Community-based flood vulnerability index for urban flooding : understanding social vulnerabilities and risks

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Mae Brigitt Bernadel Villordon. Community-based flood vulnerability index for urban flooding : understanding social vulnerabilities and risks. Other. Université Nice Sophia Antipolis, 2014. English. NNT : 2014NICE4145 . tel-01128335

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UNIVERSITE DE NICE-SOPHIA ANTIPOLIS

ECOLE DOCTORALE STIC

SCIENCES ET TECHNOLOGIES DE L'INFORMATION ET DE LA COMMUNICATION

T H E S E

pour l'obtention du grade de

Docteur en Sciences

de l'Université de Nice-Sophia Antipolis

Mention: Automatique, Traitement du Signal et des Images

présentée et soutenue par

Mae Brigitt Bernadel VILLORDON

Community-Based Flood Vulnerability Index for Urban Flooding: Understanding Social Vulnerabilities and Risks

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soutenue le 8 décembre 2014

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ACKNOWLEDGEMENTS

I am deeply thankful to God Almighty who has always been treating me so kind and so generous. For HIS unwavering love and blessings, I am grateful.

I extend my gratitude to the European Commission for Erasmus Mundus Mobility with Asia (EMMA Action 2) Lot 12: 2010-2362/001-001-EMA2 and to Silliman University to possibly carry out my PhD study here in Nice, France.

To Prof. Philippe Gourbesville whom I am also very grateful for the opportunity to work with him, for giving me space to do my studies, space to write and space to be. Forever, I will be grateful to you, thank you sir.

I am also thankful to Prof. Roy Olsen De Leon for his support and guidance in my studies, my colleagues Joan Tura and Prof. Michael Alcala for the data input and assisting me in my field work. Thank you to Rafael Vargas, Qiang Ma, Duong Vo, Mingxuan Du, Kim Lien and Jelena Batica who were kind and helpful enough to helped me improved my paper and for their cheerful company, thank you guys!

And to those wonderful people whom I have met during my stay in Europe, thank you for enriching my personal life. My time here has been a wonderful and beautiful journey. To mommy Ingrid M. Rosell thank you for the love and support. To all my dear friends back home, here and in other parts of the world, thank you for keeping me company through your letters, mails and postcards. Thank you.

Finally, I would like to express my deepest love and gratitude to my mother and sister for their constant love and support and the coming of my niece into this world is such a great joy and blessing. And to the greatest guru of all: life.

With love and thanks.

Community-Based Flood Vulnerability Index for Urban Flooding: Understanding Social Vulnerabilities and Risks

Sujet de thèse en Français: Index de vulnérabilité sanitaire pour les crues urbaines: évaluation de la vulnérabilité sociale et des risques

Résumé en Français

Selon le World Risk Report publié par United Nations University Institute for Environment and Human Security, les Philippines occupent la troisème place mondiale pour l'exposition aux risques naturels. Un des risques majeurs est celui des inondatoons qui représente un défi pour la sécurité de sa population et le développement économique du pays. L'impact de ses inondations sur la santé publique des communautés en function deleur vulnérabilité sociale a été très peu étudié jusqu'à présent faute de données systématiques. Ce travail de recherceh se concentre sur ces aspect et propose une méthodologie pour évaluer la vulnérabilité sanitaire d'une population exposée à des inondations récurrentes. La methodologie est basée sur une évaluation de la connaissance, de l'attitude et des pratiques (KAP) des populations inondées et de leur résilience vis à vis de leur exposition à des pathogènes tels que E.coli, Leptospirosis and la dengue qui peuvent se développer à la suite d'un typhon. Des indicateurs communautaires ont été élaborés afin de caractériser les communautés. Ces indicateurs intègrent le profil socio-démographique, les conditions de logement, l'environnement physique ainsi que la gouvernance locale. Ces éléments sont importants pour évaluer le dégré de vulnérabilité sociale vis à vis du risque sanitaire afin de pouvoir ensuite intégrer ces éléments dans les outils de modélisation. Une investigation de terrain a été effectuée dans la ville de Dumaguete, Philippines, de mars 2013 à juillet 2013. Un total de 357 familles réparties dans 12 communautés ont été interrogés. L'analyse de ces données a permis de révéler une vulnérabilité synthétisée dans un indice (IVF) qui s'établi en moyenne à 39,34 %. Le secteur de Barangay Tabuc-tubig présente un indice de 53,39 % et s'avère le site le plus vulnérable. L'indice de vulnérabilité est basé sur 5 composants: hydroclimatique, social, économique, socio- comportementale et politico-administratif. Cette rapproche permet de caractériser l'état de vulnérabilité des communautés. Les résultats démontre que

l'indice de vulnérabilité reste faible malgré des indicateurs d'exposition élevées. Ce résultat peut s’expliquer par la résilience élevée des communautés dans leurs stratégies d'adaptation lors des inondations. Cette recherche a permis de démontrer que Dans ce travail de recherche, l'indice de vulnérabilité est lié aux variables intervenant dans la caractérisation de la résilience.

ABSTRACT

According to the World Risk Report released by the United Nations University Institute for Environment and Human Security, the Philippines is ranked third globally in terms of disaster risk. One of those disaster risks is flooding which poses a serious challenge to the development and the lives of the people. Public health risks and understanding social vulnerability are usually overlooked and undermined and only very little attention is given. Thus, this research work focuses on these aspects. This research was an exploratory step towards assessing vulnerability particularly to fluvial flooding. It was a rapid assessment of the Knowledge, Attitudes, and Practices (KAP) of the community people towards flood vulnerability and resilience and their exposure to microorganisms such as E.coli, Leptospirosis and the Dengue Fever mosquito which could pose an outbreak after a typhoon event. Appropriate community-based indicators were formulated and developed. Their socio-demographic profile, housing conditions, physical environment and governance were also included. These are important factors to be assessed in order to establish correlations and relationships in understanding social vulnerabilities and risks using local indicators which can be incorporated later in hydroinformatics. The survey was done from March 2013 to July 2013 to capture the dry and wet season for sampling. A total of 357 household respondents from the 12 communities and 30 respondents from the LGU and NGO were surveyed. Results of the study revealed an overall Flood Vulnerability Index (FVI) of 39.34%. Barangay Tabuc-tubig (53.39%) topping from all the 12 communities surveyed using the newly developed 36 community-based flood vulnerability indicators with its corresponding 5 major components namely; hydro-climatic, social, economic, socio-behavioral and the politico-administrative. This research also reveals the most vulnerable communities from each of those 5 major components surveyed. It is interesting to note that Flood Vulnerability Index remains low in spite that the exposure indicators are high. The low FVI can be attributed to the community's high resilience in its coping and adaptation strategies. In this research work, the Flood Vulnerability Index is significantly sensitive to susceptibility and flood resilience variables.

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Nomenclature and Symbols

The following nomenclature and symbols were used in this dissertation.

ABBREVIATIONS

AIS - Administrative and Institutional Subsystem
ACDV's - Accredited Community Disaster Volunteers
AGE – Acute Gastrointestinal Enteritis
AMSL – Above Mean Sea Level
BDCC - Barangay Disaster Coordinating Council
BDRRMCs - Barangay Disaster Risk Reduction Management Committee
BRW - Banica River Watershed
CaMReSC - Camp Management and Relief Service Command
CDCC - City Disaster Coordinating Council
CCFVI – Coastal Cities Flood Vulnerability Index
CDRRMC - City Disaster Risk Reduction and Management Council
CDRRMP - City Disaster Risk Reduction Management Plan
CFU's – Colony Forming Units
CHO - City Health Office
CRED – Centre for Research on the Epidemiology of Disasters
CSWDO - City Social Welfare office, Planning and Development Office
DANA-SC - Damage Assessment and Needs Analysis Service Command
DBM – Department of Budget and Management
DENR – Department of Environment and Natural Resources
DILG – Department of Interior and Local Government
DIPECHO – Disaster Preparedness European Commission's Humanitarian Aid Department
DOH - Department of Health
DRI - Disaster Risk Index
DRR - Disaster Risk Reduction
DRRMF - Disaster Risk Reduction and Management Fund
EMB - Eosin-Methylene Blue agar
EMT - Emergency Management Team
EPA – Environment Protection Agency
EM-DAT – Emergency Events Data Base
EM-DAT: The OFDA/CRED International Disaster Database
EWSC - Early Warning Service Command
FVI – Flood Vulnerability Index
GDP - Gross Domestic Product
GIS - Geophysical Information System
GIZ - Deutsche Gesellschaft fur Internationale Zusammenarbeit
GPS – Global Positioning System
GRoWe - Global Research on Water-Based Economies

HFA - Hyogo Framework for Action
ICS - Incident Command System
IFRC - International Federation of Red Cross
IPCC - Intergovernmental Panel on Climate Change
ISDR – International Strategy for Disaster Reduction
KAP - Knowledge, Attitudes, and Practices
LDRRMC - Local Disaster Risk Reduction and Management Council of Dumaguete City
LDRRMO - Local Disaster Risk Reduction and Management Office
LDRRMP - Local Disaster Risk Reduction and Management Plan
LGU's – Local Government Units
MHSC - Medical and Health Service Command
MGB - Mines and Geosciences Bureau
MOA - Memorandum of Agreement
NDRRMC- National Disaster Risk Reduction and Management Council
NIA –National Irrigation Administration
NGO's – Non-Governmental Organizations
NOAA - National Oceanic and Atmospheric Administration
OFDA – Office of Foreign Assistance
PAGASA – The Philippine Atmospheric, Geophysical and Astronomical Services
PDRRM – Philippine Disaster Risk Reduction and Management
PDRRMC - Provincial Disaster Risk Reduction Management Council
RA – Republic Act
RRSC - Response and Rescue Service Command
SP –Sangguniang Panlalawigan
SUVFRU - Silliman Volunteer for Fire and Rescue Unit
UNEP – United Nations Environmental Programme
UNESCO-IHE – United Nations Educational, Scientific and Cultural Organization-Institute for Water Education
UNDP – United Nations Development Program
UNISDR - United Nations Office for Disaster Risk Reduction
UNU-EHS - United Nations University Institute for Environment and Human Security
WB – World Bank
WHO - World Health Organization

SYMBOLS

AHDF – Attitude of Households on Dengue Fever
AHEC – Attitude of Households on E.coli
AHFR – Attitude of Households on Flood Resilience
AHL – Attitude of Households on Liptospirosis
EA - Educational Attainment
FF - Frequency of Flooding
FI –Family Income
FVIc - Flood Vulnerability Index Combined (Flood Resilience and Microorganisms)
FVIfr – Flood Vulnerability Index for Flood Resilience
FVImqs - Flood Vulnerability Index for Microorganisms (E.coli, Liptospirosis, Dengue Fever)
G – Governance
HC – Housing Conditions
HF – Height of Flooding
HH – Households
HNE –Houses Not on Elevated area
HNIS – Houses with No access to Improved Sanitation
HNIW - Houses with No access to Improved Water source
HPP – Health and Prevention of E.coli, Liptospirosis and Dengue Fever
HRF – Houses Reached by Flood
KHDF – Knowledge of Households on Dengue Fever
KHEC – Knowledge of Households on E.coli
KHFR – Knowledge of Households on Flood Resilience
KHL – Knowledge of Households on Liptospirosis
LUMSD - Land Use Management and Structural Design
NTY – Number of Typhoons per Year
ODAW - Open disposal of animal waste
PHDF – Practices of Households on Dengue Fever
PHEC – Practices of Households on E.coli
PHFR - Practices of Households on Flood Resilience
PHL – Practices of Households on Liptospirosis
PI –Property Insurance
PRAI – Post-Risk Assessment and Integration
PRV – Presence of Rats in the Vicinity
PWLV – Presence of Water-Logged areas in the Vicinity
RNRMP – River's Natural Resources and Natural Features Management and Programme
RSP – Relocation Site Project
SCLP – Sustainable Community Livelihood Programme
SN - Social Networks
SS – Sample Size
UVR - Unwillingness to vacate and be relocated
WT - Water Treatment or Sterilization Practice

CHAPTER 1 INTRODUCTION

SUMMARY

Chapter 1 is an introductory chapter where it gives a brief description of what this entire research work is all about. For instance, how the development of this community-based flood vulnerability index was formulated and how different it is from other similar studies; the respondents whom the survey was solicited from; in what way this research work is done in a more detailed manner compared to the previous and similar studies and how it is improved. Furthermore, glimpses illustration of previous and existing approaches and frameworks for flood vulnerability studies along with the proposed community-based flood vulnerability index are also presented. The identified flood vulnerability factors, key components and indicators will also made mentioned in this chapter.

Apart from the surveys solicited for this developed community-based flood vulnerability index, a health impact assessment was also included in this research work and briefly presented here. Microbial hazards such as that of E.coli, Leptospirosis, and Dengue fever mosquito were identified and chosen as focus of the study. This particular environmental microbial hazard was characterized and noted. Exposure assessment and risk characterization were also considered and being made mention in this chapter. Alongside, flood resilience adaptation strategies assessment is also briefly presented.
Much of this chapter reveals about historical records of natural disasters worldwide from 1900-2012 and of the Philippines that are of great importance in this research work. For the purpose of clarity, types and causes of floods were also clearly described and categorized. Reviews of relevant literature, reports, and surveillance data of focus and its impacts to human health are also presented.

Other similar studies on disaster risks, flood vulnerability and resilience index were also reviewed. The current situation in the Philippines in terms of disaster coordination and facilitation is also look into. Finally, the aim and purpose of this research work was laid down including the needed improvements and significance and its importance of why conducting this kind of research work are presented in the latter part of this chapter.

CHAPTER 1
INTRODUCTION

The development of community-based flood vulnerability index (FVI) for urban flooding through using local components and indicators is important in generating a localized-based flood vulnerability index that depicts a more realistic scenario of vulnerability and resilience indexes in a local, national and international setting. There have been a number of studies conducted in the past years that is similar to this but mostly revolves around national data or on a per country description but have neglected to include some of the important components which has theoretical and practical significance due to lack of relevant data from the community level. The gaps of knowledge for disaster risk, the lack of concerted actions from numerous players in the society during disaster recovery, and using community-based indicators is what this research work is trying to accomplish to address those gaps so we would have a thorough understanding why the community people are vulnerable or resilient in the first place.

Soliciting the responses from the individual household respondents themselves and the local government units (LGU's) from each of the communities involved and including those who are in the city and provincial disaster coordinating council office and the volunteers from the non-governmental organizations (NGO's) have been the sources of the actual community survey. It is very important to do an actual field survey so that a realistic scenario will be generated and projected.

This research work is done in a more detailed survey of which the improvement that this work has accomplished when it comes to addressing the socio-economic profile of the individual households, including their socio-behavioral approach in terms of the knowledge, attitudes, and practices towards flood vulnerability and resilience particularly on the items of hazards, risks, exposure, preparedness, response, recovery, coordination, and adaptation strategies. The socio-behavioral approach was conducted in a more detailed way by soliciting the community people's Knowledge, Attitudes and Practices (KAP) particularly on flood preparedness and health impacts and it is measured in terms of their exposure to E.coli, Leptospirosis and Dengue Fever particularly on the nature of these organisms, their mode of transmission, prevention, signs and symptoms, how fatal, treatment, and the financial cost of treatment. The hydro-climatic and politico-administrative components were also studied in detailed. Measuring the KAP of the respondents from preparedness to recovery, and as well as the KAP on the exposures of the microorganisms in focus would give us a clue how community people perceived in these kinds of phenomenon which are translated into

their attitudes and practices before, during or after any catastrophic events such as typhoons and flooding.

There are five (5) flood vulnerability components and thirty-six (36) indicators that were developed in this work. Each of the indicators is belonging to a specific flood vulnerability component and to a particular flood vulnerability factors; namely exposure, susceptibility and resilience that would eventually produce community-based flood vulnerability index profile.

Apart from developing a community-based flood vulnerability index, this research work has also included a simple health impact assessment that is associated with the daily exposure of the community people in the river prior to, during and after flooding events. The health impact assessment includes microbial analysis through laboratory culture of E.coli from collected water samples from the river. The frequency of exposure and the possible amount of ingested contaminated water were also included. The KAP towards exposure to E.coli, Leptospirosis and Dengue fever mosquito completes the health impact assessment in this research work.

Moreover, this research work has also performed an assessment on the flood resilience adaptation strategy solicited from Local Government Units (LGU's) and the Non-Governmental Organizations (NGO's) and from the Household Respondents respectively to be able to have a holistic view and a comprehensive result of the different items that are significant in the overall understanding of social vulnerabilities and risks.

The approaches and frameworks of this community-based flood vulnerability index (FVI), health impact assessment and flood resilience adaptation strategy assessment will be thoroughly discussed in the succeeding chapters, in the meantime an overview of these approaches and frameworks will be presented below

1.1 Approaches and Frameworks for Community-Based Flood Vulnerability Index (FVI)

A system's vulnerability to hazards consists of (i) linkages to the broader human and biophysical (environmental) conditions and processes operating on the coupled system in question; (ii) perturbations and stressors/stresses that emerge from this conditions and processes; and (iii) the coupled human – environment system of concern in which vulnerability resides, including exposure and responses (i.e. coping, impacts, adjustments, and adaptation). It is seen that changes in the resilience can affect the susceptibility of a system and if we are careless with our actions, it can alter the whole system in ways that make it difficult to recover.

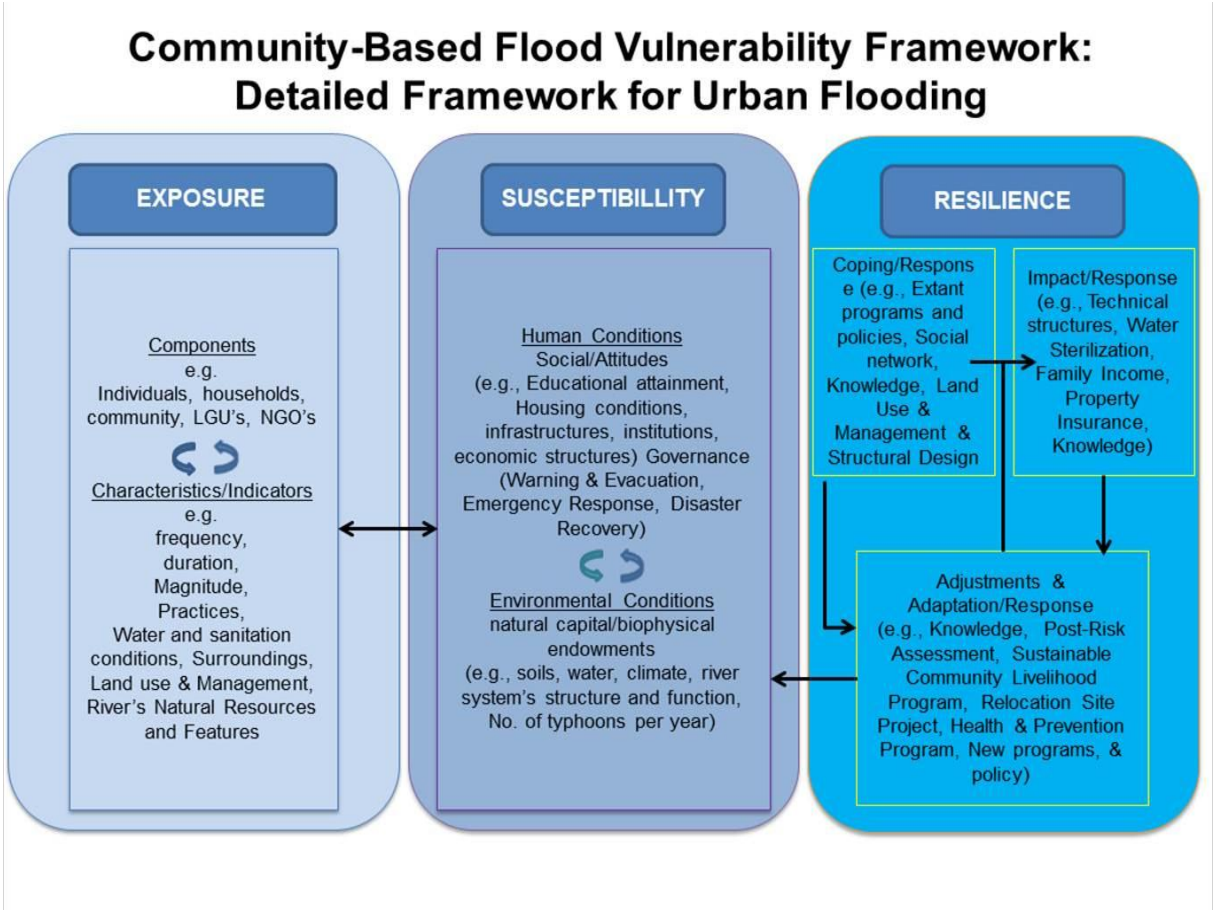

Figure 1-1: Community-Based Flood Vulnerability Framework: Based from SUST Vulnerability Framework (Turner II et al. 2003)

Figure 1-1 depicts the proposed version of "working framework" which is based from Turner's conceptual framework. The different components and indicators that were

used in this work are shown in the category (exposure, susceptibility, and resilience) to which it appropriately belonged to.

