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Preliminary data analysis summary report

QUANG NAM PROVINCE, VIETNAM

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Introduction

MICRODIS is an Integrated Project funded under the EU Sixth Framework Programme – Thematic Priority 6.3 Global Change and Ecosystems (Contract number GOCE-CT-2007-036877).

Disaster losses are increasing with great consequence to the survival, dignity and livelihoods of individuals and communities, particularly of the poor in developed and less developed countries. Disaster risk arises when hazards interact with physical, social, economic and environmental vulnerabilities. In the past two decades, more than 200 million people have been affected, on average, every year by these extreme events.

Environmentally unsound practices, global environmental changes, population growth, urbanisation, social injustice, poverty, conflicts, and short-term economic visions are producing these vulnerable societies. This takes on particular urgency in the face of long-term risks brought about by climate change, and goes beyond environmental degradation or the mismanagement of natural resources.

There is now international acknowledgment that efforts to reduce disaster risks must be systematically integrated into policies, plans and programmes for sustainable development and poverty reduction. The MICRODIS project locates itself within this above framework.

The two regions which form the focus of the MICRODIS project are:

1. European Union, associated countries and new accession states: Belgium, France, Finland, Germany, the Netherlands, Norway, the United Kingdom.
2. South and Southeast Asia regions: India, Indonesia, the Philippines and Vietnam.

These regions have been selected based on their high frequency of extreme events and the impact on affected communities.

There are twelve broad and twenty-three sub-groups of distinct extreme events, ranging from chronic slow onset phenomena to acute rapid onset ones. The health and socio-economic impact implications differ vastly between these twenty three types and addressing all of these would compromise the quality and applicability of the project results, risking over-generalisation.

In both Asia and the European Union, three types of extreme events, namely **floods**, **earthquakes**, and **windstorms**, account for nearly seventy-five percent of the occurrence of all extreme events. The MICRODIS project will concentrate on these three phenomena.

The recent evidence of climate change indicated that the frequency of floods has increased and affected a diverse set of biological, physical and economic systems in Quang Nam province, Vietnam. The situation is likely to become worse. Natural and socio-economic systems are sensitive to such extreme events because of their limited adaptive capacity. Thus some of these systems might undergo significant and irreversible damages. For those living in rural communities, whose livelihoods rely on access to

natural resources and agricultural production, they are highly vulnerable to the impacts of these disasters due to limited access to management options and insufficiency of resources to adapt.

Relevant knowledge based on practical observation in the themes of concern as raised in MICRODIS Project is essential to monitor the impacts of disasters and to plan adaptation options for both local authorities and local communities. The output of the project will include an evidence-based database on impacts, field methodologies and tools for data compilation, impact models, and integrated vulnerability assessments. It will also strengthen standardized data collection of extreme events and their impacts at local, regional and global level. The aim of this research project is to conduct a survey using the MICRODIS integrated questionnaire in combination with an Economic impact assessment protocol in order to assess the flooding event in 2007 in the Quang Nam province in Vietnam. Accordingly, Hue College of Economics involved in the EU Sixth Framework Programme-Thematic Priority 6.3 in order to conduct the MICRODIS Integrated Questionnaire Survey (MIQ) in Quang Nam province that was jointly developed by the partners of the MICRODIS Consortium. We also designed an annex study, which focused deeply on economic in-depth case studies.

Background

Located on the Indochina Peninsula in Southeast Asia, Vietnam is a developing country with a total land area of nearly 332,000 square kilometres. According to the Vietnamese government's declaration, Vietnam's territorial water is 12 nautical miles, which equates to one million square kilometres of privileged economic waters. The country stretches over 1,650 km in length from the North to the South. Three-quarters of the country is covered by mountain and hills, the rest is the vast deltas of the Red and Mekong rivers. Vietnam has 2,860 rivers in which the two biggest Rivers Red River in the North and the Mekong in the South. The country also has 3,200 kilometres of coastline with almost 3,000 off-shore islands. Facing the Pacific Ocean in the East, Vietnam is considered as one of the most prone-natural disasters countries in the world.

Vietnam is characterized typically by tropical climate region, with both the continental air stream and equatorial ocean air stream are blowing. Therefore, its climate is affected by the Asian monsoon, mainly the winter and summer monsoons. The climate of the North includes two different seasons: the cold season from November to April, and the hot season from May to October. The South is affected by the summer monsoon, and so it is hot all year round, yet it still has two distinct seasons: the dry season from December to April and the rainy season from May to November. On average, Vietnam has nearly 2000 hours of sunshine per year; about 100 days of rain, with a volume of about 2000 mm/year; a humidity of around 85%; and a temperature of 24^{o}C. Vietnam is usually also affected by six or seven storms and tropical depressions annually, mainly in the North and Central regions. This climate pattern has caused negative impacts on the socio-economic development, especially on local poor communities. In the

context of increasing climate changes with frequency and severity of disasters, the country suffers from many types of natural disasters: floods, storms, tropical depressions, storm surges, inundations, whirlwinds, flash floods, river bank and coastline erosion, drought, landslides, and forest fires. Among these types, floods are the most threatening, then typhoons, and third comes droughts as the major natural disaster risk (Tuan and The, 2009).

In the last ten years, Vietnam suffered from a number of extremely destructive disasters. The 1997 typhoon Linda in the Mekong Delta provinces killed nearly 3,000 people, and was considered as the most devastating disaster in the century nationwide. In 1999, the historical flood in Central Vietnam was the worst one in a hundred years in this area. This flood killed 715 people, inundated nearly 1 million houses, swept away thousands of houses, and incurred an economic loss of about $350 million. This loss was among the biggest disaster related damage in the 20th century in Vietnam (CCFSC, 2005). Since then, climate changes, impacts, vulnerability and adaptation have been a subject of intense debate among government development strategies in recent years. Vietnamese Central Government recognized that it is necessary to obtain accurate and more comprehensive data on the source of climate changes, impacts and the implications of all development plans from central to local level.

Quang Nam province

Geographical position

It is located in the heart of Vietnam, about 860 km to the north of the city of Ho Chi Minh and 865 km South of the country's capital, Ha Noi. To the South of Quang Nam is Quang Ngai with DungQuat- a largest industrial zone in Central Region. Da Nang city is neighbour city in the North which is well-known centre of the Central Region. To the West of province, Quang Nam shares border with Laos Republics and Sea in the East (see Figure 1).

