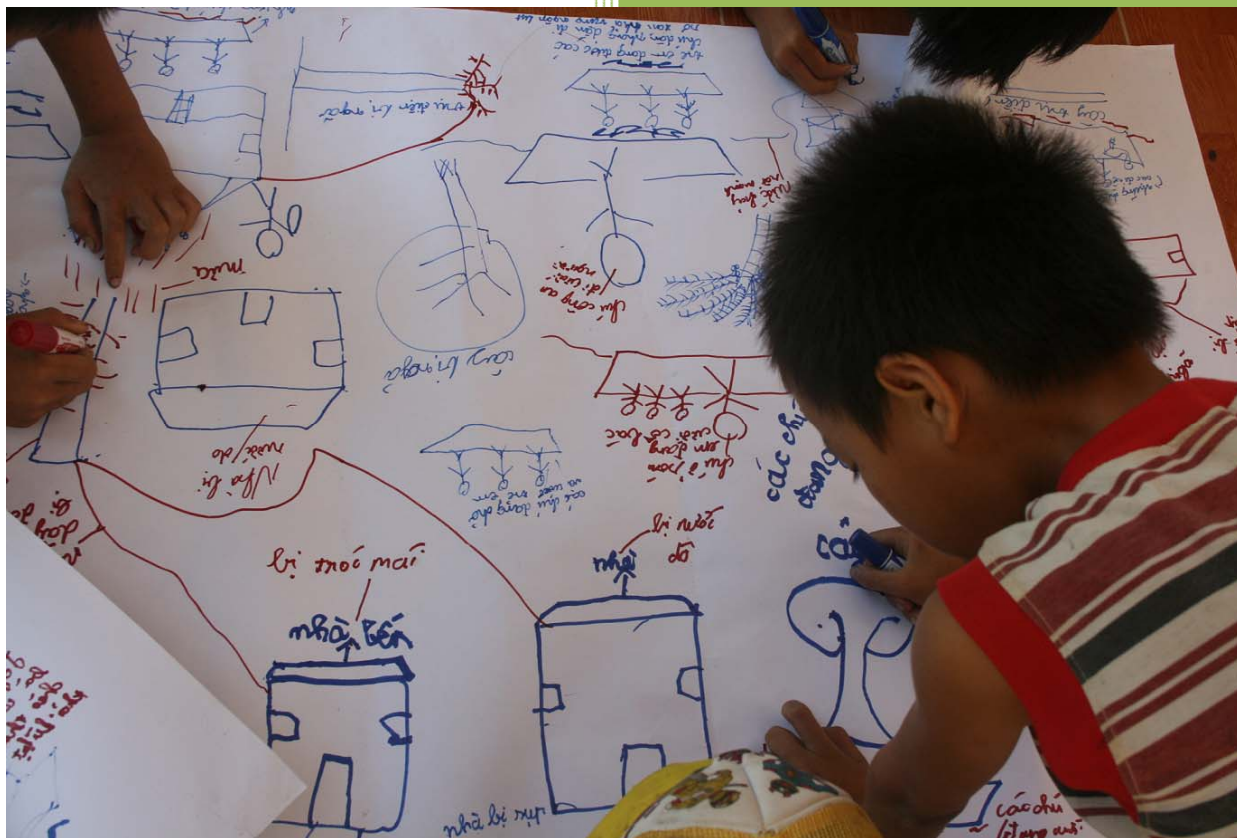


2009

HCVA in Da Nang



Hazard, Capacity & Vulnerability Assessment

Prepared by

Challenge to Change
and Hue University

with

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 Local facilitators and
 Local communities

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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
DN	Da Nang Thành phố Da Nang (TPDN)
CTAPCC	City Target Action Plan for Climate Change Kế hoạch Hành động Mục tiêu Thành phố về Biến đổi Khí hậu
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
ISSET	Institute for Social and Environmental Transition Viện Chuyển giao Xã hội và Môi trường
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)

Executive Summary

a) Project Sites

Da Nang is a coastal city located in Central Vietnam. One of Vietnam's major urban centres, the city has been developing rapidly in recent years. Growth of the commercial port, industrialization and an expanding tourism sector are creating a steady shift in the economic and spatial structure of the city. Agricultural and small-scale fishing activities in particular have been in decline, partly because they are not a target for strategic investment. The city has also embarked on resettlement programmes as part of structural plans to reduce agricultural land. Nevertheless there are many residents, particularly poorer sections of the community, who continue to rely on small-scale primary sector livelihoods, despite attempts to promote vocational re-training.

Da Nang is effectively ringed by mountains, making it not only prone to the effects of typhoons and lesser cyclonic storms arriving from the South China sea to the east but also at risk from floods arising from high rainfall on the upland areas to the north, north-west and south-west. These, together with other natural hazards such as drought, high tides, coastal erosion, salinization, landslides, are a major concern for city residents and local authorities, and are likely to be exacerbated by climate change. Urban pollution problems also have a high profile in Da Nang, partly because provision of infrastructure for drainage and sanitation has lagged behind the urbanization process, and partly because of inadequate waste treatment from industrial and aquaculture activities and domestic sewage. These chronic problems exacerbate the risks associated with hazards such as flooding.

Through group discussion, based on the losses of people, property, production activities in recent years and the ability to be affected by natural hazards, the representative officials of local government has ranked the serious level and influence of hazards in 7 districts of city as following table.

Ranking of serious levels of hazards of districts in Da Nang City

Name of district	Cyclone	Flood	Flash flood	Landslide	Summer flood	Typhoon	Drought	High tide	Number of hazards
Son Tra		2	2	2	1	1	2	1	7
Lien Chieu		1		2	2	1	1	1	7
Thanh Khe		3		3		2	3	3	5
Ngu Hanh Son		1		2	2	2	1	1	6
Cam Le		1		3	2	3	2		5
Hai Chau		3				3	3		3
Hoa Vang	1	1	1	1	1	2	1		7

Notice: 1. most serious; 3. less serious (Focus group at city level)

Results ranking through group discussions reflected in the table shows quite clearly the most danger hazards in Da Nang are flood, typhoon and drought. The most vulnerable areas are Son Tra, Lien Chieu and Hoa Vang districts.

The HCVA focused on two areas – Tho Quang in Son Tra district; and Hoa Hiep Bac in Lien Chieu district. Both wards face a complex mix of hazards as discussed above, and were identified as sites of particularly high social vulnerability to climate change impacts.

b) Objectives and Methods

The objectives of the HCVA were as follows:

- Identify the most vulnerable communities and most vulnerable households/groups within targeted communities in Lien Chieu and Son Tra (urban districts);
- Provide sufficient samples from which pilot projects according to programme criteria, can emerge;
- Contribute to the identification of research issues in the city for the programme of the Institute of Social and Environment Transition (ISET) and for the preparation of Phase 3 investment;
- Form an 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).

The HCVA activities were carried out in May 2009 at city, district, ward and section levels. Two sections (communities) in each ward were selected for particularly intensive study, involving work with section residents. Data collection included secondary documentation, questionnaire surveys, in-depth interviews, focus groups and a selection of PRA tools including historical profiles, timelines, seasonal calendars, mapping, transect walks, ranking and venn diagrams.

c) Hazards and Impacts

In common with much of Vietnam, the priority implications of climate change for Da Nang appear to relate to risk of hazards to life, livelihoods and infrastructure arising from extreme weather events and chronic environmental changes. Hence, analysis focussed on a range of such hazards.

Historical profiles and local testimonies indicate that typhoon, flood, drought, high tide and flash flood tend to have been the most significant natural hazards affecting the city. These, in turn generate 'secondary' hazards such as spread of pollution, disease risks, river and shoreline erosion and saltwater intrusion. In Hoa Hiep Bac ward, for example, inadequate drainage, sanitation and garbage collection exacerbates flood impacts, especially in older residential areas where many of the poor live.

Impacts of these hazards include loss of livelihood especially for farmers who may lose crops and agricultural land, small-scale fishers who may lose boats and access to fisheries, and shrimp-farmers whose ponds may be damaged or submerged. Some hazards also cause direct mortality, heightened health risks from injury and environmental contamination, loss of property, damage to homes, and damage to business, services and infrastructure. The health station in Tho Quang ward, for example, which is one-storey and roofed with steel sheets, is prone to rainy season inundation because of its low-lying location, and is at risk of roof damage during strong typhoons.

Although the precise of pattern of future change is difficult to predict, climate change is likely to exacerbate risk of typhoons, floods and possibly drought for Da Nang. Some hazards may already be changing. A total of 25 typhoons directly affected the city from 1997-2007; though the statistics cover too short a timescale to suggest a positive trend, the highest number and/or intensity of typhoons was experienced in the final years of that period, including two storms that caused multiple deaths since 2005 (Chanchu 2005, Xangsane 2006).

Sea level rise is an additional risk from climate change, and one that is particularly relevant for the coastal city. At one section in Hoa Hiep Bac, people perceived that sea level rise had already worsened saline intrusion on agricultural areas on the banks of the Cu De river, and caused greater risk of flooding of shrimp ponds during high tides.

d) Institutional responses

Institutional analysis in the HCVA focussed especially on processes for disaster management and socio-economic/urban planning in the local authorities. There is not the space here to describe detailed governance structures, activities and planning processes. Nevertheless, it is notable that disaster preparedness activities appear to have improved significantly in recent years with, for example, closer coordination of early warning, evacuation and rescue activities, promotion of adjusted crop production schedules in some sites to minimize flood risk to crops, and mitigation of damage to infrastructure through dyke/embankment strengthening. Da Nang city also has a draft action plan for integration of disaster mitigation into socioeconomic development planning, which is awaiting approval.

However, the analysis raised a series of issues regarding respond capacity of institutions and planning processes. In terms of disaster management there were indications for example that: emergency equipment is often in short supply, especially at ward level and below (e.g. for emergency communication, life vests for fishermen, moving of boats to safe places); more safety training for fishermen is needed; more attention should be paid to provision of food, drinking water, medicine and care for pregnant women and babies in shelter sites. The low level of participation of women in disaster management committees at all levels was emphasized. Disaster mitigation and preparedness planning also does not presently address all hazards – drought, high tide and saline intrusion were identified as examples of destructive hazards that tend to be neglected.

In terms of socio-economic development and urban planning, the currently inadequate integration with disaster risk management was highlighted and linked with lack of skills, policy direction and budget (although note above that an action plan is awaiting approval). This issue is even more highlighted in terms of lack of specific integration with climate change adaptation. Planning procedures were also criticized in terms of the skills base with which to encourage grassroots participation, inadequate assessment of infrastructure projects in terms of environmental and socio economic development impacts, and too little assessment of livelihood opportunities in the context of resettlement programmes. (alternative employment opportunities for resettled fishermen and farmers may be in short supply, and, where available, may not be accessible to such people without targeted support). Urban planning had also been unable to address sufficiently the problems of drainage, sewage and latrine access, water supply, and environmental pollution affecting some parts of the city and selected wards.

e) Vulnerable population groups

While all economic sectors and residents of Da Nang are vulnerable in some sense to current and future hazards, there are certain groups that clearly have heightened vulnerability and for whom support for adaptation should be targeted.

Two livelihood groups emerge as particularly vulnerable in terms of occupation and maintenance of income: farmers and small-scale inshore fishermen. Many farmers in Da Nang already face issues of water stress, salinization and loss of agricultural land to urban development, and crop losses caused by extreme events intensify these chronic problems. Inshore fishers already face problems of declining catches and city policies to limit fishing to protect marine resources. During typhoons they can be in mortal danger if caught at sea without adequate life vests and radios to receive warnings, and, even if they stay on land, their boats may easily be damaged because of lack of access to safe harbour (e.g. for fishers in Tho Quang). Efforts by some fishermen to change jobs to reduce risk to themselves and their livelihoods have been hampered by shortage of skills and capital to invest in new businesses. In addition, hired labourers are a third group vulnerable to hazard events because of the instability of their employment and the likelihood of losing work during crisis periods.

Households dependent on these forms of income tend to be among the poorest, and there are other aspects of poverty that make the poor yet more vulnerable to hazards. The poor tend to live in houses that have weaker construction – around 1200 poor households in Tho Quang are estimated to live in houses that are unsafe during typhoons. Poverty in households can also be linked with old age and illness – again, characteristics that heighten vulnerability to hazards. Health risks that arise during and after hazards may be a particular problem for the so-called ‘near-poor’ – groups that also suffer unstable livelihoods and unsafe houses but that do not quite qualify for free medical insurance – the needs of this group were particularly highlighted in the study. The impact of disasters on houses, health and livelihoods can easily send the near-poor into (or back into) poverty: for example, borrowing to repair repeatedly damaged housing can create spiralling debts for households.

The combination of poverty and vulnerability in Da Nang also intersects with ethnicity and gender. The city has members of the indigenous Co Tu people, most of them relocated from the mountains, who tend to have low incomes dependent on dwindling agricultural productivity and low education levels hamper their access to non-farm jobs. Women appear to suffer less risk of mortality than men during hazard events, but the livelihood and wellbeing impacts of hazards for women tend to be greater. For women from poorer households, access to jobs outside traditional dwindling sectors such as selling fish can be difficult, especially for women over 35. The economic hardships can be especially difficult for women-headed households.

f) Adaptation priorities

The findings of the HCVA suggest a number of priority actions that can help reduce both the physical and the social vulnerability of people in Da Nang to the impacts of climate change. These include suggestions for research and capacity-building.

The suggested actions fall under the following themes.

i) Hazard preparedness and mitigation, including:

- Training to improve safety and build awareness of hazard risks;
- Provision of emergency communication equipment for fishing vessels;
- Rescue equipment including boats, lifejackets, lifebuoys;
- Repair of the Tho Quang anchorage;
- Supporting households to repair and strengthen poorly constructed houses, with training, materials and technology;
- Building sea walls in specific sites and/or forest planting on beaches;
- Improved irrigation systems to manage drought;
- Research on and promotion of crops with short growing season and alteration of cropping schedules to avoid damage from early-season floods;
- Research on the health impacts of hazards with a view to targeting of health sector disaster management and training;
- Improve education and communication on disaster preparedness for both teachers and pupils. It is crucial to address practical skills such as swimming or reaction in case of disasters;
- Change the practice and methods of education: organise extra-curriculum and off-school activities on disaster preparedness, use movies, documentaries, videos and other means of communication that can stimulate children’s participation;
- Develop training sessions on climate change, impact and adaptation for all grades in primary school.

ii) Planning processes, including:

- Review the urban master plan and develop a vision for 2050 that takes account of climate change;
- Research on the actual rate of population increase of Da Nang city and future projections of population change;

- Regular assessment of hazard vulnerability to be integrated into socio-economic development planning at all levels;
- Protect and develop watershed forests, coastal protection forests and marine/forest nature reserves;
- Promote community participation in planning processes at district and ward levels, including training of officials in PRA and other techniques;
- Training and skills development in understanding climate change and adaptation.

iii) Enhanced pollution control, including:

- Upgrading of drainage in certain residential sites;
- Improvement of management of wastewater and other forms of pollution in the industrial and export processing zones;
- Investment to build systems of living sewage treatment;
- Constructing concentrated seafood-processing areas;
- Enhancing awareness of environmental sanitation for residents;
- Organizing suitable points for garbage collection, supporting garbage collectors, and improving road access to some sites for garbage collection vehicles;
- Supporting households to build latrines.

iv) Strengthening livelihoods options of the poor, including:

- Improving access to alternative livelihoods through training and support;
- Assess availability and training needs for alternative livelihoods in areas of resettlement to help ensure that resettled households have access to jobs and the means to take on new occupations;
- Occupational support directed especially to women.

1. INTRODUCTION

SUMMARY OF ACCCRN

The Asian Cities Climate Change Resilience Network (ACCCRN) is an initiative of the Rockefeller Foundation in the United States. It aims to catalyze attention, funding, and action on building climate change resilience for poor and vulnerable people, by creating robust models and methodologies for assessing and addressing risk through active engagement and analysis of various cities. Through the actions of the ACCCRN it is anticipated that by 2012, a network of cities in Asia will have developed robust plans to prepare, withstand and recover from the predicted impacts of climate change. ACCCRN is part of a broader RF Climate Change initiative which is documented on http://www.rockfound.org/initiatives/climate/climate_change.shtml

Challenge to Change (CtC) is an INGO with a Project Office in Hue City in the central region of Vietnam. Its mandate is to support poor communities in the developing world to adapt to climate change, and to engage in public education in the UK on the causes and effects of climate change (CC). CtC is currently supporting Da Nang, Quy Nhon and Can Tho cities in ACCCRN Vietnam to achieve the following objectives:

- i) Broad understanding of the extent of vulnerability in the three cities of Da Nang, Quy Nhon and Can Tho, among government and non-government institutional stakeholders, and for vulnerable communities themselves;
- ii) Demonstrate successful community-based resilience-building which could be scaled up, and highlight challenges which need to be overcome by pilot interventions with poor and vulnerable communities;
- iii) Increase capacity to manage disaster risk, and to develop appropriate plans to respond to CC for poor and vulnerable communities, and local authorities.

1.2 CITY AND DISTRICT PROFILES

Da Nang city (Figure 1) consists of 8 districts with total area is 1256.54 km², in which the 6 on land urban districts and one suburban Hoa Vang district and have an area of 951.54 km² under geographical coordinates 15^o15'15" to 16^o13'15" North Latitude and 107^o49'00" to 108^o20'18" East Longitude. Hoang Sa island district has an area of 305 km² in South China Sea.

Northern city is Bach Ma mountain chain with a high average of 700m and many high mountains tops over 1,000 m such as Hon Ong (1,072 m), Bach Ma (1,444 m). Range of Bach Ma mountain is a natural border between the Da Nang city and Thua Thien Hue province. Northwesterly is Mang mountain with 1,712m high is border of 3 provinces and city, Thua Thien Hue, Quang Nam and Da Nang. South-west are a mountain of Ba Na with Nui Chua is mountain top, 1,487m in high. The western city is Hien district and southern city adjacent to Dien Ban and Dai Loc districts of Quang Nam. The eastern city is South China Sea and Son Tra mountain on Son Tra peninsula. Thus, the mainly area of Danang city on land is surrounded by high mountains. The plain and coastal plain areas in the south of the city are divided by the Han river. The area between mountainous and coastal plain is hills with medium high. Along the coast are sandy beaches sand dunes.

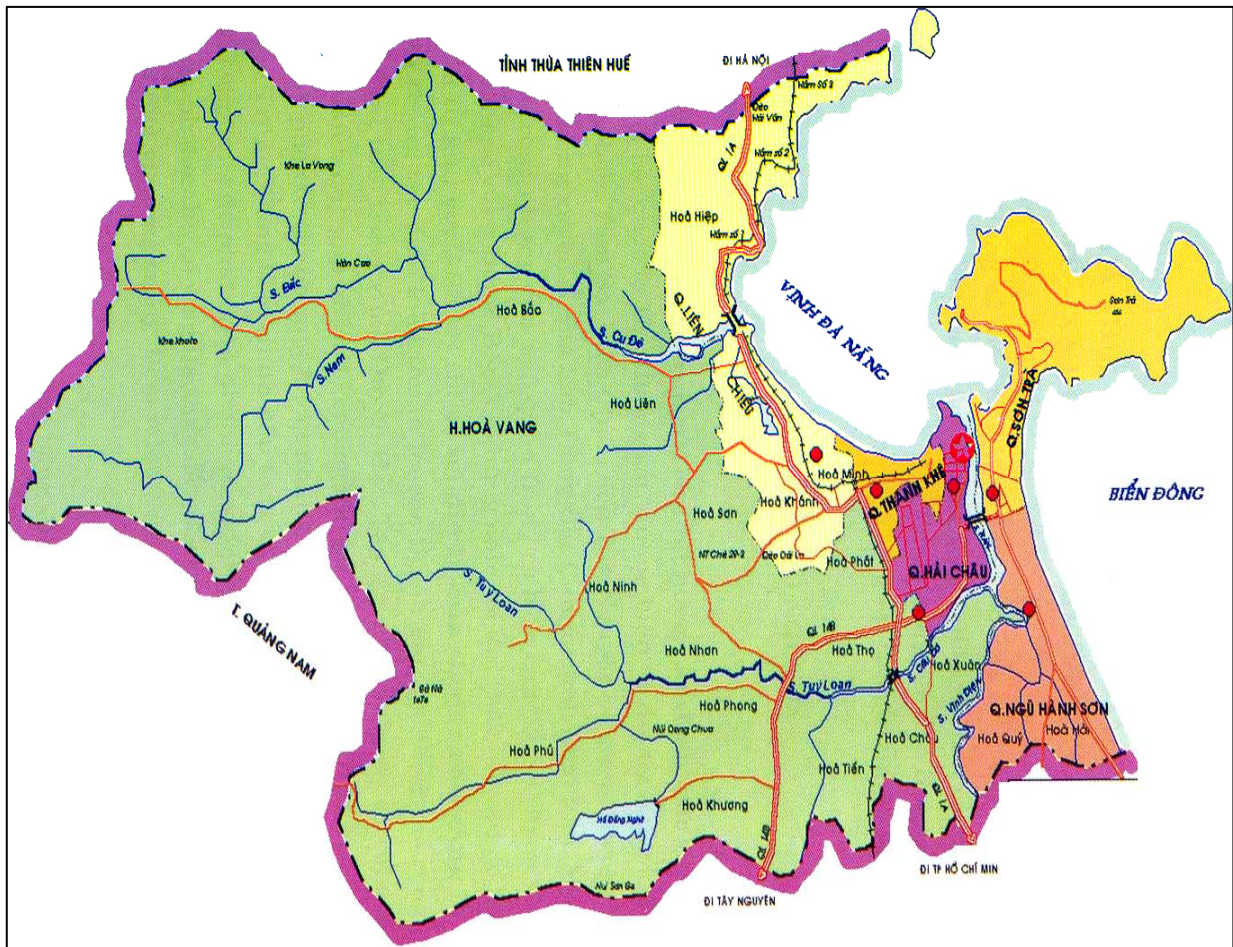


Figure 1. Map of Da Nang City

From January 1, 1997, Da Nang became the city directly under central authority by resolution at the 10th session, the National Assembly IX, which is approved on November 6, 1996 and development following the direction of “*Industry - Services – Agriculture*”. Due to promote the advantages of the commercial port city, service and commercial in the past, with this development orientation, and with the support of the Central Government, many of the important infrastructure such as seaports, airports, railways, roads, electricity system, water supply, training facilities, health care is constructed, upgraded and modernization. Da Nang is gradually creating an urban development towards the modern due to development of economic, ensuring national defense – security and enhance people's lives,

The economy of the city is developing rapidly and environmental protection is also focused during development process. Some industries easily cause environmental pollution like shipbuilding, iron and steel...are not encourage to invest but instead of the high-tech industries such as information technology, bio-technology to minimize negative impacts of natural environment. The production sectors have caused pollution must moving to industrial zone or far of population area or forced to close. The development of tourism, especially in coastal areas, must also meet the high standards of environmental protection.

The development of industry, services and urbanization causing of reduction of agricultural production area as well as the number of labor involved. For agriculture, the large production area of the urban district have to change into other purposes, a few remaining area will change soon so it is limited to invest for agriculture development such as irrigation system. The other activities causing pollution such as raising cattle and poultry are not implemented in most of urban district. Aquaculture is not encourage because pollution risk of sea environment and influence to coastal ecosystems. Catching fish are encouraged to only form of offshore. Therefore, the people work on agriculture and fishery as traditional activities before have to change their livelihood during the development of Da Nang city in recently years.

The process of urbanization and economic development of the city have making better living conditions for people. However, Da Nang city still have some challenges need to resolve soon. Some old residential area under adjust to the urban master plan but the process of adjustment take a long time or delay due to partly investment policy may have some issues on environment. One problem is the difficult in drainage system of these areas not improved yet, during the rainy season or even in dry season, these areas easily to inundated and polluted. Besides, the changing of livelihoods for the people from agriculture and fishing to non-farm encountered many obstacles. A household in this city want to change jobs to be vocational training, capital needs, they should have the means, should have experience and skills to new job and need a higher level. Many farmers, fishermen have to convert and adapt, but also a lot less of follow-speed development, so this group easily becomes the poverty. The vocational training of farmers, fishermen are also difficult because every new job requires the conditions of a higher level of capacity and education. Next issue is the environmental pollution by industrial activities in the city. Although the industrial zones has been set up waste treatment systems to process the waste water and matter but the operation of these system are not absolutely so it is still a issue concerned by local people and government at all levels.

In addition, a big problem of city which is interested as new challenge: the more impact of the potential hazards and climate change. As a coastal city like others in Centre of Vietnam, Da Nang under the influence of many typhoons, floods, drought, cyclone annually and the risk of these growing up when the these dangerous weather is predict increased. Typically in recent years is typhoon No 6 in 2006 (Xangsane) caused severe damage to city: 30 people killed, 14,138 houses collapsed, 112,691 houses partly damaged or lost roofs, and infrastructure such as electricity, post offices, schools, health stations, plants and manufactories, roads and aquatic products... damage or lost. Total economic lost were up to 5,290 billion VND (nearly half of city GDP at the time).

Related to the potential impact of hazards and climate change, in the 8 districts, the two coastal Lien Chieu and Son Tra districts are identified as most vulnerable areas.