The theoretical framework is presented in the succeeding page along with its corresponding description and detailed discussions of the interplay of the different components and indicators in producing a community-based flood vulnerability index.

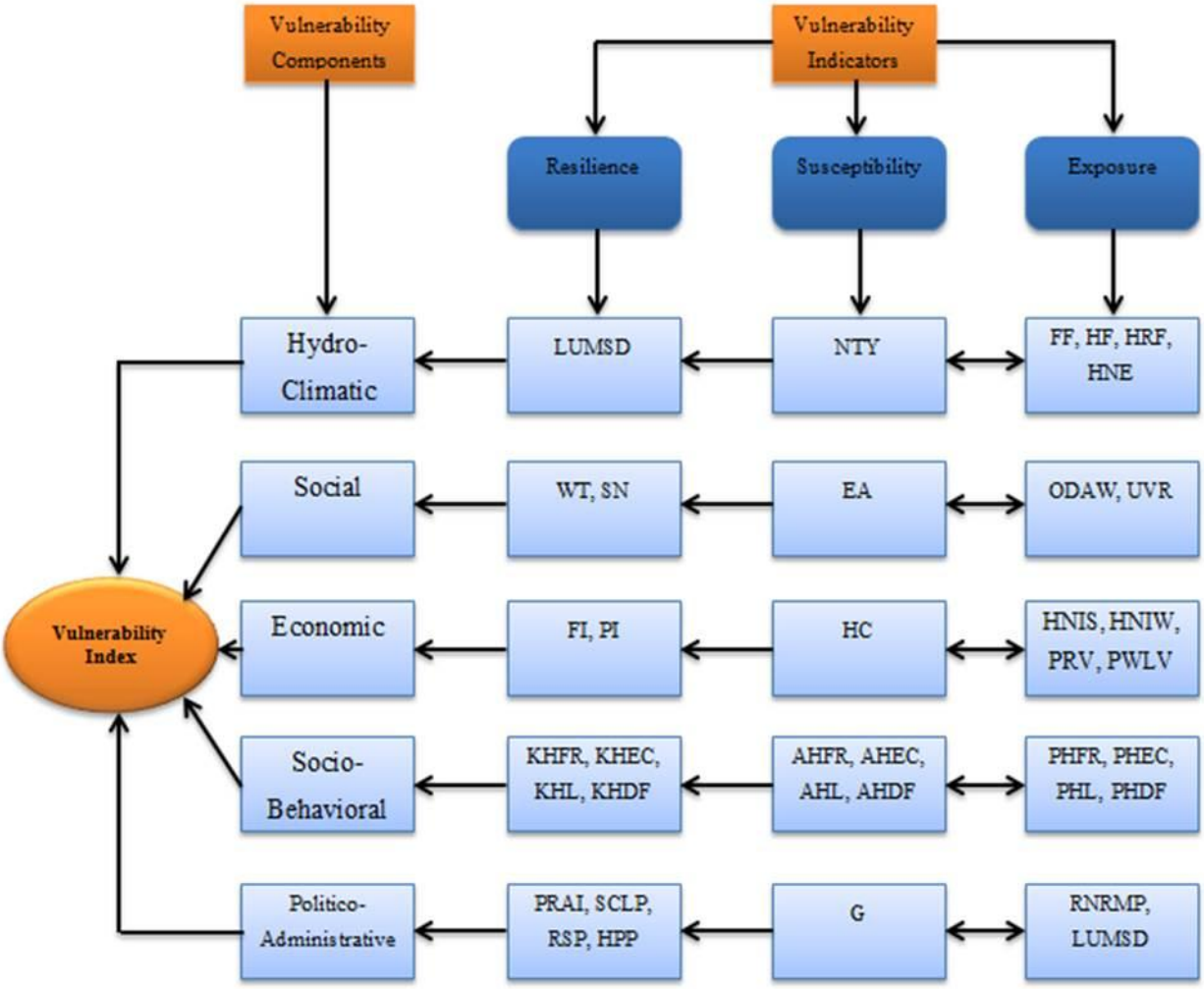

Figure 1-2: Community-Based Flood Vulnerability Components and Indicators

In this community-based flood vulnerability framework shown in figure 1-2, the researcher presented the relationship of the vulnerability components along with the three (3) vulnerability factors and its corresponding indicators on how it could influence vulnerability. The indicators are shown in a more detailed manner (see table 3.1) for the detailed description of the abbreviations used. A brief illustration is presented below while the detailed descriptions and discussions are found in the succeeding chapters.

1.2 Flood Vulnerability Factors

This section provides an overview of the selected components and indicators in the development and calculation of the Community-Based Flood Vulnerability Index (FVI) for Dumaguete City, Negros Oriental Philippines. This research work was done locally among the twelve communities of Dumaguete City and the researcher has based the analysis to the following components: Hydro-Climatic, Social, Economic, Socio-Behavioral and Politico-Administrative components which are general and relevant to the local level. The individual indicators of each of the components will be made mention below.

There are 3 important factors of vulnerability to consider all throughout the components which determine the vulnerability index. These factors are exposure, susceptibility and resilience. In addition, the concept of vulnerability will also be described below to facilitate a complete understanding of the interplay and influence of the indicators to the components and factors of vulnerability.

Vulnerability is considered as the extent of harm which can be expected under certain conditions of exposure, susceptibility, and resilience. More specifically in the case of floods, a system is susceptible to floods due to exposure in conjunction with its capacity/incapacity to be resilient, to cope, recover or adapt to the extent. Some of the exposed populations are protected from flooding by various structural and non-structural measures that are part of the resilience strategy. On the other hand, some of them have none, or only weak, flood defenses and the exposed populations are more often subject to flooding with the consequent disruption, economic loss and loss of life (Balica, S.F., Wright, N.G., and van der Meulen, F., 2012). In this research, vulnerability is the result of the interplay of the indicators in the exposure, susceptibility and resilience category.

By dividing the FVI into different components, such as hydro-climatic, social, economic, socio-behavioral, and politico-administrative and linking them with the factors of vulnerability (exposure, susceptibility, resilience) can help identify the weak and strong points of a certain community in terms of flood vulnerability and in that way, it helps to propose strategies for improvement and identifies which one is a priority.

1.3 Identifying the Key Components and Indicators of the Developed Community-Based Flood Vulnerability Index (FVI)

This part deals with the description of the components and its indicators as used on the local scale to capture the aspects of exposure, susceptibility, and resilience as well as their aggregation to the Community-Based Flood Vulnerability Index. In this research work the indicators vary, a totally different indicators used but were chosen based on the same concept developed by the WorldRiskIndex Report and the study of Balica *et.al* (2012) on the development of Flood Vulnerability Index for Coastal City.

This research work is trying to fill those categories suggested by those studies that were not included in the global scale, for instance, indicators such as housing conditions; disaster preparedness and early warning; social networks; property insurance; Knowledge, Attitude, Practices (KAP) of respondents on flood resilience; and exposure to microorganisms such as that of E.coli, Leptospirosis and Dengue fever mosquito; the different adaptation strategies such as integration of post-risk assessments; sustainable community livelihood; relocation site projects and health programs for the prevention against diarrhoea, leptospirosis and dengue fever which are facilitated by the LGU's and as well as some NGO's. Figure 1-3 below shows the five components of this proposed community-based flood vulnerability index in producing flood vulnerability indexes, maps and profiles.

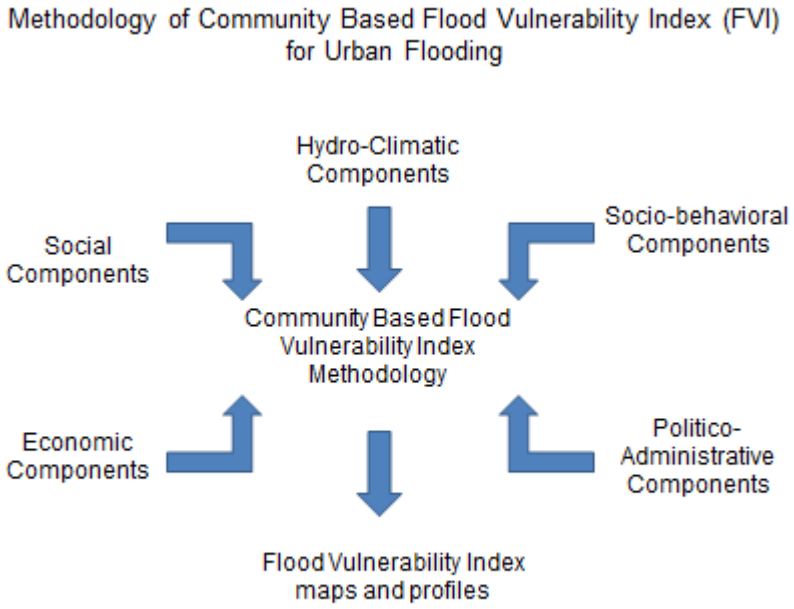

Figure 1-3: Methodology Framework for Community-Based Flood Vulnerability Index for Urban Flooding

These five components have been linked with the three factors of vulnerability as shown in Table 3.1 The relationship of these factors and components should increase the robustness of the developed Community-Based FVI as it was also observed in the study of Balica et al. (2012). These five components are; hydro-climatic, social, economic, socio-behavioral, and politico-administrative and along with the thirty-six (36) indicators that were used and examined in computing for the community-based flood vulnerability index (FVI) for Dumaguete City, Negros Oriental. By computing the FVI of the city, hotspots to flooding events with the corresponding strong and weak points will be identified and mapped. By doing so, this would serve as a tool to assist planners and policymakers in prioritising their areas of intervention and to provide useful information for awareness rising.

The development of this community-based FVI which is in the Philippines local context involved the interplay of factors within the water resource system in the event of flooding, a deductive approach was used to identify the best possible indicators based on the existing principles and conceptual framework (Chapter 2).

1.4 Health Impact Assessment

In a developing country like the Philippines and among others, outbreaks of certain diseases such as that of bacterial and viral in origin are common during and after a flooding event. Traumatic experiences are also observed during such events and to some extent exposure on a daily basis is also a common scenario. Their effects can be direct or indirect, immediate or long term. Health impact assessment is therefore important so as to address this issues which is usually have been overlooked. This research work has conducted a crude assessment on the presence of E.coli in the Banica river where the community people have the possibility of being exposed to.

Water samples were taken during dry and wet season for five (5) consecutive months. The frequencies of possible exposures were investigated including the activities that predisposed the respondents. The amount of ingested of contaminated water were also taking into account on a daily basis and during and after flooding events. The respondents were also asked if they have experienced diarrhoea, leptospirosis and dengue fever infection through memory recall. For Leptospirosis and Dengue fever cases, available health data from the city, provincial and national health agencies were solicited. Hydrological data such as uniform stream flow were also recorded to be able to be able to have a crude picture of the possible flow or stagnation of the organism in focus. Due to limited resources, a simple health impact assessment was done.

In conducting a health impact assessment the European Commission's Directorate General on health and Consumer Affairs (SANCO) have formulated the following steps to harmonized risk assessment procedures and terminology. The four key steps are as follows (European Commission, 2000).

A. Hazard Identification
B. Hazard Characterization
C. Exposure Assessment
D. Risk Characterization

As mentioned in the CORFU project (CORFU FP7 Collaborative Research on Flood Resilience in Urban Areas: Health Impacts Model, 2014), the second step, hazard characterization, is sometimes referred to as Dose-response assessment. Moreover, these four steps have previously been described by the US National Academy of Science's earlier report on Risk Assessment for Federal Government (National Academy of Sciences, 1983) and formed the US's Environmental Protection Agency's Risk Assessment and Management Paradigm. These four steps has been adopted and used but were conducted slightly different in this particular health impact assessment.

For hazard identification, E.coli, Leptospirosis and Dengue Fever cases were the chosen microorganisms to be assessed because of its common occurrence during and after flooding events. Usually, during and after flooding events cases of diarrhoea are in significant numbers. In some places, leptospirosis cases are also occurring. Dengue fever cases is also rampant during rainy or typhoon seasons. But, what is interesting to know is the people's vulnerability or resilience in terms of their knowledge, attitude and practices towards these microorganisms. These items have been addressed and solicited from the questionnaires administered to the household respondents.

In doing the hazard characterization, a dose-response assessment was not conducted but instead, results from surveys from the household respondents that indicates their experienced of being sick from any of the focus microorganisms were noted and counted. Top 10 leading causes of morbidity in the city and the country were solicited to counter-check the incidences and occurrences of those diseases.

Exposure assessment was conducted through survey questionnaires. Household respondents were asked if any member in the family has been exposed to E.coli, leptospirosis and dengue fever mosquito. The frequency of exposure to the river and the amount of possible ingestion of the contaminated water were asked and recorded.

After gathering the relevant data from hazard identification, characterization and exposure, risk characterization is possible to be established. The level of risks and correlation to exposure in terms of the number of E.coli taken from the different sampling sites, and the number of diarrhoeal cases per community are mentioned in the results and discussion chapter. The step-by-step procedure and discussion is presented in the succeeding pages.

1.5 FLOOD RESILIENCE ADAPTATION STRATEGIES ASSESSMENT

Assessment on flood resilience adaptation strategies were also solicited from Local Government Units (LGU's) and the Non-Governmental Organizations (NGO's) and from the Household Respondents respectively. Issues on governance, sustainable community livelihood, the rivers natural resource and natural features management, land use and management and structural design, risk knowledge-post risk integration, warning and evacuation, emergency response, and disaster recovery were assessed in detailed. It is very important to conduct such assessment to be able to pinpoint the strengths and weaknesses of the program the government has initiated. Having an understanding of the current situation, what needs emphasis and focus, improvements will be given attention. Participation from the different players in the society is important to be able to have a holistic view and a comprehensive result of the different items that are significant in the overall understanding of the social vulnerabilities and risks.

1. 6 BACKGROUND OF THE STUDY

According to the World Risk Report released by the United Nations University Institute for Environment and Human Security, the Philippines is ranked third globally in terms of disaster risk (United Nations University Institute for Environment and Human Security, 2011). Typhoon which usually followed by flooding in some areas is one of those disaster risk that is frequency occurring in the Philippines, twenty or more typhoons visits the country every year leaving devastations in many forms. It is a global phenomenon and due to climate change, this will continue. Urban fluvial flooding in particular caused havoc in many aspects in the society particularly to human health, infrastructure and the economy of the country. Moreover, it has become a usual scenario especially in underdeveloped and the developing countries. However, this phenomenon is also occurring in developed countries though less more frequent than those previous countries mentioned. Flooding poses a serious challenge to the economic development and the lives of the people particularly the residents of a rapidly

expanding towns and cities in developing countries. Its causes are shifting and their impacts are accelerating against the backdrop of increasing demographics, urbanization trends and climate change. The current and projected levels of flood impacts give urgency to the need to make flood risk management in urban settlement a high priority on the political and policy agenda. It is therefore important to conduct studies related to vulnerability and resilience at the community level so issues on health and disaster risks will be addressed appropriately.

Public health risk in urban fluvial flooding are usually been overlooked, undermined and only very little attention is given. In Dumaguete City alone, there was no study similar to this that was conducted. This would therefore hopefully serve as a baseline study. Faecal pollution of water particularly human faecal sources are the most relevant source of human illnesses globally especially during flooding event and rainy season. Exposure and ingestion of faecally-contaminated water and other routes of transmission are responsible for a variety of diseases such as diarrhoea, leptospirosis, and bites from dengue mosquitoes which demands special attention. Diarrhoeal and other waterborne diseases still rank among the leading causes of morbidity worldwide and in the Philippines. According to the World Health Organization (WHO), each year diarrhoea kills around 760,000 children under the age of five and is the second leading cause of death among that age group. Worldwide, there are nearly 1.7 billion cases of diarrhoeal disease every year (WHO, 2013). In the surveillance report of 2013 by the Department of Health (DOH) in the Philippines, a total of 1,174 leptospirosis cases have been reported nationwide from January 1, 2013 to September 17, 2013. This is 78.74% lower compared to the same period last year (5,522), (DOH, 2013). A total of 117,658 dengue fever cases from January 1 to September 7, 2013 were reported nationwide. This is 5.25% lower compared to the same period last year's (124, 173) cases and mostly coming from regions VI and IV-A, (DOH, 2013). Though the figures of the surveillance report in 2013 were lower than the previous years, yet these recent statistics is still very alarming. Given this high incidences of diarrhoea, leptospirosis, and dengue fever cases, it is therefore important to conduct studies that would provide better understanding how each households perceives, relates and employs their attitudes and practices towards personal hygiene and protection, and to environmental sanitation.

According to the 2012 Philippines Disaster Report, a total of 471 natural and human-induced disasters were reported in the Philippines in 2012 (CDRC, 2012). One thousand six hundred fifteen (1,615) people were killed, and more than 2.8 million families or 12 million people were affected, and caused over Php 39.9 billion in economic damages. In terms of frequency, flood topped the list with 143 reported incidents, or 30% of the total number of disaster events monitored in 2012. Given this

high-risk status of the Philippines to hazards in general, it is surprising to find that there were very few comprehensive place-specific vulnerability and resilience assessments performed at the local level in the Philippines which accounts on social vulnerability specifically on how the community people respond to these kind of phenomenon and to the impacts of global warming. Such kinds of studies and assessment should be conducted so such gaps will be addressed properly. This study was an exploratory step towards assessing flood vulnerability and resilience, a rapid assessment of the Knowledge, Attitudes, and Practices (KAP) of the community people towards flood resilience, exposures to the different microorganisms that have health concern during and after a typhoon or flooding event. Environmental sanitation, the hydro-climatic components, including their socio-demographic profile and governance were also included in this study. These are important factors to be assessed in order to established correlations and relationships in understanding social vulnerabilities and its indicators so it can be incorporated in hydroinformatics. Determining flood vulnerability index varies from one country to another. There is no single gold standard used worldwide. Measuring vulnerability and resilience is important, it mirrors how well are the people adapting to climate change and its impacts, how are the resilience programs implemented and facilitated by the local government units. Perhaps it is also important to note that gauging vulnerability may have a number of different reasons but understanding the context of people's vulnerability to hazards and why they are vulnerable in the first place, seems to be more useful for making a difference in their lives.