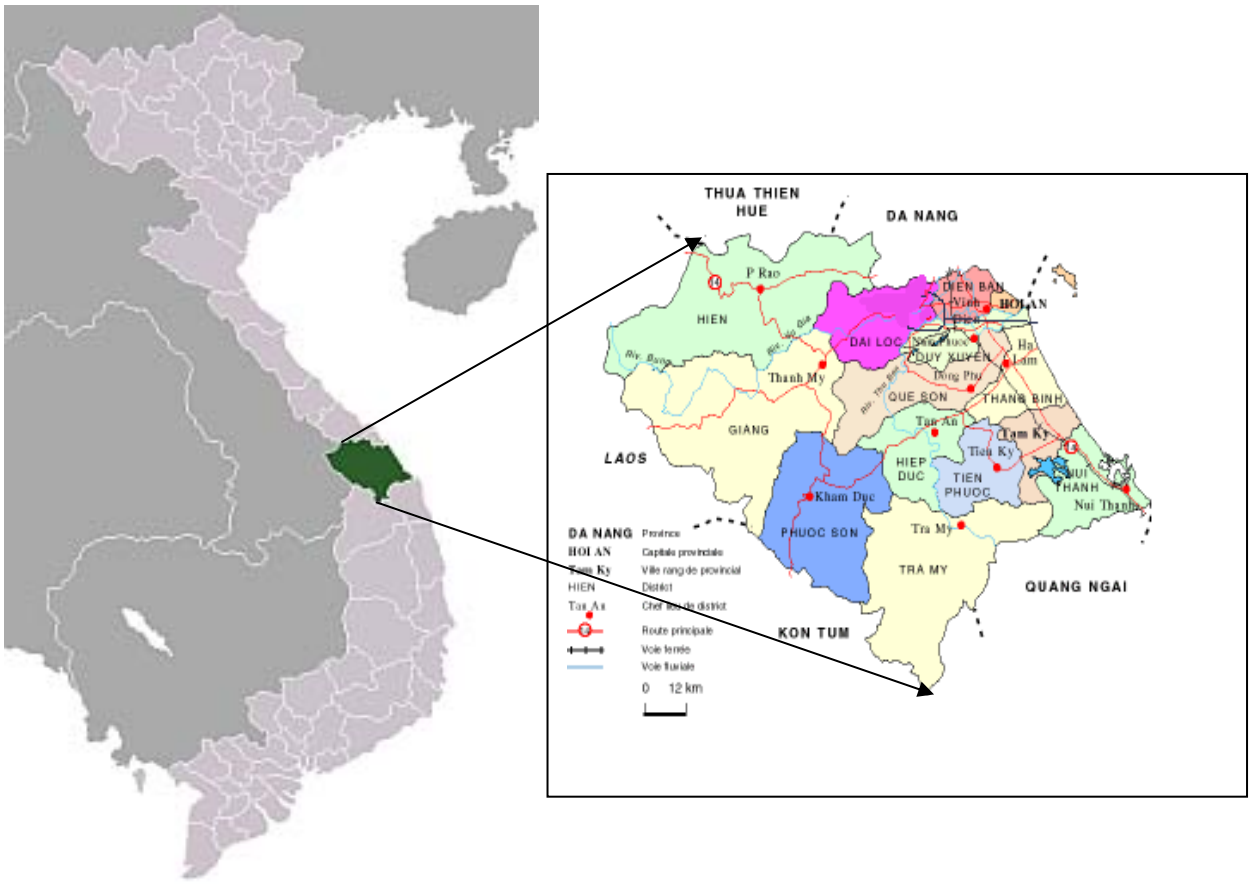


Figure 1: Map of Quang Nam Province

There are 18 administrative units at district level in which 9 of that are defined as upland and mountainous districts where local communities mainly imbed in agricultural production and natural resource access (e.g. deforestation, mining and materials) for their survival. These districts are also recognized as the most prone disaster areas such as storm, flood flash and erosion. The rest of provinces are delta and coastal regions where local community mainly involves in farming and fishing activities for their income generation. These districts and town are also the most prone flooding areas in the context of increasing climate change.

The province located in the point of intersection between the two geographical regions of North and South which are characterized by aslope topography from West to East with many mountainous ranges, short rivers, delta and coastal areas that created a diversified ecosystem and become one of the highly disaster prone disaster regions in Vietnam. Rainy season and dry one are identified as typical climate pattern of Quang Nam. Rainy season occurs from September to January with annual average rainfall of about over 2000 mm (most of which fall in from October to late of November), flooding is a regular occurrence that caused serious impacts on local communities, especially in the flooding prone areas such

as coastal areas, low-lying deltas and downstream of rivers. In dry season, high temperature and Southwest monsoons also cause droughts in Quang Nam.

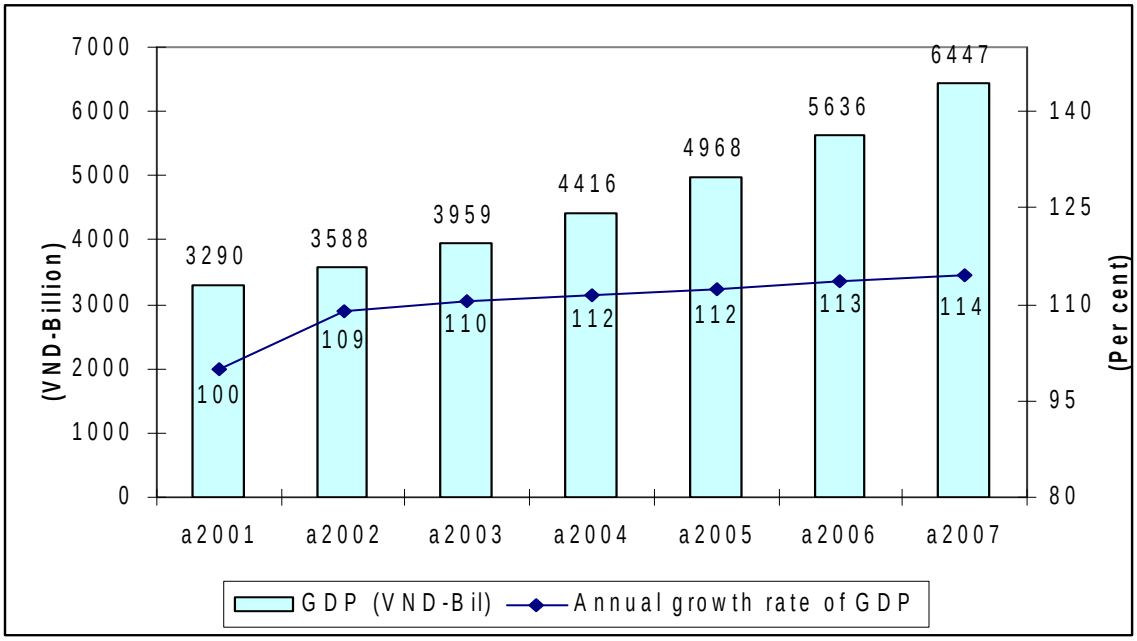
In terms of resources, Quang Nam has diversified ecosystems and natural resources. Table 1 shows that a large area of province is upland and mountain covered by forest. Upland area is also considered as comparative advantages of this province that can be use for industrial tree planting, however a lack of infrastructure and poor communities are common features of, that constrain socio-economic development in these areas. There are about over 300 thousand hectares of unused land that are likely to use for agricultural production (see Table 1). Besides, the province also has potentials to develop industrial sectors such as petrol, chemicals, cement production, and granite production.

