned plans.</li> <li>• Strengthen land erosion protection by using concret poles on the weak dyke parts in Con Son.</li> <li>• Community-awareness raising on basic knowledge of disaster preparedness and disaster risk reduction.</li> <li>• Set up new safer resettled residential areas.</li> <li>• Carry out local internal support policy.</li> <li>• Access to external suport</li> </ul>
<b>10. Most vulnerable groups</b>	<ul style="list-style-type: none"> <li>• Climate Change related Programmes and projects should priotise the needs of the most vulnerable groups including the poorest households, poor migrant households, poor women and children, elderly and disabled people.</li> <li>• Social support should be considered.</li> </ul>

Table 21. Recommended measures for diasters mitigation and climate change adaptation of Binh Thuy with ranking

No	Situation and ranks	Causes	Solutions and recommendations	Ranking
1	Dyke damages and erosion causing land loss and damaged crops (2)	Illegal sand exploitation	- Local government invited the sand exploiters to make commitment in writing to exploit the sand according to the regulations. - Forbid the sand claimation/exploitation around Con Son island. - Propose to functional agencies to check and strictly fine those who do not exploit the sand in accordance with the regulations.	1
			- Identify the sand exploitation plots in the rivers that are allowed and inform the local people on these spots. - Coordinate with local authorities and people to constantly monitor (hotlines)	2
			- Propaganda/Inform Environment laws (enhancing the awareness level for the communities)	3
		Natural water flow	- Make cù tràm, make earthen bags (short term) - Build firm dykes - Put in the concrete poles in the V shapes	1
			- Advocate the regular dyke improvement by the local people in cooperation with the government (at the head of the island), making earthen dykes and cu tran. - Calculate well the water flow when making detailed planning	2
			- Research on the changes of the flows and inform the local people. - Make a planning for the eco gardening area.	3
		High speed boats (army, private boats that sells snad to Singapore, big boats anchoring near the shores.	- Control the speed on the river, install signboards for spots for anchoring for boats. - Propose to the functional agencies to not allow sea boats to try their high speeds around Con Son island.	1
			- Local people regularly improves the dykes, and heighten the heads of the Con Son island (the tip) with the support from the government - Grow the plants to stop the erosion (bần, bình bát, gừa)	2
			- Have regulations for anchor	3
		2	Environment pollution (1)	Waste water and dust and smkoke from factories and enterprises
Pollution due to industrial fish raising, with waste water discharged directly into the river	- Make digged well for Vam Ha canal - Propose to functional related agencies to check and request the fish raising enterprise owners to treat the waste water before discharging them into the river. - Propose to fish raising enterprises owners to pump the mud and earth dugged up for making pond to the gardens of the local people nearby.			2
95% of the	- Enhance the awareness for the communities on			1



No	Situation and ranks	Causes	Solutions and recommendations	Ranking
		households do not have their own latrines	hygienic living conditions and food habits- conducive to the environment sanitation. - Install the clean water supply for the local people (factory water)	
		Husbandry at household level (KV 3) and waste water also is discharged directly into the rivers	- Enhance the awareness for the local people on environment protection. - Garden-Pond and Stable model implementation	3
		Stagnant water pools (KV3)	- Enhance the awareness level of the local people on environment protection (people should not throw the rubbish into the rivers and canals) - Clear up the drainage system in the flooded seasons - Propose to enterprises and factories to construct the drainage systems in local residential areas (due to the fact that the factories have built their foundation higher than the drainage system for the local households.	5
		Domestic rubbish (KV3)	- Educate the local people on the good habits of not throwing the rubbish everywhere. - Set up concentrated rubbish sites to ensure the good environment - Install rubbish bins in the key locations in the residential areas. - Impose heavy fines against the environment damages	4
3	Diseases	Due to planning work of leveling the fields higher than other works, house construction that affects the drainage system and natural drainage system.	- Propose to the higher level authorities to consider when making planning for the new residential areas where they need to make the new drainage system compatible to that of the old residential areas. - Advocate the participating organizations to clear the drainage system every year.(KV 3) - Impose heavy fines to those individuals, households, organizations who violated the environment laws	1
		Empty land that no construction work is conducted, where the grass grow and the local	- Propose to urban work companies to work closely with local authorities to manage the urban environment and sanitation	2