1.6.1 Types and Causes of Flooding

Flood is usually due to several factors (Jha, A.K., et al., 2012). A combination of meteorological and hydrological such extreme precipitation and flows is one and human activity is another. Unplanned growth and development in floodplains or from the breach of a dam or the overtopping of an embankment may result to flooding when these structures failed to protect under extreme hydrological weather conditions. Among others are the influxes of people from rural areas to urban places that often settled in areas that are highly exposed to flooding. The lack of flood defense system, the improper implementation of land use and urban development that reduces the permeability of soil while increasing surface runoff coupled with poor drainage system, are one of the many reasons that increases the risk of flooding.

For the purpose of clarity, descriptions and categorizing of floods should be distinguished properly (Balica, S.F., Wright, N.G., and van der Meulen, F., 2012). As mentioned in their paper of which was based from the works of previous authors named as follows, a flood is "defined as a temporary condition of surface water be that be river,

lake or sea in which the water level and or discharge exceeds a certain value, thereby escaping from its normal confines," this does not necessarily results in flooding (Douben, K.J., 2006). On the other hand, flooding is defined as the spilling over or failing of the normal limits for example river, lake, sea, stream or accumulation of water as a result of heavy precipitation through lack or exceeding of the discharge capacity of drains, or snow melt, dams or dikes break affecting areas which are normally not submerged (Douben, N. and Ratnayake, RMW., 2005).

Floods vary and are based on a combination of sources, causes and impacts. Based on such combinations, floods can be generally characterized into river (or fluvial) floods, pluvial (or overland) floods, coastal floods, groundwater floods or the failure of artificial water systems. Based on the speed of onset of flooding, floods are often described as flash floods, urban floods, semi-permanent floods, and slow rise floods. All the above-mentioned floods can have severe impacts on urban areas – and thus be categorized as urban floods. It is important to understand both the cause and speed of onset of each type to understand their possible effects on urban areas and how to mitigate their impacts (Jha, A.K., et al., 2012).

In the recent decades facts have revealed the growing incidence of floods and flooding from many parts of the world which can be caused by climate change and global warming according to the reports of UNDP.

A distinction can be made between five different types of floods: river floods flash floods, urban floods and coastal floods, (MunichRe, 2007) is described briefly in the study of Balica et al. 2012 and here below are the detailed description along with other studies and reports.

River floods or Fluvial Floods

This type of flood occurs when the surface water runoff exceeds the capacity of natural or artificial channels to accommodate the flow. The excess water overflow the banks of the watercourse and spills out into the adjacent, low-lying floodplain areas (Balica, S.F., Wright, N.G., and van der Meulen, F., 2012).

The river such as the Mississippi in the United States or the Nile in North Africa and the Yangtze River Basin are typical places where fluvial flooding inundation to its floodplains occurs once every 20 years or so affecting millions of people, and causing economic losses of millions of dollars.

Figure 1-4: River Flood (Dumaguete City, Philippines)

This is a typical illustration of a river flood (Figure 1-4). Floods along rivers are a natural event and some occur seasonally during rainy season. River floods do not occur abruptly but build up gradually and are a result of copious rainfall usually continuing for a period of days over a large area. When the ground becomes saturated and cannot cope with infiltration, the rainwater flows directly into the rivers (Hoyt, G.W, and Langbein, W., 1955).

As a rule, they last from a few days to a few weeks and may vary in the extent of devastation depending on the topography of the river. River related flooding also brings indirect threats such as the spread of disease arising from contaminated food and water (Douben, K.J., 2006).

Flash Floods

Figure 1-5: Flash Flood (Dumaguete City, Philippines)

Flash floods (Figure 1-5) are short-term inundations of small areas such as towns or parts of a city. They are caused by short periods of intense rain often occurring over a very small area and typically in conjunction with thunderstorms. When the river dikes or levees fails or washed out, the river flood waters are released to become a flash flood. They are the most deadly and damaging kind of floods because they happen without warning and delivers massive amounts of fast-moving water. Unfortunately, they are also the most common kind of flood. They are much shorter in duration than river floods. Most of the water disappears after a few hours (Perry, 2000).

As also defined by the International Federation of Red Cross (IFRC) and Red Crescent Societies, flash flood are sudden and extreme volume of water flow rapidly and cause inundation. Because of its rapid nature flash floods are difficult to forecast and give people little time to escape or to take food and other essentials with them (IFRC, 2014)

Flash flood is also defined by The US National Oceanic and Atmospheric Administration (NOAA) National Weather Service Manual in December 2012, as the one whose peak appears within six hours from the onset of a torrential rainfall (NOAA, 2014). Flash floods can be caused by local convective thunderstorms, or by the sudden release from an upstream impoundment created behind a dam, landslide, glacier or ice-jam. Factors that contribute to this type of flooding are, in addition to rainfall intensity and duration, surface conditions and the topography and slope of the receiving basin. Urban areas are notably susceptible to flash floods because a high percentage of their surfaces are

composed of impervious streets, roofs, and car parking areas where runoff occurs very rapidly. Flash floods can be particularly dangerous because they occur suddenly and are difficult, if not impossible, to forecast. They typically affect a more localized area compared to other floods but can still caused serious damage as the water may be travelling at high speed and carrying large amounts of debris, including rocks, trees and cars.

In November 5, 1991 Ormoc region in the Philippines was inundated by Tropical Storm Uring. The city government recorded 4,922 deaths, 3,000 missing persons, 14,000 destroyed houses, and more than 600 million pesos worth of damaged property.

Urban Floods

Figure 1-6: Urban Floods (Manila, Philippines)

As mentioned by Balica, et al (2012) in their paper, urban floods (Figure 1-6) are usually caused by extreme local rainfall combined with blocked drainage systems. This type of flooding depends on soil and typographical conditions and the quality of the drainage systems (Douben, K.J., 2006). These scenarios are the result of urban and sub-urban sprawl where developed land areas lose their ability to absorb rainfall. In a developing world where infrastructures and drainage systems are poor, the exposed population is more often subject to flooding unlike in developed countries, exposed populations are protected from flooding by various structural measures (e.g. UK, the Netherlands and Japan). People in developing countries have less capacity to adapt to change and are more vulnerable to environmental threats, floods and global change, just as they are more vulnerable to other stresses (UNEP, 2002).

In the paper of Jha et al. (2012), it was made mention that urban floods are a growing issue of concern for both developed and developing nations. They cause damage to buildings, utility works, housing, household assets, income losses in industries and trade, loss of employment to daily earners or temporary workers, and interruption to transport systems. The damage caused by urban floods is on the rise. It is therefore important to understand the causes of and impacts different types of flooding have on urban areas. Urban floods typically stem from a complex combination of causes. The urban environment is subject to the same natural forces as the natural environment and the presence of urban settlements exacerbates the problem. Urban areas can be flooded by rivers, coastal floods, pluvial and groundwater floods and artificial system failures, urban floods are also caused by the effects of deficient or improper land use planning. Many urban areas are facing the challenge of increased urbanization with rising populations and high demands for land. While there are existing laws and regulations to control the construction of new infrastructure and the variety of building types, they are often not enforced properly owing to economic or political factors, or capacity or resource constraints. This leads to obstruction in the natural flow path of water, which causes floods. Unless there is awareness amongst residents and proper cooperation between decision makers, risk management authorities and the public in the process of flood risk management, it will be very difficult to control the deterioration of the global urban flood risk situation.

Coastal Floods

Figure 1-7: Coastal Floods (Iligan City, Philippines)

Coastal floods can occur along the coast (Figure 1-7). Coastal floods usually occur when storms coincide with high tides and can also produce by sea waves called tsunamis, unusually giant tidal waves that are created by volcanoes or earthquakes in the ocean. Hurricanes and tropical storms can produce heavy rains, or drives ocean water into the land.

Again in the paper report of Jha et al. (2012) to the World Bank, coastal floods arise from incursion by the ocean or by sea water. They differ from cyclic high tides in that they result from an unexpected relative increase in sea level caused by storms or a tsunami (sometimes referred to as a tidal wave) caused by seismic activities. In the case of a storm or hurricane, a combination of strong winds that causes the surface water to pile up and the suction effects of low pressure inside the storm, creates a dome of water. If this approaches a coastal area, the dome may be forced towards the land; the increasing sea floor level typically found in inshore waters causes the body of water to rise, creating a wave that inundates the coastal zones. The storm surge usually causes the sea level to rise for a relatively short period of time of four to eight hours, but in some areas it might take much longer to recede to pre-storm levels. Coastal floods caused by tsunamis are less frequent than storm surges, but can also cause huge losses in low-lying coastal areas. The 2004 Indian Ocean Tsunami was caused by one of the strongest earthquakes ever recorded and affected the coasts around the ocean rim, killing hundreds of thousands of people in fourteen countries.

Pluvial or Overland floods

Figure 1-8: Pluvial or Overland Floods

In the same paper, an account on pluvial floods also known as overland floods are caused by rainfall or snowmelt that is not absorbed into the land and flows over land and through urban areas before it reaches drainage systems or watercourses. This kind of flooding often occurs in urban areas as the lack of permeability of the land surface means that rainfall cannot be absorbed rapidly enough, flooding results. Pluvial floods are often caused by localized summer storms or by weather conditions related to unusually large low pressure areas. Characteristically, the rain overwhelms the drainage systems, where they exist, and flows over land towards lower-lying areas (Figure 1-8). These types of floods can affect a large area for a prolonged period of time: the 2007 floods in the Hull area in the UK were the result of prolonged rainfall onto previously saturated terrain which overwhelmed the drainage system and caused overland flooding in areas of the city outside the fluvial floodplain. Pluvial floods may also occur regularly in some urban areas, particularly in tropical climates, draining away quickly but happening very frequently, even daily, during the rainy season. The Philippines is no excused to be spared from this type of flooding. Every year when rainy season commence big and crowded cities such as Manila and Cebu can be flooded for the same reason mentioned above.

1.6.2 Natural Disasters: Storm and Flood Record Worldwide and in the Philippines

The information on natural disasters presented here is taken from EM-DAT: The OFDA/CRED International Disaster Database (EM-DAT, 2014). In order for a disaster to be entered into the data base at least one of the following criteria has to be fulfilled: 10 or more people reported killed; 100 people reported affected; a call for international assistance; declaration of state emergency.

For some natural disaster (particularly floods and droughts) there is no exact day or month for the event, and for other disasters (particularly pre-1974) the available record of the disaster does not provide an exact day or month.

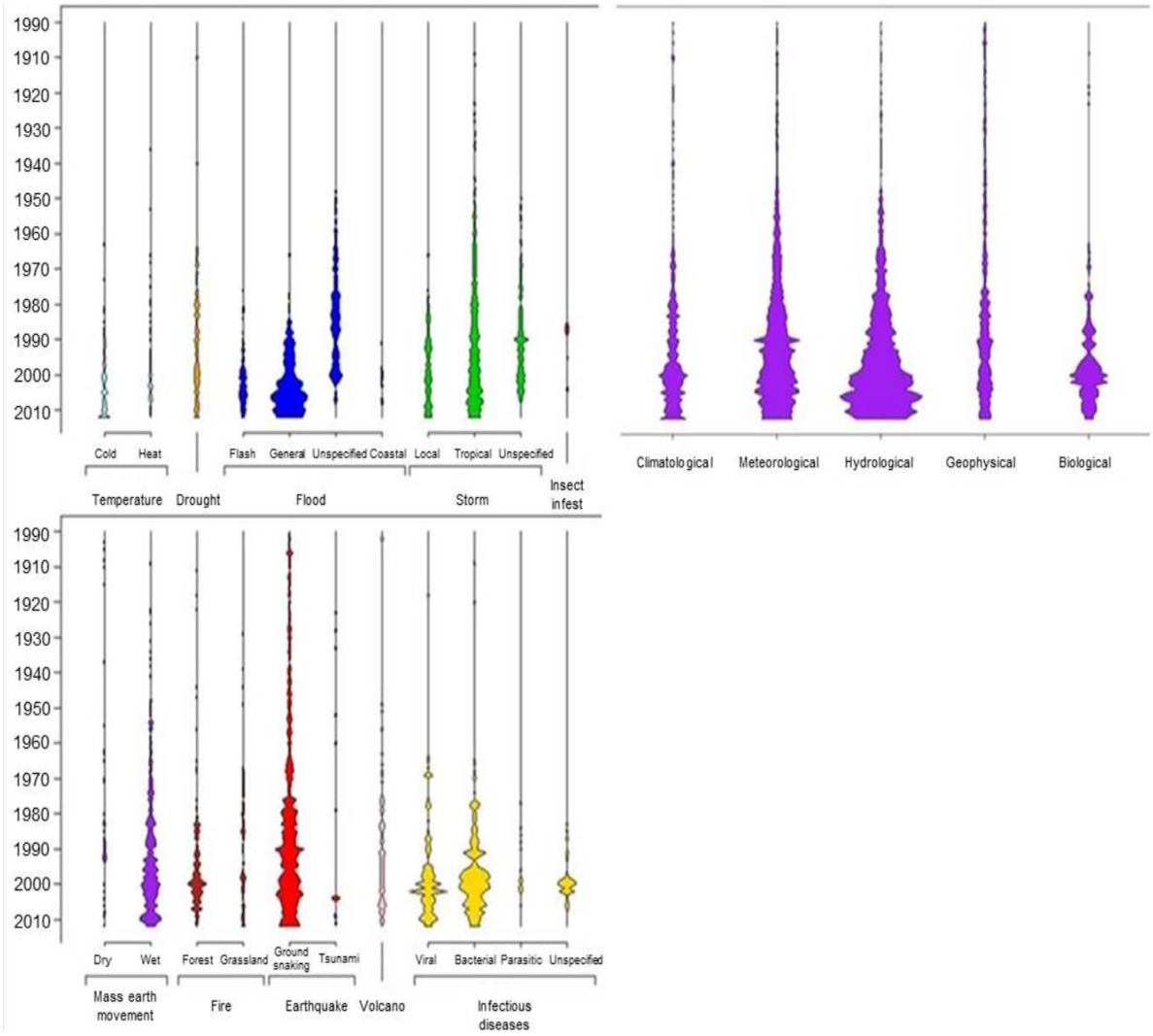

Figure 1-9: Number of Natural Disaster Reported 1900-2012

Figure 1-9: Shows the number of natural disaster reported from 1900 until 2012 particularly those of hydrological and meteorological in nature showed an increasing number of occurrences for the last three decades (1990-2010).

As illustrated in Figure 1-9, flood of all types but of particularly of the general type accounts a huge increase in terms of occurrence for the last three decades (1990-2010) and along with earthquake and infectious diseases of those particularly caused by bacteria and virus.

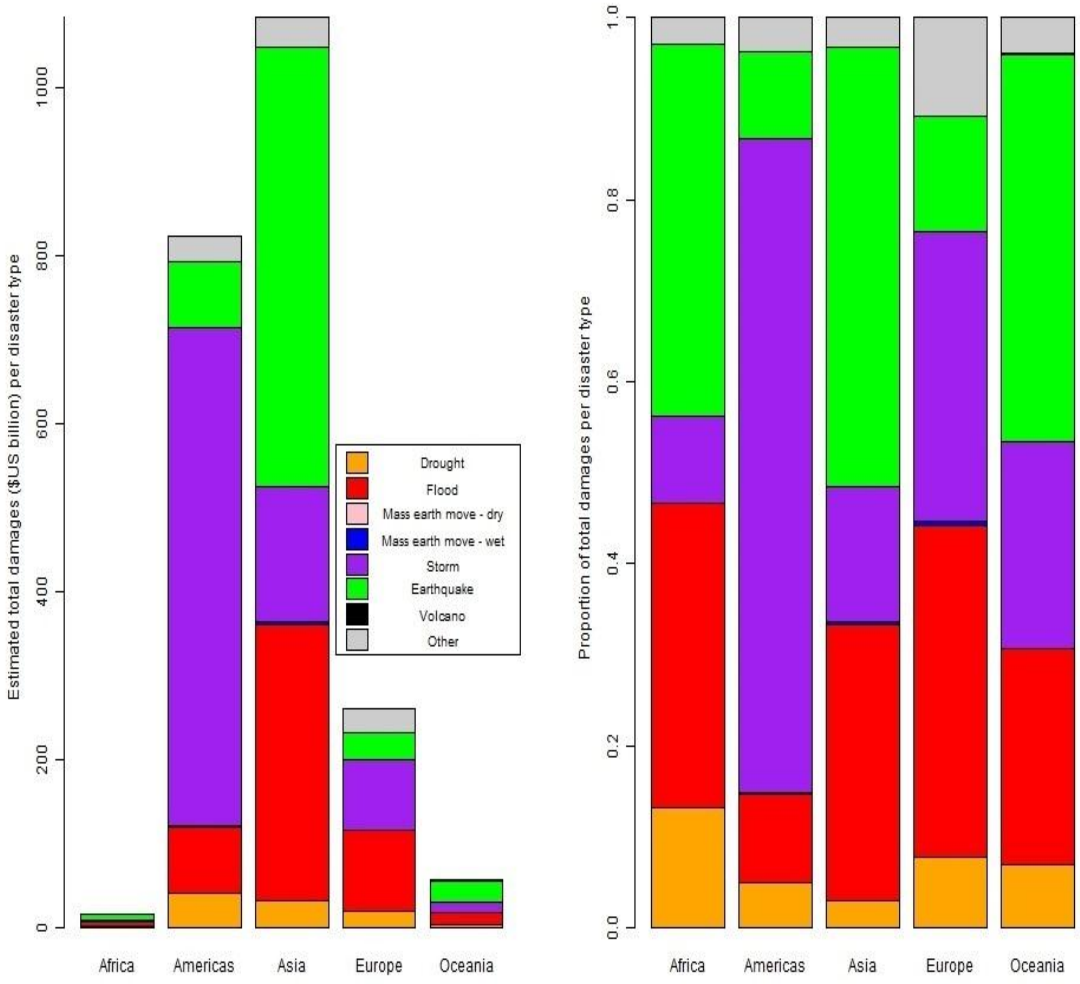

Figure 1-10: Total Damages ($US billion) Caused by Reported Natural Disasters 1900-2012

Figure 1-10 shows the total economic damages in US billion dollars from the different continents in the world (Africa, Americas, Asia, Europe, and Oceania) caused by the different natural disasters (Drought, Flood, Mass earth move-dry, Mass earth move-wet, Storm, Earthquake, Volcano and Others) from 1900-2012. Earthquake, floods and storm topped the list in Asia when it comes to total economic damages. Earthquake, flood and drought topped in Africa. In the Americas, storm, flood and earthquake topped the list. While in Europe, flood, storm and earthquake topped on the list. In the Oceania, earthquake, flood and storm are the natural disasters that topped on the list respectively.