Socio-Economic Development and Local livelihoods

It is important to recognize that the successfulness of economic renovation of Vietnam (i.e. Doi Moi policy) has brought prerequisite accelerating the development of multiple dimensions of Quang Nam. During the last two decades of economic renovation, the province has made remarkable economic strikes, with annual growth rate averaging in excess of 10.0% over the last 5 years (see Figure 2). The industrial sector has gained greater importance in Quang Nam's GDP, with its share increasing 34% in 2005 to 38% in 2007. The service sector has made considerable progress in diversification and its contribution of 36% to provincial GDP (see Figure 3). Rapid growth rate of economic development has improved the living standards in both urban and rural communities in last five years with an increasing GDP from about US$ 600 to US$ 800. It also resulted in remarkable progress in the elimination of hunger and reduction of poverty. The proportion of the population living in the poverty has reduce by more than a half in last decade, from over 50% in 1993 down to 21% in 2007 (Quang Nam Statistical Yearbook, 2007; Quang Nam People Committee, 2007).

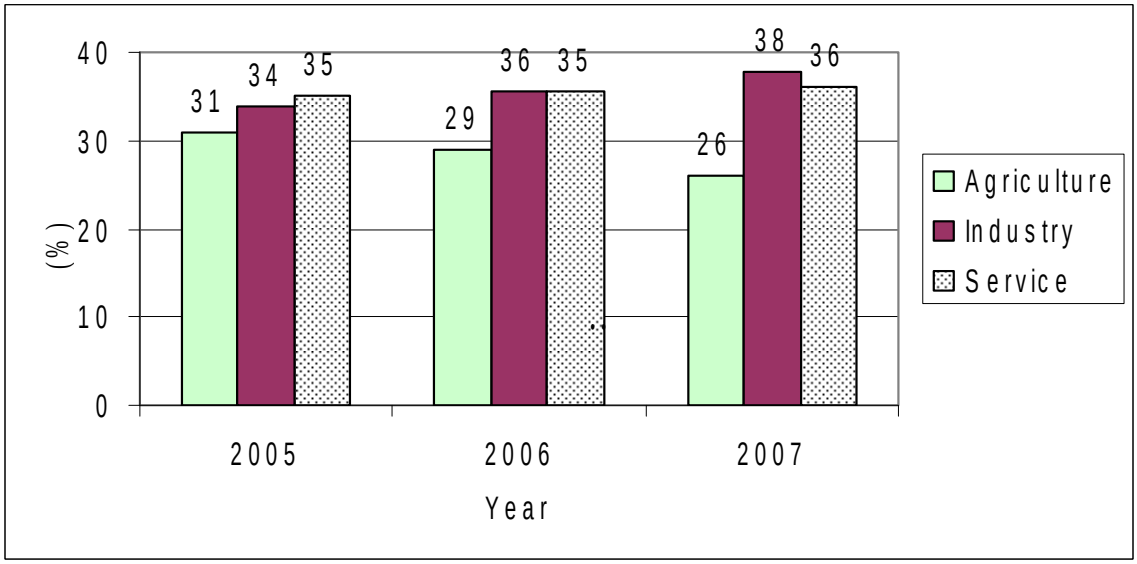
Despite its relatively small areas and a population of 1.4 million people, with its rapid economic growth and comparative advantage in position the province is recognized as a key economic zone for the Central Region of Vietnam in the Overall Comprehensive Development Strategy. Quang Nam province is well known for its cultural resources and natural beauty, and has become a major tourism centre in Vietnam. Quang Nam People Committee has acknowledged the role of the Tourism Industry as strengthen linkages among economic sectors and alleviate poverty at local level. Additionally, Quang Nam now calls for a change in its economic structure so that tourism, industry, construction and services will be the key socio-economic drivers of province. However, like other provinces in the Central Region, due to unfavourable weather condition, poor infrastructures and poor local communities, Quang Nam is one of the poor provinces in Vietnam.

Figure 2: Gross Domestic Product and Annual Growth Rate by Year



(Source: Quangnam Statistical Yearbook, 2007)

Figure 3: Gross Domestic Product by Sector



(Source: Quangnam Statistical Yearbook, 2007)

As shown in Table 2&3, over 82 % of provincial population living in rural areas, and 67.4% of labour force working in agricultural sectors while agricultural sector contributed only 26% of provincial GDP. It

indicates the fact that agricultural production is still main economic sector creating job for local communities in Quang Nam, however majority are low income-generating practices. Evidently, there is a big gap in terms of income between labour working in agriculture and industrial-service sectors (see Table 2&3). Additionally, most of labour working in agricultural sector lives in local communities which are prone-flooding areas, thus lead them to more socio-economic vulnerability to disasters, especially flooding than any other groups in the context of Quang Nam.

Table 1: Distribution of Labour Force by Main Economic Sector

Item	Unit	#	%
Total labour	**Labour**	**778,349**	**100**
By sector			
1. Agriculture	Labour	524,735	67.4
2. Non-profit organizations	"	49,136	6.3
3. Manufacturing	"	70,521	9.1
4. Construction	"	23,416	3.0
5. Trading	"	72,030	9.3
6. Other		38,511	4.9

(Source: Quangnam Statistical Yearbook, 2007)

In terms of local livelihoods, local communities, especially those in the prone-flooding areas of Quang Nam tend to involve in subsistence living practices. For ethnic minority groups living in upland areas, cultivation, husbandry, Non-timber forest product collection, and reforestation are main livelihood practices generating income for them. Farming activities, husbandry, and non-farming ones are main source of income of communities who live in delta regions (most of them are Kinh people). For households who live in urban areas such as Hoi An, Tam Ky and along National Highway No. 1, non-farm activities and services are main livelihood practices while farming activities are only minor sources of income of this group. One of the most flooding prone group is fishing communities who are living downstream of rivers, and coastal lines, fishing activities and fishery processing activities are main practices.

Generally, it can be concluded that farming activities in Quang Nam tend to be more subsistence than cash crops, rice is the dominant crop but yields are low. Successfully growing other crops is relatively limited by viable alternative options due to lack of resources, information and poor infrastructure. Seeking for sustainable livelihood alternatives for local communities, especially for those who live in flooding prone areas will play an important role in increasing vulnerable communities' resilience to climate changes.