No	Situation and ranks	Causes	Solutions and recommendations	Ranking
		people start dumping their rubbish in		
		Level of environment protection awareness of the local people is low	- Enhance the level of awareness on environment laws compliance for the local people.	3

### **Prioritized issues and adaptation measures**

Prioritised adaptation measures for Binh Thuy District:

- 1- Prevention of erosion at the top end of the Son island
- 2- Connection of electricity grid to Son island: either national grid or electricity generators
- 3- Organisation of health unit in Son island: first aid services before bringing the patients to the mainland
- 4- Support in terms of transportation vehicles across the river to facilitate the goods transport and travels by the pupils.
- 5- Support of equipment, and first aids technical training in the island during the flooded season.
- 6- Monitoring Environment, reduction of environment pollution from industrial areas and Cat fish raising enterprises on the island.
- 7- Concretisation of dyke surface on Son island
- 8- Provision of clean water to the local people on the island
- 9- Reduction of low skilled workers by support the cooperation with factories to conduct the vocational training courses

### **8.3 NEEDS, FURTHER ISSUES AND RECOMMENDATIONS FOR VINH THANH DISTRICT**

Through focus group discussions with district, commune and hamlet officers and local people in the study hamlets, emerging issues and needs were suggested to help local communities further improving their current status related to sanitation, education, health care and livelihood activities for better adapting to possible hazards in the future. The results of this suggestions were validated through participatory workshops with local stakeholders at commune, district and city level. At city level, an assessment sheet was distributed to participant district and city officers, by which they could selected or suggested most necessary issues and needs for the study areas.

Emerging issues and needs for further improvement were proposed for environmental and educational aspects and health care (Table 27). In addition, participants suggested local needs for further study to climate change and hazard adaptation as follows:

- Can Tho City has to organise a workshop on hazard and climate change adaptation and then to provide directions to Vinh Thanh District planning and implementing activities of coping with climate change for educational, health care and environmental aspects.
- Study on environmental impact assessments of intensive rice production;

- Water/waste treatments and increased awareness of local people in environmental protection and hazard control, particularly engaging them with currently educational programs;
- Impact assessments of environmental degradation on livelihood activities and human health for proposing possible options to minimize negative impacts, to safeguard the environment, and to increase awareness of environmental protection.
- Environmentally sustainable management of natural resources.

Table 22: Emerging issues and needs for adaptive measures in environmental, health care and educational aspects for local communities in the study areas

<b>Issues</b>	<b>Needs<sup>1</sup></b>	<b>Conditions for successful implementation</b>
1. Clean water supply	<ul style="list-style-type: none"> <li>▪ Communities' clean water supply stations (12/14)</li> <li>▪ Tanks/jars storing rain water for domestic uses (7/14)</li> <li>▪ Technical knowledge of water treatment (9/14)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Supporting policies for clean water supply in rural areas and favourable credits for households (i.e. mid- or long-term credits with low interests)</li> <li>▪ Clean water supply stations for poor households in disadvantaged areas</li> <li>▪ Increased awareness of clean water use by local people</li> </ul>
2. Sanitation and environment	<ul style="list-style-type: none"> <li>▪ Waste management (13/14)</li> <li>▪ Best farming practices (11/14)</li> <li>▪ Improved sanitation and environment in residential clusters (group 7, Bo Bao hamlet) (12/14)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Community-based waste collection and availability of waste treatment plants, improved perception of waste collection by local people</li> <li>▪ Enhancing implementing regulation of environmental protection by local authorities</li> <li>▪ Favourable credits for households</li> <li>▪ Increased awareness of waste management by local people</li> </ul>
3. Health care	<ul style="list-style-type: none"> <li>▪ Knowledge and perception on family health care (10/14)</li> <li>▪ Improved capacity of hamlet clinics (10/14)</li> <li>▪ Family planning, women health, children malnutrition and public health care accessibility (11/14)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Enhanced role of local mass organisations to increased awareness of local people</li> <li>▪ Free supply of health insurance for poor households</li> <li>▪ Improved knowledge and skills of women in health care by trainings</li> <li>▪ Favourable policies for local community-working groups</li> <li>▪ Upgraded resources of commune and hamlet clinics</li> </ul>
4. Education	<ul style="list-style-type: none"> <li>▪ Upgrading schools and teaching facilities (12/14)</li> <li>▪ Engaging hazard control and climate change with extra-educational subjects (11/14)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Financial budgets for appropriately upgrading schools and facilities</li> <li>▪ Improved knowledge of teachers and pupils on hazard controls and climate change</li> </ul>