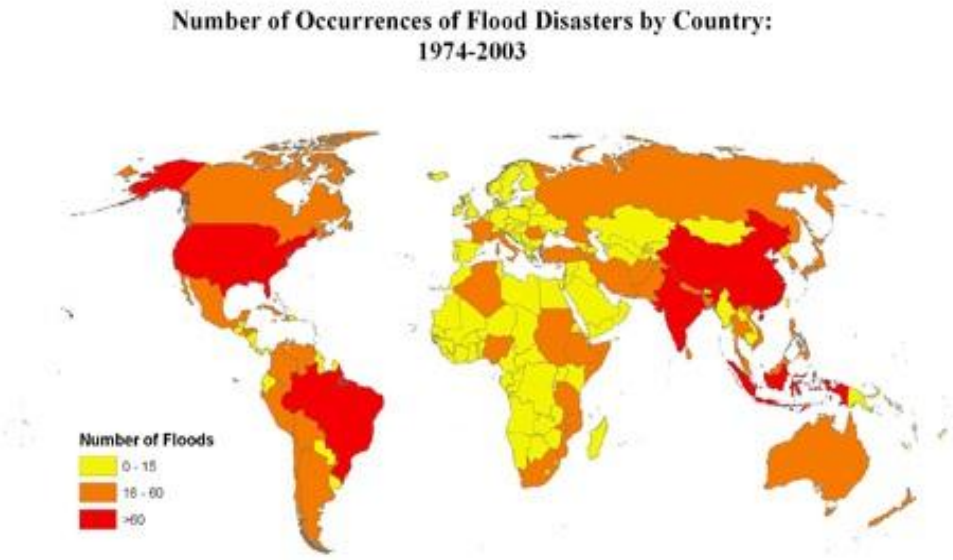

Figure 1-11: Number of Occurrence of Flood Disaster by Country: 1974-2003

The number of occurrences of flood disasters by country from 1974 to 2003 is shown in this map (Figure 1-11). The Philippines falls within the 16-60 flood occurrences from 1974-2003 when it comes to flood disaster among other neighboring countries such as Viet Nam, Thailand, Japan, South Korea and Australia. Russia, Pakistan, Afghanistan, Iran, Turkey, Italy, France, Algeria, some countries in Africa, Latin America and North America are also between 16-60 occurrences. On the other hand, China, India, Brazil, United States of America, Alaska, and some parts of Indonesia and Papua New Guinea topped the list with more than 60 occurrences of flood disasters from 1974-2003.

1.6.3 The Natural Disaster's Data in the Philippines from the 1900-2014

Table 1-1: Top 10 Natural Disasters in the Philippines for the period 1900-2014

Disaster	Date	No. Killed
Storm	08/11/2013	7986
Earthquake (seismic activity)	16/08/1976	6000
Storm	05/11/1991	5956
Earthquake (seismic activity)	16/07/1990	2412
Storm	04/12/2012	1901
Storm	29/11/2004	1619
Storm	13/10/1970	1551
Storm	15/12/2011	1439
Storm	01/09/1984	1399
Storm	30/11/2006	1399

Most of the natural disasters in the Philippines that has been recorded from 1900-2014 has been dominated by storm when it comes to the number of people affected from that disaster. As depicted in Table 1-1. The most recent and probably the most devastating storm that hits the country as far as record is concern is Typhoon Haiyan (local name Yolanda) that displaced about 16.1 million people (Table 1-2). A flood that struck in August of 2012 has also affects about 4.4 million people.

Table 1-2: Top 10 Natural Disasters in the Philippines for the period 1900-2014

Disaster	Date	No. Total Affected
Storm	08/11/2013	16,106,807
Storm	04/12/2012	6,246,664
Storm	12/11/1990	6,159,569
Storm	24/09/2009	4,901,763
Storm	21/06/2008	4,785,460
Storm	29/09/2009	4,478,491
Flood	06/08/2012	4,451,725
Storm	21/10/1998	3,902,424
Storm	27/09/2006	3,842,406
Storm	20/11/1973	3,400,024

Storm Haiyan (local name Yolanda) also topped the list when it comes to economic damage cost. A 10 billion US dollar cost was the total damaged caused by Yolanda. In August 2013, torrential monsoon rains brings flood in most parts of Manila and the National Capital Region due to heavy downpours brought by the Habagat or Southwest

monsoon. The economic damage amounted to 2.1 million US dollars. The rest of the economic damages are mostly caused by storm with one exception, the earthquake that struck in July of 1990.

The following figures and statistics are data related to human and economic losses from disasters that have occurred between 1980 and 2010 from EM-DAT: The OFDA/CRED International Disaster Database.

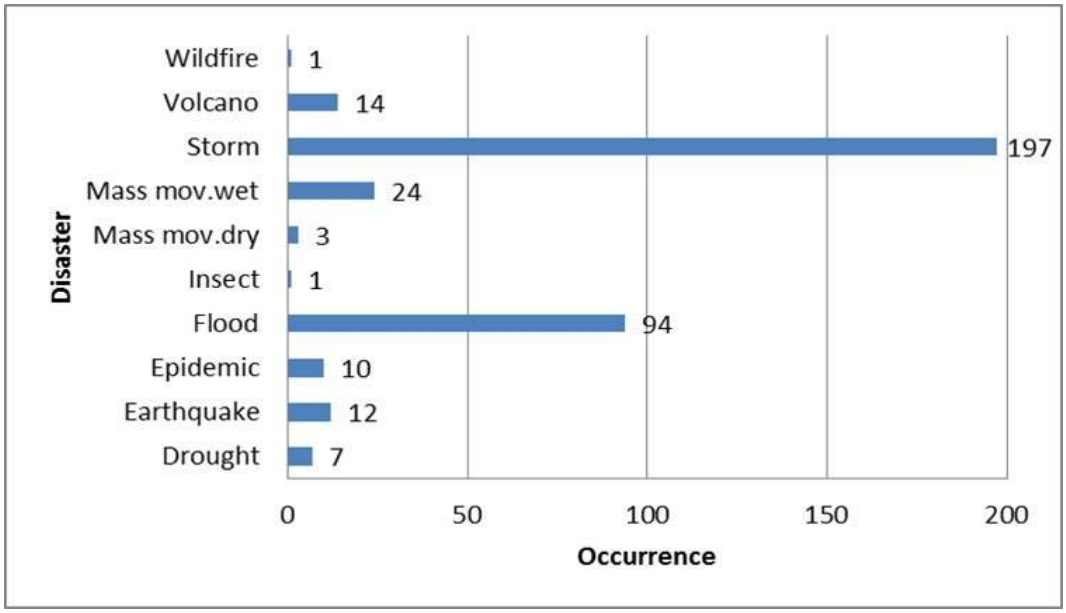

Figure 1-12: Natural Disaster Occurrence Reported

This graph (Figure 1-12) depicts storm as the most number of occurrences (197) followed by floods (94), and mass movement-wet (24) respectively from 1980-2010.

Table 1-3: Average Disaster per Year Worldwide

Disaster	Annual Disaster
Drought	0.23
Earthquake	0.39
Epidemic	0.32
Extreme temp	-
Flood	3.03
Insect infestation	0.03
Mass movement dry	0.10
Mass movement wet	0.77
Volcano	0.45
Storm	6.35
Wildfire	0.03

As seen in Table 1-3, storm and flood are the leading disasters per year worldwide, 6.35 and 3.03 on average per year.

Statistics by Disaster Type

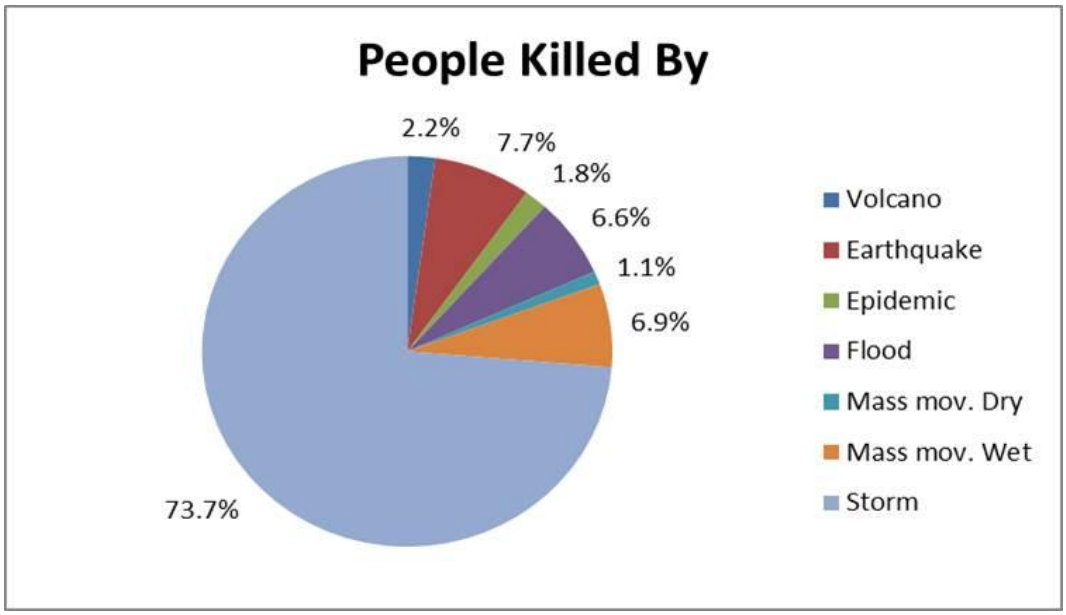

Figure 1-13: Percentage of Reported People Killed by Disaster Type

Figure 1-13. In terms of disaster type, storm (73.7%) tops the list on the percentage of people killed, followed by earthquake (7.7%), mass movement-wet (6.9%) and flood (6.6%) respectively on a per annual basis.

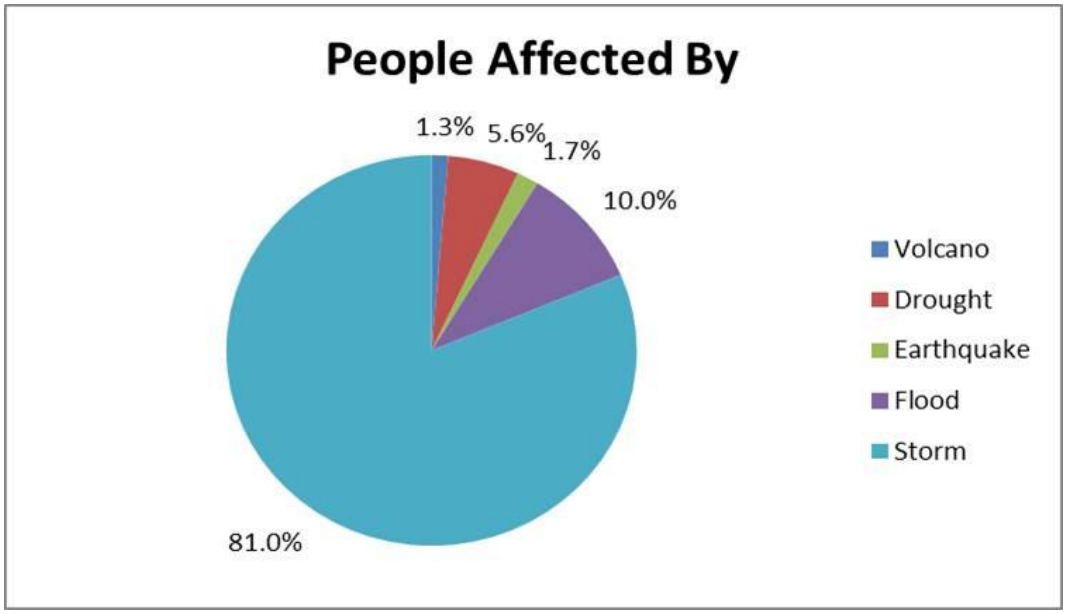

Figure 1-14: Percentage of Reported People Affected by Disaster Type

On the basis of the percentage of reported people affected by disaster type (Figure 1-14), storm (81%) still top the list followed by flood (10%) and drought (5.6%) which is not the case of people reported killed by these disaster types on a per annual basis.

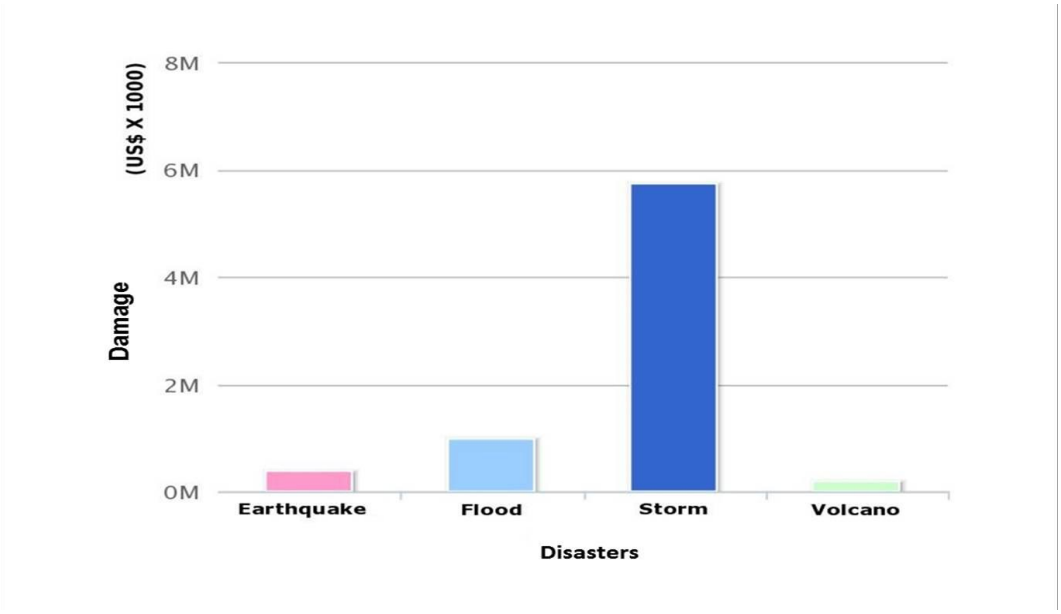

Figure 1-15: Estimated Economic Damages Reported by Disaster Type (US$ X 1,000)

The same pattern is observed in Figure 1-15. Storm ranks first (nearly 6 million) in terms of economic damages reported by disaster type in US dollars. Flood follows about 1.5 million US dollars on a per annual basis.

Table 1-4: Timeline of Disaster Events in Dumaguete City, Negros Oriental Philippines.

Type of Hazards/ Disasters	Typhoon RUPING	Northeast Monsoon	Northeast Monsoon	Typhoon SENDONG	Storm Surge along coastal Brgys: Mangnao, Calindagan, Brgy 1, Looc, Piapi and Bantayan	Typhoon PABLO	Typhoon AURING
Date of Occurrences	Nov-90	Dec-08	Feb-09	Dec 16, 2011	Perennial	Dec 4, 2012	Jan 3, 2013
Impact and Strength	Signal # 3	Heavy Rainfall	Heavy Rainfall - 240mm; 9 Barangays; 1000 families affected	Typhoon Signal # 2; 21 Barangays; 4,017 families affected	High tide and surges	Signal # 3	Signal # 1
Injured/ Casualties	No Data	No Data	None	4 deaths from floods	None	Zero Casualty	Zero Casualty
				1 electricuted; Injured – 468		21 injured;1,350 families affected	Less than 10 persons (health problem); Less than 20 injured
Property Damage	40 houses totally damaged	No Data	60 houses totally damaged	392 Houses totally damaged	Light material Houses	Houses: 72 totally damaged; 1,278 partially damaged	Life Raft, Life vest, Ropes
				740 partially damaged		Cost P7,830,000	Boat (Zamboanga Ferry Incident) etc. Cost P500,000
Infrastructure Damage	No Data	Damaged roads and spillways.	Damaged roads,	Damaged roads, 4 spillways, Calabnugan bridge; disrupted water and power supply;	Seawalls damaged/eroded	Electrical Facilities	Sea port P300,000
			4 spillways, Calabnugan bridge	Destruction of river control dikes;		300+ Electric poles down; P215,600	
Agricultural Damage	No Data	No Data	P500,000 worth of Agricultural damage	P1.1 Million.; Farmland - 12.5 has; Fisheries - 1 has	None	P 1,247,000; Rice 8.4 has.; 5,120 fruit trees; Mango 13, Coconut 20; Corn 4 has.	None
				Brgy Banilad - About 200 kilos of tilapia and milkfish washed out.		Vegetables 1,000sqm, Banana 8.4 has; Fruit trees 1,000; Total area 21.9 has.	
Environmental Damaged	No Data	No Data	Trees along Banica River uprooted.	Trees along Banica River uprooted;	None	358 trees uprooted	None
				Siltation of Banica River;Change in river channel;			
				Erosion and destruction of river banks;			
				Siltation of sea floor and covering of sea grass.			
Estimated Amount of Damaged	No Data	No Data	P 25Million	P 60Million	0	P 40Million	P 915,000

This table above (Table 1-4) shows the different disaster that hit Dumaguete City for the past three (3) decades.

On December 17, 2011 almost 50% of the entire population of the city was affected by floods brought about by Typhoon SENDONG. Total estimated damages from the typhoon on infrastructures, agricultural crops and livestock, livelihoods, lifelines and properties was around 60 million pesos as recorded by the Local Disaster Risk Reduction and Management Council (LDRRMC) of Dumaguete City.

Almost a year later, Typhoon PABLO struck Dumaguete City on December 4, 2012. The typhoon hit with maximum sustained winds of 175 kilometers per hour that day at around 5 pm and the force of the wind was very strong that it tore away sheets of metal from the roofs of houses as well as boards and signage's from private establishments and stores. More than 300 electrical post and over 300 trees were toppled that blocked most road networks around the city, resulting in a total power black-out that lasted more than a week. With the heavy rains and strong winds, agricultural crops and fruit bearing trees were uprooted and wiped out. More than 1,400 families were affected, 73 houses totally damaged and over 1,300 homes considered partially damaged. Again the total cost of damage from Typhoon PABLO was estimated around 40 million pesos.

1.6.4 On the Health Impact Assessment: Disease Surveillance in the Philippines on Diarrhoea, Leptospirosis and Dengue Fever

A review of the relevant literature, reports and surveillance data on the health impacts of floods has been identified and presented below. As mentioned and identified from the corfu project, the first and perhaps the most obvious health impact of flooding is the direct risk to human life through direct contact with deep and fast flowing floodwaters. This can result in the loss of life and physical injuries. The risks of death and injuries are often exacerbated by the presence of debris within the floodwater, and mitigated by effective flood warning and evacuation procedures. The greatest burden of mortality comes from drowning, heart attacks, hypothermia, trauma, and vehicle-related accidents.

A second type of impact caused by flooding is the risk to human health that results from the diseases and illness. These illnesses can be subdivided into several categories, depending on the types of pathogens that cause them and how they are transmitted.
The first major type of illness is that of faecal-oral diseases. These can include diarrhoeal diseases, which can result from the ingestion of specific pathogens. These pathogens include viruses, bacteria and protozoans. The second type of illnesses or diseases caused by flooding are the vector borne diseases, typically transmitted by

mosquitoes. These can include malaria, which is caused by a parasitic Protist (a type of microorganism), and Dengue Fever which is caused by the Dengue virus. Other than vector-borne diseases transmitted by mosquitoes, there are diseases that are borne by other carriers. Leptospirosis (or Weil's Disease) is caused by a bacterial pathogen and transmitted by rodents. The pathogen is excreted into floodwaters. Leptospirosis causes a range of symptoms including fever, headaches and vomiting as well as liver and kidney damage. The psychological impacts of flooding can be very significant and long-lasting. Flooding can lead to common mental health disorders such as depression, anxiety, sleeplessness and irritability.

This research work has only focused on the most common health impacts that are commonly occurring in the Philippines and these include diarrhoea, leptospirosis, and dengue fever cases respectively.

As described by the World Health Organization, diarrhoea is the passage of three or more loose or liquid stools per day (or more frequent passage than is normal for an individual). Diarrhoea is usually a symptom of an infection of the intestinal tract which can be caused by a variety of bacterial, viral and parasitic organisms. Infection is spread through a contaminated food or drinking water, or from person-to-person as a result of poor hygiene. According to the World Health Organization, each year diarrhea kills around 760,000 children under the age of five and is the second leading cause of death among that age group. Worldwide, there are nearly 1.7 billion cases of diarrheal disease every year (WHO, 2013).