Climate change and disaster in Quang Nam

Increased climate variability have been occurring widely throughout country, and particular in Quang Nam province, especially increased volume of rainfall caused by climate change during the last few years has intensified the flood events in this region. The situation is projected to worsen the frequency and severity of extreme disaster events. Climate changes, especially extreme disasters killed thousands of people and destroy the livelihoods of millions of people annually.

The most frequency and severity in Quang Nam are flooding events; unfortunately it points to the fact of increasing frequency of flooding events. The flooding events are regular occurrences which result from heavy rainfall in September to November annually. Annually, Quang Nam often deals with 3 to 4 floods. Due to its typical topography of aslope from West to East with short rivers, flooding events often occur rapidly and inundation lasts from 4 - 6 days in downstream that caused huge losses in terms of socio-economics and health (Tuan and The, 2009). For example, in 1999, the historical flood in this region was the worst one in last hundred years. The flood killed 715 people, inundated nearly 1 million houses, swept away thousands of houses, and incurred an economic loss of about $350 million. In 2007, 9 flooding events on the road within two months caused devastating impacts on local communities with damaged cost estimated upto VND 2000 billion.

It is stated that typhoon is one of the major and dangerous types of disasters in Vietnam in general and particular of Quang Nam. Typhoon often occurs in from August to December annually. Typhoons raise sea levels, cause storm surges and inundation. Typhoons destroy houses, buildings, infrastructures in affected areas, and generate waves which can damage sea dykes protecting coastal areas. The torrential rains accompanies by typhoons can cause flash floods and submerge low-lying areas, causing losses to agriculture and fisheries (Tuan and The, 2009).

The third kind of disaster in Quang Nam is droughts which caused serious impacts on local communities, especially on agricultural production. Droughts often occur in July to September annually.

Due to its typical topography, flooding events often occur rapidly and cause serious impacts on local communities in Quang Nam. It is reported that the costs of relief, recovery and reconstruction consume billions of dollars from household savings and government development budgets (Quang Nam PC, 2008). Disasters push households toward poverty by destroying their assets, resources and even their lives and trap them in local poor communities into vicious circle of poverty. The population is likely to be hardest hit by flood disasters is the poor communities who lack resources and little capacity to cope with, and to take protective measures for reduction of, impacts of flooding events. Investigating disaster impacts on, and strengthening capacity for, local communities are important to integrate local capacity for climate change adaptation and risk management in order to mitigate vulnerability and safeguard the sustainable community-based development for local communities.

The year of 2007 was recognized as "year of flooding event" in Quang Nam (Quang Nam PC, 2008). Due to impacts of storm No. 5&6 in the North provinces and monsoons, heavy rain occurred in the whole province with rainfall averaging 2000 mm, in some districts rainfall reached nearly 3000 mm, in October 1st to 7th December, 2007. Within nearly 2 months, there were 9 flooding events occurred in Quang Nam province. In which there were three big floods occurred in only 20 days (from 15/10 to 5/11/2007): the first flood occurred from 15/10 to 18/10/2007; the second one from 29/10 to 01/11/2007; and the third one from 01/11 to 5/11/2007). Consequently, many communes were inundated about 1.5-1.7 meter, about 0.5-1.5 meter higher than water level of historical flood in 1999. Especially, it caused many serious impacts as local communities have not recovered from previous floods yet (detail see Table 2). These floods have caused many difficulties for people in the province.

It was reported that 2007 floods killed 67 people and 339 people injured and total damaged cost of VND 2000 billion. Local authorities had to evacuate about 70,000 people from inundated areas to public buildings (Quang Nam PC, 2008). There were 200,000 people need urgent aids of foods and water. The 2007 floods caused devastating impacts on local infrastructure: In the flood season, rain and overflowing limit transport, community roads experience serious damage. Floods isolate villages by disrupting community roads, prevent access to services, and suspend business activities. The 2007 floods also caused pupils off-schooling, collapsing information and communication systems. Infrastructures such as sea dykes, village-connected roads and main roads in coastal communities in Quang Nam were degraded seriously.

Local government has conducted a resettlement program for over 5000 households from flooding basins to safety areas. It, however, find less successfulness as households could not move to new place as they don't have capital to build new house, especially a lack of livelihood practices in the new resettled areas. Thus, "living with flood" has become adaptive strategy of both local authorities and local communities in flooding basin in Quang Nam. Conducting flooding impact assessment and seeking for initiatives in order to mitigate flooding impacts on local communities living in the flood prone areas will make significant contribution to sustainable development in flooding basin in Quang Nam.

Survey Objectives

MICRODIS is a project with the overall goal to strengthen preparedness, mitigation and prevention strategies in order to reduce the health, social and economic impacts of extreme events on communities.

Broad Objectives

- ⇨ To strengthen the scientific and empirical foundation on the relationship between extreme events and their health, social and economic impacts
- ⇨ To develop and integrate concepts, method, tools and databases towards a common global approach

- ⇨ To improve human resources and coping capacity in Asia and Europe though training and knowledge sharing

The aim of this project is to contribute to the overall goal of MICRODIS, which is "strengthen prevention, mitigation and preparedness strategies in order to reduce the health, social and economic impacts of extreme events on communities". The study also contribute to strengthen "the scientific and empirical foundation of the relationship between extreme events and their impacts; to develop and integrate knowledge, concepts, methods and databases towards a common global approach and to improve human resources and coping capacity in Asia and Europe through training and knowledge sharing.

The project, among others, specifically aimed at:

- ⇨ developing an integrated impact methodology
- ⇨ establishing an evidence-base of primary field research through surveys
- ⇨ increasing the coverage accuracy and resolution of global disaster data
- ⇨ To review the existing literature on disasters and its impacts, socio-economic vulnerability and adaptation; particularly relating to economic impacts.
- ⇨ To investigate possible socio-economic impacts of the floods on rural and urban households in the heavily flooded communities (compared to a non-flooded control group)
- ⇨ To identify the health impacts (e.g. morbidity patterns, nutritional status of children under 5 years old.) in flooded and non-flooded households in Quangnam province after the flooding season 2007.
- ⇨ To identify the ways in which local communities respond (i.e. adapting behaviors/coping mechanism) to the flooding impacts; and to determine the set of adaptation possibilities in relationship with constraints/barriers that would be appropriate to mitigate such impacts in the certain local context.
- ⇨ To map how local context including socio-economic context, government's preparedness, and demographic characteristics of households (such as age, gender, income, livelihood strategy) influence the impacts of disasters, local adapting behavior, and risk-sharing activities.
- ⇨ To provide recommendations to assist local authorities and policy-makers in designing appropriate plans and tools to mitigate the impacts of disasters, and enhance the adapting capacity of local communities.