Lien Chieu District is located in the northern Da Nang city with 05 wards: Hoa Minh, Hoa Khanh Nam, Khanh Hoa Bac, Hoa Hiep Nam and Hoa Hiep Bac. This district has an area of 79.13 km². 22.551 household and 100.051 people (in 2008). Northern is Hai Van pass and this is a naturally border between Da Nang and Thua Thien Hue, the Eastern district are Da Nang Bay and Thanh Khe district, West and South sides is Hoa Vang district. The district has important position as beginning points of traffic of city with 1A main road, North-South railway, Lien Chieu port and near Da Nang International Airport. These create a good condition for trade and transportation within city, other provinces and other country.

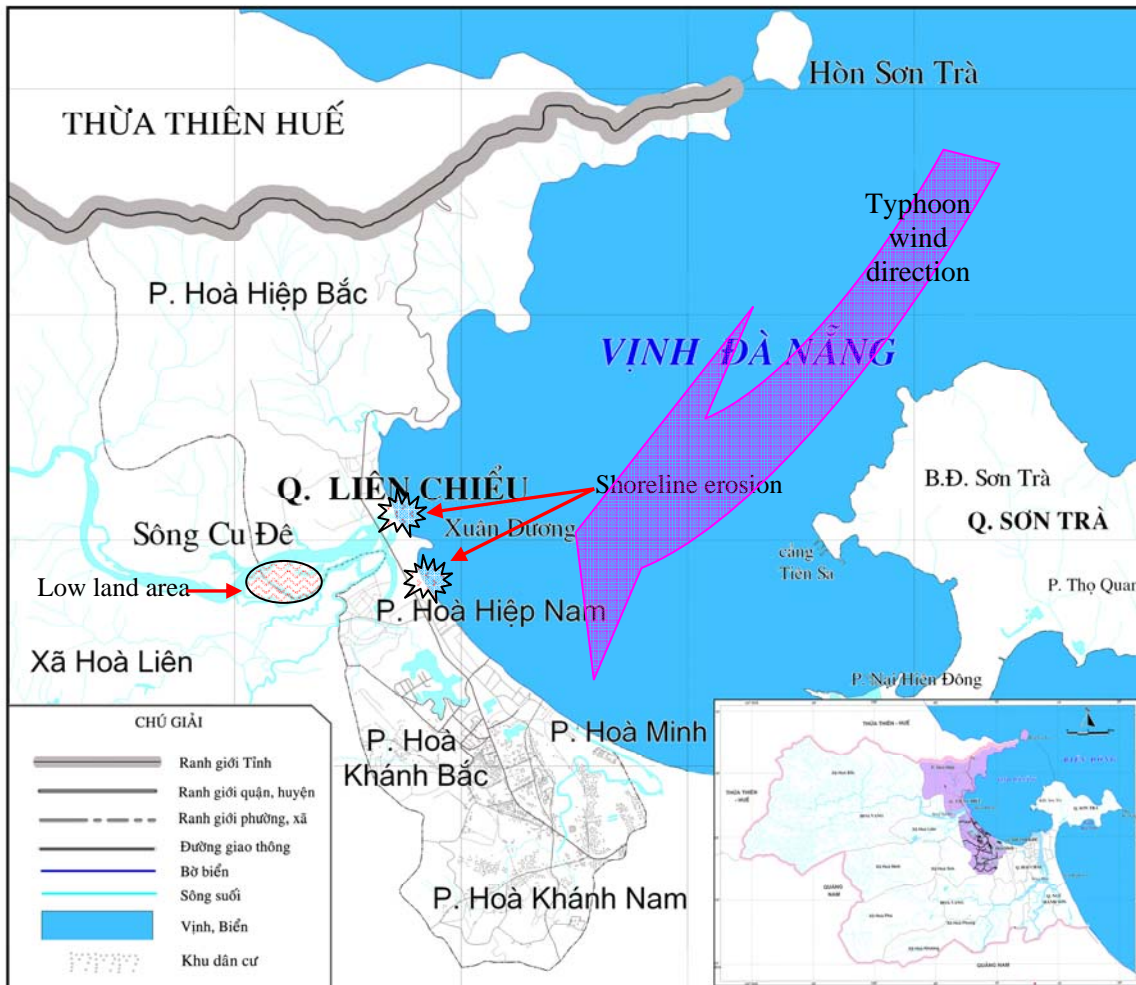


Figure 2. Map of hazards of Lien Chieu district

As some conditions mentioned above, Lien Chieu takes many advantages for development of trade and economic as development-oriented of Da Nang city, but as complicated terrain - particularly in Hoa Hiep Bac and Hoa Hiep Nam wards - coastline of 24km long and many low land areas so Lien Chieu district regularly affected by natural disaster. According to group discussion, there are 8 types of natural hazards annually impact to the district. The typhoon, flood and drought are identified as the most serious hazards. Many areas of agricultural land have to leave fallow due to lack of water and saline intrusion. Some others are inundated in rainy season. High tide is making shoreline erosion and destroying protective forest. The typhoon affected to human lives and properties. Some secondary hazards such as environmental pollution, disease often appear after natural disasters also affect the health and livelihoods of people.

Son Tra District is located in the eastern of Da Nang city. This has 7 wards with natural area of 59.32 km², 27,722 households and a population of 122,571 people (in 2008). As a peninsula with 3 sides is surrounded by Han river and South China Sea, Son Tra district is the first location of Da Nang have impact of typhoons and tropical depression come from the sea. With approximately 5,000 households in the district participate in fishing and doing fishery service so the influences of typhoon not only on fishing activities but indirectly affect to work on land of people also. The beach area in Tho Quang, Thai Man and Phuoc My wards is easily affected by typhoon and strong waves because most of the people in these communities go fishing in-shore and have small boats. The boats of fisher often concentrated along the beach and during worse weather and their un - or semi-solid houses are also closed by the sea so some time cause serious damaged. The fishing activities in Son Tra district are not only affected by the typhoons into land, but affected in open sea when they go fishing. In 2005, about seventy people 10

fishing boat were missed because of a typhoon namely Chanchu in open sea. In addition, the development of industry, especially fishery service logistics and processing aquatic products in recent year showing some issues of environment. Waste water, bad smells from the industrial area influenced the people lives and contribute to pollute marine environment.



Figure 3. Map of hazards of Son Tra district

2. METHODOLOGIES

2.1 Objectives

- Identify the most vulnerable communities and most vulnerable households/groups within targeted communities in Lien Chieu and Son Tra (urban districts);
- 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)

2.2 Timing and surveyed sites

- The survey was carried out from 6th May 2009 to 23rd May 2009.
- The surveyed sites: Da Nang city, 2 districts namely Son Tra and Lien Chieu were chosen for HCVA. Hoa Hiep Bac of Lien Chieu and Tho Quang of Son Tra are two wards were chosen to survey and two communities (two sections) in each ward were chosen for HCVA (Figure 4).

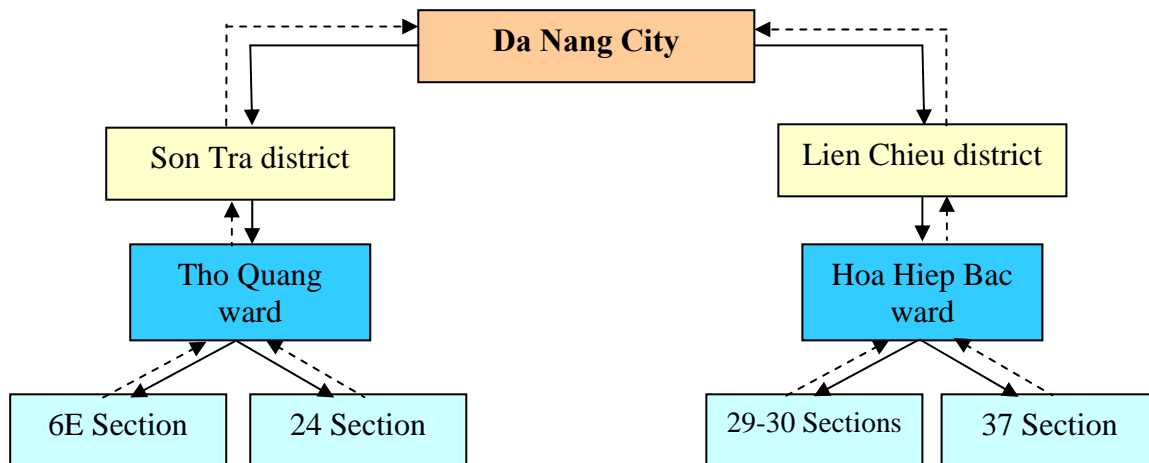
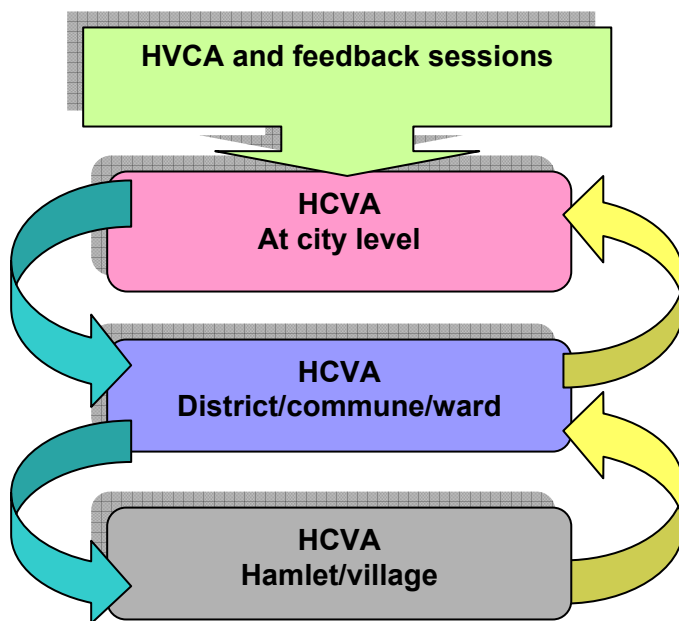


Figure 4. Surveyed sites in Da Nang city

Note: —> HCVA process
 - - -> Feedback process

After HCVA activities, the feedbacks were proceed to wards, districts and city in order to consolidate all collected information.



A. Levels

1. HVCA from city to village level.
2. Results of assessment were feedbacked from village to commune/ward to city level.

B. Key contents of assessment

1. Hazards assessment to determine potential and secondary hazards
2. Assess the vulnerability by disasters and climate change and identifying the impacted areas/themes; identifying most vulnerable groups.
3. Assess the impacts of disasters and climate change on gender
4. Identify the key areas impacted.

2.3 Tools and methods

Collecting secondary data from participants, related organizations, departments and agencies: collecting information on topography, climate, population, infrastructure, environmental sanitation, natural resources and legal documents of resources management, urban plan, disaster management and etc. This was done by survey members and facilitators of Da Nang city during servey times.

Household survey: by using questionnaires (provided by CtC) to get information on livelihood, education, environmental sanitation, work share between males and females, advantages and disadvantages of households in coping disaster and keeping them alive, etc. 200 questionnaires were used. This was done by a 4 members of survey group with help of 4 facilitators from 2 districts.

Focus group discussion:

- 9 groups were organized at 4 level: city (1 group), districts (2 group), wards (2 group) and sections (4 groups). Each group has 20-45 participants who responsible or have relevant knowledge to clarify information, gather different opinions on certain issues.

- Besides 9 focus groups, 18 small discussions were done also at communities of Tho Quang and Hoa Hiep Bac: 6 discussions with elderly people groups; 6 with poor people groups, 6 with pupils.

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 were use for HCVA during discussion:

Historical profile: used to get information on types of disaster during the last 20 years, types of losses, reasons to losses and the most affected zones in community and information compilation of potential hazards.

Timeline: used to get historical information on changes of disaster, livelihood, population to understand local practices and attitudes in the past and at present, to get information on effects of disasters in recent years...

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 to be used as shelters...

Transect Mapping: used to collect information on distribution of various 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 the suggestions and needs of community to cope with climate hazards. The participants prioritize by giving a score to each of the options.

Venn diagram: used to estimate the relationships and interactions between organizations influencing economic actions as well as actions related to coping disaster and epidemic diseases capacity in survey sites.

Some other tools such as *Problem tree*, *wealth ranking* also applied during the survey.

In-depth interviews:

- 48 household in-depth interviews (including 6 better-off households, 6 average households and 36 poor households), in which, 16 households are out of the chosen section in Tho Quang and Hoa Hiep Bac wards. Poor households consist of 6 women-headed households, 6 men-headed households, 6 new households, 6 single women households, 6 households with disability family member, 6 households with many children.

- 2 interviews with Da Nang Women's Union staff (Besides, the team had some brief talks with Women's Union staff in Son Tra, Lien Chieu Districts and in Hoa Hiep and Tho Quang wards)

- 2 interviews with the principals of Hai Van primary school (Hoa Hiep Bac ward) and Tran Quoc Toan school (Tho Quang ward).

- About 10 in-depth interviews with officials at departments and agencies of city, districts and wards.

During survey, gender balance is a requirement in group discussion and household in-depth interviews.

3. DIASTER MANAGEMENT OF DA NANG

3.1 Structure

Disaster Management, Rescue and Relief Steering Committee (DMSC) are established at the levels of Province, District and Commune and they operate in close coordination with each other. The mechanism of these steering committee from city to section levels is sum up as follows (Figure 5):

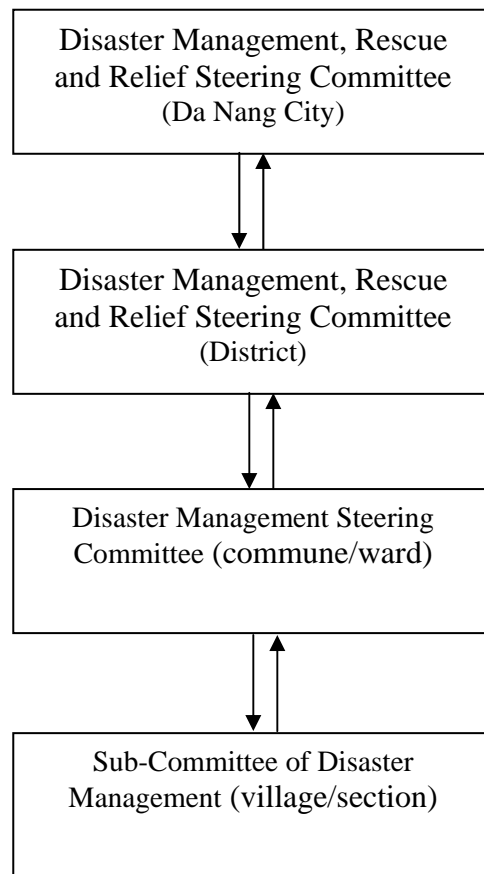


Figure 5. The operating activities of DMSC at all levels in Da Nang

At the city level, DMSC is lead by standing vice-chairman of City People’s Committee, vice-director of Department of Agriculture and Rural Development (DARD) is standing deputy of Steering. Chief of secretary of steering is head of Irrigation Branch and Flood and Typhoon Control. The other members of city DMSC are directors of departments, director of Police, head of City Army Force and 8 chairpersons of 8 districts. DMSC action follows the 5 year-directed and the specific actions based on annually Disaster Preparedness (DP) plan. This DP was imitated based on the last year disaster, the disaster mitigation activities and updated information from Station of Hydrographic Meteorology of Centre of Vietnam.

In DMSC at district level, chairperson of District People (DPC) takes lead of Steering. Vice-chairman (responsible for economic of DPC) is deputy of Steering and standing member is head of DPC economic department. The other members are head of all DPC departments, and head

of other organisms and agencies: police, force commander, National Front, Youth Union, Woman Union Secretary and chairman of wards/communes of district.

In DMSC at ward level, chairperson of Ward People's Committee takes lead and vice-chairperson is deputy of the Steering. The more than 10 remain members is key staffs of WPC, such as head of police, force commander, key staff of social-culture, land survey, finance sections, head of health service station, head of other organisms: Youth Union, Woman Union and heads of sections.

At the section level, the Sub-DMSC is lead by head of the section; the responsible of sub-unit of organisms such as Woman Union, Fatherland Front, in section are members. Sub-DMSC take responsibility for i) perform the function of state management on disaster prevention and mitigation; ii) set up the DP plan and iii) Assign tasks to members of the Sub-DMSC to ensure good command of DMSC before, during and after disaster occur.

Every year, at the beginning of the main hazard (typhoon and flood) season (it is should be in May) DMSC of ward will meet to assess damage from disasters and coping experience last year to set up the DP plan for the year. Renew all DMSC of ward and Sub-DMSC of sections. The assessing damages and lessons learnt well as new DP plan will be sent to report to DMSC of district before the DP plan implemented.

At district level, before the rainy and typhoon (May or June), DMSC of district have to report the total assessed the last disasters, damages and coping experiences and drawing the actions for the year. Before 2007, the DP plan of district was set up annually, but from 2008, the districts set up 3-year DP plan, 2008-2010.

3.2 Budgets

For the all activities of City DMSC get from annual budget based on the estimate of Irrigation Branch and Flood and Typhoon Control with approval of chairperson of City People's Committee.

At district level, before expenses for disaster mitigation get from the fund to prevent flooding and typhoon of enterprises, economic organisms and people living in the area by the annual goals (such as Lien Chieu district funds this year 2006 is 110 million VND). However, this budget now deduct from the annual fund of district and the expenditure will depend on the situation of disaster (in 2008, Lien Chieu district paid no money for this purpose because there is no damage by natural disaster). Son Tra district uses 20 millions VND annually in for DP actions.

At ward level, Hoa Hiep Bac ward also use annual budget for DP activities in according to the disaster events. Tho Quang Ward has save up 5 million from annual budget to use for small buying equipment, fuel costs, small preparing and allowance for standing officials. When serious damage occur, annual budget from the lower level not enough for situation, they may get more budget from upper level.

3.3 Coordination

The coordinate implementation works as DP plan, follow the "Four-local Preparedness" principle: local commands, local forces, local means and local logistics. DMSC and the function departments of the DPC coordinate with the force of police, army, border army station check the fishing boat on the sea, guide the boat go to safety areas, prepare car, boat, excavator to timely use. Radio station using network of loudspeakers give some knowledge on DP and updating information of coming hazard. Centre of health service of district, health stations of wards prepare mandate and drugs, environmental treatment chemicals. National Front Committee and other organisms propagandize in very active by several ways and coordinate with all level of government on the rescue and relief before, during and after disaster.

The coordinate implementation works is coordinated by DMSC at each level. The standing work is carrying out 24hours per day. DMSC also assign tasks to people as personal responsibility and other forces at each important area.

3.4 Early warning system & communication

The early warning system and communication on hazards give to the people mainly through television and radio. Today, most of people can approach the information from these means. Some poor households have no TV also have information from their neighbors or radio.

The wireless FM radio of ward with system of loudspeakers can reach everybody of the local area (eg. The Hoa Hiep Bac ward has 44 loudspeakers/38 sections). The fishing boat on the sea forming groups to interdependent each other, sharing information not only on catching activity but information on worse weather also.

When have information of coming typhoon or flood, the communication systems action at once and the frequency of time of giving information to people depend on the status of hazard (for example, information on distant typhoon, near typhoon and urgent typhoon coming). Use a car or boat (depending on specific area) equipped high volume speakers to give the information in case of no electricity or important place which can not receive information from FM loudspeakers continuously.

In case of urgent typhoon coming, the border army station will shot flare as indicate that the near hazard and all the means on the sea have to come to safety place immediately. The DMSC of wards and Sub-DMSC also equipped hand loudspeakers to give information and guidance to local people directly once command on evacuation is given. The telephone and mobile phone are use for contact between levels of DMSC as well as local people. The phone number of DMSC, member of DMSC and officials responsible for each important place are given on the DP plans.

Sometime there are problems with power and telephone systems during disaster, the report and receive command or information have to do in face to face. However, this is often dangerous and difficult in case of typhoon and flood.

3.6 Lien Chieu District

Rescue teams

Besides District DMSC, there is a assist unit to the Steering. They are officials from some department of DPC. The rescue team of district consists of: 52 members, 10 boats always ready when having information of coming hazard. The other forces, police, army, border army station 244 are always ready also when disaster coming and occur.

Facilities

Some of the building have constructed at important area to improve the rescue capacity and create the shelter for people. The "Disaster Mitigation House" (Figure 6a) is built after historical flood 1999 at Hoa Hiep Nam ward, now it managed by ward Red Cross Association. This is a solid house with using area of 32m², iron frame, concrete piles, dome roof with can stand under strong typhoon. This house is equipped some necessary means and tools such as: life vests, first-aid stretchers, hoes, shovel, masks and buckets with number of 20 each. Some other equipment also available in this house: 2 aluminum bladders, battery lights, walkie-talkies. In 2008, the district PC use amount of money from annual budget to built a 2-story Flood Prevention House in section 37 (Figure 6b) – the important low land of Hoa Hiep Bac. This house can use as shelter for 200 people. The mobilization forces for DP of the Lien Chieu district is done systematically and effectively with the participation of people and means from agencies, factories, schools at district area.



Figure 6. Disaster Mitigation House (a) at Hoa Hiep Nam and Flood Prevention House (b) at Hoa Hiep Bac

Techniques and skills

On the basis of Four-local Preparedness” principle, the district DP plans will be deployed on the each wards of district. The DP plan of wards, which are more specific tasks based on the each condition of ward and district DP plan will be deployed to its sections. The DP command, hazard defensive measures, evacuation plans, rescue, overcome the consequences of disaster are concretized. All of DP plan at levels deal with means (boat, car, truck) and arrangement of means at each important place. Human resources, the official responsible for DP and unit, medicine, food and the shelters are recheck and ready before flood or typhoon occur.

Coping experiences and good practices

Through many years of implementation of DP activities, the controlling timely and coordinate closely between DMSC and other forces, the campaign action or even the force required to bring people out of dangerous area as well as emergency rescue is well done in Lien Chieu district help effectively mitigation damage to human lives and properties. Especially after the typhoon No 6 (Xangsane) in 2006, all of the roofs of houses, factories, schools and stations are reinforced with $\psi 6 - \psi 8$ string of steel concretized the margin to prevent loss of roof. According to the group discussion at district, the awareness of people on the damage of natural disaster is increasing much as it's before.

However, all DP plan mainly deal with typhoon, flood, tsunami, landslides. In fact, the hazards in Lien Chieu not only some above but others such as drought, high tide, saline intrusion yearly threat to the human live, properties and livelihood of local people also. And, there no effective measure to mitigation the impacts of these hazards.

3.7 Son Tra District

Rescue teams:

Besides the district DMSC, there is a team disaster prevention force. This team has 50 members. And, the Son Tra district also have strongness with lot of the army forces in the area: the border army station 252, region 3 naval force, local force at wards and the Son Tra forest wardens. According to the focus group discussion, these forces always ready to participate in DP action in rainy and typhoon season.

Facilities

The officials of district DMSC have equipped the live vest, battery light. And, in coping with disaster, they also strengthen the rescue means and human resource from the naval army and border army station 252.

The facilities for official of ward DMSC rather limited, mainly the personal safety-working (life vest, lifebuoy). Tho Quang ward have two boat winch system to move boat on land when typhoon or worse weather coming. There are also 8 ox carts to carrying small boat to the safety place. With number of these means, they have to spend at least 3 day to move all of the boat to the safety place and sometime they have not enough time to do this. The facility for the Sub-DMSC is nothing. The fishermen are lacking of live vest and communication means like walkie-talkie. At least 50% of fishermen have no life vest, 100% in-shore and some of off-shore fishing boats have no walkie-talkie.

Techniques and skills

Annually, district organizes training and exercise on first aid and rescue for the key force. Training on safety-first for the own of fishing boats but not all fisherman are participated yet. This activity just only like a short training course but not a exercise as supposed a real situation.

The owner of small boat and coracles, the main means of fishing of Tho Quang community are not involved in the training or exercise on the safety-first although this group is most vulnerable because of lacking budget.

Coping experiences and good practices

Being a ward in coastal area, Tho Quang often affected by typhoon so that the government and local people have some experiences on disaster management and prevention. After the typhoon No 6, 2006 (Xangsane), they realized that disaster preparedness activity must be specific and as detail as possible after considered many measures. The most important is evacuation action. The coast people must come to the shelters or other safe places. The food, medicine, drinking water should be available at the shelters. When bring people to the shelter, it is should pay more attention to pregnant woman, newborn baby to help them a suitable condition. The people involved in the local force should be sure that they already to participate and can go to help other people and family freely (not to be busy with his/her family for example) in emergency case.

For housing in coastline, it must be solid. So the material have to chosen carefully. The house must have firm base and pillars. The roofs, purlins should be cemented with wall. Inside the semi-solid house, a small very solid room should be prepared to use as "family shelter" in case of the house might collapsed by strong wind. The reinforcement of house should be done with typhoon prevention technical or it may increase the damage.

When the boats come to the safe anchorage already to avoid typhoon, they should be carefully attached. In the past, some boat were not careful attached by at least 3 anchors had hit other boats in anchorage and made more damage for the means of the fishers.

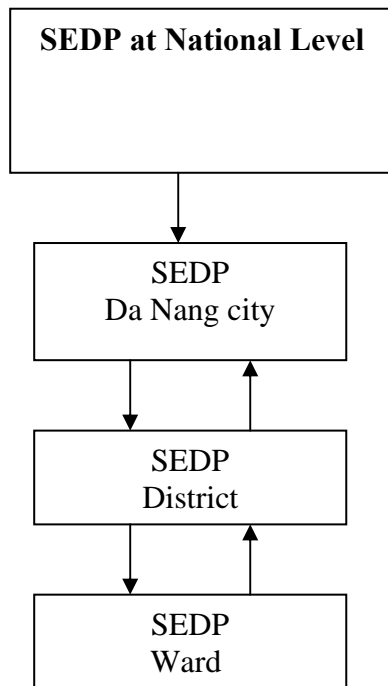
4. SOCIO-ECONOMIC DEVELOPMENT PLANNING

In Viet Nam cities are generally under the administration of province in which they are located. However Da Nang, as one of the five largest cities in Viet Nam, is under the direct control of the central government.