Leptospirosis is another disease in focus of this research work. Leptospirosis is zoonotic disease caused by the pathogenic Leptospires of the genus Leptospira. It has a worldwide distribution but endemic mainly in humid subtropical and tropical countries. It is transmitted through contact of mucus membranes or (broken) skin with water (swimming or immersion), moist soil or vegetation contaminated with the urine of infected animals; occasional infection occurs through ingestion/inhalation of food/droplet aerosols of fluids contaminated by urine. The incubation usually lasts about 10 days (2 to 30 days). The usual presentation is an acute febrile illness with headache, myalgia (particularly calf muscle) and prostration. In the surveillance report of 2013 by the Department of Health (DOH) in the Philippines, a total of 1,174 leptospirosis cases have been reported nationwide from January 1, 2013 to September 17, 2013. This is 78.74% lower compared to the same period last year (5,522). Most of the cases were from the following regions: National Capital Region or NCR (17.80%), VI (17.22%), III (15.16%), Region 11 (11.41%) and Region II (8.94%). Ages of cases reported ranged from 2 to 83 years old (median= 30 years old) and majority (86.1%) of the cases were male. The

most affected (27.17%) is the age group higher than 40 years old. Of all the cases reported, there were 86 reported deaths (CFR 7.33%), (DOH, 2013).

On the other hand, dengue fever is transmitted by the bite of a mosquito infected with one of the four dengue virus serotypes. It is a febrile illness that affects infants, young children and adults with symptoms appearing 3-14 days after the infected bite. Dengue is not transmitted directly from person-to-person and symptoms range from mild fever, to incapacitating high fever, with severe headache, pain behind the eyes, muscle and joint pain, and rash. For the dengue fever cases, the DOH has reported a total of 117,658 cases from January 1 to September 7, 2013 nationwide. This is 5.25% lower compared to the same period last year's (124, 173) cases and most of the cases were coming from regions VI (14.82%), IV-A(13.98%), Region VII(9.38%), XII (7.98%), III (7.82%). Ages of cases ranged from less than 1 month old to 98 years old (median= 12.83 years) and majority of the cases were male (52.9%). Most of the cases (40.03%) belonged to the 1-10 years age group. There were 433 reported deaths (CFR 0.37%) from these reported cases. Though the figures of the surveillance report in 2013 were lower than the previous years, yet these recent statistics is still very alarming (DOH, 2013).

In the case of diarrhoea, it is not part of the surveillance of diseases monitored by the Department of Health (DOH) in the Philippines but is recorded as part of the top ten (10) leading causes of child mortality from year 2000 to 2010 along with dengue fever. Diarrhoea and other gastroenteritis of presumed infectious origin is usually in the top 5 leading causes of child mortality among 1 to 4 years old age bracket. Here below is the latest available data from DOH official website.

Table 1-5: Ten (10) Leading Causes of Child Mortality Among 1-4 Years Old.

Cause	1-4 Years			
	Male	Female	Both Sexes	Rate
1. Pneumonia	1,073	978	2,051	223
2. Diarrhoeas and gastroenteritis of presumed infectious origin	482	334	816	9.3
3. Congenital anomalies	409	388	797	9.1
4. Septicemia	251	231	482	5.5
5. Other diseases of the nervous system	246	212	458	5.2
6. Accidental drowning and submersion	296	159	455	5.2
7. Dengue Fever and Dengue-haemorrhagic fever	195	223	418	4.7
8. Chronic lower respiratory diseases	213	202	415	4.7
9. Meningitis	179	154	333	3.8
10. Leukemia	148	91	239	2.7

N.B: Rate per 100,000 population of corresponding age-group

In the top 10 leading causes of mortality among 1-4 years old in 2010 (Table 1-5) pneumonia tops the list. Diarrhoea and gastroenteritis of presumed infectious origin which are one of the microorganisms concern on this research ranked second on the list while dengue fever and dengue-hemorrhagic fever ranks 7th. However, leptospirosis infection is not among the top 10.

Table 1-6: Ten (10) Leading Causes of Child Mortality Among 5-9 Years Old.

Cause	5-9 Years			
	Male	Female	Both Sexes	Rate
1. Pneumonia	334	282	616	5.9
2. Dengue Fever & Dengue-haemorrhagic fever	211	328	539	5.2
3. Accidental drowning and submersion	299	159	458	4.4
4. Other diseases of nervous system	177	155	332	3.2
5. Transport accidents	198	107	305	2.9
6. Congenital anomalies	159	126	285	2.7
7. Leukemia	137	111	248	2.4
8. Meningitis	123	80	203	2.0
9. Septicemia	90	80	170	1.6
10. Diarrhoeas and gastroenteritis of presumed origin	87	77	164	1.6

N.B: Rate per 100,000 population of corresponding age-group

For children 5-9 years old (Table 1-6), the leading causes of child mortality is still pneumonia topping the list. Dengue fever and dengue-hemorrhagic fever went up on the second rank while diarrhoea and gastroenteritis of presumed infectious origin went down to bottom 10. Leptospirosis infection is still not on the list.

Table 1-7: Ten (10) Leading Causes of Child Mortality Among 10-14 Years Old.

Cause	10-14 Years			
	Male	Female	Both Sexes	Rate
1. Pneumonia	233	195	428	4.4
2. Accidental drowning and submersion	212	140	352	3.6
3. Other diseases of nervous system	150	116	266	2.7
4. Transport accidents	172	77	249	2.5
5. Congenital anomalies	130	114	244	2.5
6. Dengue Fever and Dengue-haemorrhagic fever	111	102	213	2.2
7. Chronic rheumatic heart disease	86	106	192	2.0
8. Leukemia	94	82	176	1.8
9. Septicemia	92	78	170	1.7
10. Nephritis nephrotic syndrome and neph	95	67	162	1.7

N.B: Rate per 100,000 population of corresponding age-group

For children 10-14 years old (Table 1-7), pneumonia still ranked first. Dengue fever and dengue-hemorrhagic fever is on the 6th ranked. On the other hand, diarrhoea and gastroenteritis of presumed infectious origin is out of the list. Still, leptospirosis infection remained not on the top 10.

Also found in the succeeding tables below (Tables 8, 9 and 10) are the top ten (10) leading causes of morbidity in Dumaguete City from 2012, 2011 and 2010 respectively. The top 10 leading causes of mortality were not included in this paper because the disease of concern were not in the top 10 list so the researcher opted not to show it here for it bears no significance.

Dengue Fever and Diarrhea/AGE (acute gastrointestinal enteritis) which are part of the target diseases in this study are on the top ten leading causes of morbidity in Dumaguete City in 2012. Dengue fever is in the top 4 and diarrhoea is on the top 5 respectively. Leptospirosis which is also part of the diseases concern in this study is not on the top 10. There were 827 cases of dengue fever in 2012 and 647 diarrhoeal cases.

Table 1-8: Top 10 Leading Causes of Morbidity in Dumaguete City in 2012

Cause	Number	Rate/100, 000 Population
1. URTI	11,315	8,275.31
2. Bronchitis/Bronchial Asthma	1,323	967.59
3. Pneumonia	828	605.56
4. Dengue Fever	827	604.83
5. Diarrhoea/AGE	647	473.19
6. Animal Bites	633	462.95
7. Wound All Types	566	413.95
8. Viral Infection	528	386.16
9. Hypertension	509	372.26
10. UTI	391	285.96

Dengue fever was not in the top 10 leading causes of morbidity in Dumaguete City in 2011 while diarrhea/AGE (acute gastrointestinal enteritis) was in the top 4 (Table 1-8). Leptospirosis was not also in the top 10 in 2011.

Table 1-9: Top 10 Leading Causes of Morbidity in Dumaguete City in 2011

Cause	Number	Rate/100, 000 Population
1. URTI	13,281	9,951.07
2. Bronchitis/Bronchial Asthma	2,589	1,939.86
3. Pneumonia	1,902	1,425.11
4. Diarrhoea/AGE	931	697.57
5. Hypertension	556	416.59
6. Dental Carries	483	361.9
7. Wound All Types	467	349.91
8. Animal Bites	381	285.47
9. PTB	311	233.02
10. Tension Headache	249	186.57

The disease of concern such as diarrhea/AGE, and dengue fever were in the top 10 leading causes of morbidity in Dumaguete City in 2010. The former was on the top 4 while the latter was in top 6 respectively (Table 1-9). Leptospirosis was also not in the top 10 in 2010.

Table 1-10: Top 10 Leading Causes of Morbidity in Dumaguete City in 2010

Cause	Number	Rate/100, 000 Population
1. URTI	10,438	8012.59
2. Bronchitis	4,327	3321.56
3. Pneumonia	1,550	1189.84
4.Diarrhoea/AGE	1,312	1007.14
5. Wounds	748	574.19
6. Dengue Fever	490	376.14
7. Hypertension	466	357.72
8. UTI	457	350.81
9. SVI	417	320.1
10. Animal Bites	360	276.35

It has been observed that the disease in focus, particularly diarrhoea and dengue fever were always on the top 10 when it comes to leading causes of morbidity in Dumaguete City and in the national surveillance data (Table 1-10). Though leptospirosis cases were not on the top 10 leading causes of morbidity but outbreaks in some areas of the country particularly during rainy season and flooding events are significantly high with over a 1000 cases nationwide. Thus, it is therefore important to give attention on these diseases.

1.7 STATE OF THE ART AND NEEDED IMPROVEMENTS

Several studies on disaster risk, flood vulnerability and resilience index have been conducted worldwide. Here is a brief review.

1.7.1 The Bündnis Entwicklung Hilft (Alliance Development Works) and United Nations University Institute for Environment and Human Security (UNU-EHS)

The Bündnis Entwicklung Hilft (Alliance Development Works), the UNU-EHS in Bonn, Germany has developed the WorldRiskIndex in 2011and calculated the risk values for 173 countries worldwide (United Nations University Institute for Environment and Human Security, 2011). The WorldRiskIndex in this report was measured on the basis of four components namely; exposure to natural hazards or a climatic stimulus, susceptibility, coping and adaptive capacities. According to this report, the Philippines ranked 3rd among those highest with a score of 24.32% on the disaster risk from all the 173 countries surveyed. However, this report did not include some of the important component which has theoretical and practical significance due to lack of relevant data.

These four sub-categories are, housing situation, social networks, disaster preparedness/early warning and adaptation strategies were not integrated into the overall calculation of the WorldRiskIndex in 2011 which are deemed to be relevant and significant. Thus, this research study focuses on these items and among others so we would have a thorough understanding why the community people are vulnerable or resilient in the first place.

1.7.2 The United Nation Development Programme (UNDP)

In 2004, the United Nation Development Programme (UNDP) also published a Global Report on Reducing Disaster Risk: A Challenge for Development. Countries with low Gross Domestic Product (GDP) per capita, low local density of population and high physical exposure were associated with high levels of risk in floods (UNDP, 2004). Part of the recommendations from this report is to address the gaps in knowledge for disaster risk assessment. A clear understanding of the depth and extent of hazard, vulnerability and disaster loss are primary steps towards a concerted and coordinated global action in disaster risk reduction along with appropriate governance and risk indexing from sub-regional areas which in turned encourages the researcher to consider these components at the local level. It is very important and vital to address these gaps in knowledge for disaster risk and vulnerability assessment. Measuring the KAP of the respondents from preparedness to recovery, and as well as the KAP on the exposures of the microorganisms in focus would give us a clue how community people perceived in these kinds of phenomenon which are translated into their attitudes and practices before, during or after any catastrophic events such as typhoons and flooding.

1.7.3 A Flood Vulnerability Index for Coastal Cities and Its Use in Assessing Climate Change Impacts

A flood vulnerability index for coastal cities was developed by Balica, et al. in 2012 using the system's components namely, the hydro-geological component, socio-economic and the politico-administrative components. It has been conducted to nine cities around the world (Balica, S.F., Wright, N.G., and van der Meulen, F., 2012). However, indicators in the socio-economic components such as the detailed description of the households in terms of their educational attainment, housing conditions, social networks, family income and property insurances were not included which are parts of the susceptibility and resilience category. Moreover, the knowledge, attitudes and practices of the households were also not taken into consideration which could also influence the vulnerability of those target population. In this same way, some indicators for the politico-administrative components such as good governance, sustainable community livelihood and among others should have been included. Thus, this research

work focuses and gives attention to these factors and indicators in developing this community-based flood vulnerability index for urban flooding.

1.7.4 The 2012 Philippine Disaster Report

The 2012 Philippines Disaster Report presents information on disasters that occurred in the Philippines in 2012 and a review of the major disaster that occurred within the country for the past decade. According to this report, compared to the 2011 data, 2012 posed a 9% increase in the number of disaster events recorded (CDRC, 2012). Reviewing the figures of the extent of devastation of the different natural disasters that has occurred in the Philippines in recent years particularly that of flooding and typhoon events, the researcher has been taking considerations on how vulnerable or resilient the community people are. It is very important to conduct studies that would give us a comprehensive view why the same scenario of devastation and sometimes even worse than the previous one is repeating. Is our government serious about implementing those measures, do we have enough resources and equipment and training, are our communities responsive, have we done something with our infrastructures that would make it resilient, and why is recovery is too inefficient and too slow in most cases, these and many other similar concerns were addressed in this research work.

1.8 Situation in the Philippines

In May 27, 2010, former President Gloria Macapagal Arroyo signed into law the Disaster Risk Reduction and Management Act of 2010 or RA 10121, to amend the three-decade Presidential Decree 1566, the old Disaster Management Law of the Philippines. RA 10121 institutionalizes the Disaster Risk Reduction and Management system not only in the National Government but also to all local government units in the country. In 2011, the Dumaguete City Council passed Sangguniang Panglungsod (SP) Resolution No. 118, Ordinance No. 63 Series of 2011 which established the Local Disaster Risk Reduction and Management Office (LDRRMO) to strengthen the effectiveness of the various protective and emergency services in the City. The LDRRMO is the coordinator of all activities and actions related to disaster risk management and is also an operational unit responsible for functions and services not presently performed or not adequately performed by existing units, offices and organizations. In spite that the Philippines has a very good National and Local Disaster Risk Reduction and Management Council Structure yet there have been cases where emergency response and disaster recovery during and after a typhoon or flooding had experienced some delays due to some political issues or gaps among concerted actions from numerous

actors across multiple sectors. It is important to know why such gaps exists thus soliciting surveys from LGU's and NGO's is a way of connecting these gaps. Concerted actions and coordination among authorities at all levels (national, provincial, municipal and community) and among other partners are critical to ensure that the resources are mobilized accordingly. On the other hand, most assessments conducted by the Local Disaster Risk Reduction and Management Council (LDRRMC) were mainly focused on the damage of physical structures, height of flood, number of families affected and deaths. There were no thorough assessments in terms of how vulnerable and resilient the community people in terms of their perception and action towards flood preparedness, response, recovery and their response to adaptation strategies.

Most studies on vulnerability and resilience revolves around national data or on a per country description but fails to cover some of the important components from the local settings, for instance, survey on housing conditions which are not included in the computation in global assessment because of insufficient data, very time-consuming and cost-intensive but they should have been included in the susceptibility component because they are highly significant. Also, items like disaster preparedness and early warning, social network and adaptation strategies should also be taken into account because of their high significance in the component. Other items that influence the occurrence of disease outbreaks were also incorporated which are believed to be highly significant in the resilience and vulnerability index at the community level. Furthermore, the community people's knowledge, attitude, and practices (KAP) towards flood resilience and disease outbreaks were gauge to be able to have a thorough assessment.

Through this research work, the Flood Vulnerability Index of Dumaguete City will be established. Vulnerable communities will be identified and map. But what is even more important is for us to understand why the community people are vulnerable in the first place. This research will allow us to pinpoint the weak and strong points of the socio-behavioral and politico-administrative components particularly on the perception and behavior of the community people in their way of coping and adapting to the effects of global warming and its impact. The aim of this research work is to improve the limitation of the previous WorldDisasterIndex and other similar studies by developing new indicators and components for Flood Vulnerability Index that will be useful in the community level.

Urban flooding poses a serious challenge to development and the lives of the people. This natural phenomenon caused havoc in many aspects in the society particularly to human health, infrastructure and the economy of the country. Moreover, public health

risk in urban pluvial flooding is usually overlooked and undermined and only very little attention is given. According to the World Risk Report released by the United Nations University Institute for Environment and Human Security, the Philippines is ranked third globally in terms of disaster risk as mentioned earlier on this research paper. Given this high-risk status of the Philippines to hazards in general, it is therefore important to conduct studies related to risk and vulnerability so issues on health and disaster risk will be addressed appropriately.

This research work will be conducted to assess the vulnerability of selected communities in Dumaguete City, Philippines in terms of flood resilience and their exposures to E.coli, leptospirosis and the dengue fever mosquito through questionnaire surveys from the households of the target community. The Knowledge, Attitudes, Practices or KAP of the respondents will be solicited. Survey questionnaires from the LGU's and NGO's will also be conducted to get the overall picture of the Flood Resilience and Health Program in the community. Finally, mapping of flood vulnerable communities of Dumaguete City will be generated, and a simple flood map of Dumaguete City will also be produced.

1.8.1 Needed Improvements

The aims of this research work are as follows:

1. To improve the limitation of the previous WorldDisasterIndex and other similar studies by developing new components and indicators for Flood Vulnerability Index (FVI) that will be useful in the community level, the nation and the general world as a whole.
2. To establish the relationship between Flood Vulnerability Index (FVI), susceptibility and resilience variables.
3. To produce flood vulnerability maps, health risk maps and profiles and flood map which can be used in the early warning system protocols.

Specifically this research work wants to know the overall Flood Vulnerability Index (FVI) of Dumaguete City, Negros Oriental and the individual FVI of each of the 12 communities. Through this work, the most and the least vulnerable communities in Dumaguete City in terms of the different components and indicators used in the FVI will be revealed. The level of governance in Dumaguete City in addressing natural disaster particularly on typhoons and flooding in terms of the benchmarks that were used will also be made known. The overall assessment on flood resilience and health program of the Local Government Units (LGU's) and Non-Governmental Organizations (NGO's)

has also been conducted. Lastly, this work allows us to understand why the community people are vulnerable in the first place.

1.8.2 Significance for Developing of the Community-Based Vulnerability Index for Urban Flooding

Flooding causes widespread devastation, economic damages and loss of human lives. It is a global phenomenon and due to climate change, this phenomenon will continue. It is very important that the community people are aware of its impacts but it is even more important that they are resilient to this phenomenon. Thus, it is important to know their level of awareness and vulnerability to the different risks and impacts of urban fluvial flooding.

In this regard, the findings of this research work will be considered significant. Specifically, to the community people, the local government units, the nongovernmental organizations and the stakeholders which are the main players and who can significantly benefit from the result of this work in various ways. By determining the vulnerability to urban fluvial flooding of selected communities in Dumaguete City, the researcher would be able to get the overall picture of the level of vulnerability and resilience in the community which in turn can provide an objective and scientific basis for risk management decisions, guide decision making, priority setting and resource allocation in health, environmental disaster management, and provide a rational basis for implementation and policy development.

It would also help establish correlations and relationships between the implementation and facilitation of the flood risk management and resilience program in the said community. Thus, it is vital to understand interplay of these factors, in doing so, areas with greater risks will be identified and map and appropriate risk management measures for the given community will be facilitated. The importance of measuring vulnerability and developing indicators is to reduce social vulnerability and build resilience and to help communities strengthen their resilience against climate change.

CHAPTER 2
CONCEPTUALIZING FLOOD VULNERABILITY

SUMMARY

This second chapter presents and discusses in details about the previous and existing approaches and frameworks for flood vulnerability studies. Describing and conceptualizing flood vulnerability in a more concrete way. This chapter also illustrates the interrelationships and complexity of the water resource system with an understanding point of view so that better decisions will be made and a holistic approach will be attained in maintaining sustainability. The proposed community-based flood vulnerability framework for urban flooding is introduced.