Methodology

For the purposes of this study, various research methods will be used for data collection and analysis. The 'mix' of various methods will allow this study to capitalize on the advantages, and address the weaknesses, of each method. Mixed methods will provide the opportunity for presenting a greater diversity of divergent views about research problems, and also enable the researcher to simultaneously answer confirmatory and exploratory questions

Sampling Plan

The multi-state cluster sampling techniques was used for sampling procedure in this project. The steps f multi-stage cluster sampling procedure was conducted as follow.

District selection

As mentioned previously, for purposes of this study re to investigate integrated health, social and economic impact of disasters with data comparability between heavily flooded village and non-flooded ones, Duy Xuyen district and Thang Binh one were randomly selected for MICRODIS Integrated Survey in which Duy Xuyen is heavily flooded district and Thang Binh is less flooded area of Quang Nam province. Secondary data collection, focus group discussion and key information interviews were conducted at these two districts. By the chance, the list of communes and villages were collected for identification of communes and villages for survey.

The results of above methods found that there are 92 villages with 26,236 households and total population of 131,668 persons were heavily affected by 2007 floods in Duy Xuyen district. It is also figured out that there are 131 villages with 47,137 households and total population of 192,550 person living in Thang Binh district (less flooded area). These lists of villages and total number of households in each village were entered into Excel Package for 25 village selection in flooded district and 8 villages in less-flooded districts by using probability proportionate to size technique.

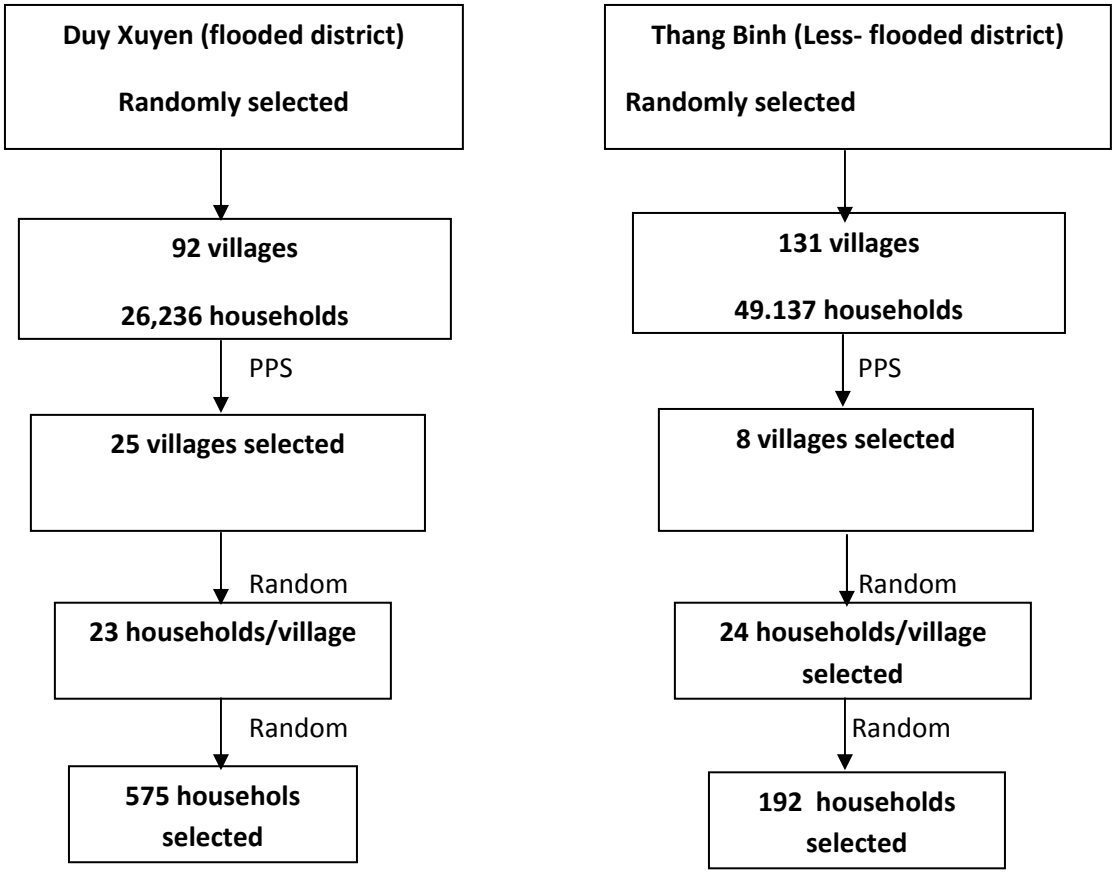
Village selection

Based on the list of village collected, all information was entered into Excel Package for village selection (cluster selection) by using Probability Proportionate to Size method. The list of 25 villages in flooded district (Duy Xuyen) and 8 villages from less flooded district (Thang Binh) was selected (see the list of villages from Appendices 1&2). It is important to note that the list of households is not available at district level. Thus, after defined clusters, the researchers collected the list of households of each village from head of village.

Household selection

Based on the list of households collected from village, number of 23 households on average is the target sample size of each village needs to be surveyed. Random selection technique was used to select households for survey based on the list of households. List of households selected was, then, distributed to each enumerators for household interviews. In case of any households could not be interviewed after three time of visits, interviewers will conduct next households and survey supervisors will select new household for displacement. Local people, most of them are head of village were employed as local guide for enumerators to identify households from the list of households selected.