<sup>1</sup> For each need item, figures in brackets showing no. of participants voting among 16 participants totally.

For livelihood activities, issues and needs were identified in Table 28. Participants also suggested further studies related to climate change and hazards as follows:

- Favourable policies for job training, particularly non-agricultural activities in industrial zones and for promoting investments on industrial development in Vinh Thanh District to take up rural labour.
- Adaptive agricultural farming systems to flooding and other climate change, and organisation of farmer networks to improve agricultural value chains and farming income.
- Development of agricultural systems with highly comparative advantages to increase local labour use efficiency.

Table 23: Emerging issues and needs for adaptive measures in livelihoods in the study areas

<b>Issues</b>	<b>Needs<sup>1</sup></b>	<b>Conditions for successful implementation</b>
1. Jobs for resource-poor households	<ul style="list-style-type: none"> <li>▪ Job training by livelihoods (14/14)</li> <li>▪ Development of rural services for creating jobs for the poor (13/14)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Investments on facilities and establishing trade communities by local government</li> <li>▪ Favourable policies for the poor (training, credits) and increased awareness of professional careers by the poor</li> <li>▪ Organising cooperative groups to attract rural labour</li> <li>▪ Enhanced role of mass organisations in organising communities' livelihood consulting groups</li> </ul>
2. Agricultural development	<ul style="list-style-type: none"> <li>▪ Adaptive agricultural systems with locally comparative advantages for multi-objectives (10/14)</li> <li>▪ Techniques: crop variety, farming techniques (9/14)</li> <li>▪ Services: input and output services (11/14)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Increased perception on adaptive farming by local people</li> <li>▪ Better management of output quality, input and output marketings</li> <li>▪ Development of input and output services, farming techniques and technical transfer to farmers</li> <li>▪ Better linkage between researcher, extensionist and farmer</li> <li>▪ Sufficient trainings supplied to farmers</li> </ul>
3. Farming organization and networking	<ul style="list-style-type: none"> <li>▪ Farmer networks for improved synergies between economic and wealth groups (7/14)</li> <li>▪ Linking actors in supply chains for developing rural marketings (10/14)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Better participation of community members</li> <li>▪ Supporting policies for establishment farmers' groups or cooperatives</li> </ul>

<sup>1</sup> For each need item, figures in brackets showing no. of participants voting among 16 participants totally.

Table 24: Concerned problems and proposals of Vinh Thanh District

<b>Phung Quoi A</b>	
<b>Concerned problems</b>	<b>Proposed adaptation measures</b>
<b>1. Disaster management:</b> <ul style="list-style-type: none"> <li>• Communication and education of disaster preparedness and early warning system.</li> <li>• Food storage of the poor households.</li> </ul>	<ul style="list-style-type: none"> <li>• Upgrade communication system to villages (more loudspeakers for Bắc Sông Cái Sấn village).</li> <li>• Trainings on disaster preparedness, especially for storm and cyclone.</li> </ul>