Disaster risk index developed by the United Nations Development Programme (UNDP) is presented in this chapter along with the world risk index report in 2012 by the United Nations University Institute for Environment and Human Security were made mentioned in this chapter. Moreover, a flood vulnerability index for coastal cities and its use in assessing climate change impacts is also presented as one of the basis of formulating this proposed community-based flood vulnerability index. To add further stronghold of this research work, it is back up with a few existing flood vulnerability index, risk, and vulnerability studies in the Philippines similar but totally of different focus, components and indicators.

Flood management and flood mitigation program of Dumaguete City through the information shared by city of Dumaguete and the Local Disaster Risk Reduction and Management Office and Staff is presented here in a more or less brief and concise manner. For example, the structural and non-structural measures; the LDRRMC structure; LDRRMO Organizational Structure; the identified emergency evacuation areas of Dumaguete City and its incident command system; the city's institutional working arrangement; and lastly the general monitoring and evaluation of framework is in detailed.

CHAPTER 2
CONCEPTUALIZING FLOOD VULNERABILITY

As described by the United Nations Office for Disaster Risk Reduction (UNISDR), vulnerability is the characteristics and circumstances of a community system or asset that make it susceptible to the damaging effects of a hazard. As there are many aspects of vulnerability, arising from various physical, social, economic, and environmental factors, this definition identifies vulnerability as a characteristic of the element of interest in this case, the community which is independent of its exposure. The concept tries to understand which of the factors is more relevant to community vulnerability (UNISDR, 2007).

There have been several attempts to define and capture the meaning of vulnerability over the last twenty years. The use of the term varies among disciplines and scientific research areas. For instance, the International Federation of Red Cross (IFRC) defines vulnerability as the diminished capacity of an individual or group to anticipate, cope with, resist and recover from the impact of a natural or man-made hazard. The concept is relative and dynamic (IFRC, 2014).

The Intergovernmental Panel on Climate Change (IPCC) in its Third Assessment Report in Climate Change 2001, described vulnerability as the function of the sensitivity of a system to changes in climate (the degree to which the system will respond to a given change in climate including beneficial and harmful effects). In its framework, a highly vulnerable system would be a system that is very sensitive to modest changes in climate, where the sensitivity includes the potential for substantial harmful effects, and for which the ability to adapt is severely constrained. Resilience is the flip side of vulnerability-a resilient system or population is not sensitive to climate variability and change and has the capacity to adapt (IPCC, 2001).

A Flood Vulnerability Index for Coastal Cities and Its Use in Assessing Climate Change Impacts considered vulnerability as the extent of harm which can be expected under certain conditions of exposure, susceptibility, and resilience. More specifically in the case of floods, a system is susceptible to floods due to exposure in conjunction with its capacity/incapacity to be resilient, to cope, recover or adapt to the extent. Some of the exposed populations are protected from flooding by various structural and non-structural measures that are part of the resilience strategy. On the other hand, some of them have none, or only weak, flood defenses and the exposed populations are more often subject

to flooding with the consequent disruption, economic loss and loss of life (Balica, S.F., Wright, N.G., and van der Meulen, F., 2012).

In this research, vulnerability is the result of the interplay of the vulnerability indicators in the exposure, susceptibility and resilience category which will be discussed in the succeeding pages.

2.1 Vulnerability to Floods

The definition of vulnerability mentioned above differs from definition to definition depending on the type of hazards exposed on a particular community or society. One of which gave a definition of vulnerability to a particular hazard like climate change. IPCC from its latest Fifth Assessment Report on Climate Change 2013 defines vulnerability as the propensity or predisposition to be adversely affected. Furthermore, vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt (IPCC, 2014).

The World Bank has made a list of the five main threats arising from climate change namely, droughts, floods, storms, rising sea levels, and greater uncertainty in agriculture (World Bank, 2009). Four of the world's poorest nations top the list of the 12 countries at the higher risks. Bangladesh heads the list of countries most at risk of flooding. Increasing glacial melt from the Himalayan ranges as a result of rising global temperatures is set to swell the Ganges and Brahmaputra rivers and their hundreds of tributaries, flooding 30-70 percent of the country each year as the water makes its way to the Bay of Bengal in the south, where the coast is also vulnerable to flooding from rising sea levels. On the other hand, the Philippines, a middle-income country in Southeast Asia consisting of over 7,000 islands, leads the list of nations most in danger of facing frequent and more intense storms.

In the United Nations Convention on Climate Change, the paper Climate Change: Impacts, Vulnerabilities and Adaptation in Developing Countries released this report. In Asia, the principal impacts of climate change on health will be on epidemics of malaria, dengue, and other vector-borne diseases (Martens, 1999). The global burden of climate change-attributable diarrhoea and malnutrition are already the largest in the world in Southeast Asian countries including Bangladesh, Bhutan, India, Maldives, Myanmar and Nepal in 2000. Illness and death are expected to increase from diarrhoeal diseases due to drought and flooding, and are also expected from increased amounts of cholera bacteria in coastal waters (United Nations Framework Convention on Climate Climate, 2007).

2.2 The Water Resource System

According to the Global Research on Water-Based Economies, management of water resource systems poses risks to the economic, social and environmental well-being of communities, regions, nations and ultimately the global world. It is of national and international interest to identify and evaluate economically viable, socially acceptable and environmentally conscious water management strategies to sustain this important region as well as other world water and agricultural resources (GRoWE, 2005).

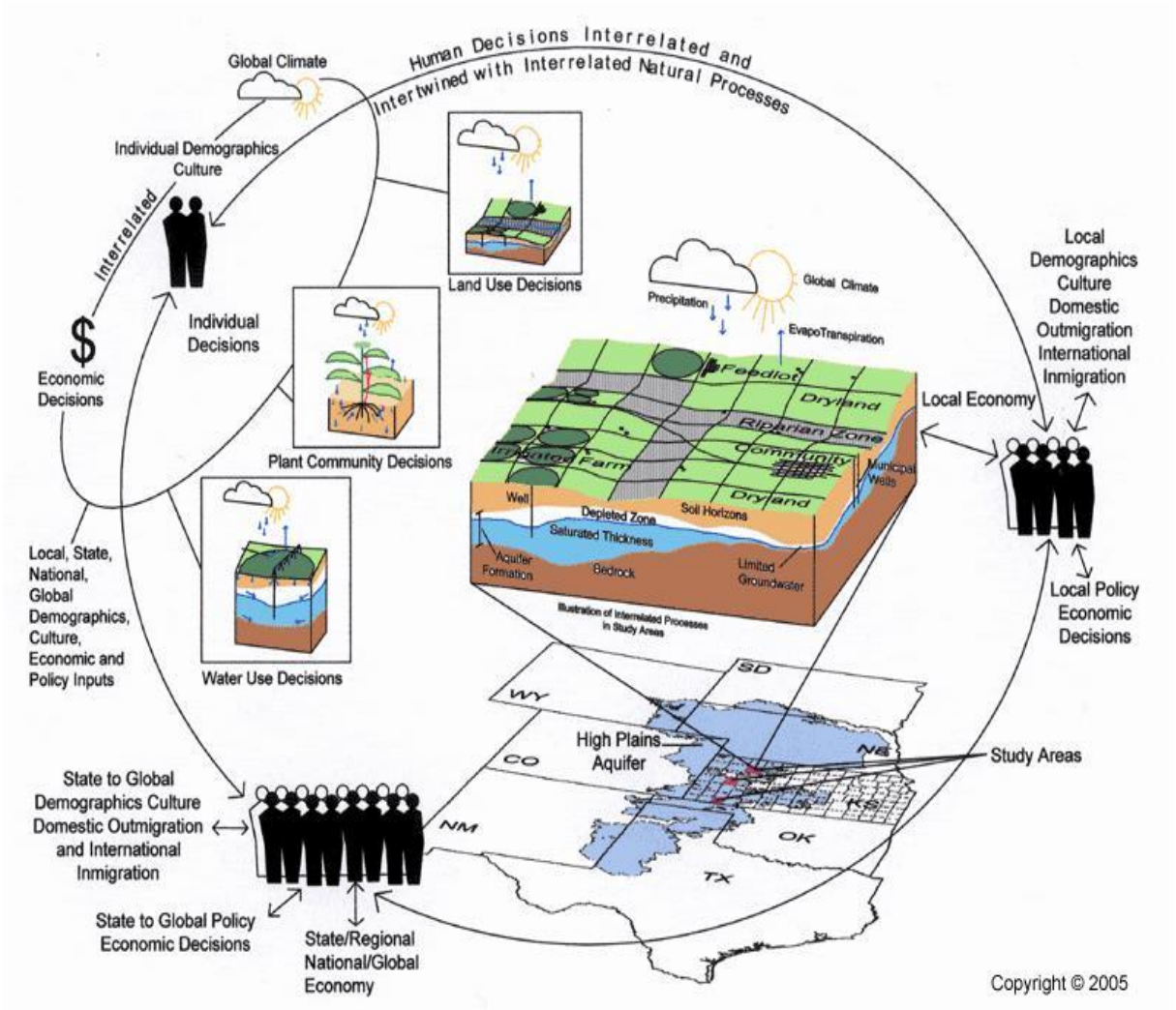

Figure 2-1：The Water Resource Systems (GRoWE, 2005)

Figure 2-1 illustrates the interrelationships, complexity and reach of management decisions related to water use and water related issues at the individual level, local, regional, national and ultimately to the global level. The interplay of the different players

in the society, from the individual decisions to international economic policy and decisions are crucial in maintaining the sustainability of the water resource system.

Understanding this interrelated and complexity in the water resource system is important so that better decisions will be made for managing the water resource system.

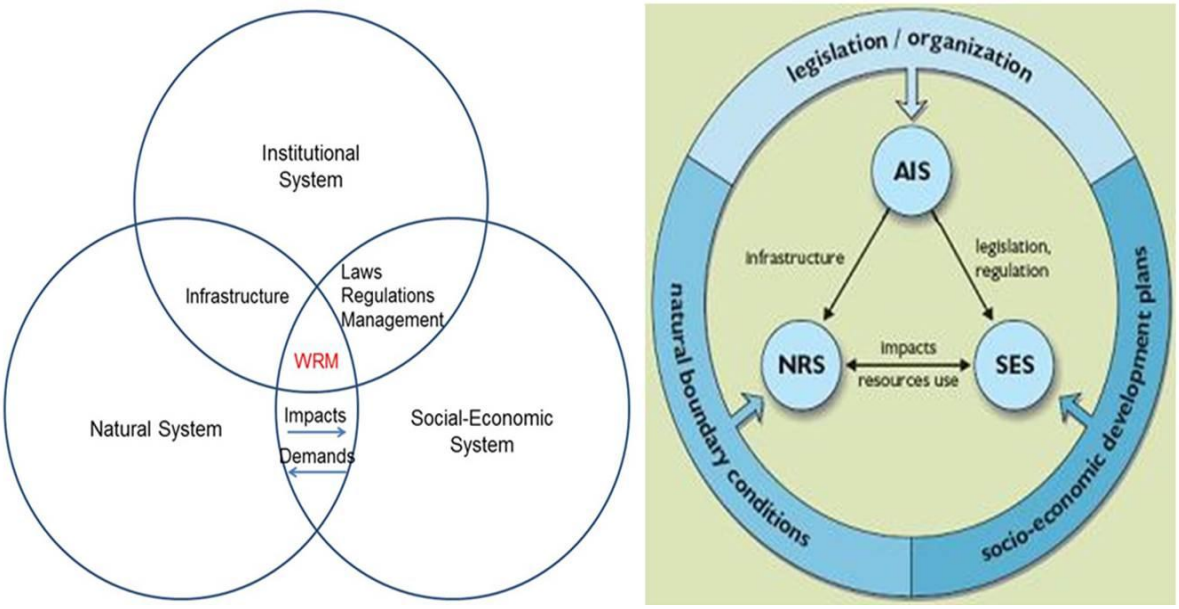

Figure 2-2： a and b Water Resource System's Sub-System and its Interactions (van Beek, 2005)

According to the Flood Vulnerability Index developed by the UNESCO-IHE, the system approach aims to identify the interactions of different actors or components within certain defined boundaries. This approach is considered holistic in understanding complex processes.

The three interdependent subsystems in the water resources system are identified (Van Beek, E. and Loucks, D.P., 2005). Figures 2-2 a and b illustrates their interaction, consisting of:

A. The natural river subsystem NRS, in which the physical, chemical and biological processes take place
B. The socio-economic subsystem SES, which includes the societal (human) activities related to the use of the natural river system
C. The administrative and institutional subsystem, AIS of administration, legislation and regulation, where the decision and planning and management processes take place.

Floods can be considered as a disruption in a normal functioning of a water resource system. There are three main systems that are affected by floods, with boundaries depending on the scale: the river basin system, the sub-catchment system and the urban system where the different players in the society are part of.

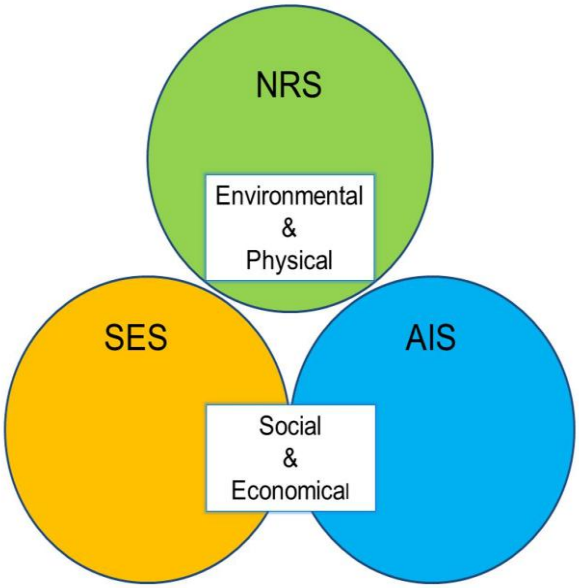

Figure 2-3：Link Between Subsystems and Components

Figure 2-3 illustrates the links between the subsystems and components. The components are assessed by different indicators to understand the vulnerability of the system to floods. The components are: social, economic, environmental and physical. Flooding distress these four components of the water resources system, each of them belong to one of the subsystems described before, and their interactions affect the possible short term and long term damages.

2.3 Vulnerability Frameworks

The conceptual framework (Figures 2.4 and 2.5) considered representative for the global environmental change community primarily due to its focus on the coupled human-environment systems (Turner, B.L. et al, 2003). The illustration of this framework is well described and explained by Ciurean et al. According to them, Turner's conceptual framework definition of vulnerability encompasses exposure, sensitivity and resilience (Ciurean, R.L. et al, 2013). Exposure contains a set of components (i.e. threatened elements: individuals, households, states, ecosystem, etc.) subjected to damage and characteristics of the threat (frequency, magnitude, duration). The sensitivity is determined by the human (social capital and endowments) and environmental (natural capital or biophysical endowments) conditions of the system

which influence its resilience. The last component is enhanced through adjustments and adaptation. A system's vulnerability to hazards consists of (i) linkages to the broader human and biophysical (environmental) conditions and processes operating on the coupled system in question; (ii) perturbations and stressors/stresses that emerge from this conditions and processes; and (iii) the coupled human – environment system of concern in which vulnerability resides, including exposure and responses (i.e. coping, impacts, adjustments, and adaptation). It is seen that changes in the resilience can affect the susceptibility of a system and if we are careless with our actions, it can alter the whole system in ways that make it difficult to recover.

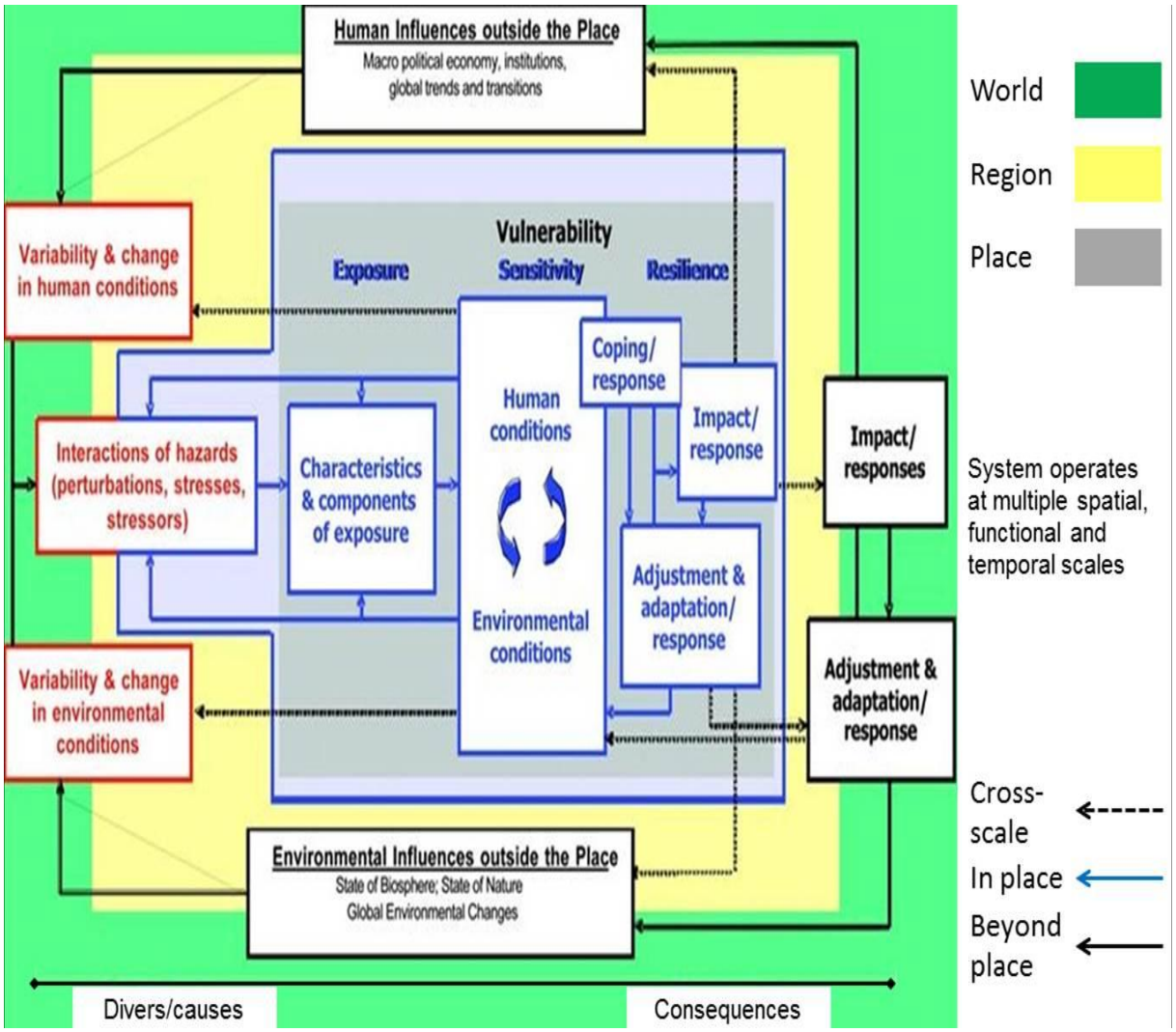

Figure 2-4：SUST Vulnerability Framework. Full Framework (Turner II et.al. 2003)