Vietnam's administrative structure consists of four levels of government: central, provincial/municipal, district and commune/ward. Every level has their respective People's Council and People's Committee, with People's Committee being the executive agency of the People's Council at each level.

The Chairman of the municipal People's Committee oversees the management of the internal and external affairs of the Committee and the leaders of organizations under the Committee. The municipal People's Committee is responsible for planning, socio-economic plans, national defense, security, financial affairs, judicial activities, inspection, personnel arrangement, criminal prevention, and administrative reform.

4.1 Planning process



- **Step of planning process:**
 - Based on City master plan and the strategy of urbanization and social economic development, which has been approved by Central Government; and it is being implemented between 2001 and 2020
 - Based on sectors development plan in SEDP of the city has been approved by Central Gov in accordance with periodic investment plan between 2001 and 2020
 - City People’s Committee instructs the districts to make the plan of social economic development in five years and its planning towards 10 years. Ward level is instructed to develop the vision to five years of SEDP and yearly action plan from district level
 - Five year SEDP of the city is approved by Central ministries, and annual SEDP of the districts is approved by City Communist Party and People Committee through the conclusion meeting with City People Council.
 - In coordination with Sector departments of the city such as DONRE, Dept of Finance, DPI, DARD, etc to review SEDP in five years and to develop action plan of SEDP in every year. DPI of the city is a key dept to finalize action plan before getting approval of annual plan from City Communist party and People’s Committee
 - After one year implementation of five year SEDP, City People’s committee organize an evaluation meeting to review achievements, outputs gained and lesson learnt to revise/orient the action plan for next year, as well as planning for the following years
 - Representative of Community is informed annual SEDP through the meeting with members of People’s Council of Ward

Figure 7. Planning process of SEDP

4.2 Key contents and implementation issues

Based on the strategy of urbanization economic development of the city together with successful results has been gained to continue the development planning for the industry-construction, service-tourism, and fishery, agriculture and forestry.

In 2009, SEDP of the city is focusing on the industrial development, and fishery-agriculture-forestry development, services provide development, and utilization of investment funds from internal or external agency which create favorable condition to complete results of SEDP set in the period of 2006 – 2010.

Each sector development is oriented to integrate environment/natural resource protection and sustainability development into socio-economic development plan from 2008 onwards.

Social policy management focuses on job creation, security, poverty reduction, health care, and family planning, etc.

From 2010 and 2015 and the vision development up 2025, SEDP of the city will be planning to perform effectively industrials development with friendly environment, services provider with

high tech and beach/eco tourism development, human resources development for sciences study, information technology for the middle region of Vietnam.

As setting goals, the city has received constructive cooperation on technical consultancy from city relevant departments for development planning of each sector. All these activities are mobilized and consulted opinions from local people. After each year of implementation, the city always organize an evaluation workshop to assess achievements and outputs gained, difficulties and problems faced in order to get lessons learnt and best solutions to revise and improve next plan for a better implementation of the following year plan.

Son Tra district has had seven administration units at ward level, those are located along the coastal areas, their main economic activity of local people is fishing exploitation, and is therefore one of key sector of SEDP of the district.

Son Tra district has their master plan of socio-economic development in period 2000-2010, and urban plan being revised for 2006-2010. So far, the district is planning a draft of SEDP in period 2008 - 2020 but it is still approve yet.

In Tho Quang ward, Son Tra district, the most concern of local authority and community is to promote fishing exploitation by getting Gov support for facility pattern change with deleting small fishing boat and to invest bigger boat. As well as supporting the resettlement household for new job creation for young generation of fishermen.

Lien Chieu district focus on strengthening industry zone development, service - trade provide and agriculture - forestry - fishery development in accordance with the strategy of urbanization economic development of the city between 2001 and 2010.

In Hoa Hiep Bac ward, Lien Chieu district, the most concern of local authority and community is how to find good way support of new job creation for resettled households, especially the farmers who have long experiences on farming when their cultivated land where now become smaller or narrower.

4.3 Weakness

Capacity of planning, making plan and strategy of the city is limited. There are many shortcomings in knowledge and awareness on integration of natural disaster mitigation and natural disaster management, especially in social development.

There is lack of scientific bases for integration. There is no budget as well as no policy on assessment of vulnerability at the city level.

Staffs at all level are lack of experiences, skills and capacity on assessment of natural disaster risks and natural disaster risk management planning. Staffs related to natural disaster risk management have not been trained and educated or participated in study tours to learn from local and international experiences.

Local Gov is lack of assessment on livelihood activity or job creation before or after implementing the resettlement program.

All infrastructure projects/programs are often carried out with poor assessment on social economic development and environmental impacts.

Planning procedures have experienced many shortcomings and been lack of participation of local people from grass root level (ward level). Skills of staffs at all level on quick rural assessment are limited.

Local planners at all level do not have any experiences, skills and good knowledge/understanding on climate change adaptation to integrate it into SEDP at locality.

Da Nang city has not integration of climate change adaptation into city SEDP, because the city has yet received accurate research data from national scientists.

4.4 Urban planning

Da Nang is one of the largest cities in Viet Nam. People's Committee is responsible for general management and to report the central of ministries. Relevant departments of the city are all assistant agencies to People's Committee for making decision on implementation, such as: DOC, DARD, DPI, DOF, DOT, etc. Of which DPI acts as advisor agency of City Peoples' Committee to generate the implementation plan in every year. The districts level is administration management units under assistance/instruction provided by City People's Committee and support given by Relevant departments of the city.

Urban planning in Da Nang is slowly evolving from highly prescriptive model based on central control to a more flexible and adaptable system with considerable authority devolved to local government. Development planning incorporates three spheres: socio-economic development, spatial development, and sector development, which fall under responsibility of different ministries. Sector development at the city level report vertically to central ministries as well as horizontally to City People's Committee, although the latter do not have sufficient power to fulfill this coordination and management role.

Urban planning of the city is oriented to follow the periodic/specific investment plan of 5 to 10 years based on City master plans approved by Prime Minister from 2001 to 2020.

Under urban planning management, the relevant assessment has been made including environment impacts, annual flood level and flood drainages to ensure infrastructure investment plans effectively.

The resettlement area has studied elevation that is ensured to be higher than the flood level based on scientific data provided/consulted by Middle region Center of Hydro and Meteorology.

Da Nang city is having adjustment issue for urban planning from 2020 to 2025 and develop the vision to 2050, which aims to review results gained, lesson learnt and to contribute urban planning in meeting high quality towards sustainability development by integrating disasters mitigation and climate change adaptation.

Lien Chieu district follows the resettlement areas and urban plans approved by the city, People's Committee of the district is responsible for implementing coordination and giving feedbacks. Development planning is integrated disasters mitigation such as: increased ground/foundation level for new resettlement areas, upgrading reservoirs of Bau Sau, Ho Tay, etc.

Son Tra district is under implementing their urban planning in between 2006 and 2020 in accordance with the periodic/specific investment plan of Da Nang city for 2007-2008, 2009-2010. Son Tra is prioritized the plan for resettlement areas together with development of infrastructure system.

a) Key contents and implementation issue

Da Nang city is one of fastest cities of urbanization development in Vietnam. Da Nang has gained good results of urbanization economic development in the last 10 years. Economic zones development is prioritized to assist another sectors development such as services, tourism and especially attractive investment funds from internal and external agencies.

In 2009, Da Nang city organizes to draft revised urban planning under consulted by JICA - Japan that will be submitting to Ministry of Construction and Prime Minister for perusal and approval. JICA agency will consult studying on the united regions for middle located by Da Nang to other neighbor provinces, then to give development strategy for Transportation system, Environment protection and urban planning. Those will be finished between Sep and Oct of this year.

There is over 1,000 resettled projects has been made in period 1997 - 2009, of which 300 projects are completed and on going at the beginning of year 2009 up to now. At the moment, Da Nang city is making an overall review for feasibility projects, if any projects is having problems of implementation that will adjusted in proper way or may be deleted.

City development planning is categorized 1 year, 5 years and 10 years planning in which climate change adaptation will be considerable to bring it into action for next 5 to 10 years plan.

City master planning and infrastructure system also take into account of the parameters/indicators of flood level, the impact of natural disasters. These indicators were provided and consulted by Middle region Centre of Hydrology and Meteorology. In addition, city planning has also paid attention to environment protection issues which are integrated into social-economic development, including awareness raising for local communities on planting trees along the streets, residential areas and demonstration of environment protection activities.

There is still lack of participatory nature of the urban planning issues and there are a lot of challenges during the urbanization process especially with land-use changes, without inadequate support to the local people.

b) Weakness

There is no integration of climate change adaptation into urban planning due to the city do not know how to integrate it.

There is no studying on measures to cope with tsunami yet or any bigger typhoons including tree, house, vulnerable area and public building protections

City has not completed sewage system yet, are therefore many residential areas of the city still having problems of environment pollution

There are still poor drainage and sewage systems for existing residential areas of Hoa Hiep Bac ward, Lien Chieu district, and Tho Quang ward, Son Tra district

Urban planning is not well updated for local residents. There is some urbanization projects which were hang due to limitation of funding source of the private constructors in Lien Chieu district. Local residents therefore do not know the implementation plan and when it can be finished.

Local Gov is lack of assessment on alternative livelihood activity for land use conversion for the resettlement areas after resettled

City planners are lack of knowledge, skills and understandings on Climate change adaptation

Existing house system of Tho An section in Tho Quang ward is too poor living condition that creates a big problem of environment pollution. Furthermore, there is no fresh water supply system of Tho An section

4.5 Community participation in planning

Community participation in SEDP or Urban Planning is limited because local authority has to follow the administration system from city or higher level to carry out periodic/specific investment plan in every year. Community is not well updated current urban planning of the city, as well as relevant policy of Gov issues for resettlement program like as land compensation, new job creation.

At the ward/section level, there is very limit opportunities for local people to have direct inputs into the ward SEDP or DPP. The section's head gives information on the status of his community on the ward plan.

After the ward plan (SEDP/DPP) has been approved, the section's head organized a meeting with the section management board and mass organization to inform the plan (assuming that these representatives will inform their members).

4.6 Mainstreaming of Climate Change and Strategy of National Disaster Mitigation to 2020 into urban plan, and socio-economic plan

Da Nang city has draft action plan of integration for National Strategy for Disasters Mitigation to 2020 into SEDP in which is to plan and review existing urban planning such as: escaping plan from typhoon/typhoon, floods, coastal erosion for residential areas; irrigation development plan;

transportation development plan, parking boat plan, forestry development plan, aquaculture development plan, tourism development plan, embankment/sea dyke construction plan, and communication system development plan for disasters preparedness. However, this action plan is still waiting for approval of Central Government.

The city has task assignments for their relevant departments including DARD and CFSC is the executing agency for National Strategy for disasters mitigation to 2020; DPI and DoF is responsible for funding estimation and management; DARD and DOT is responsible to build infrastructure system; and DOC is responsible to provide guidance on building resistance technique to typhoon and further research need to effective measures for earthquake and tsunami.

The current annual DPP of the city and ward focus on preparing the responsive activities such as: rescue activities, evacuation and reinforcing sea dyke/embankment or infrastructure systems. They do not pay attention on building the community's capacity for natural disasters mitigation.

Hoa Hiep Bac ward has adjusted their agricultural production system as a part of strategic integration of DPP into their social economic development goals, which includes the development of the dyke system, adjustment of production schedules and the adoption of short term varieties. These measure aim at early sowing for Winter Spring crop and avoid early flood for Summer Fall harvest.

All wards have developed the resettlement cluster and lines as a long term strategic measures to avoid negative disaster impacts.

City master planning and infrastructure system take into account of the parameters/indicators of flood level, and the impact of natural disasters. These indicators were provided and consulted by Middle region Centre of Hydrology and Meteorology. In addition, city planning has also paid attention to environment protection issues which are integrated into socio-economic development including awareness raising for local communities on planting trees along the streets, demonstration of environment protection activity

However, climate change adaptation is quietly new approach for city and ward knows how to integrate it into SEDP or urban planning because of lacking knowledge/methodologies and scientific information on climate change.

5. Climate Change and Ethnicity

Co Tu ethnic group

In Da Nang, there is one ethnic group called Co Tu. They mainly reside in Hoa Bac and Hoa Phu communes, the two poorest communes of Hoa Vang district. Hoa Vang is also one of the poorest districts of Da Nang, where the key economic activities from the local people are agriculture and forestry production. As Hoa Vang consists of a large area of agriculture and forestry land with mountains, the local farmers here are including the ethnic groups of Co Tu face a number of disasters such as landslide, flashfloods, river erosion, typhoons as well as water stress.



Figure 8.



Figure 9.

Customs and habits

The Co Tu believes in and worships Giang (Genie). The houses are set out in the form of an ellipse. In the middle of the village is the Rong (Communal House), a large and beautiful building used for the reception of guests, to hold meetings, rituals and cultural performances. Patriarchy prevails among the Co Tu as the children take the family name of their father. The right of inheritance is reserved only for sons.

Culture

Co Tu language belongs to the Mon-Khmer Group.

Traditionally, Co Tu people lived on the mountains. At present, due to the government resettlement programmes, most of the Co Tu people were relocated to living at low land areas, and many of them have been supported to build houses, provided with clean water taps and pumped water.

According to the village head and a group of local people in the village, currently, there are still lots of poverty among the Co Tu people. Key constraints in their lives low incomes, as a result from dwindling agriculture land, poor production yields and their agriculture yields are more and more affected by flashfloods, landslide and even lack of water for cultivation. There are many young Co Tu who cannot move successfully into other non-farm jobs due to their limited education level compared to young people from other parts of the city. Local people at present also face the lack of clean water supply, although they have taps and pumps installed, there is not enough water for consumption, and the wells are also dried up slowly. Local people are asking for support in terms of water supply.



Mr and Ms. Sach aged 78 and 70 live in Phu Tuc village, Hoa Phu commune. For the last 10 years they moved down to lowland areas from the mountain, and they have one 'sao' for their rice cultivation. As they are older now with poor health for working, and the cultivated land is of poor quality, and the lack of water lead to low yields of their crops. The couple still lack food for few months per year and had to supplement their food with the wood collection and sale every day.

The typhoon in 2006 carried away their roof of their house, like many other local people's houses in the villages, their furniture in the house damaged, important papers lost and even rice bags got wet, and all the roads were flooded. All the villagers were quite scared. Although they have a tap water and pumped well, but there is no water for most of the time. The village well only has water up May, and now they have to walk every day to the mountain water source for half an hour to collect their water for use.

Coping measures

The traditional styled houses of Co Tu were quite resistant to typhoons, due to its structure and wood materials. Local people cited that the Xangsan typhoon could not cause any damage to their traditional houses. Yet, there are not many houses of this kind in the areas, as most of the local people cannot afford a lot of wood and leaves for constructing such houses. Currently, most of the houses are of temporary.

Other initiatives

Safe shelter from typhoon, for the elderly



I am Nguyen Van Roi, the Village chief aged 86 and my wife Ms. Nguyen Thi Len lives together with me. My main tasks as a village chief according to the custom of Co Tu are in charge of worshipping the dead, facilitating pre-wedding and wedding customs, and other agreements for villagers. In 2006, a biggest and most scary typhoon has destroyed a lot of houses in the villages, and everybody in the villages got so scared. I was also so scared that I thought of building a 'tank' as in the war time, for me and my wife to go into when another typhoon as such comes along in the

future, as it is extremely difficult for us, old people with poor health to run away to far away places to hide. My wife now even cannot walk very far, so I will have to carry her to the tank.

Although we are poor like all others in the village, but we have a small garden to grow bananas for sales and we started saving since 2006. By 2008, we have saved enough some money to build the tank with the help of some of my grandchildren.

Now I think if people can save up they can do like me. There are many old people like us in the villages. So hopefully this one will help protecting us from a big typhoon.

People's needs for support

- Improving their livelihoods by having more agriculture land.
- Reallocating the farm land for the local farmers.
- Growing more indigenous plants in their forests land or newly allocated forest land
- Be provided with loans for production
- Jobs creation and support for the local young people.
- Reducing the damages of typhoons to their houses, crops.
- Providing new clean water source from the mountains.

6. Impact of Climate Change on Gender

6.1 Vulnerability of women and men due to the impacts of natural disasters and climate change

At coastal areas, men are main laborers; therefore, when natural disasters happen, they are directly impacted in terms of human life. Although there is no official statistics on the number of deaths, Women Union staff said that most of the deaths are men. These deaths from natural disasters leave psychological impacts on people. It is obvious the biggest loss which everyone is aware of. However, according to the Women Union staff of Lien Chieu and Son Tra districts,

women suffer both spiritually and materially after disasters, which is not every is aware of. Living people bear the spiritual loss. When the dead person is the main source of income and spirit in the family, the living has a bigger burden on their shoulders.

In some families, when the husband passes away, the wife really has to struggle for a living. This is because before that, they mainly waited “for the husband to bring fish home for selling”. After disasters, women do not only lose their jobs (as they depend on the fish brought home buy their husbands) but they also become the main laborers in the family. As such they have to bear all the family burden with the risk of poverty imposed on them through their life. Many women have not “learnt” how to cope with this situation.

Impact to the livelihood when the main laborer passed



In the past, my husband caught offshore-fish, I stayed at home to take care of my family and sell fish. In 2004, the typhoon No. 6 came in Quang Ngai and Da Nang also was in its effected zone, at that time my husband was on the sea, when hearing typhoon from the radio, he steered coracle around Son Tra island for shelter but long distance and the coracle went slowly so his coracle was beaten by wind and sunk when he just got a half of way. After his death, I have to feed 2 children alone, my husband no longer catch fish for selling, I find out a job as

a worker in frozen seafood company with 800 thousand VND/month salary besides I work anything such as carrying, washing dishes in restaurant or cleaning up house and earn 20 thousand VND/day. My children have grown up and need much money for study that I try to manage by myself. Since August, 2008 I have stopped working at company to treat middle-otitis and arthritis. My children and I provisionally dependent on my parents in law, and receive assistance from neighbours. I hope I will recover my health soon to continue to work and feed my children.

Ms Tran Thi Hoa, 37 years old, Section 8, Tho Quang ward, Son Tra district

Many interviewed women said that women are more vulnerable than men in terms of psychology. That is because they always have to take care of all the family members, especially for children and the elderly. When facing with hunger and thirstiness, women’s first concern is to look for food.

Women are always in charge of production and reproduction for their families. Findings again show that just because they play the key role in taking care of the family, women are the most hardworking and concerned. Some people said men are the most impacted in times of floods just because they have to do heavy work. However, many interviewed women and men said that “when disasters happen, it is the women who suffer the most”

A woman becomes main labourer after the typhoon

Ms Nguyen Thi Huong lives in the resettlement area in team 6E, Tho Quang ward. Her husband was sick but before 2006, he was strong enough to collect fuel wood and work as a hired worker to bring home some money.

In 2006, hearing that the typhoon 6 was coming, her husband rushed to the dormitory for evacuation but he fell at the stair and had his brain damaged. He was in the hospital for 2 months but then was returned as they could not find any treatment.

He now is not able to help her at all. He even gets mad sometimes. Her husband-in-law father helped her to fix the house. She got a loan of 3 million from the Bank for Social Policies (interest rate of 0.6%). She also gets other loans. At present, she is in debt of 10 million. Everyday she wakes up at 4am to buy fish at the sea and then sells them to earn around 40,000VND. She uses the money to feed her husband and two children. After the typhoon, there was fewer fish, which leads to smaller income. When she lived near the sea before, she was not in debt, but she is now since moving to resettlement area.



6.2 Women have fewer job opportunities than men – especially those in the age from 35-55 although unemployment is the problem for both men and women in the locality

The Provincial Women Union staff said that women in the age from 35-55 find it very hard to have a job. City women are mostly housewives or sell fish. In the current situation, as fish source is becoming depleted, it directly affects the job opportunity for women. It is more difficult to do selling which brings less income. Those women who are only used to being housewives are not able to find a job after their husbands dies. Urbanization and the development of industrial zones create new jobs. Female youngsters can find jobs in factories, industrial zones of the city, some of which are located in Tho Quang and Hoa Hiep Bac wards. However, women over 35 years old do not meet the requirements of the enterprises as they do not possess skills. Additionally, enterprises are not keen on recruiting these women.

The depletion of fish source and the discouragement of near-shore fishing by the local authorities also directly impact on the livelihood of fishermen. However, men can do general manual work (construction workers, porters, motorcycle taxi drivers, hired workers on big ships...). Da Nang Women's Union said that working as maids are good job opportunities. However, most of the current maids come from other places while the poor in Da Nang do not want to do this as they consider it "inferior". In reality, working as maids has recently become one of the activities that bring high income for rural families. Usually women do this kind of job. Maybe the most important is to change urban poor people's way of thinking about this job.

Urbanization and industrialization have created many jobs for labourers. However, limited skills are barriers to local women and men in accessing job opportunities, especially women.

Gender prejudices against women's labouring ability may decrease their opportunities to good income jobs. For example, some men said men are not able to do fish processing (such as shrimp peeling, slicing fish) well. These tasks require clever hands. However, women are not able to do hard work. However, this research reveals that in poor families, women also have to do hard work. Those poor women living on collecting fuel wood said that their job is unstable as it depends not only on the decreasing wood but also on the weather. In some families, this is the main income, especially in cases where husbands have no jobs after losing all the fishing equipment in typhoons. Some women-headed households have to bring up children on their own. Having no other alternatives, they have to go collecting wood for a living.

In implementing the project “Orienting, changing and creating jobs for women in the age group of 35-55 in resettlement areas in Da Nang city”, Da Nang Women’s Union organized surveys on the current situation and job needs of women in the age group of 35-55 in resettlement areas in the city (a sample of 815 women). The results are: (i) 88.8% women have needs for consultation and job orientation; (ii) 62.9% have needs for loans; (iii) 52.6% have needs for job introduction and (iv) 18.6% have needs for vocational training¹.

According to this survey, almost 90% women have needs for consultations and job orientation. Those women that we interviewed in this HVA shared that they do not know what to switch their jobs to. Some wished to get loans but they did not know what trade to spend that money on and whether it would bring income. This reality reflects the urgent needs for job orientation and consultation for both men and especially women based on categorizing groups of women and understanding their capabilities and needs.

6.3 Working time and family burden increasing on women

Natural disasters have impacts on both women and men, increasing the time they spend in the families before, during and after the disaster. However, discussions with the poor group show that the traditional gender role has increased the burden on women. Restoring life after disasters, especially cleaning houses, washing clothes, removing mud...as well as community activities such as cleaning for sanitation is done by women. They also take the main responsibility for other tasks such as taking care of families, preparing meals and caring for children’s schooling (Table 1).

Due to the short time for discussing, the mix group did not specify the number of hours that men and women spend in case of disasters. However, the qualitative data below may partly shows that the work burden has increased considerably for both men and women. Some people say that women have to spend 3-5 hours/day o housework, depending on the situation of their families (having small children, working in agriculture, living on fishing...). When disasters happen, they have to spend up to 8-10 hours/day, or even more.

Table 1. Gender-based labour division, during and after disasters

Tasks	Women	Men
1. Before disasters	Preparing meals and drinking water Evacuate children and old people Packing to bring to roof of the house Get candles and oil for cooking Help husbands strengthen houses Feeling more intense and stressful	Strengthening houses Building embankment to stoop floods in areas close to the sea Evacuate people to safety
2. During the disaster	Keeping the house and the children Preparing meals for families Feeling more intense and stressful Participating in helping others	Ready to evacuate people when needed Keeping ships and fishing baskets at sea Participating in helping others
3. After disaster	Cleaning the house Removing mud Cleaning clothes and mosquito nets Restoring the family Taking care of meals for the family Taking care of children’s schooling Participating in cleaning the community area Help husband to fixing the house	Fixing the house Removing fallen trees Cleaning the house

¹ Da Nang Women’s Union (2009): Report of the survey on the current situation and job needs of women in the age group 35-55 in resettlement areas in Da Nang city

(Discussion with the mix group of poor people in Hoa Hiep Bac ward)

6.4 Single women, poor women-headed houses are the most vulnerable groups in the all the poor

Women-headed households in this research include: (i) women having children without husband; (ii) divorced women; (iii) widows or women with sick husbands. Although there is no official statistics of the number of women-headed households in Tho Quang and Hoa Hiep Bac wards, among 70 people joining the group discussions and in-depth interviews here, 11 are themselves or having daughters who fall into this category (refer to the list of participants in group discussions). In divorce cases, children all stay with their mothers and the remarried husbands do not provide any financial assistance to their old wives. According the Head of Team 24, Tho Quang ward, among 17 poor and near-poor households in the team, 12 are women-headed households who are divorced, widows or single mothers.

The research group had a discussion with women-headed households about the difficulties in their life. These women shared that they are not able to work as men. When they go fishing, their income is less (men earn 20,000VND/day but women only 15,000); this is because men do heavier work (dragging nets in the sea, pulling nets onto the ships, starting ships, but women only pulling nets on the shore). They have difficulties in bringing up children because according to traditional belief, is fathers who teach the children. These women agreed that the children did not receive proper schooling, partly because they cannot afford it and partly because they followed their friends to drop out.