Phung Quoi A	
Concerned problems	Proposed adaptation measures
<ul style="list-style-type: none"> <li>• Cleaning water for living for Bắc Cái Sấn village.</li> <li>• Temporary houses of the poor.</li> </ul>	<ul style="list-style-type: none"> <li>• Construct community water supply in Bắc Sông Cái Sấn village.</li> <li>• Support poor households with water containers to get rain water for drinking.</li> <li>• Credit program for the poor households to build family latrines.</li> <li>• Support poor households to rebuild their houses resistant to flood and storm.</li> </ul>
<p><b>2.Needs of women for kindergartens for children during the flooding season</b></p> <p><b>Loans access for the poor women and men</b></p>	<p>The discussion among women who have small children in Phung Quoi A ward (Thanh An township) pointed out a critical need for child care during the flood season. Mothers who have small children at the child care group 1, Phung Quoi A ward insisted on having the child care group re-open. In addition, <b>there are proposals</b> on building the fence or surrounding walls for the school, paving the school yard (currently it is a sand lot); providing toys, clean water supply, mats, cooking utensils etc.,</p> <p>Critical problems reflected through both the group discussions and our observation were:</p> <ul style="list-style-type: none"> <li>• <b>Sanitation:</b> All child care groups do not have toilet. According to a teacher, they took the children to the river – like local people here who mostly did not have toilet.</li> <li>• <b>Nutrition</b> as the subsidy was limited compared to food price.</li> <li>• <b>Safety</b> as the surroundings of the child care location was also flooded or going to the river for instead of having a latrine implied a risk to the safety for children.</li> </ul> <p>Provide more loans and better access to loans for the poor women and men.</p> <p>Loans should be provided with vocational trainings and coaching and could be emerged with other activities by the women's union such as raising awareness on women's rights besides providing loan.</p>
<p><b>3.Education</b></p>	<p>In discussion with the teachers, educational management officials, and groups of children in the community, the following ideas are raised as the solutions helping pupils mitigate the damages and cope with the climate change.</p> <ul style="list-style-type: none"> <li>• In their pictures, the children drew and wrote down their wishes of having clean water to drink, unpolluted water to bath, many trees for cool weather, not many floods and not heavy ones, less heat, and having stable and strong houses to withstand storms.</li> <li>• Strengthening the infrastructure to withstand floods, storms, heat, and other natural disasters which can appear to ensure safety and better health for the pupils and the teachers.</li> </ul>

Phung Quoi A	
Concerned problems	Proposed adaptation measures
	<ul style="list-style-type: none"> <li>• Mainstreaming the subjects of climate change, natural disaster type management in the local places including common disaster in the local place, and environment into the extracurricular activities, combining with the field trip model aiming at studying.</li> <li>• The rehearsal of preventive activities in school related to natural disaster management, and life safety in the hot and flooding season.</li> <li>• Strengthening the knowledge about health care, especially in the hot weather, and flooding and rainy season for the pupils and the teachers.</li> <li>• Pay attention to the reducing of health care insurance cost for the pupils, especially for the poor pupils. The school needs to cooperate with the pupils' parents and the local authorities to support the birth certificate making. To the poor pupils who have not got the family record book, it is necessary to grant them privileges with school fees and other extra expenses.</li> <li>• Safer school constructions for the children in the 1st level in flood prone areas.</li> <li>• Support with the swimming teaching program for the pupils especially targeting girls..</li> </ul>
<b>4. Health</b>	<ul style="list-style-type: none"> <li>• Support clean water supply, latrine and livelihoods for poor communities, especially in remote areas.</li> <li>• Support community to raise awareness and knowledge on common diseases and prevention of transmittable diseases, with due attention on their relations with weather conditions, disasters and climate change.</li> <li>• Improve community health communications and education on disease prevention and hygiene using different approaches.</li> <li>• Improve traditional health care services to reduce the cost of health care for poor people.</li> <li>• Improve the quality of programmes on maternal health care and nutrition for children, especially for those who live in the poorest and remote areas.</li> <li>• Establish programmes on hygiene improvement.</li> <li>• Enhance the competency and enlarge the number of village health workers in the communities, especially in the remote and poor areas.</li> <li>• Support poor households and near-poor households to access free health insurance and certificates to get free health care for their children.</li> <li>• Increase staff and their capacity for emergency</li> </ul>