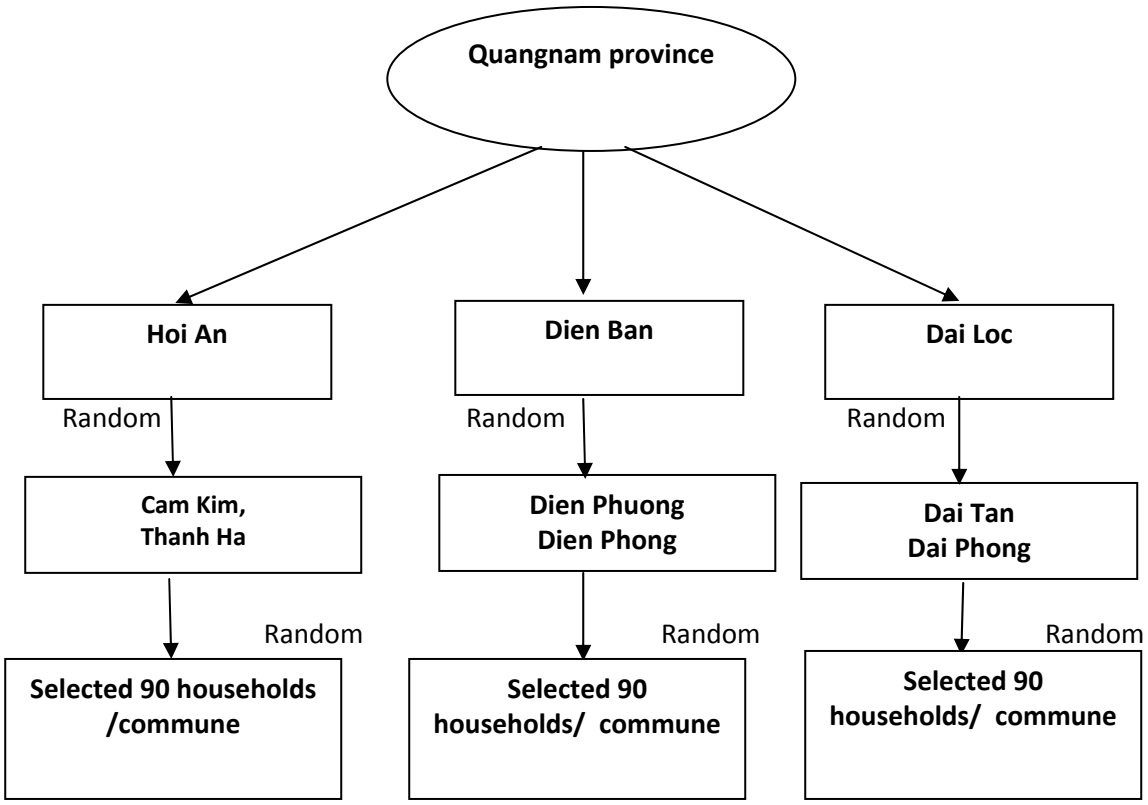
Figure 3: MICRODIS INTEGRATED SAMPLING PROCEDURE



Sampling procedure for Economic Annex Study

As mentioned previously, there were three districts selected from coastal (Hoi An), delta (Dien Ban) and upland (Dai Loc) regions of Quang Nam province. The list of communes from these districts was collected for commune selections. There were 6 communes; two in every district were randomly selected for survey. The list of household was collected from villages of each commune for household selection.

Figure 4: Sampling procedure for Economic Annex Study



Questionnaire Development and Adaptation

It is important to note that HCE team's involvement in MICRODIS Project is later (3rd year of project) in comparison with other teams. In other words, the MICRODIS Integrated Questionnaire (MIQ) have been already conducted in many research sites, for example in Philippine, Indonesia, especially in Ha Noi, Vietnam. It means that MIQ questionnaire was translated into Vietnamese by Ha Noi HSPH MICRODIS Team. At the beginning, HCE team adopted the both MIQ English Version and MIQ Vietnamese one adapted and translated by Hanoi HSPH team. Based on that, HCE teams carefully reviewed and

compared the content and language between MIQ English version and MIQ Vietnamese one. By doing so, we recognized that the MIQ questionnaire is able to collect robust data to answer all research questions that our study expects to research. However, in terms of Vietnamese used in this translated version, we also recognized that there are many Vietnamese terms used in MIQ translated by HSPH team that are able to make respondents find hard to understand the questions. This is due to linguistic difference between Northern region and Central region of Vietnam. We replaced these terms with regional Vietnamese terms for our research site.

The MIQ questionnaire was also used for enumerators training course in June, in which many of them are from Quang Nam province and neighbour ones. This set of questionnaire was asked between enumerators in role-playing section. In this process, we also asked enumerators both practice interviewing techniques and identify obscure Vietnamese terms in MIQ. By so doing, we aim to confirm the all questions raised in MIQ are understandable questions before conducting pilot survey.

The Key Informant Interview, Focus Group Discussion and Pilot Survey were conducted in Quang Nam in order to collect information for project and to confirm all questions used in MIQ questionnaire are answerable and availability of information in research site. Completing these steps, we found that there are still some questions of MIQ, local respondents found hard to answer (see the details in Annex 3 of Logbook). Based on the results of these steps, HCE team worked in group to revise and finalize MIQ questionnaire in order to adapt with our research site and extreme flood occurred 2007. The MIQ questionnaire finalized in Vietnamese version was then duplicated for about 800 sets for final surveys. Completed final survey in flooded district and less-flooded one in Quang province, HCE team organized a meeting between supervisors and enumerators in order to evaluate advantages and difficulties we had to deal with during the final surveys, special focus was also placed on difficulties and lessons learnt from running MIQ survey. Based on that, the HCE team worked in groups to back translate MIQ questionnaire into English for final submission.

As mentioned previously, we should recognize the advantage of HCE team's late involvement in MICRODIS project that MIQ questionnaire was already conducted by some of our teams in MICRODIS Family. At the beginning, we adopted fully the MIQ questionnaire both in English and Vietnamese versions. Based on the research objectives and research hypothesis as raised in our study design, our team conducted in-depth review of the content and language used in MIQ questionnaire adapted by the HSPH team.

HCE team also conducted Meeting provincial and district authorities (i.e. Key Informant Interviews) in which we invited number of knowledgeable and intensive experience persons who are in charge of position related to climate change from provincial government organizations to district levels. By this chance, HCE researchers asked participants for different issues related the core themes in our research.

Participants were also asked to confirm the validity of core themes and questions raised in MIQ in the context of Quang Nam Province.

There were also 9 focus group discussions held from provincial level (1) to district level (2) to commune level (3) and village ones (3). Conducting these focus group discussions helped to collect deep insights about research issues as raised in research questions, but also validate core themes and questions raised in MIQ questionnaires. Questions used to validate core themes and questions used in MIQ questionnaire as follow:

(1) From your knowledge and experience, do you think that we are able to collect this source of information related to extreme flood occurred in 2007 from households?

(2) Is this theme/question applicable to the flood 2007 in research site? Does this information exist in reality at household level?

(3) For this source of information, we raised this set of questions, are they answerable? If not how should they be modified?

(4) In your case, if you were asked these questions (themes), are you able to answer it correctly, if not why?

By doing so, we found that most of core themes and questions raised in MIQ questionnaires are applicable and answerable for final survey of integrated impacts of 2007 floods in research site. These are technical validations and cultural ones upon which we should be make to adapt with local context in order to make sure that we are able to collect accurate data for the study (see Annex 3 - Logbook).

Pilot survey was also conducted to pre-test the work of MIQ questionnaire in reality. It is important to note that this set of questionnaire was pre-tested by Hanoi HSPH in Hanoi. Accordingly, this set of questionnaire was pre-tested with 20 households in Quang Nam province. The result of pilot survey found that most of questions worked well in the research site. The information collected are very close with responses of participants of focus group discussion and key information interviews in the core themes such as health impacts, children nutritional status, local prevention, mitigation and preparedness, and damages, etc. This is to confirm the validation of questionnaires. However, pilot survey also helps to identify that some questions made respondents find hard to answer. All of these questions are revised as shown in Annex 3.