These above figures and situation shows that this is the group that should receive attention. These are not individual or unique cases. The situation of women-headed households in the city tends to be more complicated due to many circumstances, in which divorces are quite common. This is how they differ from rural women-headed households (because this group is biggest in the rural: widows or single). After the divorce, most women return to live with their biological parents, becoming a burden on the elderly people, especially if the women do not have stable jobs. Many cases in this research show that elderly people over 70 years old still have to work so as to feed their children and grand children.

What jobs single women do to feed their families?

I live with my son. We got divorced a few years ago. At present, my son is in 8th grade. I have to do many jobs to earn enough money to bring him up: collecting fuel wood when it is not too hot (only a few days in a month), collecting broom leaves one month before Tet. It is hard work as I have to go to the mountain to chop down the plants which are tall and scatter around. I earn 50,000VND out of this. In November, I go collecting seaweed (a species of algae that is edible). They grow on stones near big waves so very dangerous. In November when it is usually cold and rainy, I have to go deep into the water to collect this algae. This can bring me 40,000-50,000/day but this activity can be done only one month in a year. In general, I do whatever jobs available. The income is very instable. I do not earn enough money in many days.

(Ms Huynh Thi Sam, Section 12- Hoa Hiep Bac ward)

Elderly women are still main laborers



Ms Nguyen Thi Huong, 77 years old, lives in Section 6E, Thọ Quang ward. Her husband died in 2006 to illness during the typhoon 6. She has a pension of 1,400,000 VND but at present, her household is in the poverty list of Team 6E. Her daughter is jobless. She got divorced some time ago and now live with her 3 children. Ms Huong is now living with her daughter and 3 grandchildren. At the divorce, the court said that the father has the responsibility to contribute to bringing up the children. However, since then, her daughter and the children have not received anything. Therefore, her pension is still the main income for five people. The burden is still on her shoulder.

Mr. Lê, 74 years old lives in team 22, Thọ Quang ward. His family does not have a house because after moving to the resettlement area, he had to sell his house to pay for the debt to the Government which he had used to buy the land. At present, he has to rent a house to live with his three grandchildren left by his dead daughter (their father remarried). His wife is 75 years old and is now working as a maid in Da Nang. Her income is 500,000VND/month. This is the only source for feeding the family. He pays 300,000VND/month for the rent and the rest is for himself and the three children.

6.5 Women rarely participate into key leadership

The proportion of women as leaders in local authorities, Party and mass organizations in the two wards is very low (Table 2) while women play important roles in the local socio-economic development process. At the city level, there is no woman in the Committee for Disaster Prevention and The Board for disaster relief. According to the staff of Da Nang Women’s Union, it is quite common for people to think that disaster-related tasks are tough and therefore should be reserved to men with little participation of women.

Women are also directly impacted by disasters and play important roles in disaster prevention, preparedness and relief. Their limited participation in leadership as well as in the Typhoon and Flood Prevention Committee may restricted their potentials and contributions in local planning to cope with climate change. Therefore, general socio-economic development programs, disaster preparedness programs, policies and program for climate change need to consider gender perspectives.

Table 2. Women participation in mass organization (female/total)

	Peopl e’s Comm ittee	Party	Line agencies	Mass organizations	DMSC
1. Lien Chieu District	0/4	2/14 (deputy) 4/25 (head)	1/21 (head) 5/34 (deputy)	1/9 (head) 3/9 (deputy)	
2. Son Tra District					
2. Hoa Hiep Bac ward	0/3	0/5		2/5 (head)	1/15
3. Tho Quang ward	0/3	0/5		1/5 (head)	2/15

- Women in surveyed areas play an important role in the livelihood of their family. The most vulnerable are: women in the household which is more people depend on and the only livelihood of them is near shore fishing, single women, women over 35 year olds in poor agricultural or near shore fishing households have to change their livelihood but have no vocation guidance.

- Women rarely participate into key leadership as well as member of DMSC at all levels

7. HAZARDS IN DA NANG CITY

7.1 Knowledge and understanding of climate change

a) Government staff

Through the mass media, the officials at all levels in Da Nang city can access to information about impact of climate change such as temperature increasing, more and stronger typhoon, flood, sea level rise... but the set up SEDP and DP plan just focus on some short term measures (yearly at ward, 3 years at district and 5 years at city level). Most of the officials from district level and lower don't know how to SEDP and other management activities to adapt and mitigate the impact of climate change. Information from interviewing key officials of two districts showing they have no information on the National Target Programme to respond to Climate Change.

The officials of Son Tra district have some information on supposed negative impacts of climate change likely: more and more serious natural disaster; the weather more severe because increase temperature, marine resources will change because changing of marine environmental. These impacts occurred already and will more. So, the most impacted group will be the most vulnerable groups now. The most impacted areas will be coastal areas. In their opinion, the source of climate change is global warming issue. However, they still lack the guidance and usable information on specific impact of climate change to use for their work. Now, only one key issue of Son Tra related to natural hazard is tropical typhoon so they try to find and implement measures to mitigate impact of typhoon on human, properties and infrastructure of district.

The staffs of Tho Quang ward PC said that their knowledge on climate change is typhoon will be stronger than before and the weather will be hotter. As the District PC there is no strategy or action plan to respond to this.

b) Community

In Hoa Hiep Bac, the local people know that the weather is irregular in recent 10 years and more impacts of typhoon, flood, drought and high tide. Most of them do not approach the information on the situation of climate change. The household survey result showing opinion of local people on natural hazards are change in frequency in trend of increase in recent years (Table 3).

Table 3. Frequency of disasters changed in comparison with 10 years ago

Commune	Frequency	% of households surveyed gave opinion about frequency of disasters changed						
		Typhoon	Cyclone	Flood	High tide	Erosion	Saline intrusion	Drought
Hoahiepba c	Increase	94	80	96	62	100	13	8
	Stable	5	17	4	38	0	87	92
	Decrease	0	0	0	0	0	0	0

Commune	Frequency	% of households surveyed gave opinion about frequency of disasters changed						
		Typhoon	Cyclone	Flood	High tide	Erosion	Saline intrusion	Drought
Thoquang	Unstable	1	3	0	0	0	0	0
	Increase	97	0	86	100	100	0	0
	Stable	1	71	14	0	0	100	100
	Decrease	0	0	0	0	0	0	0
	Unstable	2	29	0	0	0	0	0

The local people in Tho Quang ward know that climate change will bring about more natural hazards. They can get information on climate change from the TV programs. In their opinion, source of climate change is the environment is destroyed by natural resource and forest are over-exploited. At the moment, the local people have no strategy to respond to climate change.

- The PC staffs have awareness on climate change but the information they have is very general. At the moment, they find no way to integrate SEDP and climate change to mitigate potential impacts.

- Local people can feel the severe of weather increase and they know that is the consequence of climate change.

7.2 Hazards

Temperature characteristics

Da Nang have temperature background is rather stable in comparing with other provinces in centre of Vietnam. The variation of temperature in the year has one peak in June or July and the lowest on January. The average temperature yearly is 25-26°C. From 1976-2006, the number of year have average temperature from 26°C is 7, concentrated on the period of 1987-2006, in which the period of 1997-2006 is 4 years. In general, the temperature of Da Nang City in recent 10 years has increasing trend (Figure 12).

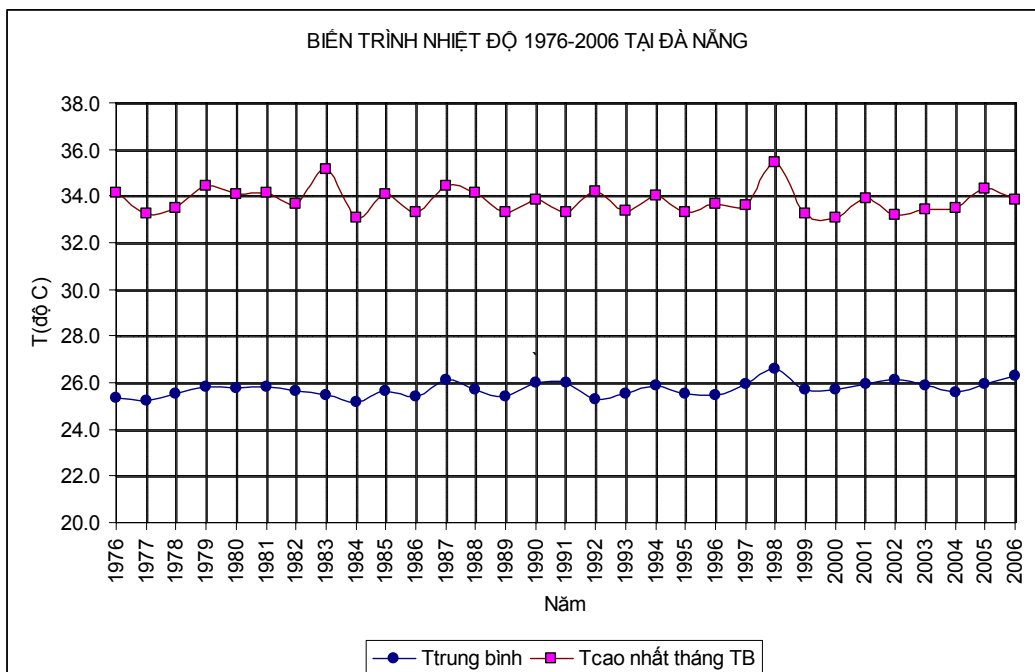


Figure 12. The variation of air temperature ($^{\circ}\text{C}$) in the period of 1976- 2006 in Da Nang
(Source: Station of hydrographic meteorology in centre of Vietnam ?)

b. Rainfalls

The rainfalls in Da Nang city are unstable during the year. Based on the rainfall in several years, two seasons are recorded:

Rainy season: 4 months long, from September to December. The rainfalls concentrated mainly in October and November (about 40 - 60% total rainfalls in a year) (Figure 13). Because there is a lot of rain water fall into a shorttime, the flood often occur in these months.

Dry season: 8 months, from January to August. In which, the period of January - April is least water (total rainfall during this time has a ratio of 8% of the year); At the end of May and begining of June, some heavy rain occur can creat summer flood; July and August is most dry time in the year caused of sunny and many days last long South-West wind. The drought often occur in this time bring about lacking water and saline intrusion (Figure 13).

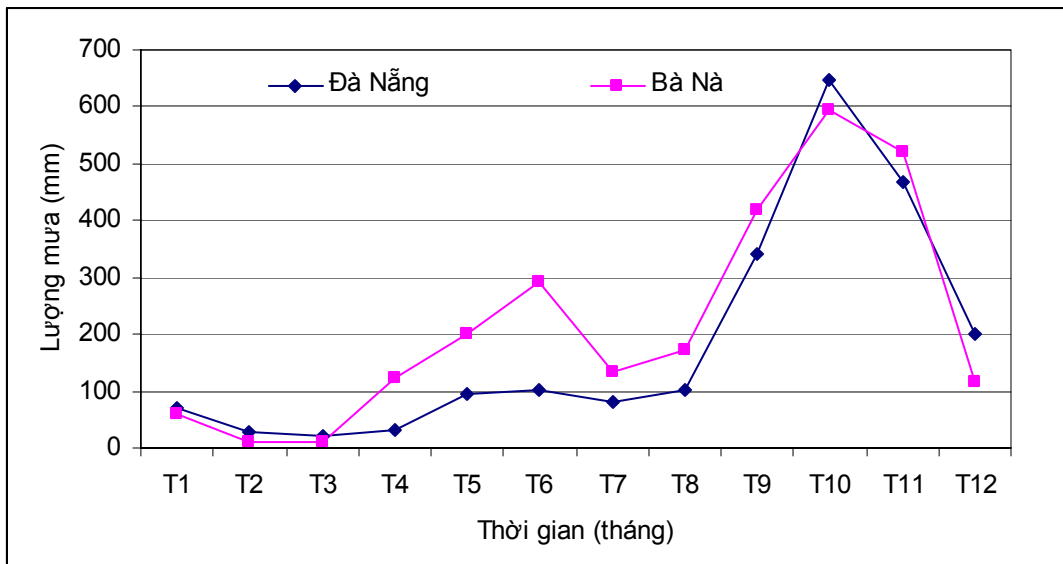


Figure 13. The many years' average rainfalls at the meteorological stations Da Nang and Ba Na
(Source: Station of hydrographic meteorology in centre of Vietnam ?)

Natural disasters:

According to the historical profiles tool, since 1971, there are 11 natural potential hazards anually affect to Da Nang City. In which, the typhoon, flood and draught are most serious hazards for human, socio-economic fields and infrastructures (Table 4). In addition, these main hazards also bring about secondary hazards such as i) soil, water and air pollution; ii) disease on human; iii) river and shore line erosions and iv) salt intrusion (Table 5).

Table 4. Ranking of serious levels of natural hazards in surveyed communities

Name of hazards	City	Lien Chieu Dist.	Hoa Hiep Bac Ward	29&30 Sections	37 Section	Son Tra Dist.	Tho Quang Ward	24 Section	6E Section
	Serious levels (1 is most, 2 lesser serious...)								
Typhoon	1	1	1	1	1	1	1	1	1
Flood	2	2	2		2	5	2	2	3

Name of hazards	City	Lien Chieu Dist.	Hoa Hiep Bac Ward	29&30 Sections	37 Section	Son Tra Dist.	Tho Quang Ward	24 Section	6E Section
	Serious levels (1 is most, 2 lesser serious...)								
Drought	3	3	3		3	4	4	6	7
High tide	4	4	4	2					
Flash flood	5	-							5
Soil erosion	6	5	5			7	7	6	
Cyclone	7	8				6	6	3	4
Summer flood	8	6	6		5				
Cold last long	-	7							
Environment pollution	-	-				2	3	4	2
Salt intrusion					4				
Thunderbolt	-	-							

Table 5. The secondary hazards (ranking as serious level of main hazards)

No	Main hazards	Secondary hazards
1	Typhoon	Environmental pollution, flood
2	Flood	Infectious diseases, environmental pollution, inundation
3	Drought	Saline intrusion, diseases, environmental pollution, forest fire
4	High tide	Shore line erosion, salt intrusion, skin diseases
5	Flash flood	Environmental pollution, soil erosion
6	Soil erosion	Water pollution
7	Cyclone	Environmental pollution
8	Summer flood	Environmental pollution
9	Cold last long	Respiratory disease in children
10	Environmental pollution	Infectious diseases
11	Thunderbolt	-

Sea level rise

At the moment, there is no significant information on the sea level rise in Da Nang. However, due to group discussion, the local people in Section 37, Hoa Hiep Bac ward have an opinion on the increasing of sea level rise leading more serious saline intrusion. The saline intrusion on agricultural area along the banks of Cu De river is more serious in compare with this in 1970s.. An area of 10 ha Dui field can growth rice and other farm produce before now is imposible

because of saline intrusion. On the other hand, the aquaculturist said that the shrimp ponds easier submerged by high tide from the year of 2000.

Man-made hazards with causes

Air and water pollution are interested in the term of environmental pollution in Da Nang. In Son Tra district, environmental pollution comes from: i) Untreated waste water from 2 industrial zones (there are waste water treatment systems, but still under construction. In 2008, 6 factories were punished by government on this issue); b) Uncompleted sewage systems, especially in the old population areas; c) Wastes from aquatic product processing activities which are collected by local people and then drying have very bad smells in population areas. In Lien Chieu district, the waste water from Hoa Khanh industrial zone affect to the aquaculture in lower area of Cu De river; smoke and dust from Da Nang Steels Factory and Hai Van Cement Factory affect to human health and farm produce which is growing in area of ward. The environmental become more serious when typhoon coming or flooded. The air and water pollution also bring about some cutaneous and respiratory diseases on people.

Environmental pollution impact on the livelihood



My family is better-off in Section 37, our income is mainly from aquaculture besides farming. In the past, aquaculture was quite good and we earned 2-3 millions per month. I signed the contract for tendering a large fishpond in front of my house in 20 years. For 2-3 years recently I can not do aquaculture, because of polluted water by Hoa Khanh industrial zone eliminates black waste water as mud. The natural aquaculture becomes exhausted, marine fish could not enter contaminated river to spawn. I can not earn

any more from the pond but I have to pay 6 millions per year but the contract will be finished in ten years. I want to borrow money in order to improve, dredge the fish tank for aquaculture but my team is in a delayed project area thus I can not. Now, my family mainly depends on agriculture and cattle-breeding.

Mr Tran Duc Hung, 40 years old, Section 37, Hoa Hiep Bac ward

Main loss and causes

According to historical profile tool, the disasters occurred from 1971 to Da Nang that suffered damage in many human and facilities, which is the most significant match of the typhoon and flood (Table 6).

Table 6. List of the damage by natural disasters in Da Nang city from 1971-2009

No	Year	Disaster	Main loss and cause	
			Live loss	Loss of properties, economic, infrastructure
1	1971	Typhoon (Hista, 5/9)	50 people killed (most of them are fisherman, their boat were go fishing or in anchorage, but their boat were	- destroyed 300 houses. Height of tide about 10m, destroyed 4 layer of houses on shoreline - 100 boats sank (20% total number of boat at that time)

No	Year	Main loss and cause		
		Disaster	Live loss	Loss of properties, economic, infrastructure
			sank by typhoon. Some other died by their house were collapsed)	
2	1983	Drought	-	- Complete loss 4.500ha rice field - Saline intrusion and lacking water
3	1989	Typhoon (20 April)	60 people killed	- 500 houses collapsed (most are temporary houses or un solid 4 level houses) - 300 boats sank (the weather forecast were very inaccurate)
4	1996	Cyclone in the sea	Some people died	- 46 boat sank because of sudden cyclone
5	1999	Flood	37 people killed, 61 people injured	- 4.579 houses collapsed, (most are temporary houses or un solid 4 level houses on river banks and mountain side) - 611 billions VND lost
		Cyclone?	-	- 10 houses lost roofs - Damaged farm produce
6	2001	Drought	-	- Saline intrusion in water source. Products quality of some processing factories were affected, could not export - 3.000 workers had to off work
7	2003	Flash flood	-	- Landslide, damaged 70 houses
8	2005	Cyclone	-	- 30 houses lost roofs - 1 house collapsed
9	2006	Typhoon (Chanchu, early typhoon)	- 227 people died, in which 72 Da Nang people (their fishing boats were sank)	- 10 fishing boats of Da Nang people were sank near Dong Sa island.
		Typhoon (Xangsane)	30 people killed	- ten thousands house collapsed or damaged - 200 boat sank
10	2007	Flood	3 people killed (man)	- 28,000 houses flooded. More than 40 houses in river banks were swept away - Damaged 9.500 tons of rice - 1.500 billions VND lost

No	Year	Main loss and cause		
		Disaster	Live loss	Loss of properties, economic, infrastructure
		High tide	-	- 5 houses collapsed - 16 fry shrimp stations collapsed - 3 ha protective forest of casuarinas swept away
		Flash flood	-	- Landslide, damaged 47 houses
11	2008	Landslide	-	Damaged fuel container, 2000m ³ spilled into Da Nang Bay. The marine environment polluted.
12	2009	Cyclone	-	- 2 houses lost roof - Damaged 2ha of forest
		Summer food	-	- Damaged part of winter-spring rices crop

- Typhoon: Typhoon and tropical depression often affects Da Nang in the period of September to December, some particular typhoon may occur earlier, in April - May. Duration of typhoon only 3 to 4 hours but before, during and after the typhoon coming, heavy rain caused flash flood, and flood the landslide may occur. In the years from 2000 - 2004, only a few typhoons and tropical depression influence to Da Nang. However, from 2005-2007, there were 7 typhoons and tropical depression each year in average impact directly or indirectly to Da Nang City []. One most strong typhoon, the No. 6 (Sangxane), 10/2006 with windy level at 13 to 14 damaged whole city, especially in Son Tra and Lien Chieu district. The typhoon not only direct impact on land, but Da Nang affected by the typhoon in open sea also. The typhoon No 1 (5 / 2006, named Chanchu) killed 72 Da Nang fisherman when they were go fishing; their 10 boats were sank and lost.

According to the report “10 years environmental status of Da Nang city” [], from 1997 to 2007, there were 25 typhoons and 86 tropical depression affected to the city directly. Number of typhoon is increasing in recent years (Figure 14).

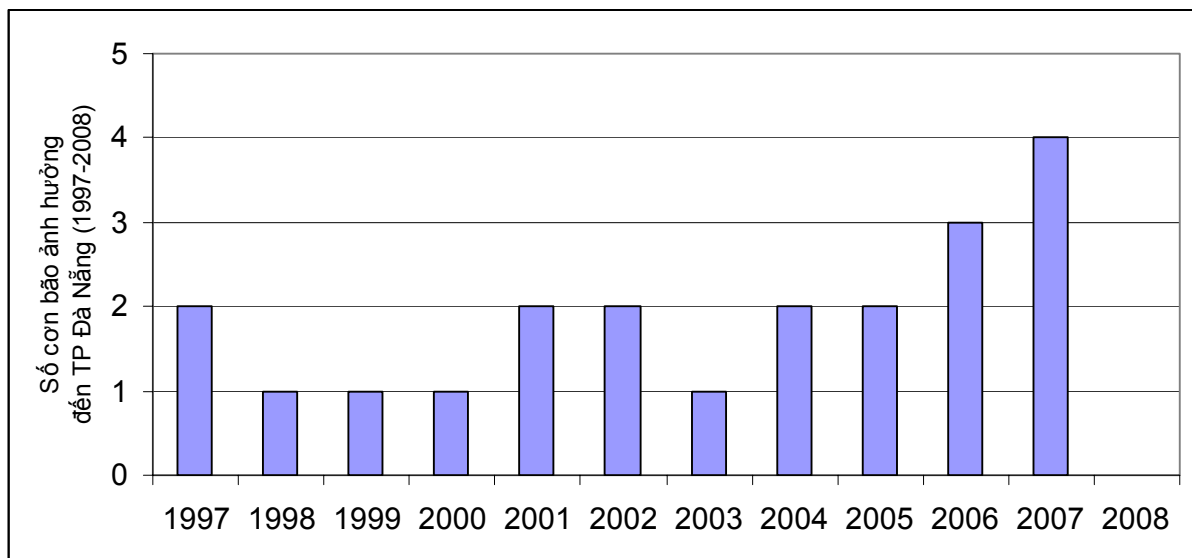


Figure 14. Number of typhoon affectig Da Nang from 1997 -2008 (Source: DMSC Da Nang)

Not only increased in number of typhoon, strength of wind flows of typhoons in the period of 1997 to 2004 only in level 11 or lower, but recently there are some stronger typhoon like No. 8 (2005) and No. 6 (2006) with wind flows from level of 12 and 13-14 respectively.

The early and irregular typhoon phenomenon in South China Sea making the lost of the city increase (the Chanchu, 2005 for example) and these types of typhoon may affect on land of the city in near future.

- Flood: After a heavy about 3days last long rain in rainy season, especially in the month of September to November, many parts of Da Nang city may be flooded. In the big flood in 1999, the water level of all the big rivers in Da Nang (Cu De, Tuy Loan, Cau Do rivers) increased rapidly and killed 37 people, 61 other people injured, more than 4,500 houses collapsed. The lost were estimated as 611 billions VND. Generally, the low land areas in all districts of the city may impact, but some low land areas along river banks are most serious impacts. Some typical area includes: Hoa Tien, Hoa Phuc, Hoa Chau, Hoa Phung, Hoa Nhon, Hoa Lien communes of Hoa Vang district; Hoa Hiep Bac ward of Lien Chieu district, Hoa Xuan ward of Cam Le district. Besides, some residential areas, although not lying on low land but now surrounded by new residential (with higher base area) and industrial zone as well as the drainage system is not upgraded, they are also partly flooded. Some of them can see at Hoa Tho Dong, Hoa Tho Tay, Hoa An, Hoa Phat wards. The duration of each flood time normally 3-4 days, sometimes longer, 7-8 days. As typhoon, the number of flood is increased in recent 10 years (Figure 15).

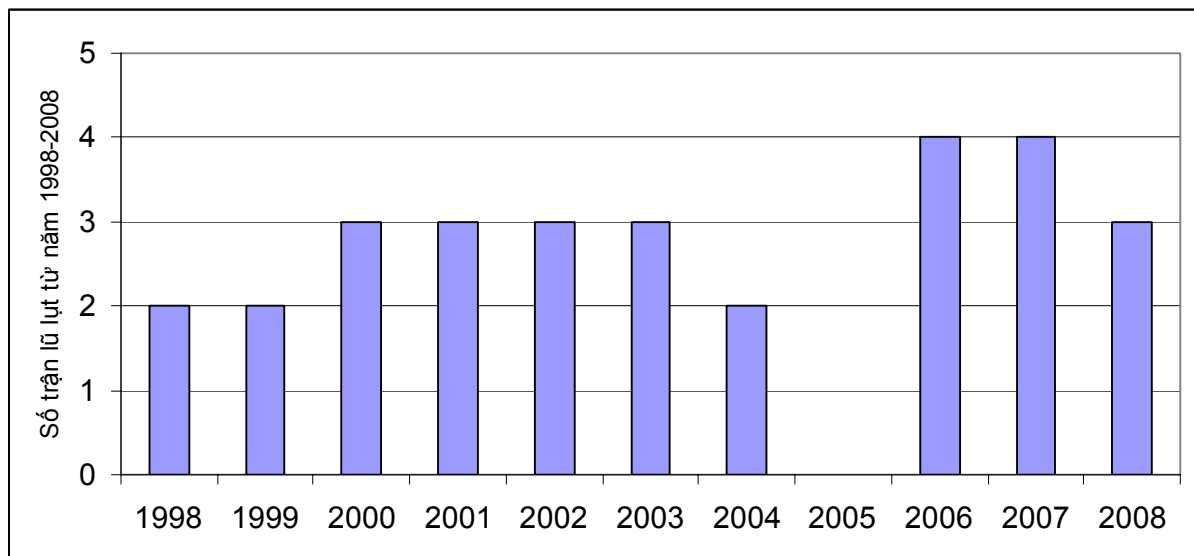


Figure 15. Number of flood from 1998-2008 in Da Nang City (Source: DMSC Da Nang city)

- Drought: occurs after dry and sunny prolonged 2-3 months. The drought in Da Nang often occurs in April - July. During a drought time, the weather so hot with air temperature sometimes reaches 39 - 40°C. Lacking water, saline intrusion, high risk of forest fire, agriculture soil dry are some evidences of drought. The typical drought in Da Nang like some periods of: March-August/1983, March-August/1993, March-October/1998 rose difficult for living and crop production in Hoa Vang, Cam Le, Ngu Hanh Son, Lien Chieu: 4,500ha rice of Summer-Autumn crop completely lost, saline intrusion to source of tap water. In 2001, a drought prolonged 6 months, from March to August; the fresh water source at Cau Do station became salty so that the water provided for the industrial zones is not met quality, affected to the products. Many factories had to close or delayed because lacking of water, about 3.000 laborers had to off work.