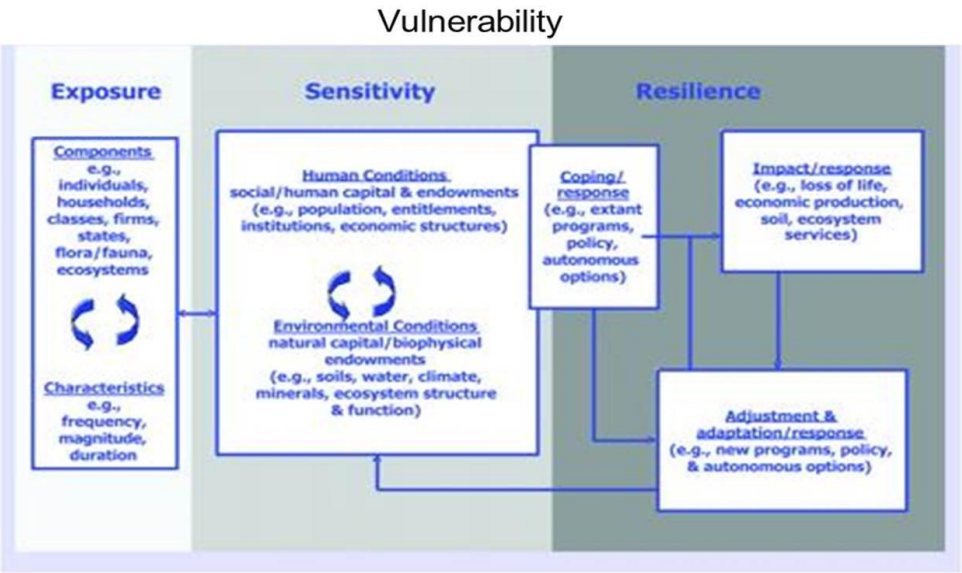

Figure 2-5：SUST Vulnerability Framework Detailed Framework (Turner II et al. 2003)

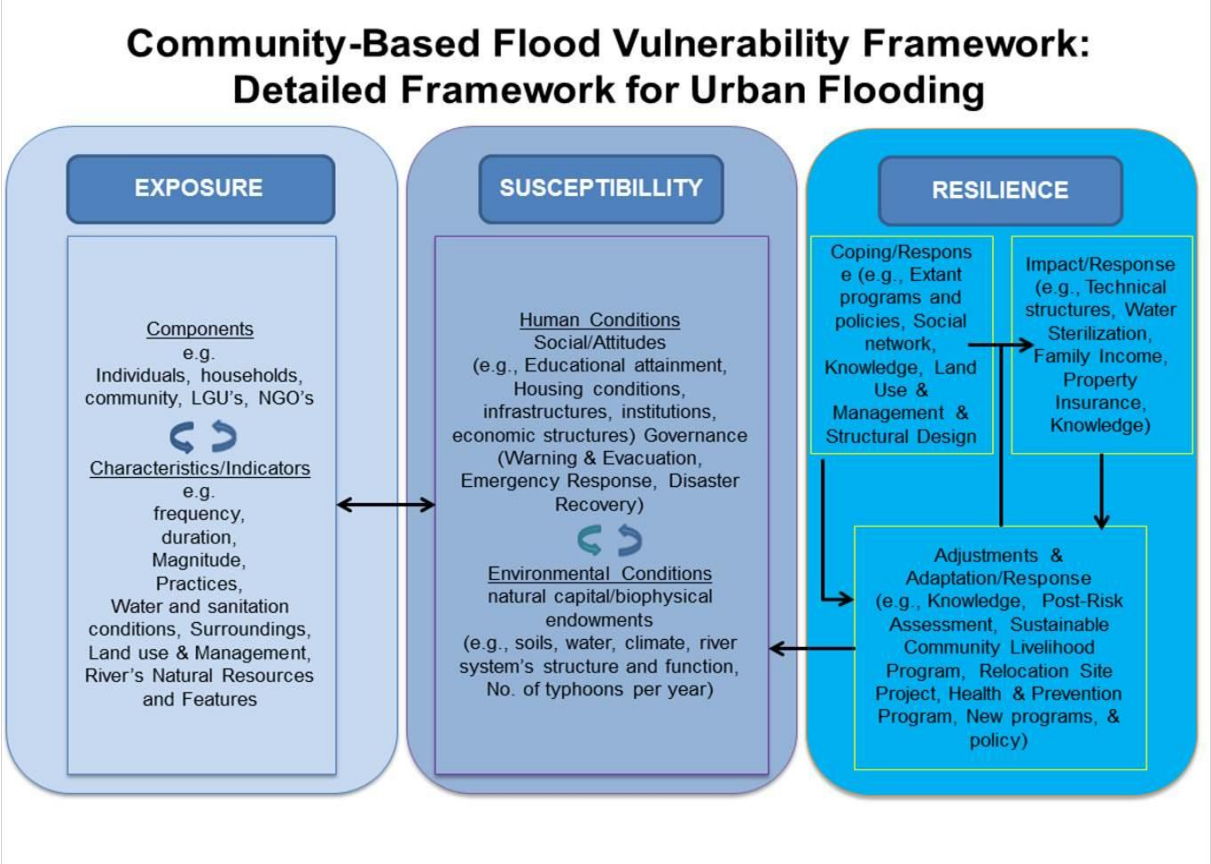

Figure 2-6：Based from SUST Vulnerability Framework (Turner II et al. 2003)

Figure 2.6 depicts the proposed version of “working framework” which is based from Turner’s conceptual framework. The different components and indicators that were used in this study are shown in the category (exposure, sensitivity, and resilience) to which it appropriately belonged to.

2.4 Global Risk and Vulnerability Indicators

2.4.1 Disaster Risk Index

The United Nations Development Programme (UNDP) Bureau for Crisis Prevention and Recovery has developed the Disaster Risk Index on its global report on Reducing Disaster Risk: A Challenge for Development published in 2004. In this Disaster Risk Index (DRI), countries are indexed for each hazard type according to their degree of physical exposure, their degree of relative vulnerability and their degree of risk (UNDP, 2004).

The key steps involved in producing the DRI were:

A. Calculation of Physical Exposure

   The DRI identified the areas exposed to each of the four hazards (earthquakes, tropical cyclones, floods and droughts) and the population living in these areas to arrive at a calculation of physical exposure for each country. This is the average number of people exposed to a hazard event in a given year. Physical exposure for each hazard was mapped in a Geophysical Information System (GIS). In the DRI, physical exposure is expressed both in absolute terms (the number of people exposed in a country) and in relative terms (the number exposed per million people).

B. Calculation of Relative Vulnerability

   The DRI has used the number of people actually killed by each hazard type in each country as a proxy for manifest risk. The DRI, therefore, was able to calculate the relative vulnerability of a country to a given hazard by dividing the number of people killed by the number exposed. When more people are killed with respect to the number exposed, the relative vulnerability to the hazard in question is higher.

C. Calculation of Vulnerability Indicators

The DRI then examined the manifest risk for each hazard type against a bundle of social, economic, and environmental indicators through statistical analysis using multiple logarithmic regression model. A total of 26 variables selected through expert opinion were available as global datasets and analyzed for each hazard type. These enabled the selection of those vulnerability indicators that were most associated with risk for each hazard type.

The formula and method for estimating risk and vulnerability in the development of DRI by UNDP is represented in the following simplified equation:

Risk = Hazard x Population x Vulnerability

Where:

Risk = is the risk (number of killed people)

Hazard = is the hazard, which depends on the frequency and strength of a given hazard

Population = is the population living in a given exposed area

Vulnerability = is the vulnerability and depends on the socio-political-economical context of this population

Hazard multiplied by the population was used to calculate physical exposure.

The formula for risk evaluation using physical exposure is shown below:

Risk = Physical Exposure x Vulnerability

Where:

Physical Exposure = is the physical exposure, i.e. the frequency and severity multiplied by exposed population

The risk indicators can be expressed in different ways (e.g. by the number of people killed, percentage killed or the percentage killed as compared to the exposed population).

Part of these indicators was considered in my study particularly on literacy rate and people with access to improve water supply as illustrated in Table 3.1.

The DRI has its limitations.

A. The DRI represents the risks of deaths because reliable data on other aspects of disaster risks (people affected, economic impacts) is not available in global level

disaster databases. Thus, the DRI only represents risks to loss of life and cannot be inferred to represent other physical, social, and economic aspects of risk.

B. The DRI does not represent risk associated with small-scale and everyday disasters. DRI utilizes publicly available global data on disaster impact available for large and medium-scale disaster events, defined as those involving more than 10 deaths, 100 affected and/or a call for international assistance.

C. The DRI only represents the primary hazard events associated with earthquakes, tropical cyclones and floods. Local impacts were not considered in the DRI such as landslides, debris flow, sea surges and flooding brought about by tropical cyclones.

D. The DRI represents disaster risk in the period of 1980-2000 because it was considered that access to information before that period was less reliable. This, however, weights the work in favour of countries that suffered catastrophic disaster events with large loss of life in the two decades under analysis and against countries that suffered such events in the 1970's, for instance, but not since then.

E. The DRI test vulnerability indicators are from available global datasets. This implies that there may be other variables that potentially might help build a better correlation with risk such as the availability of direct indicators of national vulnerability. Small difference in the vulnerability indicator figures can mask major changes in disaster risk.

F. The DRI does not include indicators on disaster risk management and reduction which can be used as an initial level analysis of the comparative effectiveness of competing risk reduction strategies (including a do-nothing option).

After examining these limitations of this DRI, the researcher has considered those direct indicators and data that are with local significance and availability.

2.4.2 World Risk Index

The WorldRiskReport 2012 was developed jointly by scientists and development experts. The calculation of the Index, which the United Nations University Institute for Environment and Human Security, Bonn (UNU-EHS), has been commissioned to perform by the Alliance Development Works, was carried out via the four components: (United Nations University Institute for Environment and Human Security, 2011).

A. Exposure towards natural hazards such as earthquakes, cyclones, flooding, drought and sea level rise.

B. Susceptibility depending on infrastructure, nutrition, housing situation and economic framework conditions.

C. Coping capacities depending on governance, disaster preparedness and early warning, medical services and social and material coverage.

D. Adaptive capacities relating to forthcoming natural events, to climate change and to other challenges.

The term exposure refers to entities (population, built-up area, infrastructure component, environmental areas) being exposed to the effects of one or more natural hazards (earthquakes, cyclones, droughts and floods). In the WorldRiskIndex, exposure relates to the annual average number of individuals who are potentially exposed to hazard events. In this regard, the frequency of hazards is also taken into account. Additionally, the number of people who are considered who would potentially be affected by the sea level rising by one meter. To calculate exposure to earthquakes, cyclones, floods and droughts, the Physical Exposure data of the PREVIEW-Global Risk Data Platform (http://preview.grid.unep.ch/) of the United Nations Environmental Program (UNEP) has been used. These include the number of people per approx. 20 square kilometers who are exposed on average to the above-mentioned natural hazards per country and per year (UNEP, 2014).

Susceptibility generally refers to the likelihood of harm, loss and disruption in an extreme event triggered by a natural hazard. Thus susceptibility describes structural characteristics and framework conditions of a society. The following five sub-categories which outline the living situation and living conditions in a country, have been chosen to represent susceptibility: “public infrastructure”, “housing conditions”, “nutrition”, “poverty and dependencies”, “economic capacity and income distribution”. Housing conditions are an important factor in defining susceptibility. However, they have so far not been included in Index calculations owing to a lack of global data. While data and methods do exist to assess housing conditions, such surveys have so far only been carried out for a few cities worldwide owing to the high time and cost effort involved so that presently, no sufficient information is available for this.

Coping and coping capacities comprise various abilities of societies and exposed elements (for example critical infrastructure such as nuclear power stations) to minimize negative impacts of natural hazards and climate change through direct action and the

resources available. Coping capacities encompass measures and abilities that are immediately available to reduce harm and damages in the occurrence of an event. The five sub-categories of coping capacities ("government and authorities", "disaster preparedness and early warning", "medical services", "social networks", "material coverage") and the indicators used together with their weighting factors are included. Due to their high importance, the sub-categories "disaster preparedness and early warning" and "social networks" are included in the coping capacities component. However, no global data referring to them is available. Hence it has so far not been possible to establish them in the Index. To calculate the WorldRiskIndex, the opposite value, i.e. the lack of coping capacities, has been used, which results from the value 1 minus the coping capacities.

In contrast to coping, adaptation is understood as a long-term process that also includes structural changes (Birkmann, 2010). In addition, adaptation encompasses measures and strategies dealing with and attempting to address the negative impacts of natural hazards and climate change in the future. Five sub-categories have been chosen for calculation that described capacities for a long-term adaptation and change within a society: "education and research", "gender equity", "environmental status/ecosystem protection", "adaptation strategies" and "investment". Owing to insufficient global data, the five sub-categories and the eleven selected indicators as well as their corresponding weightings are selected except for the sub-category of adaptation strategies could not be integrated into the calculations either. In analogy to the coping capacities, the lack of adaptive capacities is included in the WorldRiskIndex.

The WorldRiskIndex is a tool to assess the disaster risk that a society or country is exposed to by external and internal factors. This index identifies global disaster hotspots. This report has calculated the individual risk values of the 173 countries worldwide. The Index focuses attention on the people, countries and regions, precisely because the emergence of disasters is crucially determined by domestic social factors. Thus, the WorldRiskIndex is based on the core understanding that a society's disaster risk is influenced by its structure, processes and framework conditions, which in turn may be affected by natural events and the effects of climate change. The concept of the Index stresses that not only the magnitude of frequency of a natural event but indeed also the social, economic and ecological factors characterizing a country essentially determine whether a natural hazard can turn into a disaster.

The formula for computing the World Disaster Risk Index is shown below and is based on twenty eight indicators:

WorldRiskIndex = Exposure x Vulnerability

Where:

WorldRiskIndex = is the product of exposure and vulnerability

Exposure = is the population or entities exposed to the different natural hazards (e.g. earthquakes, storms, droughts, sea level rise)

Vulnerability = is the result of the combination of the lack of coping and adaptive capacities which comprises the susceptibility components.

For better comprehension, the individual indices have been transformed into percentage values and classified with the aid of the quantile method integrated into the ArcGIS10 software packet. The five classes calculated contain the same number of cases and are translated into a qualitative classification of “very high – high – medium low – very low”. The WorldRiskIndex has also its limitations. Owing to insufficient global data, this report have not included the following indicators such as housing conditions, disaster preparedness and early warning, social networks, and adaptation strategies in the calculations in the WorldRiskIndex in spite that it has theoretical and practical significance. Thus, this research study focuses on these items and among others so we would have a thorough understanding why the community people are vulnerable or resilient in the first place.

2.4.3 A Flood Vulnerability Index for Coastal Cities and Its Use in Assessing Climate Change Impacts

This Flood Vulnerability Index for Coastal Cities was developed by (Balica, S.F., Wright, N.G., and van der Meulen, F., 2012) considering the system approach identified previously by (Van Beek, E. and Loucks, D.P., 2005). Balica et al. uses the hydro-geological, socio-economic, and politico-administrative components. Nineteen (19) appropriate indicators out of the thirty (30) indicators from the World Bank data set, 2001, (Gornitz, 1990), (McLaughlin, 2010) and (Cutter, 2003) were chosen and administered to nine cities around the world.

The CCFVI of each coastal component in this study was computed based on the general Flood Vulnerability Index formula:

$$\mathrm{FVI} = \frac{\mathrm{E} \times \mathrm{V}}{\mathrm{R}}$$

Where:

FVI = is the Flood Vulnerability Index

E = Exposure

V = Vulnerability

R = Resilience

The general formula for FVI is computed by categorising the indicators to the factors to which they belong (exposure (E), susceptibility (S) and resilience (R)) (Cendrero, 1997). The indicators of exposure and susceptibility are multiplied and then divided by the resilience indicators, because indicators representing exposure and susceptibility increase the flood vulnerability and are therefore placed in the numerator. The resilience indicators decrease flood vulnerability and are thus part of the denominator.

2.4.4 Existing Flood Vulnerability Index, Risk and Vulnerability Studies in the Philippines

As mentioned by Balica et al. 2012 in their paper, an existing Flood Vulnerability Index (FVI) by Connor & Hiroki in 2005 which presented a methodology to calculate a FVI for river basins, using eleven indicators divided in four components (Climate (C), Hydro-geological (H), Socio-Economic (S), and the Counter measures (M) component), (Connor, 2005). The methodology was tested on the river basin in Japan were there's accessibility to enough information. The index uses two sub-indices for its computation; the human index which corresponds to the social effects of floods; and the material effects which cover the economic effects of floods. The weights of the indicators were presented with the following equation:

$$\mathrm{FVI} = \mathrm{C} + \mathrm{H} + \mathrm{S} - \mathrm{M}$$

Where:

FVI = is the Flood Vulnerability Index
C = is the Climate component
H = is the Hydro-geological component
S = is the Socio-economic components
M = is the Counter measure component

The purpose of the FVI is to serve as a tool for assessing flood risk due to climate change in relation to underlying socio-economic conditions and management policies. This methodology was also administered in 18 river basins in the Philippines where some indicators were added or changed because of the lack of information.

A number of vulnerability and risk assessments have been conducted in the Philippines over these past few years. For instance, the Manila Observatory released the vulnerability and risk maps which give a national overview of risk and vulnerability susceptibility aggregated at the provincial level. The aim of the project (Mapping Philippine Vulnerability to Environmental Disasters) was to identify areas in the country

that are of high vulnerability and risk to environmental disasters. Hazards and disasters are mapped and analyzed using Geographic Information Systems (GIS), environmental modeling tools and spatial databases. The categories used in identifying vulnerability and risks in this study are climate/weather-related, geophysical, ecological and anthropogenic (Manila Observatory, 2005). However, national-scale flooding or the likelihood to flooding has not been addressed in this study.

A study on Measuring Social Vulnerability to Build Resilience to Environmental Hazards in the Philippines was published in 2012. In this study, the author measured social vulnerability by using social vulnerability index (SoVI) from census of population and housing which was based from the works of Cutter et al, in 2003b. As census data can be acquired at the detail of the individual in the Philippines, it is possible then to aggregate this information at the barangay levels. In his study, the SoVI indicators are a composite of variables from census data that described the inherent vulnerability of a population, for instance age (children or elderly), gender, ethnicity, employment and housing characteristics. This census-based SoVI was incorporated in the methods of mapping risk assessments. However, this study only includes those categories mentioned above (Ignacio, J.A.F, and Henry, S., 2013). The knowledge, attitude and practices among community people towards resilience have not been included in this study which could also give an indication of how these communities will be affected.

As pointed out by Ignacio in his paper, another related study was done by Fano, J., 2010, who combined natural and social factors in establishing a Philippine flood risk index at the provincial level by using fifteen (15) indicators (Fano, J. , 2010). His work was largely based on the work of (Kannami, Y., 2008) who developed a global country-based flood risk index. In the study conducted by Fano, the 15 indicators that are needed generate for the five (5) indexes namely; hazard, exposure, basic vulnerability, capacity (hard countermeasures), and capacity (soft countermeasures) are readily available at the provincial level but down to the municipal and barangay level (the smallest basic unit of governance in the Philippines) is next to impossible because those data do not exist. Thus, a flood risk index that is at the barangay (community) level which are space-specific is highly limited. Again, in this study the social indicators are very limited and few. A thorough survey or information which has practical significance and bearing in flood risk indexes was not achieved. The social indicators in this study only includes, annual poverty threshold index, human development index, literacy rate, education indicator and access to information indicator which are all at the provincial level and not by per household information.

Another study was conducted by Acosta-Michlik in 2005 where she developed a static vulnerability assessment to global environmental change among farmers in the Philippines. This study uses socio-economic and biophysical indicators. Eighteen (18) attributes or indicators were used in this study. The vulnerabilities of which are captured by the differences in their social, economic, institutional and environmental structure at a given point in time. The exposure units are usually the geographical areas. The methods follow three approaches-indicator based, profile-based and agent-based. Under this approach, composite vulnerability indices are derived from aggregating socio-economic and ecological indicators using methods of indiscriminate aggregation, fuzzy logic, and weighted indicators which are useful for identifying vulnerable countries, regions or communities (Acosta-Michlik, L. and Espaldon, V., 2005).