Phung Quoi A	
Concerned problems	Proposed adaptation measures
	<p>team.</p> <ul style="list-style-type: none"> <li>• Enhance equipments and facilities for local health care services.</li> <li>• More studies on diseases related to climate change, their trends and prevention of transmitted diseases such as flu, denger fever.</li> <li>• More research on access to health insurance for poor and near poor people and its impact.</li> </ul>
<p><b>5. Environment</b></p> <ul style="list-style-type: none"> <li>• Water pollution</li> <li>• Air pollution cause by brick production and rice grinding enterprises.</li> <li>• Garbage collection side at community.</li> </ul>	<ul style="list-style-type: none"> <li>• Community awareness raising on how to use chemical petise effectively.</li> <li>• Fish raining models with water treatment to minimize environment pollution.</li> <li>• Develop animal husbandry combining with bio-gass models.</li> <li>• Improve duck raising practices to prevent environment from being polluted.</li> <li>• Organize community garbage collection sides.</li> <li>• Community awareness raising on living environment protection.</li> <li>• Controle air and noice pollution affecting communities living close to the enterprises.</li> </ul>
<p><b>6. Livelihood</b></p> <ul style="list-style-type: none"> <li>• Rice variaties resistant to hot, cold bell and peticises.</li> <li>• Environment friendly animal husbandry models.</li> <li>• irrigation system for rice production.</li> </ul>	<ul style="list-style-type: none"> <li>• Support to develop animal husbandry combine with bio-gass to prevent environment from being polluted.</li> <li>• Upgrade irrigation and dyke systems.</li> <li>• Conduct a market research for better policy supporting farmers with sustainable business contracts of farming products.</li> </ul>
<p><b>7. Housing</b></p>	<ul style="list-style-type: none"> <li>• Education on hazards and coping methods (through media, propagandists, posters, and training courses).</li> <li>• Disseminate technology on consolidating houses for households with unsolid houses.</li> <li>• Support poor households funds for building.</li> <li>• Organize training courses on hazard knowledge and coping methods (cause, loss and coping experiences) for staffs and local people.</li> <li>• Train communication skills for trainers in associations and organizations.</li> </ul>
<p><b>8. Most vulnerable groups</b></p>	<ul style="list-style-type: none"> <li>▪ Programmes from the government and other organizations should pay attention to priority groups of most vulnerable people impacted by climate change and hazards. These include poorest households, poor migrant households, women children, and elderly people and disabled people.</li> <li>▪ Social protection support to these groups to be resilient to climate change.</li> </ul>



Phung Quoi A	
Concerned problems	Proposed adaptation measures

Bo Bao village	
Concerned problems	Proposed adaptation measures

**1. Disaster management**

- Emergency rescue facilities for the rescue teams.
- Communication system from villages to remote hamlets.
- Temporary houses of the poor.

- Engine boats for at least 30 seats for rescue and evacuation activities.
- Life-jackets, life-bouys and first aids bags for rescues teams and villagers in the most prone areas.
- Training on first aids and information, education and communication techniques and skills.
- Trainings on disaster preparedness and climate change adaptation for the villagers.
- Upgrade communication system (provide 10 loudspeakers and megaphones).
- Support with electricity generator to keep communication during disaster when no power.
- Resettle households in section 7 living illegally on the edge of irrigation channel.

**2. Needs of women for kindergartens for children during the flooding season**

The discussion among women who have small children in Phung Quoi A ward (Thanh An township) pointed out a critical need for child care during the flood season.

Mothers who have small children at the child care group 1, Phung Quoi A ward insisted on having the child care group re-open. In addition, **there are proposals** on building the fence or surrounding walls for the school, paving the school yard (currently it is a sand lot); providing toys, clean water supply, mats, cooking utensils etc.,

Critical problems reflected through both the group discussions and our observation were:

- **Sanitation:** All child care groups do not have toilet. According to a teacher, they took the children to the river – like local people here who mostly did not have toilet.
- **Nutrition** as the subsidy was limited compared to food price.
- **Safety** as the surroundings of the child care location was also flooded or going to the river for instead of having a latrine implied a risk to the safety for children.