- High tide: As coastal city with semi-daily tide mode, the high tide in Da Nang appears twice per month in the middle and at beginning of lunar month. Normally, this phenomenon is not affect to the people activities. However, once high tide appear during/combine with other serious weather

such as typhoon, tropical depression or monsoon, the tide can growth up to more than 1m. Strong waves and high tide during this time can blow off the shoreline. There are some losses by high tide in 2005, 2006 are recorded in Hoa Hiep Bac and Hoa Hiep Nam wards: saline intrusion in river, 16 tiger shrimp hatchery station and one house collapsed, 3 ha of protective forest blowed off (the trees in this area are 20-30 year olds).

- Flash flood and landslide: two kinds of hazards often occur after a very heavy rain. Most of flash flood occurs in rainy season, in the months of August - October. A four days last long heavy rain in October, 2007 makes 47 houses collapsed and damage a lot of farm produce. Before that, in August 2003, a prolonged and heavy rain created a flash flood was damaged 70 houses in the same area. Besides, heavily rain also bring about landslide at the mountain slopes and erode the roads. In 2008, the erosion of mountain slope on Hai Van pass damaged the fuel pipe line and containers so more than 2.000m³ of fuel spilled into Da Nang Bay, serious impacted to marine environmental and fishing activity of the local people.

- Cyclone: This extreme kind of weather is not common but it can make a serous impact to human and properties because of it sudden occur with no early warning evidence. The duration of each cyclone is quite short, normally in 15 minute to one hour. Some cyclones are recorded in some areas of Hoa Khanh (Lien Chieu distric) and Hoa Phu (Hoa Vang district). In 2005, a cyclone in Hoa Khanh lost or damaged roofs of 30 houses, some of those was collapsed. In April, 2009 in Hoa Hiep Bac, a cyclone with wind level up to 9-10 has lost or damaged roofs of 5 houses and damaged 2ha of cultivated forest.

- Summer flood: occur in late of April or May (lunar month, in bissextile often occurs earlier). Commonly, the summer flood provide an important mount of water for dry season but sometime it can damage for Winter-Spring rice crops due to this is harvest time. Hoa Vang and some areas of Lien Chieu districts are often impacted by the summer flood.

- Prolonged cold: Da Nang city located in southern side of Hai Van pass so rarely impact by severe cold like other provinces and cities in northern side of this pass. However, in recent years, sometime in winter, air temperature was decrease to 13-15⁰C and last long for one month. This type of cold weather has never seen before. In January and February, 2008 more than one month cold makes more than 80% chidren under 5 tuổi in Lien Chieu have some respiratory diseases like sore throat and bronchitis disease.

- Environmental pollution: Beside of natural hazards, there are some problems on the environment in Da Nang city. This kind of hazard often as secondary hazard of natural disasters or this is man-made hazards and become more serious after a natural disaster. Waste water, solid waste, smokes, dust, smells from factories, industrial zones, aquatic product precessing... are being some issues on environment, impact to human health and other activities of local people.

One more, the thunderbolt also makes some lost for Da Nang. From 1999 to 2004, the 4 thunderbolts killed 8 people anf 3 others injured.

Besides the damage on lives, properties, infrastructure and productive activities, natural hazard is one of the challenges for the trying on protection of landscapes and the important ecosystem of Da Nang city. Through focus group discussion, the impact of strong waves during typhoon and high tide, the polluted factors, high turbidity from city and the river contribute to destroy more than 80% of coral reef area in Son Tra. The marine biological resources in Da Nang Bay also decrease rapidly in recent 10 years.

c) Most vulnerable areas

In terms of geographical location Da Nang city area on land, the entire areas of the districts are affected by typhoon. With a 91km long coastline and terrain slopes from West to East and divided by two river systems is Cu De river (the North) and the Han River (south), typhoons from the South China Sea when hit on land can cause damage to the coastal, plain, medium and high mountainous areas.

Some districts may be more affected by typhoon are Son Tra (3 sides are sea and river), Lien Chieu (with 24km long coastline and some low land areas). The Hoa Vang district, although no coastline, but with large area and mountainous also have suffered impact of typhoons.

Through group discussion, based on the losses of people, property, production activities in recent years and the ability to be affected by natural hazards, the representative officials of local government has ranked the serious level and influence of hazards in 7 districts of city as following table (Table 7)

Table 7. The ranking of serious levels of hazards of districts in Da Nang city

Name of district	Cyclone	Flood	Flash flood	Landslide	Summer flood	Typhoon	Drought	High tide	Number of hazards
Son Tra		2	2	2	1	1	2	1	7
Lien Chieu	2	1		2	2	1	1	1	7
Thanh Khe		3		3		2	3	3	5
Ngu Hanh Son		1		2	2	2	1	1	6
Cam Le		1		3	2	3	2		5
Hai Chau		3				3	3		3
Hoa Vang	1	1	1	1	1	2	1		7

Notice: 1. most serious; 3. less serious (Focus group at city level)

Results ranking through group discussions reflected in the table shows quite clearly the most danger hazards in Da Nang are flood, typhoon and drought. The most vulnerable areas are Son Tra, Lien Chieu and Hoa Vang districts.

d) Most vulnerable groups

According to historical profile on the damage by natural disasters from 1971 to present, almost economic - social sectors in Da Nang are affected, particularly by typhoon, flood and drought. Results ranked through group discussion shows losses on people and issues related to human health are most serious. The following are losses related to livelihoods, natural resources, environment and infrastructure (Table 8)

Table 8. Ranking on losses by hazards in Da Nang

Field	Losses	Rank
Social	People died, people injured, loss of house, loss of jobs, lack living water, disease on human	1
Economic	Boat sank, loss residential area, loss rice crops, farm produce, lacking irrigation water, loss rearing animal, affected to service and tourisms	2
Natural resources and environment	Environmental pollution, loss forest, loss urban tree, reduce biodiversity, saline intrusion in freshwater ecosystems	3
Infrastructure	Road erosion, damage power line, damage dike, dam, bridge, embankment, damage schools and health station	4

(Focus group discussion at city level)

The loss of people fall into some following groups, and they also most vulnerable groups in the surveyed areas: i) Fishermen go fishing but they do not have the enough accurate information on the weather or direction of typhoons; ii) Fishermen stay on boat in anchorage during typhoon; iii) The people in the not solidified houses or they go out to reinforce the house during typhoon; iv) The people must move in dangerous conditions: on the road of evacuation, on the way to go rescue; v) Some students live in the house which is rent from local people, these type of house was not solidified and easily to collapse.

According to group discussion at city level, loss of economic mainly concentrated on agricultural - forestry – fishery sector and the most people involved in this sector are poor. Especially the poor people doing agriculture, fishing and aquatic product processing live on lowland and near coast areas.

- Typhoon, flood and drought are 3 most serious potential hazards in Da Nang. Environmental pollution caused natural disaster and human activities have strong impact on marine environment and ecosystem; impact to natural conservation activity, livelihood of the people doing fishing, aquaculture and agriculture.

- High tide makes shoreline erosion, saline intrusion in agriculture area and surface and ground water may lead longer impact.

- There some evidences on negative impact of climate change in Da Nang.

8. HAZARDS, CAPACITY AND VULNERABILITY IN HOA HIEP BAC WARD

8.1 Hazards and impacts

Hoa Hiep Bac is one of the 5 wards of Lien Chieu district, located in the North City has a total area of 4,359ha. Being large natural area but the main resident only concentrates in a narrow coastal area along the 1A main road. Most of the area (3.360ha, accounting for 77.08%) is forest land. The West, North sides are the mountainous terrain with high slopes, then a narrow plain and South China Sea with a length of coastline is 10km long.

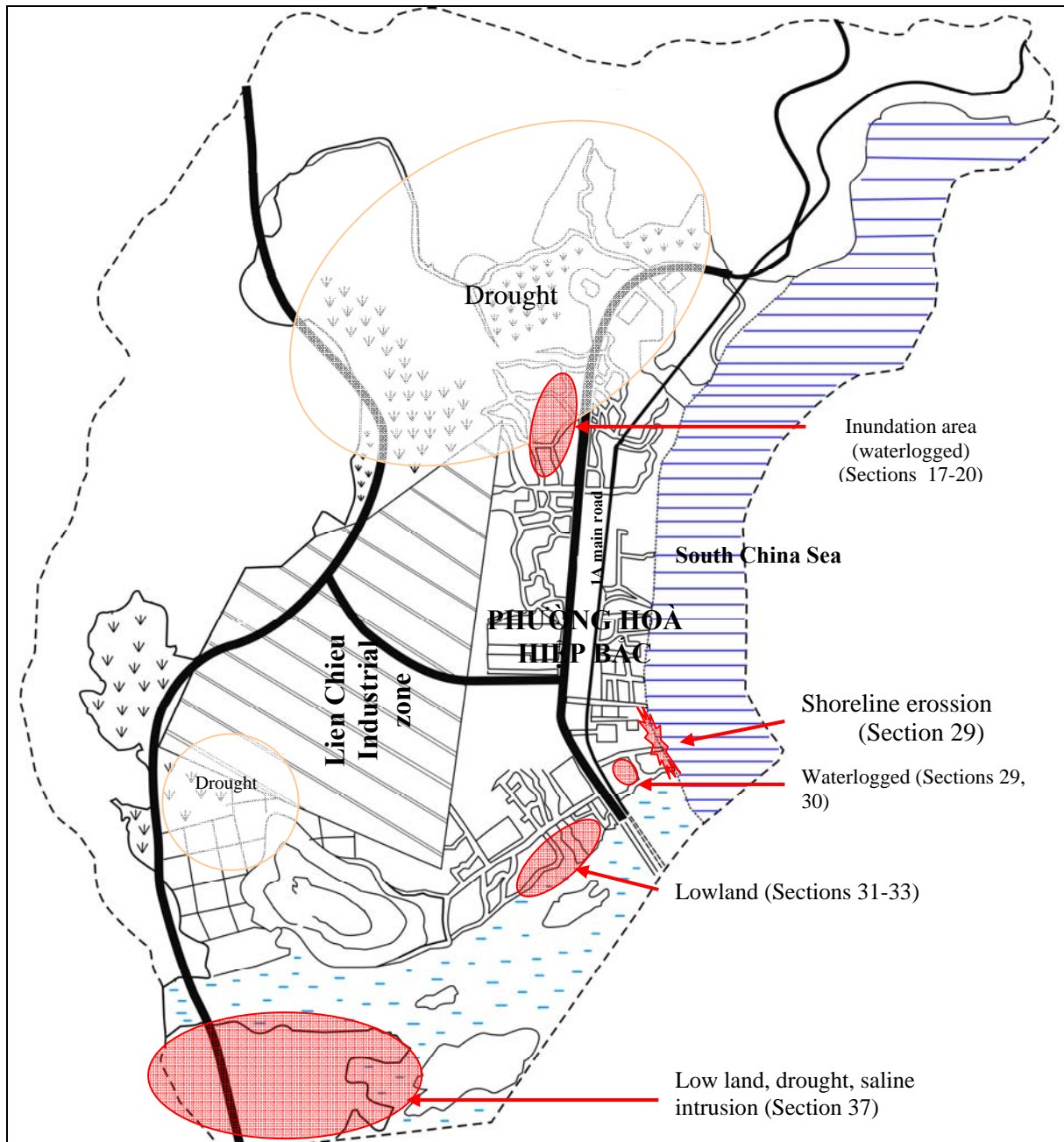


Figure 16. Hazards map of Hoa Hiep Bac ward

Population of ward is 12,082 people (50.2% female) (annual statistics of Lien Chieu District, 2007). Number of poor households under the new standard (monthly income is under 500,000 VND/person/month) in 2009 is 733 households (accounting for 28% of total households). At Hoa Hiep Bac ward, according to historical profiles, there are 6 kinds of hazard annual threat to the ward area (Figure 16, Table 10)

Table 10. Type of hazards in Hoa Hiep Bac

Hazard	Ranking			Secondary hazard
	Man	Woman	Result	
Typhoon	1	1	1	Flood, waterlogged, environmental pollution, diseases
Flood	2	2	2	Waterlogged, diseases, environmental pollution
Drought	3	4	3	Diseases, saline intrusion (Section 37), high risk of forest fire
High tide	4	3	4	Shoreline erosion, saline intrusion,

Hazard	Ranking			Secondary hazard
	Man	Woman	Result	
				environmental pollution.
Landslide	6	6	5	
Summer flood	5	10	6	Waterlogged, environmental pollution

(Source: Focus group discussion at Hoa Hiep Bac)

With a complex terrain, long coastline and narrow plain and Cu De river with high water discharge in rainy season, the ward annually affected by many natural disaster and there are many losses caused by the disaster (Table 11).

.Table 11. Losses by disasters in the period of 1985-2009 in Hoa Hiep Bac

Time	Type of disaster	Affected zone	Main losses
9/1985	Typhoon (wind level 11-12, with heavy rain)	Hoa Hiep commune (before)	<ul style="list-style-type: none"> - 1.000 houses (mainly wattle house) collapsed or lost or damaged roofs. - Damaged roads (earth road) and irrigation system - 10 boat sank at the anchorage - Damaged rice crop, farm produce
5-6-7/1988	Drought	Hoa Hiep commune (before)	<ul style="list-style-type: none"> - 300ha of rice and farm produce completely lost. - Lack living water - Diseases: fever, varicella (especially on the elderly and children)
10/1999	Flood (historical flood)	Section 37, 30	<ul style="list-style-type: none"> - Damaged rice, production vegetation - Diseases: sore eyes, weeping scabies, diarrhea (30%), dermatophyte (70% people of Section 37). - Lack living water - Earth road erosion
11/2005	Typhoon No. 8 (wind level 10-11)	All ward (37 sections and Hoa Van village)	<ul style="list-style-type: none"> - 300 houses lost roof - Damage more than 50ha cultural forest (Caribe pine 20 years old) - Sweft away 16 tiger shrimp hatchery stations - Sank 5 boats at the anchorage
20/11/2005	High tide	Section 29	<ul style="list-style-type: none"> - Shoreline erosion (an area of 100m wide and 500m length) caused high tide and strong waves. - 2 ha protective forest 20-30 sweft away. - Some houses collapsed - Damaged 2 tiger shrimp hatchery stations.
10/2006	Typhoon (Xangsane) wind level 12 – 13 or more with heavy rain	All ward (37 sections and Hoa Van village)	<ul style="list-style-type: none"> - About 1.500 of level 4 houses (accounting to 60% total number of house) collapsed and lost or damaged roofs - 2 people died caused houses collapsed - 16 people injured caused houses collapsed and on the way to go

Time	Type of disaster	Affected zone	Main losses
			<p>rescue</p> <ul style="list-style-type: none"> - Damaged roads, schools, health station and health service equipments - Damaged roofs of Ward PC station, facilities and stored profiles - Sank 5 boats at the anchorage, lost fishing gears - Office houses, manufactories: lost or damaged roofs - Damaged farm produce - Damaged aquaculture ponds, lost culture shrimp - Damaged 100ha forest - Damaged power system - Jammed 1A main road
11/2008	High tide	Section 29	<ul style="list-style-type: none"> - Shoreline erosion, swept away an area of 50m wide and 300m length - Damaged protective forest - 16 tiger shrimp hatchery stations collapsed (these stations had rebuilt before, this time were collapsed again).
10/2008	Landslide (caused 10 days heavy rain)	Section 11-12-13-14-15	<ul style="list-style-type: none"> - Damaged fuel pipe line and container, 2000m³ of fuel spilled to sea - Marine environmental pollution - Fishers could not go fishing - Ulcerated hand and legs of fishers - Landslide at the railway tunnel No. 3 on Hai Van pass - Landslide at main road on hai van pass - Traffic jammed in 3 days.
4/2009	Heavy one week last long rain	Section 37	<ul style="list-style-type: none"> - Waterlogged. Damaged farm produce
May/every year	Summer flood	Section 37	<ul style="list-style-type: none"> - Damaged farm produce

(Focus group discussion at Hoa Hiep Bac Ward)



Figure 17. Shoreline erosion damaged houses and tiger shrimp hatchery station, Hoa Hiep Bac

The impacts of natural disasters have also changed according to each area, depending on geographical location, topographical features and production characteristics. For example, Sections 29, 30 influenced by 3 types of hazards: typhoon, high tide and the waterlogging (Figure) while the Section 37 under the impact of various types of natural hazards: typhoon, flood , drought, summer flood and saline intrusion (Table 12)

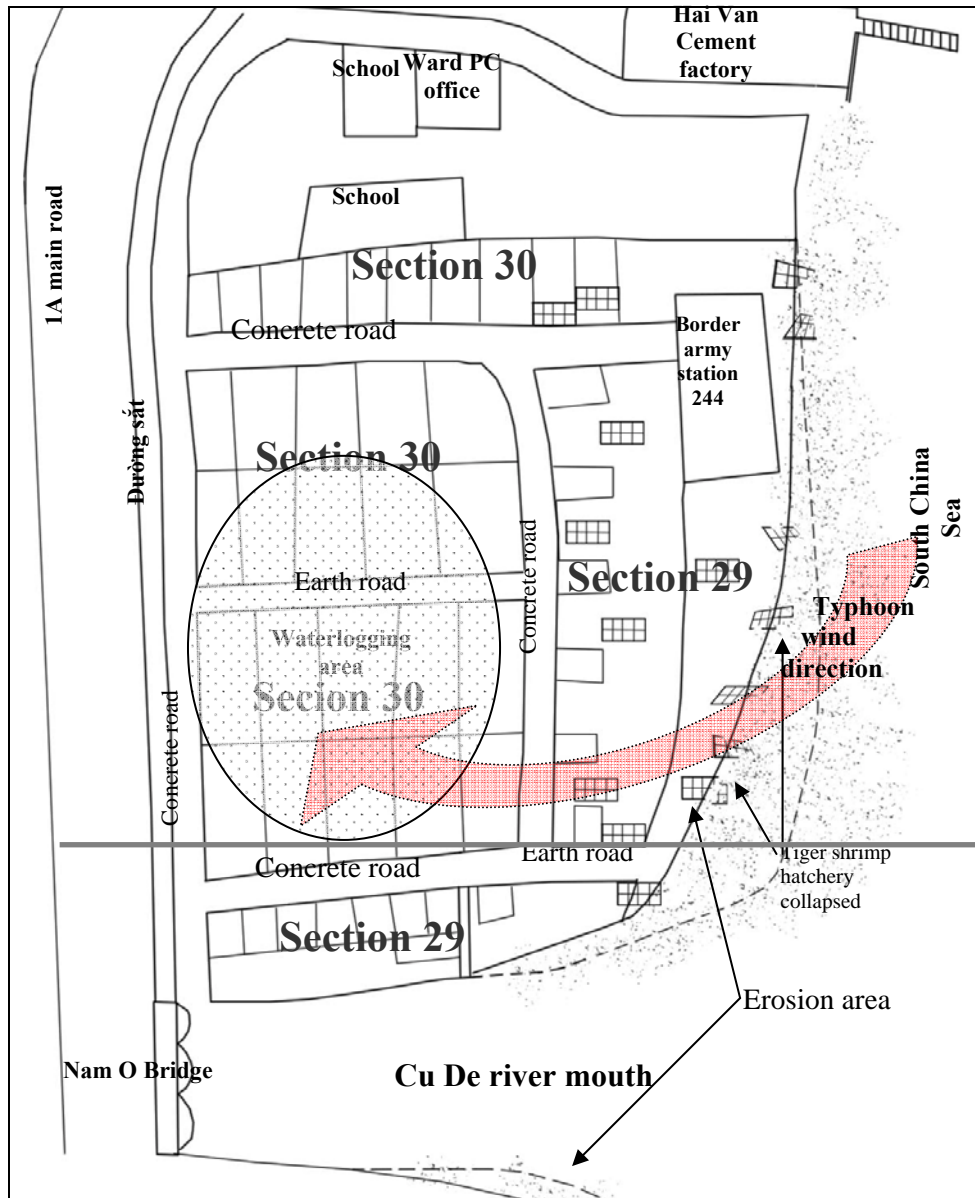


Figure 18. Hazard map of Sections 29 & 30

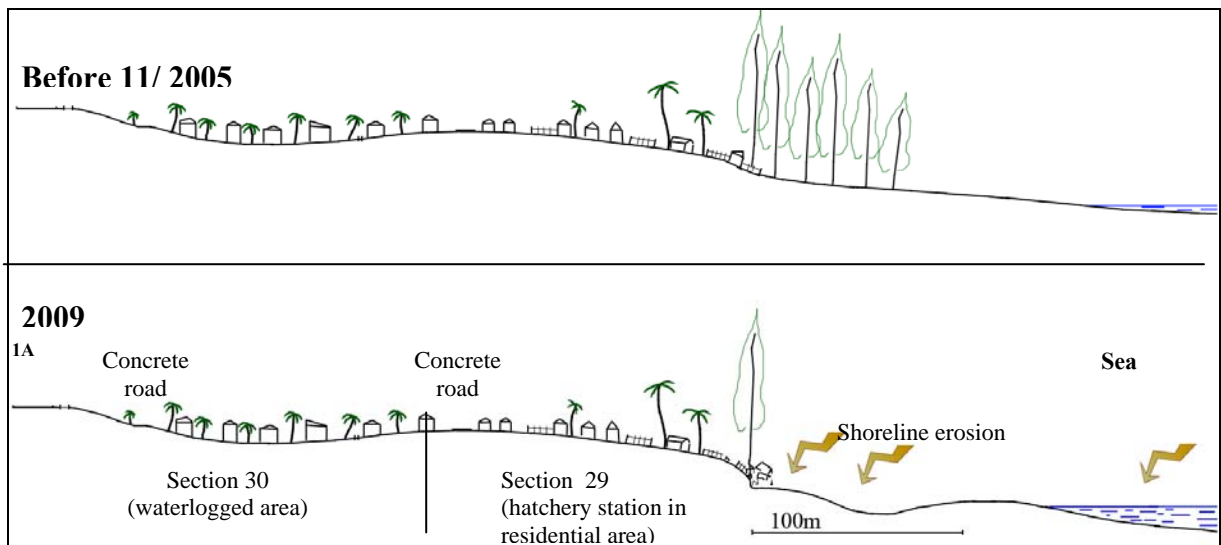


Figure 19. The transect map of Sections 29 & 30

Table 12. Losses by disaster in Section 37

Time (month/year)	Type of disaster	Area	Main lost
4/1989	Typhoon No. 2 (wind level 10, 11 with rain)	Section 37	<ul style="list-style-type: none"> - 100% house (wattle or woody house) collapsed or damaged roofs (about 100 houses). - After this typhoon, some households had move to other place (in section 21-30) to live. - 1 buffalo and 5 oxen died, lost a lot of poultry and pigs. - Flooded 0.5m-0.7m in house. - Damaged 50ha farm produce, 20ha rice crop, 20ha shrimp pond and other facilities
10/1999	Flood	Section 37 (the flood water up to 1,5m-2m from base of section)	<ul style="list-style-type: none"> - More than 50ha farm produce destroyed. - Swept away the facilities and animal rearing in 20ha pond. - 100% house (65 houses) inundated: 1,5m-2m - Diseases occurred: diarrhea, flu, hands and legs ulcerated, sore eyes.
3-8/2000	Drought	Section 37	<ul style="list-style-type: none"> - 50-60ha farm produce completely lost. - Many fruit-tree died - Lack of living and drinking water
10/2005	Typhoon with flood (wind level 7,8)	Section 37	<ul style="list-style-type: none"> - Damaged farm produce - Lost 4-5 pigs, more than 1400 poultry
11/2006	Typhoon No. 6 (Xangsane) with wind level 13-14	Section 37	<ul style="list-style-type: none"> - 30 houses collapsed damaged 40 house's roofs (house in level 4, without pillar in wall). - 1 woman injured because the house collapsed. - Damaged 20ha farm produce
9-11 yearly	Flood	Section 37	<ul style="list-style-type: none"> - The serious of flood increased in recent years (caused of harvesting forest, increase water flow). - In 1970s, the highest level of flood: 1.4m-1.5m; now: 1.7m-2m. - After raining heavily in 1-1.5 days, this area may flood. - The flood time in this section depends on rainfall: 2-3 times/year to 10-12 times/year. - Duration of flood: 2-3 hours to 2-3 days in house; 7- 30 days in field or garden.
4/2009	Summer flood	Section 37	<ul style="list-style-type: none"> - Damaged 50ha of peanut (2/3 this area completely lost). - Damaged 50ha of casava (1/2 this area completely lost).
7,8 / yearly	Saline intrusion	Section 37	<ul style="list-style-type: none"> - 30ha of farm produce area left fallow.
5 / yearly	Summer flood	Section 37	<ul style="list-style-type: none"> - 50-60 ha - Shrimp and fish rearing in 20ha completely lost.