In order to achieve validation for this study, HCE team always recognize the role of enumerators of final survey. All enumerators of this study were recruited and trained carefully. Enumerators were not only trained interviewing and recording data techniques, but also the way of raising questions and creating friendly environment for interviews. Ethical rules and regulations of conducting survey are also reported to all enumerators. During the process of final survey, two supervisors from HCE team conducted check

and cross-check during the interview and completed questionnaires. All involved aim to increase the accurate and validity of this study.

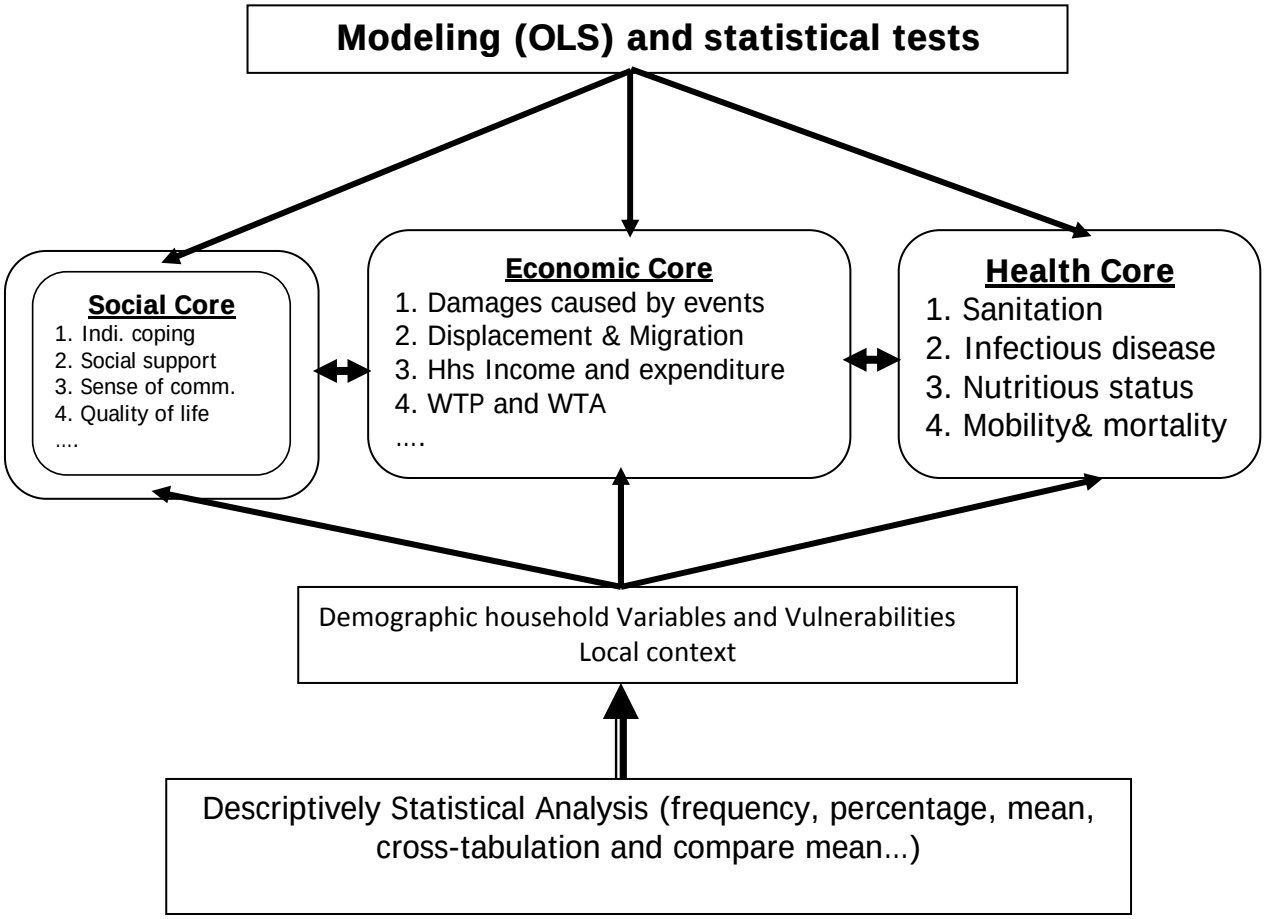
Pre-test questionnaire

The pre-test surveys were conducted with 20 households in flooded districts for MIQ questionnaire and 50 households for questionnaire used for Economic Annex Study in study sites in Quang Nam province. The pilot survey was conducted by HCE team who are knowledge and experience in survey at household level. Household were selected randomly based on the list of household provided by head of village. Enumerators were also requested to observe interview skill and experience of supervisors during the pre-test of questionnaires.

Data Analysis Methods

The data collected by MIQ survey will be analyzed as indicated in Figure 2:

Figure 5: Data Analysis Framework



The data collected from Integrated Questionnaire Survey will be integrated as follow (from Economic Viewpoint)

Relation between emotional psychological factors and WTP and WTC (willingness contribute):

A set of hypothesis that we should test is that the psychological and emotional impact of past disaster on a respondent would affect his/her WTP/WTC or willingness to take part in a disaster risk mitigation/reduction program. If past disasters were perceived very threatening and traumatic to a respondent, he/she would be willing to pay more to reduce the risk of the disaster.

We could test this hypothesis by doing a regression analyses (ordinary least square -OLS or logistic regression model). In the case OLS regression analysis, the dependent variable of the regression model is WTP (continuous variable). The dependent variable in the logistic regression is the choice of respondent to contribute or not contribute to the disaster risk reduction program. The independent variables of the two models would include variables reflecting respondent's emotional or psychological experience of past disasters and other socio-economic and demographic variables. Sign and statistical test values of estimated psychological coefficients would tell us how these variables affect respondent WTP/WTC to a disaster risk reduction program.

Health risk and WTP/WTC: If a respondent are aware of the risk of getting health problems and their consequence due to the disaster (s)he would be willing to take part in a disaster risk reduction program. It is likely that there is positive correlation between the probability of getting health problems and probability of joining a disaster risk reduction program. This hypothesis should be tested.

Synthesis of the findings from economic, social and health core analysis: The unit of the analysis is individual respondent/household. All core analyses focus on different aspects related to risk and coping behaviour of the same sample households. One of the important advantages of the inter-disciplinary approach adopted by MICRODIS is that it allows attaining a more comprehensive insight into the coping/adapting strategies of households and associated outcomes. It is suggested that each research team should synthesize/analyze the findings from different core analysis using sustainable livelihood framework.