**Loans access for the poor women and men**

- Provide more loans and better access to loans for the poor women and men.
- Loans should be provided with vocational trainings and coaching and could be emerged with other activities by the women's union such as raising awareness on women's rights besides providing loan.

<b>Bo Bao village</b>	
<b>Concerned problems</b>	<b>Proposed adaptation measures</b>
<b>3. Education</b>	<ul style="list-style-type: none"> <li>• In discussion with the teachers, educational management officials, and groups of children in the community, the following ideas are raised as the solutions helping pupils mitigate the damages and cope with the climate change.</li> <li>• In their picture, the children drew and wrote down their wishes of having clean water to drink, unpolluted water to bath, many trees for cool weather, not many floods and not heavy ones, less heat, and having stable and strong houses to withstand storms.</li> <li>• Strengthening the infrastructure to withstand floods, storms, heat, and other natural disasters which can appear to ensure safety and better health for the pupils and the teachers.</li> <li>• Mainstreaming the subjects of climate change, natural disaster type management in the local places including common disaster in the local place, and environment into the extracurricular activities, combining with the field trip model aiming at studying.</li> <li>• The rehearsal of preventive activities in school related to natural disaster management, and life safety in the hot and flooding season.</li> <li>• Strengthening the knowledge about health care, especially in the hot weather, and flooding and rainy season for the pupils and the teachers.</li> <li>• Pay attention to the reducing of health care insurance cost for the pupils, especially for the poor pupils. The school needs to cooperate with the pupils' parents and the local authorities to support the birth certificate making. To the poor pupils who have not got the family record book, it is necessary to grant them privileges with school fees and other extra expenses.</li> <li>• Safer school constructions for the children in the 1st level in flood prone areas.</li> <li>• Support with the swimming teaching program for the pupils especially targeting girls..</li> </ul>
<b>4. Health</b>	<ul style="list-style-type: none"> <li>• Support clean water supply, latrine and livelihoods for poor communities, especially in remote areas.</li> <li>• Support community to raise awareness and knowledge on common diseases and prevention of transmittable diseases, with due attention on their relations with weather conditions, disasters and climate change.</li> <li>• Improve community health communications and education on disease prevention and hygiene using different approaches.</li> <li>• Improve traditional health care services to reduce</li> </ul>

<b>Bo Bao village</b>	
<b>Concerned problems</b>	<b>Proposed adaptation measures</b>
	<p>the cost of health care for poor people.</p> <ul style="list-style-type: none"> <li>• Improve the quality of programmes on maternal health care and nutrition for children, especially for those who live in the poorest and remote areas.</li> <li>• Establish programmes on hygiene improvement.</li> <li>• Enhance the competency and enlarge the number of village health workers in the communities, especially in the remote and poor areas.</li> <li>• Support poor households and near-poor households to access free health insurance and certificates to get free health care for their children.</li> <li>• Increase staff and their capacity for emergency team.</li> <li>• Enhance equipments and facilities for local health care services.</li> <li>• More studies on diseases related to climate change, their trends and prevention of transmitted diseases such as flu, denger fever.</li> <li>• More research on access to health insurance for poor and near poor people and its impact.</li> </ul>
<p><b>5. Environment and cleaning water</b></p> <ul style="list-style-type: none"> <li>• Environment pollution.</li> <li>• Sanitation (latrines for the poor households)</li> <li>• Cleaning water</li> </ul>	<ul style="list-style-type: none"> <li>• Community awareness raising on environment protection.</li> <li>• Credit program for latrine construction.</li> <li>• Set up community garbage collection sides managed by the villagers.</li> <li>• Construct two water supply stations (one for section 7 and one for section 4, 5 and 6).</li> <li>• Support poor households with water containers.</li> <li>• Training villagers how to refire water for living and water treatment after flooding</li> </ul>
<p><b>6. Livelihood</b></p> <ul style="list-style-type: none"> <li>• Sustainable contrats for rice production</li> <li>• Unemployment</li> <li>• Impacts cuased by abnormal weather on rice production.</li> <li>• Credit for animal husbandry development.</li> <li>• Low quality sow</li> <li>• Fish diseases</li> </ul>	<ul style="list-style-type: none"> <li>• Markets for rice production.</li> <li>• Set up handicraft or rice prinding enterprises to employ more local laborers.</li> <li>• Study to select resistant rice variaties.</li> <li>• More credit with longer terms of payment.</li> <li>• Support to get good quality sows from company.</li> <li>• Provide trainings on fish keeping techniques to villagers.</li> </ul>
<p><b>7.Housing</b></p>	<ul style="list-style-type: none"> <li>• Education on hazards and coping methods (through media, propagandists, posters, and training courses).</li> <li>• Disseminate technology on consolidating houses for households with unsolid houses.</li> <li>• Support poor households funds for building.</li> <li>• Organize training courses on hazard knowledge</li> </ul>