Focus group discussion in Hoa Hiep Bac

8.2 Disaster Management

Hoa Hiep Bac ward have DMSC and 38 Sub-DMSC in its 37 sections and Hoa Van village.

Through community group discussion at 2 suveyed sections, after have the decision on set up Sub-DMSC (12-15 member in each section, all are man), the Sub-DMSC will organize a community meeting to set up DP plan for the section. This DP plan consists of i) determine the shelters of community to avoid each kind of hazard such as typhoon and flood, set up plan and means for evacuation; ii) checking and asking community people to reinforce the house before rainy and typhoon season, plan to help the single households, the elderly, and the disabled ; iii) pre-prepared rescue facilities such as coracles, small boat (these in normal condition are the means for production of household), 1 hand loudspeaker and depending on the specific conditions of each section, 5-10 life vests are equipped for Sub-DMSC and iv)the plan on security activity to protect property of local people during disaster also set up and damage recording after disaster is include in DP plan of section.

The Sub-DMSC will start to implement their DP activity at the same time of receive command from DMSC of ward or through FM loudspeaker system or even on mass media. In case of no electricity, they will receive the commands, information via mobile phone.

The initiative preparing of Sub-DMSC as well as the actions of the local people before, during and after disasters (Table 9) are harmony and as result, the damage of disaster are mitigated in compare with those before.

Table 9. Coping experience with hazard in Section 37, Hoa Hiep Bac ward

Kind of hazard	Coping experiences with hazard	Done by				
		Man	Women	Children	Eldery	Other
Typhoon	<p><u>Before:</u></p> <ul style="list-style-type: none"> - Set up DP plan - Reinforce the house: <ul style="list-style-type: none"> Roof tightening Preparing string, sandbag - Checking the house - Help elderly, single women in reinforce their house. - Preparing food, drinking water enough for use in 2-3 days. - Preparing means: small boat, coracle, 5-10 life vests, 2 lifebuoys. - Battery light, fuel, lighter, raincoats, dry clothes... - Put poultry, cattle into a safety place <ul style="list-style-type: none"> + Moving children, elderly to the shelter (the "Traffic and transportation No. 5 School"), 5km far from section by bus or trucks + The strong people stay at home to protect property. + Put properties in safety place + Cooking 					<p>Sub-DMSC (with a community meeting).</p> <p>Sub-DMSC.</p> <p>Sub-DMSC.</p> <p>The means of Ward DMSC</p>
		x				
		x	x	x	x	
		x				
		x	x	x	x	
			x			
		x	x			
		x				
		x	x			
		x	x			

Kind of hazard	Coping experiences with hazard	Done by				
		Man	Women	Children	Eldery	Other
	<u>During:</u> - Listen to the radio to get informed about the typhoon and latest weather forecast. - Listen to the information from ward DMSC via mobile phone or hand loudspeaker. - Find the shelter at home or neighbors (Section 37 have 3-4 solid house) - Some bamboo hedges can be use as shelter - Rescuing victims if possible	x				
	<u>After:</u> - Checking property. - Assessing the damage of the family to report to the Sub-DMSC. - Cleaning waste and washing mud - Looking for the property. - Checking production. - Preparing house: using usable materials - Cleaning the intravillage road.	x	x			
	<u>Before:</u> Like as respond to typhoon but do not go for evacuation because: - All houses have lofts. - Can moving in safe by coracle or small boat to the higher place (2-3 house have one boat).					
	<u>During:</u> - Tracking level of water to move property to a higher place - Tracking level of water to move cattle, poultry to the high road or near mountain.	x	x			
	<u>After:</u> like to respond to typhoon					
	<u>Before:</u> Digging , dredging well, pond but these well and pond just usable for a short time, after that they become dry or salty	x	x			
	<u>During:</u> nothing done because no fresh water sources					
	<u>After:</u> Trying to recover production	x	x	x	x	
Summer flood	<u>Before:</u> - Harvesting crop	x	x	x	x	

Kind of hazard	Coping experiences with hazard	Done by				
		Man	Women	Children	Eldery	Other
	- Dredging the sewerage to avoid flood.	x				
	<u>During:</u> Nothing done. Waiting for the low water.					
	<u>After:</u> - Accessing the damage - Trying to recover production	x x	x x	x	x	
Saline intrusion	No measure, nothing have done because of no fresh water source in this time					

(Group discussion in Section 37, Hoa Hiep Bac ward)

The MDSC of ward and Sub-DMSC of the section have good coordination and to prepare thoroughly before a disaster occurs. All of the activities as the checking and helping families in difficult to reinforce the houses, bring elderly and children to the shelter, prepare food, medicines and officials at each evacuation place will be implemented immediately when the command is given by head of DMSC or through the other emergency evidence related to the coming hazard.

However, means for personal protection (life vest, lifebuoys) is not enough for all members of the Sub-DMSC and rescue team.

8.3 Impacts on Education

In Hoa Hiep Bac ward, there are 2 primary schools with a total of 902 pupils in 31 classes. The rate of children coming in 1st grade achieves 100%, 207/209 pupils finised primary level, accounting for 99%. Hai Van primary school was recognised as a national standard school in level I, and Tran Binh Trong primary school as a national standard school in level II. These schools were built solidly and spaciouly with large precincts, playgrounds and sufficient toilets. When disasters happen, the shools give pupils some days off on their own initiative.



Figure 20. Interviewing pupils

At present, there is no school curriculum on disaster knowledge but pupils also know how to self-protect from flood and typhoon through television, radio, relatives and Nature – Society subject in school. In low land areas (Sections 1, 2 and 37) where floods usually hapen when heavy rain, the study of pupils is often interrupted in rain season. Despite living near to sea, rather many pupils cannot swim.

The pupils let us know how they can protect themselves (for example, seek for safe place for hiding, not stand underneath electronic poles and trees in typhoony rain, not go on roads near rivers or ponds, not go in the strong winds...).

Disasters affected schooling of the children. Fortunately, no pupils drop out of school after the typhoon. They return to school after one week. In the typhoon in 2006, the school gave them three days off before and after the typhoon. Unfortunately, one pupil died in the water

(he fell into the pond behind his house). Some pupils had the books and notebooks soak with rainwater because the roof blew away. All school classes also had the roof blown way. Hai Van school has about 20 pupils in Section 1 and 2, which is a sunken area suffering from flood every year. These pupils had to take many days off.

(Teacher Nguyen Thanh Tuan, Headmaster of Hai Van primary school, Hoa Hiep Bac ward)

Natural disasters influence on study of pupils

We live in a place where flood usually happens. After each flood or typhoon, it is very difficult for us to go to school because the road to school is still under water and thick mud layer. Besides many broken trees lie about in disorder and in the way, so for year we often cannot go to school for 7 – 10 days more than pupils in other areas do. Our houses leaked and flood



water rose high, which made our books and notebooks wet, so after that my parents had to spend a lot of money on buying new ones, sometimes without money we cannot go to school until receiving government supports, and unfortunately some pupils in too poor family left school. Especially, after typhoon in 2006, our houses were mostly broken, metal sheets flew, fortune, clothes and study equipments were lost. We fell in bad situation.

(Pupil group in team 37, Hoa Hiep Bac ward)

Some organizations such as Farmer, Women, Youth and War-Veteran Union and Associations combined with Pupils' Parents Association, Study Encouragement Society and Hai Van Border station 244 to campaign children in school age to schools. Maintaining continuous education classes in the evening with 53 pupils. Steering committee of Compulsory Education in ward associated with Border Post 244 in starting a new class to universalize education and eliminate illiterates for 20 trainees over 35 years old.

8.4 Impacts on Health

Ward medical station is a solid 2-story house with functional rooms and 4 patient beds. The staffs include 6 people (2 male, 4 female), in which 1 doctor and 1 physician. The medical station carried out well National medical target programs, methods for preventing epidemic diseases and protecting community health. Task on ensuring the quality of food sanitation and safety is increasing. In 2008, 5.050 people times came to examine and cure in the medical station.

Rate of malnutrition children under 5 years old in ward in 2008 were about 6,51%, much less than in 2007 with 14,96%. Also in 2008, over 400 poor children times were got many benefits from social charitable programs and other projects.

Situation of epidemic diseases, especially diseases relating to environment were control rather well thank to standby medical activities and good preparation before natural disasters. However, in the opinion of ward staffs, properly because of unconvenient weather, some epidemic diseases increased rapidly last year such as varicellous epidemic in teams from 17 to 20 (about ½ number of children were varicellous), fever epidemic.

According the elderly people that we interviewed in Hoa Hiep Bac ward, old people used to live longer thanks to the better climate. People's health is affected not only by natural disasters but also by the environment. The living environment is affected by the wastewater from local industrial zones. At present, all people in Hoa Hiep Bac ward use drilled well water. The rainwater seeps into the soil and pollutes the water source. Some skin diseases (causing itch),

rheumatism, sore throat and nose are quite common, especially among elderly people. More people also die young due to strokes or dengue fever. Regarding men, many suffer injuries from accidents during fishing such as falling into the sea, blown away by the waves, broken leg, rheumatism.

The risk for women to get infected with diseases is higher than for man. This is because women have special needs for hygiene. Therefore, many women ask for assistance in medicines, medical equipment and water purifying system in time of typhoons and floods.

Regarding reproductive health, Women Union staff in the two wards said the infection rate is relatively high (about 70% of all patients). Due to these diseases, many women cannot use IUD (intrauterine device). Consequently, they tend to have many children as the contraception burden is on the women.

Poor households have free medical insurance. Near poor (called by local people as “difficult families”) usually cannot afford to buy medical insurance. The problem is the high number of difficult and near-poor households. For example, in Section 24, Tho Quang ward, there are 50 households, among which 8 ones are poor, 9 ones are near-poor. These near-poor families do not get any subsidy for free medical insurance nor can they afford to pay for medical services, even when there is no natural disaster. As mentioned above, this group does not constitute the “official poor”. However, observation by the research team reveals that this group also faces with similar problems as the poor group: shortage of jobs, unstable livelihoods, unsafe houses, and no access to health services...Therefore, this group really needs more attention. One of the needs of this near-poor group, especially women, is for free medical insurance.

Although we do not have official statistics nor complete evidence to confirm the above-mentioned findings in terms of accuracy, severity of diseases, this can serve as a basis for deeper research/survey on the impacts of natural disasters and climate change on coastal people’s health.

8.5 Clean water supply, drainage and sanitation

Clean water supply

Nowadays, living water supply of inhabitants in Hoa Hiep Bac ward is mainly dug-well and bored-well. The quality of well water is dependent on location of each team, team 29 and 30 well water is pure and not polluted by alum but in team 37 in a low land area, well water is polluted by alum and salt. Number of households using running water is very low, only fewer than 2% total of households. 40/65 households in team 37 use running water thanking to supply of city for poor area and having old revolutionary fighter, the remaining households were not be supported yet because the distance to their houses is too far (over 300 meters). At present, there is the main water conduit in team 29 and 30, however most households cannot use because the price of setting up conduit to their houses is much higher than their income (it costs over 1.2 millions VND), except for few households (5-6 households).

According to result of group discussion in team 29 and 30, although well water is pure, it can be polluted by local floodwater in a long time, harmful substances could imbibe into underground water. Additionally, wastewater from nursery shrimp farms, which was not treated completely, can cause water polluted by salt. There is no effective method to treat well water polluted by salt in drought season.

Due to living water supply is mainly well water, so after each typhoon and flood, medical team combines with Flood and Typhoon Control Service to lead households how to treat environment and living water.

Drainage

Drainage system in ward only comprises of 2 main conduits along Nguyen Van Cu street. In most residential area, drainage was not built. In urban constructing and adjusting process, some concrete ways were built and according to a ward staff “No concrete way with drain”. Because they did not calculate accurately in building the road from low land area to high land

area as well as lacking fund for building synchro system of road and drainage, some roads were built without drainage which cause flood in many days in rain season (5-7 days/time) in many areas, especially in team 17-20 and 30. Flooding brought many difficulties in life of local people, caused environmental pollution and influenced on quality of underground water.



Figure 21. Executing drainage in Sections 29, 30

However, in accordance with announcement of Ward People's committee and real observation, no synchronization in construction and flooding phenomenon like that will be overcome soon. Now ward were received investment from district in order to build drainage from team 30 to Cu De river and this project is carrying out positively and finishing before rain reason in 2009 (Figure 21).

Sanitation

According to group discussion of ward staffs, approximate 80% households in ward area have septic latrines; these households concentrated in teams along 1A national highway. Some teams rate of households without latrines are quite high, including team 37 (88%) and Hoa Van village (70%), team 11-14 (20%) and team 17 (a few households having latrines). These team are in the planning areas or poor (teams 11-14, 17, and Hoa Van). In the opinion of ward Women Union staff, although lacking latrines

is a pressing problem, these households cannot be invested or borrow fund from Women Union to build latrines because they are living in planning areas or in resettlement areas. Households in teams 11 -14 also cannot approach funding policy because they are too poor to return (in level of 5 millions VND/household).

Because of no latrines, when drought and food happen, sanitation problem is getting more and more serious, which lead to some epidemic diseases such as eye sore, diarrhea, itch...

Now approximate 20% households is living in the area without garbage collection by Urban environment company because high topography is difficult to push garbage collection three-wheeled cart there, for example in teams 17-20, Hoa Van village and team 37. People here treat rubbish by burying or burning to make use of organic rubbish for fertilizing trees.

Systems of wastewater treatment and drainage in industrial zones do not work enough well to avoid impacts on aquaculture as well as sea environment.

Furthermore, after each flood or typhoon, many kinds of garbage, animal corpses from residential areas along Cu De river float along river to the sea and being waved back beach in team 29. To avoid damages of environment pollution to local people, ward People's committee mobilized the combination of Militiaman Force, Youth association, all people in teams 29, 30 and staffs of urban environment company to gather rubbish and clean up beaches.

- The drainage system in ward is not synchronic, hence it is easy inundated, especially in old residential areas under constructing and adjusting process.

- Poor households and households in the areas waiting for release (from 2004) cannot build latrines because of no condition or no permission.

- Gathering garbage did not meet inhabitant's need yet to keep environment clean. Garbage in residential areas along river which was not collected completely caused polluted sea environment whenever heavy rain.

8.6 Infrastructure

100% households at Hoa Hiep Bac have power. Transportation is convenience, except Hoa Van village (because of separated terrain, 3km road from Hai Van pass to the ward was difficulty, the local people using boat as a main mean of transportation) and Section 37 is located a small island of Cu De river and connected with Hoa Hiep Nam ward by a small bridge. Main streets have been covered by asphalt and local roads of team have been concreted apart

based on urban reorganization processing. Hoa Hiep ward has around 35 kilometer asphalted road (1A main road, the road lead to Hai Van tunnel, assignment street, Ngo Xuan Thu street), 6.2 kilometer concreted local road in village, around 10 kilometers pathway. However, 1 kilometer asphalted road of Ngo Xuan Thu street is usually covered by floods where has been serious degraded.

The Section 37 has been waiting clearance for premise and resettle so it could not allowed to invest in infrastructure, including a connecting road to the byway of city – despite of this is a high road-base, across section, signification for local people evacuate when flood coming. To supporting local people and more convenience when evacuating, the district authorities has invested a 2-story building, capacity of this building about 200 persons in the central of section, nearly the byway of Da Nang city.

The ward set up a FM broadcast system with 44 speakers, the broadcast signal is covered about 99% of area and 95% of local people is hear radio program and the ward’s announcements as well as early warning information about natural disasters.

8.7 Livelihoods

According to the implement result of economic assignment in 2008, the industry and small-scale industries are highest ration of economic trades (accounting for 79.0%) and agriculture, forestry and aquaculture are lowest (4.1%) (Figure 22)

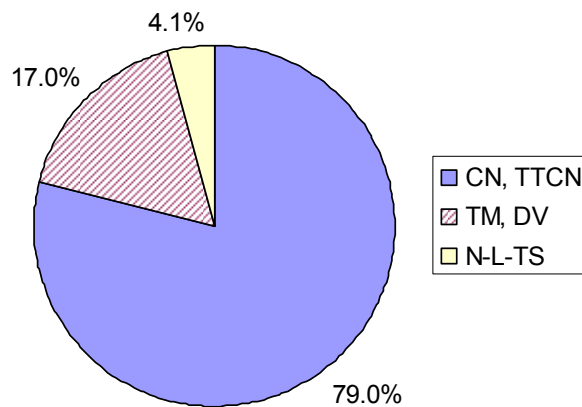


Figure 22. The ration of economic branches value in Hoa Hiep Bac ward

(Source: Report on the implement situation of Economic – Social – Security 2008, PC of Hoa Hiep Bac ward)

Although production value are not play high ratio but according to local people, agriculture – forestry – aquaculture production activities are more significant to local people. In other hands, this sector is most vulnerable and easier damaged by impact of disasters during last years (Table 13.).

Table 13. The important and vulnerable of trades int Hoa Hiep Bac ward

No.	Production activities	Important			Vulnerable		
		Male	Female	Rank	Male	Female	Rank
1	Rice cultivate	3	1	1	1	1	1
2	Fishing	5	4	4	2	2	2
3	Aquaculture	2	5	2	3	3	3
4	Forestry	4	6	7	4	6	4
5	Farm produce	7	2	6	6	4	5
6	Rearing poultry and and cattle	6	3	5	5	5	6
7	Trades	1	7	3	7	7	7
8	Seafood processing (fish sauce, dried products)	8	9	8	8	9	8
9	Tourist	10	8	9	10	8	9

No.	Production activities	Important			Vulnerable		
		Male	Female	Rank	Male	Female	Rank
10	Small scale industries (brush, paper produce)	9	10	10	9	10	10

1. Most important/vulnerable, 10. Less important/vulnerable (Group discussion at Hoa Hiep Bac ward)

Rice cultivates and farm produce

Farming is a traditional occupation of Hoa Hiep Bac people. According to local people, however, this work has not high income but helping local people have enough food for living. 121 ward's house holds are rice producing with average area 2 "sao" (500m² per "sao") and 100 households are farm producing. In agriculture producing activities, both of male and female are participating, including some heavy works such as dredge of irrigation channels. However, the living of farmers now is in difficulty because following reasons:

i) Natural disasters always damaged crops. Drought caused lack of water and saline intrusion; early typhoon damaged rice paddy and farm in Summer-Autumn crop. Summer flood may damage rice and peanut in Winter-Spring crop at the harvest time (Table 14).

Table 14. Seasonal calendar and disasters at team 37, Hoa Hiep Bac ward

Weather/ Production activities	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
Rice:												
Winter-Spring crop	—————											—————
Summer – Autumn crop					—————							
Farm produce:												
Peanut	—————											—————
Sweet potato									—————			
Corn				—————								
Cassava	—————											
Sesame				—————								
Rearing animals												
Tiger shrimp	—————											
Tilapia, snake-head fish	—————											
Poultry, cattle	—————											
Fishing	—————											—————
Hazards												
Flood									—————			
Typhoon						- - - - -			—————			
Salt intrusion						—————						
Flash flood					—————							
Drought				—————								

ii) The production area has reduced by urbanization, water supply for production has lacked, and the rest of agriculture area has belong to the planning area of city for industry and urban. Before 2000, Hoa Hiep Bac's agriculture production areas including 185 hectare rice paddy and 90 hectare farm production and local people could practice 2 crops per year (Winter-Spring and Summer-Autumn season crop). In 2000, Lien Chieu industry zone had been built and 140ha of agriculture area are used for this zone area. In 2003, the path road to Hai Van tunnel has been built and 24 hectare of agricultural area also. According to ward officials whose participated in group discussion, set up industry zones and roads has blocked the main water supply for production activities that lead to 34.5 hectare lack of water, the have to leave this land fallow or production perfunctorily. During 2007 – 2008, only 11.5 hectare rice paddy and 13 hectare farm production on Winter-Spring crop and 10 hectare rice paddy, 5 hectare farm production on Summer-Autumn seasonal crop has been produced.

iii) Each farm production household in Section 37 have from 1,000m² (2 sao) to 10,000 m² (2 mau) of garden but rather difficult to cultivate because salt intrusion (10 hectare Dui field has been left fallow for 10 years, the rest of this area has left fallow partly) (Figure 23) and lack of water supply during Summer-Autumn crop.



Figure 23. Farm production area has been left fallow at team 37, Hoa Hiep Bac ward.

iv) Farmer who only practice agriculture often have not other job to improve their income.

v) Based on development strategy of city, in the next 10 years, all agriculture area will be converted to industrial and urban zones. Hence, the local people have not allowed investing in long term for production and these people will be unemployed.

To mitigate impacts of disasters, under supporting of DARD of Lien Chieu ward, the local people are using seasonal crop calendar in flexible and suitable seed stocks (Table 14). In other hand, aim to sustainable funds and investigation effort, avoid to loose by drought, two kinds of main livestock (rice and peanut) has focused invest on Winter-Spring season crop. Another livestock (such as maize, cassava, sesame, sweet potato,...) has cultivated at lower investigate and home-garden area on Summer-Autumn season crop.

Two irrigation dams aimed to stored water resource which supply for agriculture (Cay Son dam above and Boi dam) but can not meet irrigation required.

Some farmers have exploited firewood at the mountain but the income not so high (20,000 - 30,000 VND per day).

House holds of team 37, 11-14 using agriculture area has left fallow to cattle rising or set up a pig farm. However, those activities have not supported to loans a fund form Bank of Social Policy and rather difficult to have a long-term investment because the main part of this area have belonging to the planned zone of Da Nang city.

In 2008, the district issued Farmer union of Hoa Hiep Bac ward one plough machine to exploit areas has been left fallow from 2006.

However, the main problem of those areas is lack of water that is still not resolved.

In-shore fishing

Hoa Hiep Bac ward have around 140 house holds practicing exploit fisheries by small and low power boats (under 20 CV) or coracle. Their fishing gear are fishing hooks, gill net, rotation net...and the fishing ground are in-shore along Da Nang Bay or in Cu De estuary. Based on local people's evaluations, in-shore fisheries resource has been exhausted lead to low economic effect, mainly income around 50,000 – 100,000 VND per day/household if the weather in good condition. The man is responsible for fishing activities and the women will sell the production. During heavy strong wave season (from September to November) the fisherman can not fishing so loose main income. To maintain living, women in villages often doing some other works like sell peddled wares at Kim Lien train station and residential areas or hired labor. At the same time, fisherman will repair fishing boats and gears.

Because of most boats are small so they can not go to Tho Quang anchorage to avoid typhoon. There is no place for safe anchorage in Hoa Hiep Bac except 2 small estuaries but these river usually have strong current on rainy season that lead to fishing boats and gears may damaged by typhoon and strong waves.

Recently, according to PC of Hoa Hiep Bac ward, a city policy have limited and toward to prohibit in-shore fishing activities to protecting marine resources so no longer supporting policies for this occupation. Hence, most fishermen in this area have will not received preferential loan from authorities to be continuous development. If maintain fishes activities they would have to set up a bigger fishing boat over 30 CV to fishing at off-shore. Moreover, due to lack of fund, workers, off-shore fishing experiences, and loss-marking of this activity during recent years lead to development potential of this is quite difficult for Hoa Hiep Bac's fishermen.

Changing jobs seem to be a possible resolution in present time for the number of fishermen and farmers. In present, the policy just only supporting for young working-age (18-25 years old) because they can adaptive and well-trained to be workers (1,400 workers resolved in 2008, 887 female. Some of them with higher skillful now working at another provinces or worker, and the rest are small scale industries and tailors). Farmers, fishermen over 35 years old – especial women – more difficult in finding a job; developing new job because of low ability (mainly trained reading skill), small trades, sell assorted stuff, hired labor with low income (around 20 – 30,000 VND per day).

It is more difficult for women to find jobs than men

It is very difficult for women over 30 years old to find jobs. Enterprises do not want to recruit us as our education level is low. In order to work for an enterprise, we have to graduate from high school. There is a ecological tourism resort here. Men can work as security guards. Young women may have more opportunities. In addition, men can do hard work or work as general workers in the ceramic factories or carry stones. No one wants to hire women as they think that we are weaker but we are able to do it. Women usually sell assorted stuff but there are many sellers now so it is more difficult. In Hòa Hiệp Bắc ward, many women collect fuel wood in the mountains and forests. They are mainly women in the age group of 40-50. This is very hard work but the income is very small (on average, a woman can collect up to 2 piles of wood which earn them 15,000VND/each). As wood becomes increasingly rarer, women have

to go further (for example to go to Lăng Cô - Phú Lộc district, Thừa Thiên Huế). These trips are also longer (some took 5-7 days, the children have to take care of themselves). This hard work cannot be done very frequently as in some months, they have to stay at home as it was too hot or rainy which made it really tough for carrying the wood.

(Discussion with the poor women groups, Hoa Hiep Bac ward)

Aquaculture

The area under tiger-shrimp culture in the ward about 52 hectare with participate of over 40 households. The tiger-shrimp has developed and more profits, especially increased almost from 1999 to 2001. According to commune's opinions, however, from 2006, industry sewage from Hoa Khanh industrial zone has affected water quality for aquaculture which lead to 10ha shrimp pond have left fallow. In 2008, local people investigated an area 42 hectares for aquaculture but water resources have been polluted lead to shrimp in 10 hectares pond in section 37 completely lost. Aquaculture is one of the occupation have high risk level: high salinity when drought causing shrimp grow up slowly, heavy rainy and flood overflows it banks at early and the end of second season crop, addition water resources has polluted by industrial waste.