Data Description

Secondary data:

Secondary data related the objectives of this study were collected from various sources from national to local level related to the study. This source of data helped researchers to get an overall understanding of the local context such as socio-economic indicators, geographical condition and demography in which issues of integrated social, health and economic impacts of extreme events on local communities. Secondary data collected was reduced it into meaningful and manageable indicators and available for the use in the final reports.

Qualitative Information:

Qualitative information of this project was collected from Key Informant Interviews, Focus Group Discussion from Provincial level to village one and Open-ended Question used in MICRODIS Integrated Questionnaire. Qualitative information is in-depth insights about study issues, and recorded in tapes and e-copy in SPSS. HCE researchers are currently labelling and coding every item of such information. By so doings, it will help to recognize the differences and similarities between study issues from different respondents. Original quotation of respondents' statement will also be applied in the final reports.

Quantitative Data:

MICRODIS Integrated Questionnaire was conducted with a sample of 767 households selected. There were 743 questionnaires completed. Double check was conducted right after interview completion, there 35 questionnaires were picked out due to many reason such as incompletion; less reliability… it means that there were 708 questionnaires were entered in this SPSS. There are 580 variables describing integrated social, health and economic impacts of extreme floods on households in Quang Nam in 2007 in which 503 variables are numeric data and the rest are qualitative information.

There are also the dataset of Economic Annex Study, which consists of 510 households completed and entered in SPSS file out of 540 households selected.

Data Analysis

Table 2: Distribution of Sample by Flooded or Less-flooded

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Affected (Flooded)	521	73,6	73,6	73,6
	Less-flooded	187	26,4	26,4	100,0
	Total	708	100,0	100,0	

Table 3: Has your household ever experienced in any disaster?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	623	88,0	88,0	88,0
	No	85	12,0	12,0	100,0
	Total	708	100,0	100,0	

Table 4: Did your household experienced over one flood?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	611	86,3	86,3	86,3
	No	97	13,7	13,7	100,0
	Total	708	100,0	100,0	

Table 5: Respondent with early warning message?

	Yes	No	Valid case	System
Did your receive warning/early warning about 2007 floods?	95,9	4,0	621	87
Was the warning clear?	97,5	2,5	597	111
Did you act upon the warning message?	96,3	3,7	597	111

Table 6: Where did you stay when the flood occurred?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	At home	608	85,9	98,1	98,1
	At office	4	,6	,6	98,7
	At school	3	,4	,5	99,2
	Others	5	,7	,8	100,0
	Total	620	87,6	100,0	
Missing	System	88	12,4		
Total		708	100,0		

Table 7: Integrated Impacts of 2007 floods on households

	Yes	No	Valid case	System
At least one of my family member was injured	1,8	98,2	599	109
Did you loose or experience in damage to your cattle due to flood?	49,1	51,8	545	163
Did you loose or experience in damage to your belongings due to flood?	21,3	78,7	544	164
Did you loose or experience in damage to your employment due to flood?	82,8	16,1	545	163
Did you loose or experience in damage to your (your stock of goods)?	10,4	89,6	545	163

Table 8: Respondents and access to health care system

	Yes	No	Valid case	System
Was your access or use of usual health care system affected DURING/AFTER FLOOD?	30,3	69,6	693	15
Affected due to Damaged Road	70,1	29,9	571	137
Affected due to a lack of medication	27,4	72,5	617	91
Affected due to a lack of transportation	40,8	59,2	115	593
Affected due to a lack money	36,0	64,0	597	163

Table 9: Damages to your residential house and amenities?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	289	40,8	42,8	42,8
	No	385	54,4	57,0	99,9
	Missing	1	,1	,1	100,0
	Total	675	95,3	100,0	
Missing	System	33	4,7		
Total		708	100,0		

Table 10: Supposed government is now considering to implement a flood prevention plan and plan is financed by government, would you be willing to contribute labor for plan?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	632	89,3	89,4	89,4
	No	55	7,8	7,8	97,2
	Do not know	19	2,7	2,7	99,9
	Missing	1	,1	,1	100,0
	Total	707	99,9	100,0	
Missing	System	1	,1		
Total		708	100,0		

Table 11: Willingness to pay and willing to contribution of households surveyed

	N	Minimum	Maximum	Mean	Std. Deviation
What is highest number of person-days will you be willing to contribute	535	0	60	11,36	11,046
If no labour contribution, what is highest amount of money would you be willing to pay (000 vnd)?	106	0	500	39,686	95,9
Valid N (listwise)	46				

Discussion

Table 2 indicates the distribution of households surveyed in flooded and less-flooded districts. This is important to identify the difference in between households in flooded and less-flooded areas in terms of integrated social, health and economic impacts as well as their responses. It means that it can be used for cross-tabulation with other variables from Economic Core (such as willingness to pay or willingness to contribution), Health Core (such as Mortality and Morbidity, infectious diseases).

Experience in disasters and flood (Table 3&4) are also important indicated should be used as demographic variables for further analysis as the households with experiences in disasters, particular in floods are able to have best practices in response to the integrated impacts of floods upon which they could reduce such impacts on their family members.

Table 5 highlights the effectiveness of early warning systems with households. It is also essential for further investigation of the hypothesis that there may be an association between local access to early warning systems and integrated Impacts of floods on households. Observation from the field indicated that local early warning system play important role to disseminate the early warning information to local communities. However, due to a lack of equipments, particularly in the context of extreme events, local early warning system does not work.

Table 6 indicated that over 98% of respondents stated that they stayed at home during the occurrence of floods 2007. The important point came up here is why there were 67 people died, and 339 people got injury due to floods in 2007. The reason here is like to be explained that due to local people did not evacuate to safer shelter during the extreme events as requested by local governments while the result of this study found that large proportion of households (60%) in Quang Nam own semi-permanent structured households.

Table 7 indicates the integrated impacts of 2007 floods on local communities, it is essential for further investigation as the main research objectives of our project is to investigate the integrated social, health and economic impacts of extreme event on local communities.

Table 8 shows the local condition of health care systems and local access in Before, During and After of Floods in 2007 and reasons explained why households had less access to usual health care system.

Table 9 indicates that damages to households' residential house and amenities, which is important to focus our further analysis on this area as by doing so we are able to estimate the total damages costs due to the impacts of 2007 flood. There will also be association between level damage and willingness to pay or willingness to contribution of households.

Table 10&11 are important variables for further analysis as mentioned previously that a set of hypothesis that we should test is that the psychological and emotional impact of past disaster on a respondent would affect his/her WTP/WTC or willingness to take part in a disaster risk mitigation/reduction program. If past disasters were perceived very threatening and traumatic to a respondent, he/she would be willing to pay more to reduce the risk of the disaster.