<b>Bo Bao village</b>	
<b>Concerned problems</b>	<b>Proposed adaptation measures</b>
	<p>and coping methods (cause, loss and coping experiences) for staffs and local people.</p> <ul style="list-style-type: none"> <li>• Train communication skills for trainers in associations and organizations.</li> </ul>
<b>8. Most vulnerable groups</b>	<ul style="list-style-type: none"> <li>• Programmes from the government and other organizations should pay attention to priority groups of most vulnerable people impacted by climate change and hazards. These include poorest households, poor migrant households, women children, and elderly people and disabled people.</li> <li>• Socio protection support to these groups to be resilient to climate change.</li> </ul>

Table 25. Recommended measures by local communities in Vinh Thanh District (priority list)

	<b>Priority issues in Thanh An Town</b>	<b>Men</b>	<b>Women</b>
<b>1</b>	Provide communication messages on disasters prevention and management and early warning systems for the pupils.	<b>3</b>	<b>10</b>
<b>2</b>	Build clean water supply stations for North bank of Cai San river (unit 12, 10, 9, 11 and 4, where local people have to use the most polluted river water in the areas)	<b>1</b>	<b>1</b>
<b>3</b>	Build rubbish collection sites as regulated and organize the rubbish sorting at the households and organize the rubbish collection team in the communities. Use various ways to reduce the air pollution in residential areas emitted from rice husking factories, brick making and from animal husbandry.	<b>2</b>	<b>7</b>
<b>4</b>	Training, providing knowledge of common diseases which can be developed into epidemics (denger fever, malaria, diahhrea, chicken pox...)	<b>9</b>	<b>2</b>
<b>5</b>	Support to enhance the capacity of health workers and staff, sanitation and community health care	<b>4</b>	<b>3</b>
<b>6</b>	Build the kindergatens and organize childcare centres during flooded seasons for the North Bank of Cai San river	<b>7</b>	<b>6</b>
<b>7</b>	Study to select the rice varieties resistant to heat, cold spells and against Ray Nau and diseases.	<b>8</b>	<b>13</b>
<b>8</b>	Provide loans programmes for poor landless households for animal husbandry and other livelihoods	<b>6</b>	<b>4</b>
<b>9</b>	Support poor households with storm and floods resistant houses whose houses are currently made of leaves	<b>13</b>	<b>5</b>
<b>10</b>	Support to develop animal husbandry in combination with biogas	<b>12</b>	<b>8</b>
<b>11</b>	Support over 90 poor households in Unit 12 to make family latrines	<b>10</b>	<b>9</b>
<b>12</b>	Improve and upgrade the dykes system	<b>11</b>	<b>11</b>
<b>13</b>	Study of marketing for water melons and pigs	<b>5</b>	<b>12</b>

#### **8.4 FURTHER RESEARCH**

- There is a need for research on diseases related to climate change, and find out vaccine types for special flu which can spread in the community.
- It is also needed to investigate more on the approach and the advantages of health insurance for poor people and close- to- poor ones.
- There is a need to understand further the constraints or issues faced by the illegal immigrants groups especially the poor.
- There should be further study of the flood new resettlement areas to understand the constraints of areas.