In the last 4 years, to reducing loose these people cultivated only 1 crop but usually suffer loose causing environment pollution. The aquaculturists think the waste water from Hoa Khanh industrial zone lead to shrimp diseases.

49 house holds are cultivating shrimp stock, the strong developing stage and bringing high benefit was occurred from 1997 to 2001. But at the end of 2005, shrimp stock house holds in coastal zone has left jobs because of high-tide intrusive land, break though shrimp hatchery stations (section 29). In other hands, water resources for shrimp cultivate getting near Cu De estuary but Cu De River has been polluted by industrial sewage so affected the quality of shrimp stock. Besides, shrimp culture has loose that lead to output of shrimp stock were limited.

According to ward's officer, industrial, trade and service branches are few affected by disasters due to priority in investigation and advantage geographical where few affected by flood. Those people who have chance to participatory these branches usually have more income; they could build a fixed house at planned stable residents and based on urban reorganization processing. After strong typhoon, factories and enterprises belong to Lien Chieu Industrial Zone must be interrupted in sometimes but few affected to local people income because of those companies just only employed 30 male local workers.

Another braches such as: afforest, domestic cattle and fowls raising, seafood processing,... are few significant to local commune or few affected by disasters.

Rural and Fishery Extension

Agriculture and aquaculture activities in Hoa Hiep Bac now still have concerned by local authorities. Annually, through Farmer Union of the ward, the centre for Rural and Fishery Extension of Da Nang city offered training courses on plants and aquaculture objects cultivate and look after techniques to farmers and fishermen. The duration of the training courses is occurred 1 day and concerned farmers are also invited.

In other hands, Economic Development Board of Hoa Hiep Bac ward spend around 20 – 30 million VND from local annual budget to implement some small facilitation for farmers and fishermen every year. In usually, facilitations are pesticides, herbicides, sand bags to reinforce the dams in order to preventing salinity intrusion or kepping water resources for irrigation and dredging of irrigation channels.

Poor house holds has been approached funds from district's the Bank of Social Policy and has been introduced, professional advised. However, the people in the areas which are waiting for clearance such as section 37 will not approach these funds for development produce because of compensation and clearance regulations

8.8 Housing

Hoa Hiep Bac is one of ward which has lowest economic condition of Da Nang city so the quality of housing is quite limited. Thank for the supporting erase temporary houses policy from city authority, until 2008, Hoa Hiep Bac ward have not existed temporary houses. However, most of local houses are un- or semi-solid house.

Housing of residents where waiting for clearance (such as section 37) not allowed new construction, repairing, reinforces 6 years ago (from 2004, with a project so-called Thuy Tu new resident and now namely Thuy Tu eco-resident). 65 housing has been degraded and may damage all by a medium typhoon with wind level 10. In other hand, during this time, 4-5 house holds have matures and get married, because of planned area so could not separated household and built house. To convenience in family life, some couples just get married have set up temporary house to living and waiting for resettle. Mrs. Nhan is one of typical situations.

Dwelling-houses of people who got married recently in areas waiting for clearance



In 2005, I got married and came here to live with my husband family. After having a child, we left to settle down our private life. Without land and money for building house, we set up an unsettled wood house on 30 square meter areas given by my mother in law. We have no land for agriculture, my husband have to work as hired farmhand. But unluckily, in 2007 while chopping trees, a tree fell down on his head and then his health went bad and his temper became irregular, so he can not keep his hired work. I am a worker in a plastic company with 1.2 million VND per month that spend for all in my family. But sometimes I stay at home for months because of no work in the company and my

family gets into debt. My wood house is not only getting decayed but also beside the drain of city side track, hence we always worry about losing our house one day.

Mrs Nguyen Thi Nhan, 24 years old, team 37, Hoa Hiep Bac ward

In the community, the Red Cross Association supported to built some houses after some disasters for poor households (their house collapsed by disasters) but rather small in area (16m²) so some people still use a temporary house for living (Figure 24).



Figure 24. For convenience, Mrs Boi (Sect 37) still uses temporary house next to a brick house.

To mitigate impact of flood, in low land areas, 100% house have a small loft to store materials when flood rising (Figure 25).

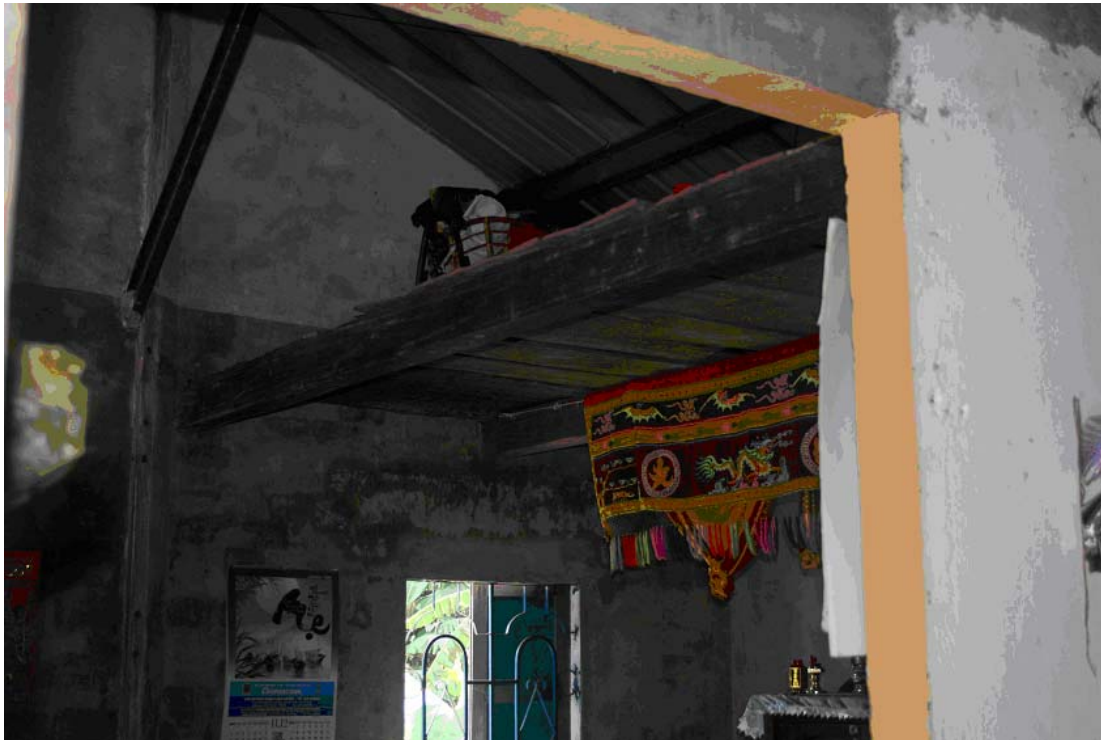


Figure 25. The loft to keep properties during flood time in Section 37, Hoa Hiep Bac ward

All most metal roofing have tie up or fasten by sand bags to preventing strong typhoon. In un-solid houses, the people often created a small concreted room (either small compartment) to use as a shelter in case of strong typhoon (Figure 26). Simple methods of short-term adaptation to cope with flood and typhoon has reducing loose in recent years.



Figure 26. The reinforce methods in Sections 29&30 (1). Tie up the roof; (2) The “family shelter”; (3) Fixing the purlins

8.9 Most vulnerable groups and poverty analysis

The difficult of economic and severe weather conditions as well as disaster causing Hoa Hiep Bac ward's households are very vulnerable, especially poor people group. The result of wealth ranking tool at Section 29, 30 and 37 showed that poor people usually have unsolid house, single, lack of workers, lack of production land and/or hired labor without permanent jobs (Table 15, 16).

Table 15. The brief of local people's living condition at team 29 and 30

Better-off group	Medium group	Poor group
<ul style="list-style-type: none"> - Solid house (pillar be attached, 4 pillars/wall thick 20). - Motorcycle prized above 20 million Vnd. - Average income around 1 million Vnd/person /month - Washing machine, air conditional. <p style="text-align: center;">5/138 households</p>	<ul style="list-style-type: none"> - Semi-solid house (4 pillars/ wall 10). - Motorcycle prized less than 20 million Vnd. - Average income 800 thousand Vnd/person /month - Gas cooker, fridge. <p style="text-align: center;">101/138 households</p>	<ul style="list-style-type: none"> - Unsolid house (wall 10, without pillar) - Motorcycle prized less than 10 million Vnd. - Average income 300 - 500 thousand Vnd/person /month - Gas cooker not used regularly, no fridge - 5 house holds have not television. <p style="text-align: center;">32/138 households</p>
Livelihoods: <ul style="list-style-type: none"> - Business - Cultivate shrimp stock 	<ul style="list-style-type: none"> - Salary, hired, small business (vegetable, bread, break first fast-food, stationeries, tailor...) 	<ul style="list-style-type: none"> - Hired labor in temporary, single or lack of manpower.

Team 29&30 group discussion, Wealth Ranking Tool

Table 16. The brief of local people's living condition at team 37

Better-off group	Medium group	Poor group
<ul style="list-style-type: none"> - Semi-solid house: 4 pillars - Motorcycle: above 15 million Vnd. - Television: 2-3 million Vnd. - Fridge - Income: 5 million Vnd/ person/ year. <p style="text-align: center;">4-5 house holds</p>	<ul style="list-style-type: none"> - Semi-solid house 2 or without pillars - Motorcycle: from 7 to 10 million Vnd. - Domestic television (300-500 million Vnd) - Ice bucket - Income: 3-4 million Vnd/ person/ year. <p style="text-align: center;">46 house holds</p>	<ul style="list-style-type: none"> - Unsolid or semi-solid house (<i>Tinh thuong</i> house) - Without motorcycle, old bicycle (under grant of authorities) - Radio - Income: 1-2 million Vnd/ person/ year (including grant for children 120,000 Vnd/month) <p style="text-align: center;">12 house holds</p>
Livelihoods: Farm produce (more than 1 ha), culture shrimp, rearing poultry and cattle	Farm produce (around 1ha), rearing poultry and cattle, hired labor.	Farm produce (1 - 4 sao), hired labor, rearing poultry and cattle (a few).
Characteristic of team 37 house holds: <ul style="list-style-type: none"> - The elderly householder: 20/65 - Female householder: 20/65 - Youth who just get married: 5/65 - Male middle age householder: 20/65 - Youth: there are 10 young people from 18 – 30 none regularly worker, uncertain 		

income or hired labor.

- Main works of team 37 people are farm produce, rice and rearing poultry and cattle

Team 37 group discussion, wealth ranking tool

The second vulnerable group is poor fishermen who do fishing in-shore. This group is easily affected by natural disasters and does not encourage investment development, difficulties in access to social capital (such as construction loans, toilets).

According to People's Committee of Hoa Hiep Bac ward report, causes of poor households: more people depend (53.57%), lack of workers (14.4%), lack of production land (4.22%), with the illness, disability (19.5%) and lack of work experience (8.04%). Normally, each cause not only in each household but they also mix with each other, when a problem occurs will be bring out many other problems and this caused some households the living conditions are better in past and now might be become poor family.

To help poor households, Da Nang city, Lien Chieu district and Hoa Hiep Bac ward has many supporting policies: i) ensure 100% poor households are preferential loans at Social Policy bank Lien Chieu district to production, business and job creation, support how to use the loan effectively; ii) ensure expense resource for poor households' pupils, students loan based on Decide 157/2007/QĐ-TTg of Prime Minister of Government; iii) support small and medium enterprises to join vocational training and create jobs for poor households; iv) the unions and societies launched helping each other programmes to get out of poor. For education, implement programme of free or reduce tutor fee for poor households' children in cooperates with Study Encouragement Society, Red Cross Association, and other organizations. For students have not ability to continue study, ward will help them for vocational training center for free. In addition, 100% number of people in poor house holds in 2009 and out of poor households group in 2008 has issued the health insurance card.

However, the the poverty issue is aggravated when natural disasters happen as people have to lend money to fix their houses. Poor households suffer the most from natural disasters as they do not have strong houses, nor the materials to strengthen their houses. Consequently, they had to lend a large amount of money to fix their houses. Being near poor, many fell back to the poverty list or became poorer due to debts. Even for those not in the poverty list, the risk of becoming poor is very high when any disasters or misfortune happen.

The key livelihoods of the poor are hired labourers, fishing and farmer. The problem is that these are unstable jobs: hired labouring (contruction workers, porters, fish skin peeling, shrimp peeling) does not always have demand for frequent labourers; fishing is depending on weather condition and now have not encouraged; farming is difficulty because of lacking water and reducing field area. More seriously, aquaculture and fishing are very much affected by climate change and the environment, particularly in the context of increasingly depleted fish source. Fishing households in Hòa Hiệp Bắc ward (Section 12, 13) said that due to the oil spill, fish were contaminated with oil. The oil spill was caused by a broken pipe in the petrol station which pumped 2 thousand litres of oil to the sea). Life of many households was negatively affected.

Some interviewed men and women said that with the development of industrial zones, enterprises may need general labourers. However, general jobs like that are not stable and at risk of losing as the supply is always higher than the demand, especially in areas with low educatino level and therefore with many poor skill workers. Moreover, in the context of global economic crisis at present, the risk of job loss is foreseeable.

9. HAZARDS, CAPACITY AND VULNERABILITY IN THO QUANG WARD

9.1 Hazards and impacts

9.2 Key description of ward and sections

Tho Quang ward located close to Son Tra mountain on the North, East sea on the East, Han river estuary on the West and Man Thai village on the South. SonTra mountain is belong to the

ward in principle, but its resource is managed by Son Tra conservation management board. The remaining area of Tho Quang is a strip of sandy land goes along the beach with the average high is about 2-3 meters. The population of the ward is about 26000 people. The rate of poor household (according to the criteria of the government) is 5%. The dominant income practices are fishing (50% labour force involved), industry (20% labour involve), services (20% labour involve) and some others. Tourism is the potential sector based on the long coastal line and the beautiful landscape of Son Tra mountain. But there have been no tourism project started so far.

Table 17. Damage caused by natural disasters from 1989 to 2008 in Tho Quang ward

Year	Type of disaster	Area	Main lost
1989	Typhoon	Whole ward	34 lives lost, 300 houses collapsed, 200 boats sank or broken.
1997	Cyclone	Cluster 24	2 lives lost and 2 boats sank
2000	Cyclone	Cluster 6E	1 boat and some fishing facilities lost
2001	Flash flood	cluster 6E	No considerable damage reported
2004	High wave	cluster 6E	5 boats sank and some other ones broke
2005	Typhoon and low atmosphere	cluster 24	Inundation and road erosion
2006	Typhoon number 6	Whole ward	393 houses collapsed, 1234 house's roofs damaged, 13 boats sank, 89 boats broken, 1 life lost, 37 people hurt; Inundated Thanh Vinh area
2007	Drought	Whole ward	Salinity instruction the underground water table on the whole ward area
2008	Tropical low atmosphere	Cluster 24	Inundation

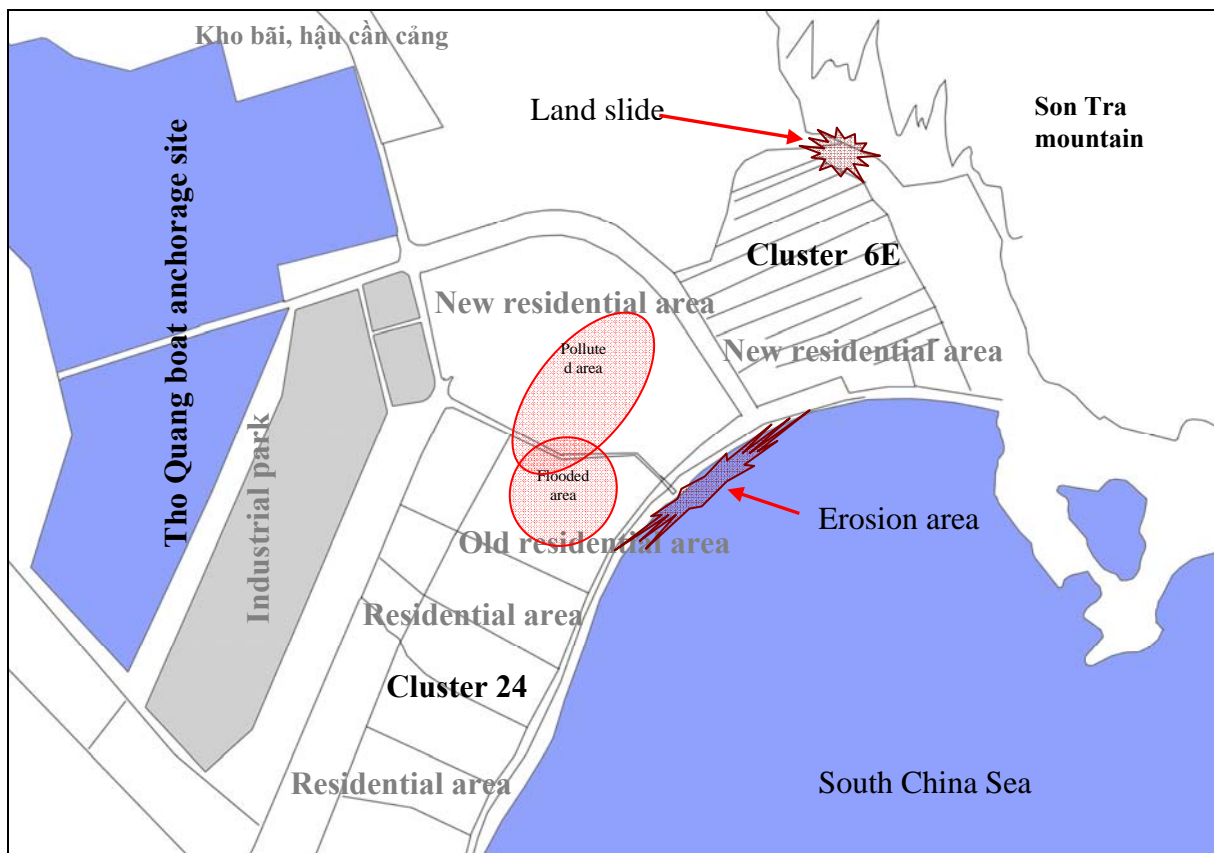


Figure 27. Hazard map of Tho Quang ward

9.2 Disaster Management

Tho Quang ward has DMSC and all the clusters of the ward have Sub-DMSC. These committees have the representative of all the government and social organizations.

Rescue team of the ward has 20 members which are mainly members of Youth Union and Red cross Association living in the ward. The rescue team of the ward is under management of flood and typhoon control committee.

Emergency facilities and safety equipment for the rescue team at ward level is simply the life jackets and rain coats. At section level, rescue team members are poor equipped.

In general, disaster coping strategies of the ward is similar to that of the district focusing on improving communication system, strengthening capacity of the rescue teams by practical exercises, collaborating with army forces for boats security checks, promoting job for people doing small scale fishing, planting tree along the coastal area and improving emergency facilities. Self-support group model will be enhanced for the fishing boats working in and off shore areas. Tho Quang ward continues to request for dike building on Hon Sup area to create a safe port for small boats. The ward will make use of the upgraded schools and residential buildings for evacuation. At the moment, there is no plan for upgrading the health station and the degraded schools in coming time. To cope with flood, the ward will work with the project management boards to speed up the progress of concrete canal and sewage building in new residential areas. In the old residential areas, the short-term coping plan is to mobilize the pumping machines to drain water.

To cope with the problem of environmental issues, the ward authorities would like to have right to do investigation on the factories that caused pollution. To solve the problem of aqua product waste drying in open air, the ward are calling for investment of a processing factory to produce food for animal and fish from the waste. The traditional fish sauce production firms will also be moved out of the residential areas. The ward is continuing to propose to the district and agencies to finish the construction of the drainage system as soon as possible in order to solve the problem of waste water.

The strategies of local people in the two surveyed sections in coping with typhoon is mainly focusing on reinforcing and upgrading houses. The better-off households like to concretize the pillars and roof. The middle households have enough resource to concretize a part of the house and used as a shelter during the typhoon. The poor have to live in risky house and have to evacuate when typhoon happen. People those are doing fishing pay more attention on the accuracy of early warning information. The inaccurate warning will cause much economic damage. Therefore, communication facility is their first priority. The model of self-help group is appreciated because it help to enhance the capacity of fishing people in coping with threatening typhoon.

To deal with flood, individual household normally heighten the platform of the house and entrance. This solution help only the upgraded house but cause water blocked and make inundation more serious for the houses nearby

9.3 Impact on Education

Tho Quang ward have 5 schools including 1 secondary school, 3 primary school and 1 kindergarten. The two of them are upgraded with 40 class room. The remaining ones are in unsafe condition especially in disaster season.

The disaster and climate change coping strategy of education sector is to upgrade the class room for more safety in typhoon season. The new residential areas have no kindergarten and the ward propose for building a solid and safe one for children in this area.

Tran Quoc Toan school located in the area between river and sea, pupils are living close to river following the fishing activities of the families. Some pupils can swim in the sea but



cannot swim in river and lakes because the sea water has higher density. The school is very near the highway that causes high risk of traffic accident. Now, the platform of the school is low and easily be inundated in rainy season. After the typhoon number 6 in the year 2006, 100% the roof of the school was blew away. Following the guidance of department of education, disaster coping and mitigation has been integrated into school program, however the time allocated for this subject is insufficient. Pupils learn about this subject in theory mainly. School has no budget to buy learning

materials to support teaching in disaster.

(Mr. Le Huy Dung, vice-head of Tran Quoc Toan primary school, Thọ Quang ward)

9.4 Impacts on Health

The health station of the ward has 9 staffs including 1 doctor and 2 midwives. With the population of more than 26000 (almost double in comparison with average), the capacity of the health station is insufficient event in normal condition. There is 1 community health worker in every of 48 clusters of the ward provide support to communicate with communities on sanitation, environment, birth rate control, first aid and site clearance whenever there is disaster or epidemic disease

The facilities, equipment for health care and medicine is provided by the health department which is sufficient for treatment of common disease and for water and environment treatment after disaster. However, community health workers have no equipment to do their job.

The health station of Tho Quang ward is a one storey house with steel sheets roof which is potentially be damaged by strong win. In rainy season, the station is easily inundated because it locates in a low place without drainage. All the roof of the health station was completely broken after the typhoon number 6 in the year 2006. The station has been repaired but it is rather vulnerable to typhoon and cyclone.

One of the disadvantages of the health service is that the station locates far from some residential areas. People living in Loc Phuoc, Thanh Vinh clusters have to travel about 5 km to come to health station. The main task of the health station is to vaccinate the children living in the ward for preventing infectious diseases such as whooping-cough, tetanus, rubella, etc. Health station also gives support monitoring to women with pregnancy. Health check for elderly those have health insurance also organized

Whenever disaster take place, health station based on the real situation will carry out environment and water treatment, focusing on the old residential areas, market sites and aqua product processing factories.

In the recent years, the preventive practice have been well done resulting in no epidemic disease spreading on large area of the commune. After disaster, health station collaborate with local forces to clear public places and treatment of potential spreading disease, mobilize local people to carry clearance houses and residential places. However, some common diseases still happen such as eyes disease, flu. Especially this year, petechial fever case sharply increase and the spreading time is happening earlier than usual.

Impact of disaster on women health

Women's health is affected by every typhoon and flood. Water for daily use taken from drilling wells and the water source is polluted because of flood and inundation. Women usually infected by female diseases. In the flooded areas, dirty water is every where, women have to walk in water that cause rheumatic, female diseases. Children are also infected with petechial fever. Women are also weaker than man and work hard with housework leading to more illness.



(women group discussion in Tho Quang ward)

Households living in old residential areas are easy infected with petechial disease because there are about 20% of household using tanks to store water which is a favorable places for mosquito breeding. The petechial fever is increasing every year.

The strategy of the ward to improve community health is to solve the problems of pollution and increasing number of health staff because the population is high.

9.5 Clean water supply, drainage and sanitation

The clean water distribution system on the ward is being upgraded. There is about 80% of households installed the pipeline and water meter. The remaining household living far from the pipeline. These household use water from well for cleaning, washing and buy clean water for drinking and cooking. In the new residential areas, clean water is much more easy to approach because the pipeline system is available in every road. The cost for installation of water meter is about 800 thousand VND. Therefore, 100% of households living in new residential areas use clean water for daily use. In the old residential areas, there are many household locate far from main pipeline that cause the cost for water meter installation become too high (up to several million VND). The poor households cannot bear that expense. They commonly use water from drilling well instead. In the year 2006, a non-government organization from Italia supported to install 500 water meter for poor households.

- The drainage system is available in the new residential areas and along the highways only. In old residential areas, waste water run on the paths, garden and concentrate in low places. Some households that produce fish sauce, noodle have temporary waste water drainage on their own. The drainage system in new residential areas is under construction and the waste water cannot drain off completely. According to the infrastructure development plan of the city, all the waste water including waste water of the industry parks will be treated before running into the sea. The wate water treatment system have been built but have not been operated. When there is inundation, the government of the district and ward mobilize pumping machine to withdraw water for temporary solving the problem. In general, infrastructure of Tho Quang ward is under construction that cause partial inundation and environment pollution because of waste water

- There is more than 90% of houses have latrine. The Women Union of the ward is running a credit program which provide loan for latrine building. There have been 390 households borrow money to build 390 latrines. The amount of money for making a new latrine is 5 million vnd and 4 million vnd for repairing.

- Waste in Tho Quang ward come from three sources including industry waste, aqua product processing waste and house waste. House waste is being collected by the centre of environment of the city with 240 litters rubbish bins put along the main roads and new residential areas. In the old residential areas, house waste of the houses locating on the main roads and large paths also being collected. Industrial waste is also collected and taken to other places. The ward is struggling with the problem of aqua product processing which is being collected and dried by sun light for animal food processing. This activity cause serious air pollution in the residential areas

9.6 Infrastructure

All of road in Tho Wuang ward are asphalt covered, excepts roads in the residential areas waiting for clearance. Road in these old residential area are earth or cobble covers. In rainy season, these road easily inundated. After a heavy rain, most of these roads and alley are in flooded water 0.2 – 0.5m, difficult for the people living there.

9.7 Impacts on Livelihoods

The people of Tho Quang ward work in many sectors such as: fishing, aqua-culture, animal husbandry, agriculture, forestry, fishing services, transportation service, small commerce, public services, skilled workers and unskilled workers. Of which, there is 50% of labour work in fishing, 10% in logistic service for fishing, 20% in industry and handicraft. Labours work in agro-forestry sector account for very small part with about 2%.

In-shore fishing

Tho Quang ward has around 500 boats used for in-shore fishing with different methods. The boats leave in the evening and return in the early morning. All the boats anchor near the beach. Income from in-shore fishing is depend on the weather and luck. In average, income of one night labour is about 1 hundred thousand to 2 hundred thousand vnd. In-shore fishing used to bring in good income. Since 10 years ago, the productivities have been decreased while the cost have been increased resulting in decreasing of income. The productivity is decreasing because many people apply improper methods of fishing and over exploit the resource in small area. The income from this activity is low and not enough to pay for making better and bigger boat. Therefore, most of the boat being used for in-shore fishing is too old. There have been many household give up in-shore fishing and work earn for living by do simple jobs such as motorbike taxi. Whenever the weather is not favourable, for example when the wind is above 6th grade, fisherman have to stay home and fishing is interrupted. When there is announcement on threatening typhoon, all the boats have to be taken off the sea for safety with rather high cost (300-500 thousand vnd)

Off-shore fishing

Tho Quang ward have total 7 ships which were built by the credit program of the government supporting off-shore fishing. There are 7 to 10 labours work on each ship. There are two fishing seasons in a year, North season and South season. South season last from August to February of next year. North season happen in the remaining months of the year. Fisherman could make good money from this activity but there are not many people could do because the investment is high. The cost for making ship is about 2 billion vnd at least excluding the facilities. Therefore, there have been no ship built though the government have policy to support. One fishing time could last from one to several weeks depend on the amount of fish collected. When the weather is not favorable, the ships anchor in Tho Quang port or estuary of Han river to avoid damage caused by typhoon. All of the ship are equipped with ICOM for communication and emergency facilities such as life jacket, lifebuoy. Self-help groups among the ships owners have been developed for supporting each other in fishing and coping with disasters

Workers

There are many factories, companies located on the ward working on aqua product processing, shoe making, textile, etc. These firms utilize many local labours. According to community group discussion, there have been many poor households become better when working for the factories. The average monthly salary is about 1800 vnd (approximately 100 usd). Among the factories, aqua product processing is the most unstable job because it depend on the result of fishing

Beside the labour force working in the factories, there are many people doing free job, mainly for the construction sites and other heavy works. These people used to work in fishing but have

no money to repair boats and facilities to continue. The average daily income is about 60 -80 thousand vnd per working day. Women labour get twenty thousand vnd lower than that of man. Labour doing free job have no insurance, job is not stable depend on the weather.

Agro-forestry

In the past, there were about 500 household involve in agro-forestry sector for income. Agricultural activities were small scale vegetable growing and animal husbandry. The agriculture land is gradually lost because of urbanization process and the remaining area is about 4 ha. Number of households keeping animal also decrease because animal keeping is not supported by the government. The total household involve in agro-forestry sector in the ward is about 60 at the moment.

The most vulnerable sector of the ward is in-shore fishing. Small and old boats are easily to be damaged in disaster. The small boats have no safe port in disaster season. Tho Quang port is too far for the boats with capacity under 20cv. Beside, the aqua resource is decreasing because of improper catching methods and water pollution.

9.8 Housing

All of household in ward have brick house. In the new residential areas, all are newly houses and the solid level depends on the economic condition of the household. Only small number of house can standing in the wind level 12 of a typhoon (this number is estimated to 5% in total house). Most of houses are semi-solid. Typhoon mitigation technic in house build were not mentioned before. In old residential areas, many house are degraded and weakly in term of coping typhoon. The owners of these houses are poor people, single and/or women-headed households. In estimated, about 1,200 households in Tho Quang ward are living in the unsafe house and need to go evacuation when a typhoon coming.

There is no strategy for safe housing in Tho Quang ward. Sometimes before, with support from the district, ward had a raising awareness program on reinforce the house but the efficient were unassessible. For the very old houses, PC ward calling the support of othe organisms to make some temporary reinforcement during waiting for new project as planed. At the moment, if build a new house, the local people will focus on the solidity of the house.

9.9. Most vulnerable groups and poverty analysis

The most vulnerable group in the ward is the people doing in-shore fishing. This group has low income, work in risky conditions and are not supported by the government.

Impact of main labour lost on household



Before, my husband go fishing on the sea, I stay at home take care of children and sell fish. Typhoon number 2 of the year 2004, Da Nang was under threaten area of this typhoon. My husband was being on the sea when he heard about the typhoon. He tried to run the boat to the back of Son Tra mountain to avoid damage. But, the boat was too slow and the distance is long, his boats was hit and turn over in the sea. My husband lost in that case. I have to take care of two children now. I work in a aqua product processing factory for a salary of 800 thousand vnd and work for any one hire me such as cleaner to get more income. My children are growing the school fee is increasing. I have stoped working in the factory since August 2008 because of my illness. My children and me are depending on the support of our parrent, neighbours and friends. I just hope to recover soon to continue working.

(Mrs Tran Thi Hoa, 37 year old, Section 8, Tho Quang ward)

According to household ranking result, most of the poor households are the one that do in-shore fishing, hired laborers and in their household have elderly, many children or illness people. Poor household are living in unsafe houses. Most of them are in dept. The poor households in community are usually:

Households with many children: People over 60 years old usually have 7-10 children. At present, although the birth rate tends to decrease, there are young families with many children (especially in Tho Quang, Son Tra). The research team also met women from 30-35 years old with 4-6 children. This situation, particular in coastal areas, comes from people's mentality that they need labourers for fishing. Another reason is son preference for taking on the fishing trade in the family. It is this preference that aggravates poverty here. Today, some families with two daughters still want to have children (*Discussion with the elderly group in Tho Quang*). As they have many children, they cannot afford to send them to school properly; consequently, the children tend to drop out of school very early.

Households with people with disability/sick or cannot work: Households who lose their main labourers will suffer from decreased income. With smaller incomes, they also have to spend on medical bills. In coastal areas, people live on fishing; therefore, off-shore accidents are one of the causes for physical disability.

Livelihood of a household that have people with disability



I met my wife at the social support centre. After marriage, we decided to settle here. I am blind and lost one leg. My wife have problem with nerve system, right hand is weak, memory is bad. We have to work very hard for feeding our 4 children and keeping them go to school. I do many job such as making toothpick, chopstick, basket, etc, to earn around 20 thousand vnd per day. In the recent years, the market demand for my products have been reduced, I change to do selling the broom produced by blind association at home and get 300

thousand vnd per month. My wife work very hard. She is cleaner at the primary school with 400 thousand vnd monthly salary. She also work for private house in extra time to earn more money for buying food for children. In addition, we receive 240 thousand vnd monthly allowance from government. Luckily, our children study very well and work hard. Our first daughter is working in probation time at the supermarket with the salary of 900 thousand vnd contributing for rice, oil and fish sauce. The other three children are going to school. My life is unhappy, I try to help my children studying to find a job.

Mr. Nguyen Xuan Ly, 49 year old, Secion 11C, Tho Quang ward

Women-headed households: These women are usually those whose husbands died leaving them with children. It is quite common for these households to be poor in Tho Quang Ward. At Section 24 in Tho Quang Ward with 50 households, 17 are poor and near-poor, among which, 12 are women-headed households. This is evidence for the feminization of poverty phenomenon. They have to bring up their children with very unstable incomes and without secured jobs. They are the most vulnerable in face with disasters.

Elderly people without anyone to rely on, elderly people without support from their children: They do not have children or their children died. One family lost all the four children to a fishing trip, traffic accident and diseases. This group also includes those with children but do not receive any support from their children due to various reasons. One reason is that the children are also very poor. Without any accurate data, talks with the elderly group show that many old people are still the main labourers in their families. Many among them are over 70 but still have

to work as hired workers for a living. Even these people are poor as they have to feed their children and grandchildren (Ms Nguyen Thi Huong, Section 6E in Tho Quang ward)

Life of a single elderly women



Her parent lost and she grows up all alone since she was a child. When she was young she work as a maid for food and accomodation. When she get old, she collect waste bottle and thing to earn for living. Since the year 2006, her eyes cannot clearly see and she cannot move herself around. People living around bring waste bottle for her. She can earn 5-10 thousand vnd per day. In addition she recieves 150 thousand vnd monthly allowance from governement. Her house which was built by ward authority now is degraded and inundated in rainy season. She said" I live by goverment support, I am all alone, old and ill cannot do anything"

(Ms. Doan Thi Thinh, 73 year old, cluster 11H, Tho Quang ward)

The strategies of people doing in-shore fishing is to find another job because fishing is risky. However, there have been several tens of households change their job. Lack of capital and skills hinder the effort of changing their job. Vocational training program organized by government is not appreciated because the time for training is too short and trainee are not able to do the job after training. Fisherman have to make use of the small and old boats without registration because the income is not sufficient for making a new boat and the boat factories are not allow to produce small boats under 20cv. Investment for bigger boat and ship is too much above the capacity of local people. In short term, the solution is to support emergency and communication facilities for the boats to mitigate impact and lost.

10. PRIORITIZED ISSUES AND ADAPTATION MEASURES

10.1 Key constraints in Da Nang now include:

- i) Because awareness of climate change is not complete yet, it is difficult to assess all possible impacts in future as well as improvement of adaptation of the economic - social programs with climate change;
- ii) Environment pollution is influencing powerfully on the life, activities, production of people and affecting the marine ecosystem.
- iii) Process of career change with orientation meet many difficulties, priority in industry-service development is still difficult and inadequate;
- iv) Performing development strategies was not simultaneous yet, and
- v) There are still many human losses because of disasters and other dangerous forms of weather.

10.2 Measures suggested at city level:

- 1) Increasing capable of wastewater and exhaust-fumes management in the industrial and export processing zones.
- 2) Suggesting investing to build systems of living sewage treatment.
- 3) Researching effective measures to protect and develop forests at riverhead, coastal protection forests and the nature reserve of forest and sea.
- 4) Constructing concentrated seafood-processing areas.

5) Enhancing awareness of environmental sanitation for residents. Organizing suitable points for garbage collection, supporting garbage collectors, campaigning for expanding road for dust-cart coming.

6) Make work chances to increase income and help poor households, fisher households to take their children to school.

7) Improving the combination of branches in joining and propagandizing climate change.

8) Suggesting taking interest in expense investment for building documents and methods to propagandize disaster management and climate change.

10.3. Suggested measures of Lien Chieu district:

No. of priority	Suggested Contents	Ranked by gender	
		Male	Female
1	Raising awareness of preventing and rescuing from natural disasters and climate change	1	1
2	Researching towards the development of sustainable industry - service – commerce branches at Lien Chieu district in the conditions affected by natural disasters and climate change	2	4
3	Repairing asphalted road, change pathway into concreted road	3	3
4	Rapid implementation of the urban consolidation plan associate with wastewater treatment system, suitable drainage concurrently	5	2
5	Checking to repair tension pole in flood areas where ground is soft and weak.	4	8
6	Supporting informational equipments to 6 ships fishing far shore	6	7
7	Investment for dredging, repair of irrigation in Hoa Hiep Bac ward and Hoa Hiep Nam ward	7	6
8	Investing pilot projects of plant varieties suffering drought with high economic value and safety vegetable	8	5

Suggested measures of Hoa Hiep Bac ward:

No.	Suggested Contents	Ranked by gender	
		Male	Female
1	Early implementation of the program, urban consolidation plan before the rainy season in 2010	1	1
2	Career conversion for the inshore fishermen, poor farmers and the unemployed	3	2
3	Constructing sewage, exhaust-fumes management measures thoroughly in industrial zones, factories, production facilities	4	3
4	Supporting 300 households to build latrines (teams 11-15,17-20, 37)	2	5

No.	Suggested Contents	Ranked by gender	
		Male	Female
5	Supporting technology and materials to re- repair the 4-level houses of poor households (700 houses nearly collapsed and downgraded)	5	6
6	Supporting technology for aquaculture and visiting good aquaculture models and aquaculture environment.	8	4
7	Enhancing people's awareness of environment and natural disasters, climate change.	6	7
8	Building sea-walls to prevent waves, invasion of seas in teams 21-29 and Cu De riverside.	7	8

Suggested measures of sections 29 and 30

No of priority	Suggested Contents	Ranked by gender	
		Male	Female
1	Building drainage systems in residential areas	1	1
2	Early building sea-walls and Cu De river-wall for avoiding the land being invasive; combination re-plant forest protection.	2	2
3	Checking regularly treatment systems of sewage, exhaust-fumes, dust in industrial zones, factories, enterprises, manufacturing establishment.	4	3
5	Supporting and guiding poor households to make stronger houses (17houses in team 29, 15houses in team 30)	5	5
4	Introducing and guiding households about the implementation of the safety house model.	3	6
6	Increasing awareness of environmental sanitation in residential areas along the Cu De river.	6	4
7	Strengthening check environmental sanitation and preventing residential area from sewage from shrimp nursery farms.	7	7

Suggested measures of section 37

No. of priority	Suggested Contents	Ranked by gender	
		Male	Female
1	Early implementation of the Project of Ecological Thuy Tu Urban (the project of Thuy Tu urban before)	1	1
2	Bringing out reproduce measures or damage compensatory for farmers cultivating in Thien field (20 ha)	3	3
3	Opening a road linking with the bypass city and finding out measures to ensure traffic safety	2	4
4	Supporting the methods of urgent rescue: 2 row-boats and 2 large coracles (capacity of 3-5 people) for the beginning	4	5

No. of priority	Suggested Contents	Ranked by gender	
		Male	Female
	and the end parts in Section 37; life jacket, lifebuoys for rescue teams and people required to stay at home in the time of rainstorms.		
5	Permitting by writing and supporting residents to make solid house before the rainy season in 2009 (approximately 60/65 households need to be repaired), supporting conditions to 43 household to build toilets.	8	2
6	Researching to find out suitable plant varieties: conditions of ground, environment, harvest, high economic efficiency.	6	6
7	Integrating popular knowledge of disaster prevention, climate change in community activities in team 37 or organizing training courses on disaster prevention, climate change for community.	5	7
8	Researching irrigational system to ensure irrigation in drought season.	7	8

Needs proposed by most vulnerable groups in Hoà Hiệp Bắc Ward

	Women	Men (priority order)
1. Elderly people group	<ul style="list-style-type: none"> • Build wave breaker embankment (along the coast from Nam O bridge to Hải Vân cement factory) • Training in storm preparedness (high tides happen in every 2-3) • Create jobs • Medical insurance for the poor • Concrete roads in hamlets 	<ul style="list-style-type: none"> • Provide equipment for storm preparedness (cable straps). 3 straps for each household with sandbags • Build wave breaker embankment so as to protect the land when the sea rising in flood season • Improve the concrete and the drainage system for 2 teams
2. Poor people group	<ul style="list-style-type: none"> - Create jobs for improving income - More investment in clean water - Build wave breaker embankment - Plan protection forests (the forest was there before) - Lighting in residential areas - Assistance in medical insurance for the poor - Treatment of water for daily use after storm - Provide medicines for cholera after storm (many old people and children get cholera due to the polluted water after storms) - Training on business orientation - Training on disaster preparedness skills 	<ul style="list-style-type: none"> - Provide steel wires and sandbags for strengthening houses - Drainage system (often broken in rainy season) - Build houses for evacuated people when storms happen - Build roads in residential areas for local people - Raincoats, lifejackets, helmets, big knives for chopping down trees, shovels - Assistance with radio programs for fishermen - Build wave breaker embankment - Lifejackets for fishermen - Build shelters for fishermen and fishing equipment

	Women	Men (priority order)
3. Children group	<ul style="list-style-type: none"> - Provide food - Provide books for friends who lost their books - Have shelters (when storms come unexpectedly) - Start campaigns to support poor friends (books, money) 	<ul style="list-style-type: none"> - Protection helmets - Medicines after storms - Foodstuff - Relief ships - Lifejackets - Books - Clothes

10.4 Suggested measures Son Tra District, Tho Quang ward and two sections:

Son Tra District	Tho Quang ward	Section 24 (Tho An)	Section 6E (Thanh Vinh)
Research on capable building sea-wall to prevent waves from seas to make boats shelter of beaches	Make solid houses	Support an electric generator	Build a nursery school
Vocational training for fishermen to reduce the number of in-shore fishers	Upgrade schools	Upgrade community centre	Build a kindergarten
Seaman training to export labor	Upgrade ward health station	Upgrade ward health station	Build a health station (or setup community health service team?)
Produce food for animal and fish from the waste aquatic products processing by closed technology	Life jacket, electric generator, canoe and other rescue facilities DMSC members and rescue team	Life jacket, lifebuoys	Reinforce house for poor households and/or single
Research for sustainable aquaculture appropriate for planed sustainable tourism development	Grow trees on coastal beaches	Drainage ditch	10 ox cart with big wheels
Organized rescue and relief exercise on the sea	Vocational training for people want to change their livelihood	Concrete road	Line, sand bag
A relief fund for fishing	Boat winch system	Rescue facilities for rescue team	Information system
Specific officials on disaster mitigation	Treatment system for waste from aquatic products processing	Support for reinforce un-solid houses	Electric generator
Modernization system contact information to ensure that can work in conditions of disaster	Exercise on the typhoon avoid		Lifebuoys, life jackets
Repair the shelter in Tho Quang anchorage			Waste water treatment

Son Tra District	Tho Quang ward	Section 24 (Tho An)	Section 6E (Thanh Vinh)
Find the typhoon mitigation house model which can be apply in Son Tra			Treatment system for waste from aquatic products processing
Support fishermen for changing boats or career			Grow protective trees on shoreline
Strengthening the capacity of fishing group to each other in fishing			Help to change career (give up fishery)
Protect the coral reef ecosystem in Son Tra peninsula			
Find jobs for women of fishery family			

Proposed by people in Thọ Quang ward

	Women	Men (priority order)
1. Elderly people group	<ul style="list-style-type: none"> - Build schools and health centres - After storms, need medical check up because epidemics often happen after storms - Money assistance when disasters happen; foodstuff, medicines - Training for people on disaster preparedness - Capital provision - Rebuild the market so that women have place to sell fish 	<ul style="list-style-type: none"> - Create jobs for youngsters - Assistance for strong houses as this coastal area is strong storm-prone - Storm resistant house construction - Need loudspeakers for information dissemination as the ward's loudspeaker is too far away for effective communication.
2. Poor people group	<ul style="list-style-type: none"> - Need zero-interest loans to repair houses (will pay by instalment) - Need money to start business (seeling noodles) - If having money will buy nets for husbands to go fishing - Create jobs - Free medical insurance for fishermen - Assistance in lifejackets for people going to sea - Rice provision in months that people can't go fishing (Sep and Oct) - Zero-interest loans for poor households to start their small business <p>Single women</p> <ul style="list-style-type: none"> - Housing assistance for 	<ul style="list-style-type: none"> - Financial assistance to improve houses - Assistance to build a primary school in the resettlement area - Build health centre in the area - Build a community house for social organizations and also serves as shelter in storms - Set up the system for pulling fishing baskets to safety - Provide lifejackets for fishermen - Assistance in generators so that people can have electricity to get updated information about storms and floods - Shelters for ships in storms - Build drainage system in the residential area, clean water system for local people

	Women	Men (priority order)
	women-headed households who are renting rooms - Assistance to fix shelters for poor women-headed households in storms - Assistance in school fees - Provide insurance for poor women-headed households	- Water treatment for local people after storms to avoid epidemics - Provide loans for the poor to build ships and buy nets
3. Children group	- Manuals for disaster preparedness; - Need umbrellas, raincoats and warm clothes - Need a team to raise awareness of disasters and preparedness - Need people's solidarity and attention to disasters - Want to learn how to swim	- Need helmets - Need foodstuff - Need raincoats - Adults need to tell children what to get prepared when storms come - Need assistance in instant noodles and rice

10.5 Other recommendations/measures:

Gender mainstreaming

- Promote the participation of both women and men in all activities and all levels of the project. In particular, try to attract women into non-traditional capacity improvement tasks (for example: managing groups in the community, ToT training, core groups). This will challenge to change gender relationships for more equality.
- Interventions need to consider the needs of both women and men
- Poor women-headed households and lonely elderly people need to be considered as the most vulnerable and to receive special attention in activity implementation.
- Attract the participation of local women unions through consultations and engagement in activities in order to ensure that women's needs are considered in the whole project implementation process.
- The project needs to collect gender-disaggregated in all the activities and all levels. In order to ensure this, **it is necessary to design report forms** requiring gender-disaggregated data (quantitative) and analyse the participation levels of men and women, progress, changes in gender relations, lessons learned regarding gender (qualitative) at all levels.

Education

- Improve education and communication on disaster preparedness and climate change for both teachers and pupils. It is crucial to address practical skills such as swimming or reaction in case of disasters.
- Change the practice and methods of education: organise extra-curriculum and off-school activities on disaster preparedness, use movies, documentaries, videos and other means of communication that can stimulate children's participation.
- Develop training sessions on climate change, impact and adaptation for all grades in primary school. In fact, only pupils at grades 4 and 5 received some information on these topics. Smaller children also need to be prepared as they are the most vulnerable group.

Health, Water, Sanitation

- Improve communications on water, sanitation and hygiene; raise awareness of people on environment protection.
- Family planning and family health care services, in particular reproductive health, should focus on both men and women. In fact, these programmes only target at women, which increase pressure on women while men are not addressed.
- Health workers at all levels need trainings on knowledge and skills to address diseases and health concern related to disaster and climate change.
- Complete sewage/waste drainage system of Da nang city to create favorable condition for flood drainage and environment protection as well
- Upgrade drainage and sewage system for existing residential areas of of Hoa Hiep Bac ward, Lien Chieu district, and Tho Quang ward, Son Tra district to enable them being connected to sewage system of the city
- Install fresh water supply system for Tho An section, Tho Quang ward, Son Tra district to ensure health care for the children and women.

Poverty/livelihoods

- To support the poor effectively, besides the overall policies for the poor, it is crucial to have proper classification among poor people. The assessment showed that poor people are not homogeneous. A proper classification of needs/potentials/problems will be useful to deliver better help for the poor. For example, young people may need vocational trainings and employment, sick people need help to access community support or available health care service etc.,
- Rehabilitation plan should include *vocational plan* for people who are displaced, especially for poor households. The financial compensation, for instance, could combine/include a certain amount of money for vocational training.
- Besides social policies for the poor, it is important to reach *the group near the poverty line* as they are facing similar problems that poor people have to cope with, and they can be easily fall under the poverty line. The government' social policies should also address this group.
- Poverty reduction programmes – from both central government and other local programmes - should *raise the poors' will to overcome poverty by their own, and build their capacity to implement activities*. While resources for poverty reduction are limited, the escape of the poverty trap is likely to be contained by a lack of will and capacity from the poor. Poverty reduction works best when its practices can mobilise both resources from outside and the strong effort from the poor themselves.

Urban Planning

- Research the rate of population increasing for the city up to 2050 that is basically to revise urban planning in appropriate with services and infrastructure development system. It may not follow the estimation for city population will be increasing from 1,200,000 to 1,500,000 people to 2050
- Strengthen capacity of climate change adaptation for the planners at all level to apply these knowledge for planning process
- Conduct community awareness raising on climate change adaptation, especially vulnerable groups
- Promote community participation in planning process and decision making
- Conduct assessment on alternative livelihood activity for the resettlement areas, and to have good study on changeable existing job to the new one or vocational training needs assessment
- Carry out an overall review for the adjustment of master plan for urban construction for Da Nang city and develop the vision up to 2050, taking account of negative impacts of climate change. The focal point is to redistribute the populations and production in consistency with forecast of climate change.

Other

- Capacity building programmes for government levels and sectors to integrate natural disaster prevention, response and mitigation into socio-economic development plans.
- Government policy on “integrating natural disaster management and mitigation into the socio-economic development plan of all sectors in the national economy.
- The issue of “assessment of natural disaster risks” needs to be regulated in the Investment Law.
- All levels should carry out assessment on their vulnerability to be base to integrate natural disaster mitigation into socio-economic development plans of each year, every 5 years and in longer term.
- Provide training courses for enhancing capacity of planning, making plan of integration of natural disaster mitigation into social development.
- Participatory planning skills, methods and process need to be provided for the planners at district and ward level.
- Disasters management, climate change adaptation should be integrated into the socio-economic development planning at all level.
- Promote community participation in planning process at the ward and district level.
- Need to receive accurate research data for climate change impacts from national/international scientists.