The different studies mentioned above has become the guiding pattern of this research study but using different indicators and components which are community-based and is appropriate for Philippine context. Vulnerability study is not a new science. Different vulnerability indicators in particular have been used in several studies such as that of risk and vulnerability assessment studies in many different fields. Understanding and using the appropriate indicator for a particular study can complement and draw out the correct functioning of a system or group and why they are vulnerable in the first place.

2.5 The Hyogo Framework for Action (HFA) (2005-2015) of the United Nations

The HFA is a 10-year plan to make the world safer from natural disasters. It was endorsed by the UN General Assembly in the Resolution A/RES/60/195 following the World Disaster Reduction Conference in Kobe, Hyogo, Japan in 2005. According to UNISDR, the Hyogo Framework for Action (HFA) is the first plan to explain, describe and detail the work that is required from all different sectors and actors to reduce disaster losses. It was developed and agreed on with the many partners needed to reduce disaster risk - governments, international agencies, disaster experts and many others - bringing them into a common system of coordination. The HFA outlines five priorities for action, and offers guiding principles and practical means for achieving disaster resilience. Its goal is to substantially reduce disaster losses by 2015 by building the resilience of nations and communities to disasters. This means reducing loss of lives and social, economic, and environmental assets when hazards strike (UNSDR, 2005).

Its outcome can be achieve by its strategic goals namely; the integration of disaster risk reduction into sustainable development policies and planning; development and

strengthening of institutions, mechanisms and capacities to build resilience to hazards; and the systematic incorporation of risk reduction approaches into the implementation of emergency preparedness, response and recovery programmes. To be able to achieve these strategies goals, priorities for action must be carried over.

The Hyogo Framework ensures that disaster risk reduction (DRR) is a national and a local priority with a strong institutional basis for implementation; identify, assess and monitor disaster risks and enhance early warning; use knowledge, innovation and education to build a culture of safety and resilience at all levels; reduce the underlying risk factors; and strengthen disaster preparedness for effective response at all levels. Cross-cutting issues must also be addressed such as that of multi-hazard approach, gender perspective and cultural diversity, community and volunteer participation, and capacity building and technology transfer.
In order to achieve the goals and act upon the priorities identified in this Framework, the following tasks (see the details from the given reference from the previous page) have been identified to ensure implementation and follow-up by States, regional and international organizations in collaboration with civil society and other stakeholders. The ISDR partners, in particular the Inter-agency Task Force on Disaster Reduction and secretariat, are requested to assist in implementing this Framework for Action.

2.6 Flood Management and Flood Mitigation

2.6.1 Structural and Non-Structural Measures

As described by the United Nations Office for Disaster Risk Reduction (UNISDR), flood risk management is about maximizing both social and economic resilience against flooding (UNISDR, 2007). This can be done by protecting and working with the environment in a way which is fair and affordable both at the present time and in the future. As part of risk management, assessments and analysis, and implementation of strategies and specific actions to control and reduce risks are performed. This is a systemic approach and practice of managing uncertainty in lessening the adverse impact of floods and other related disasters to minimize harm and loss.

Resilience to flooding can be increased through a variety of measures, including structural (flood defense such as dams, barrages, levees, dikes, and other forms of channeling, etc. that reduce the impacts of floods to the population and infrastructure to flood prone areas), non-structural (flood warning, floodplain storage, flood event management) and, most commonly, an optimum combination of the two.

Non-structural measures, such as preparedness, response, legislature, financing, environmental impact assessment, reconstruction and rehabilitation planning, and their component techniques, contribute directly towards reducing losses of life and damage to property. Other mitigating actions include reducing physical vulnerability, reducing vulnerability of the economy, and strengthening the social structure of the community. These actions can be undertaken at individual, community, and state levels. Non-governmental organizations, voluntary, and socio-cultural organizations may also play an important role in this respect (Andjekovic, I., 2001).

Dumaguete City has no particular flood management and flood mitigation program but it is incorporated in the city's disaster risk reduction management plan. All data, figures and tables used on this concept are borrowed and quoted from the unpublished 5-Year Local Disaster Risk Reduction and Management Plan (LDRRMP) which was developed by the City Government of Dumaguete City, Negros Oriental and its constituents through the Dumaguete City Local Disaster Risk Reduction and Management Office (LDRRMO) with technical assistance provided by Deutsche Gesellschaft fur Internationale Zusammenarbeit (GIZ) Gmbt and funding support of DIPECHO 8th Action Call of the European Commission, the basis for founding the City Disaster Risk Reduction Management Plan (CDRRMP) was when former President Gloria Macapagal Arroyo signed into law the Disaster Risk Reduction and Management Act of 2010 or Republic Act (RA) 10121 in May 27, 2010 to amend the three-decade Presidential Decree 1566, the old Disaster Management Law of the Philippines (Dumaguete City Local Disaster Risk Reduction and Management Office (LDRRMO), 2013). RA 10121 institutionalizes the Disaster Risk Reduction and Management system not only in the National Government but also to all local government units in the country. One of the important features of this new law is the comprehensive utilization of the 5% Calamity Fund which is now the Disaster Risk Reduction and Management Fund (DRRMF). Under the old law the whole 5% Calamity Fund could only be utilized when there was a declaration of a state of calamity. Now under Section 21 of RA 10121, 70% of the LDRRM Fund can be used for pre-disaster activities thereby giving LGU's a more pro-active approach in disaster risk reduction (NDRRMC-DBM-DILG Joint Memorandum Circular No. 2013-1, dated March 25, 2013). RA 10121 requires the establishment of a Local Disaster Risk Reduction and Management Office (LDRRMO) in every Province, City and Municipality. In order for the LGU's to be efficient and effective in the utilization of the LDRRM Fund, the law now also requires them to formulate a comprehensive DRRM Plan which it shall implement together with local partners and stakeholders as basis for the disbursement of the fund (Par. 1 of Sec. 21 of RA 10121). Hence, this CDRRM Plan was formulated.

Section 11 of RA 10121 states that, the existing City Disaster Coordinating Council (CDCC) shall henceforth be known as the City Disaster Risk Reduction and Management Council (CDRRMC). The Barangay Disaster Coordinating Council (BDCC) shall cease to exist and its power and functions shall henceforth be assumed by the existing Barangay Development Council.

In 2011, the Dumaguete City Council passed SP Resolution No. 118, Ordinance No. 63 Series of 2011 which established the Local Disaster Risk Reduction and Management Office (LDRRMO) to strengthen the effectiveness of the various protective and emergency services in the City. The LDRRMO is the coordinator of all activities and actions related to disaster risk management and is also an operational unit responsible for functions and services not presently performed or not adequately performed by existing units, offices and organizations. To date this ordinance is waiting for its approval at the Provincial Board of Negros Oriental pending clarification from DBM on the question of funding source and from the Civil Service Commission on filling up the positions of the LDRRMO as mandated by RA 10121.

The structural composition (Figure 2.7) of the Dumaguete City Disaster Risk Reduction and Management Council shall be headed by the City Mayor. Members of LDRRMC are divided into four committees namely; 1) Disaster Preparedness Committee, 2) Disaster Response Committee, 3) Disaster Mitigation and Prevention Committee and 4) Rehabilitation and Recovery Committee. Just like the structure of NDRRMC, the specific membership of every committee were identified not as individual members but rather per LGU department to ensure the continuity of the programs being identified in this 5-year LDRRM Plan. According to the LDRRMC it is very strategic to identify the committee members as per LGU department compared to appointing individuals, because people in the LGU departments will come and go but the department will remain even if a new set of political leaders will be elected every elections. Table 2.1 highlights the members of the LDRRMC per committee.

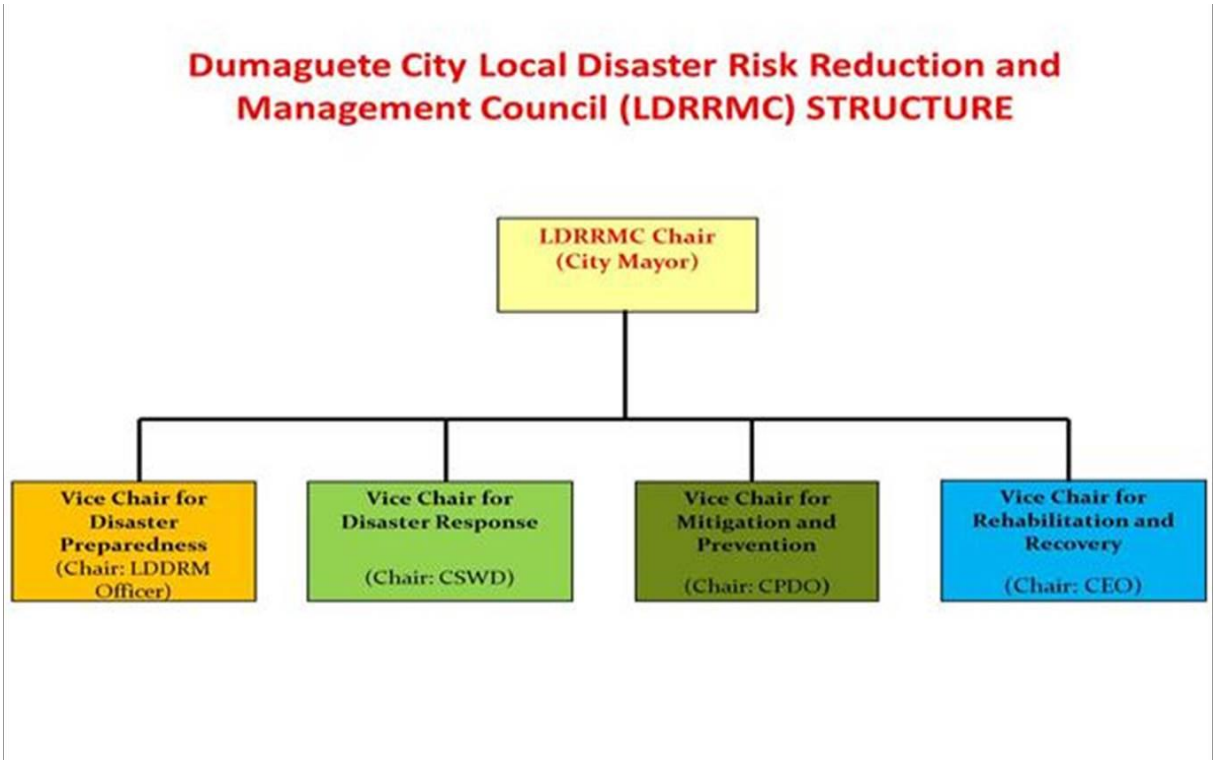

Figure 2-7: Local Disaster Risk Reduction and Management Council (LDRRMC) Structure

Table 2-1: List of LDRRMC Members

LDRRMC Committees	DEPARTMENT AND INSTITUTION MEMBERS	
1. Disaster Preparedness Committee	Chair:	- LDRRM Office / Rescue 348
	Members:	- City Social Welfare and Development (CSWD) Office
		- Philippine Red Cross (PRC)
		- Department of Interior and Local Government (DILG)
		- Public Information Office (PIO)
		- Association of Barangay Captains (ABC) Pres.
		- Department of Education (DepEd)
		- Negros Oriental Hotels and Restaurants Association
2. Disaster Response Committee	Chair:	- City Social Welfare and Development (CSWD) Office
	Members	- City Budget Office (CBO)
		- City Accounting Office (CAO)
		- City Treasurer's Office (CTO)
		- Philippine National Police (PNP)
		- Bureau of Fire Protection (BFP)
		- Rescue 348
		- City Traffic Management Office (CTMO)
		- Armed Forces of the Philippines (AFP)
		- Philippine Coast Guard (PCG)
		- Negros Oriental Chamber of Commerce
3. Disaster Mitigation and Prevention Committee	Chair:	- City Planning and Development Office (CPDO)
	Members	- City Environment and Natural Resources Office (CENRO)
		- City Veterinary Office (CVO)
		- City Health Office (CHO)
		- Office of City Agriculturist (OCA)
		- Silliman University (SU)
		- Foundation University (FU)
		- Negros Oriental State University (NORSU)
4. Rehabilitation and Recovery Committee	Chair:	- City Engineering Office (CEO)
	Members	- General Services office (GSO)
		- City Social Welfare and Development (CSWD) Office
		- Gender and Development (GAD) Office
		- City Legal Office (CLO)
		- Local Contractors Association (LCA)
		- Philippine Institute of Civil Engineers (PICE) – Negros Oriental
		- Negros Oriental Electric Cooperative (NORECO)
		- St. Paul University
		- Philippine Maritime Academy (PMA)

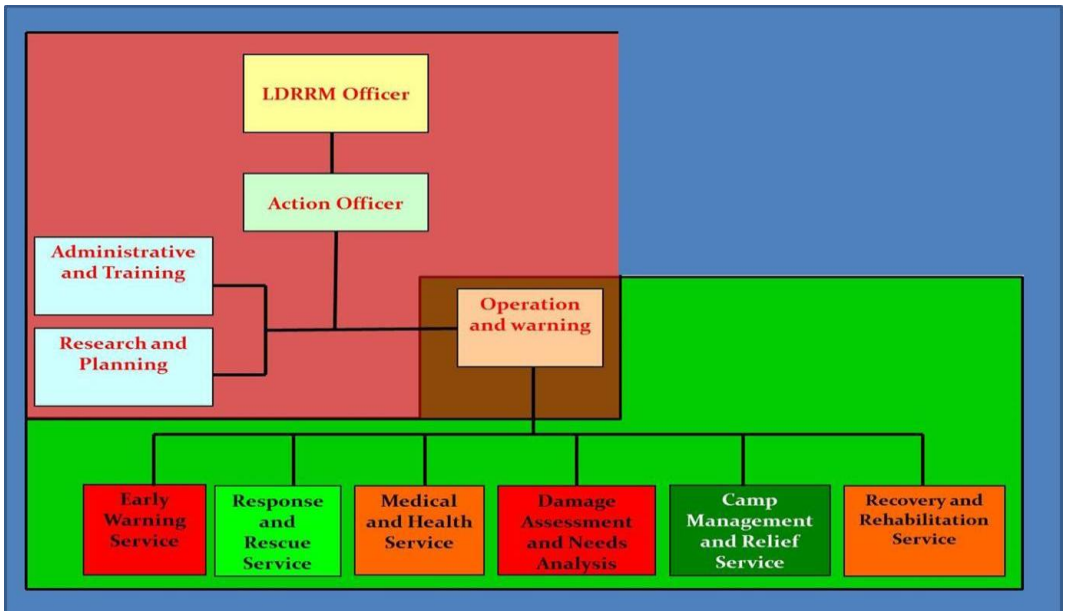

Figure 2-8: Small to Medium Isolated Emergencies/Disaster Situations

When a disaster situation occurs and can be classified as a relatively small or medium emergency with an anticipated minimal amount of possible damage and affected population, this structure in figure 2.8 will serve as the working structure of the Local Disaster Risk Reduction and Management Office (LDRRMO) of Dumaguete City. The City Mayor or the Local Disaster Risk Reduction and Management Officer will act as the Head of the Emergency Management Team (EMT). The Administrative and Training Officer together with the Research and Planning Officer will serve as Secretariat and Administrative support to the Operations and Warning Desk. The Deputy/Action Officer and the Operations and Warning Officer shall be responsible for the defining and execution of the Emergency/Disaster Operations or Contingency plan of the LDRRMO, in coordination with the Action Service Commands which are the following:

A. Early Warning Service Command (EWSC) – The EWSC shall be headed by the ABC President with the Barangay Captains and SK Chairpersons of the 30 Barangays of Dumaguete City, Local PNP and the City Public Information Office as institutional or department members.

B. Response and Rescue Service Command (RRSC) – The RRSC shall be headed by the Dumaguete City Rescue 348 with the assistance of One Rescue Team, Philippine Red Cross, Silliman Fire Brigade, BFP, PNP, Philippine Army, Chinese Volunteers, Philippine Coast Guard, ENRO and the City Engineering Office as the Institutional/ Department Members.

C. Medical and Health Service Command (MHSC) – This service command shall be headed by the City Health Office as service command Team Leader. The members of MHSC are the City Veterinary Office, Philippine Medical Association (Dumaguete Chapter) and the Philippine Nursing Association (Dumaguete Chapter).

D. Damage Assessment and Needs Analysis Service Command (DANA-SC) – DANA-SC shall be headed by the City Administrator's Office as Team Leader with the assistance of the City Planning and development Office (CPDO), Office of the City Agriculturist (OCA), City Veterinary Office, and the Philippine Institute of Civil Engineers as members.

E. Camp Management and Relief Service Command (CaMReSC) – CaMReSC team leader is the City Social Welfare and Development Office (DCSWDO) with PNP and DepED as service command members.

F. Recovery and Rehabilitation Service Command (RRSC) – This service command shall be headed by the City Engineering Office as team leader, with the City Accounting Office, NORECO, GSO, ENRO DCWD and the TELCOs as service command members.

The above mentioned departments and institutions were objectively chosen by the LDRRMC of Dumaguete City based on the related function of their office or group, and qualifying capabilities such as skills and expertise, knowledge, and experience relative to the requirements needed for the LDRRMO Action Service Command. Below is the illustration of the members of Dumaguete City LDRRMO Action Service Command (Figure 2.9).

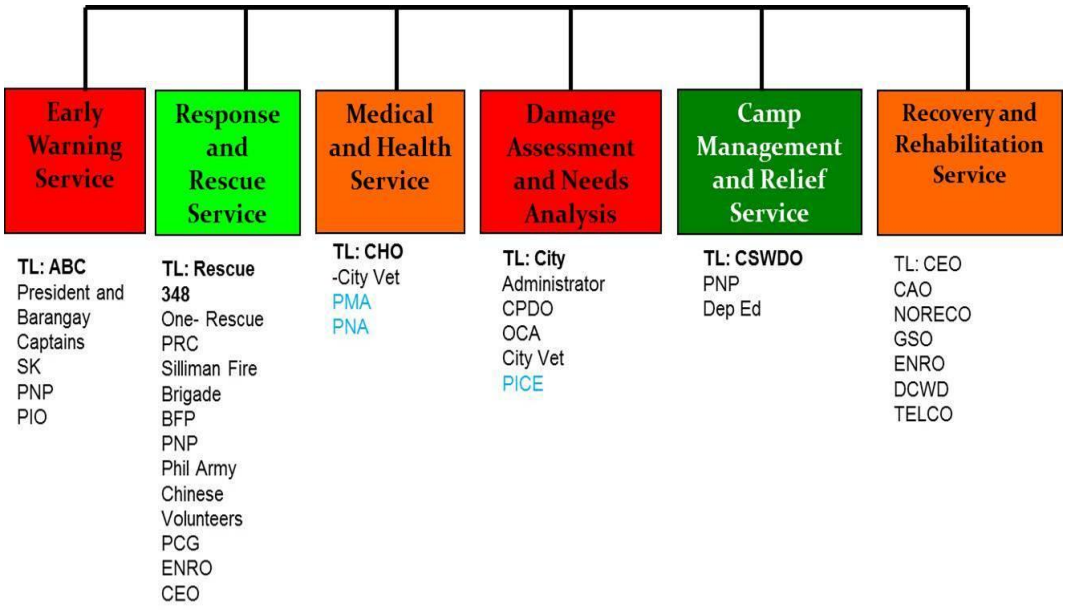

Figure 2-9: LDRRMO Service Command Team Leaders and Members

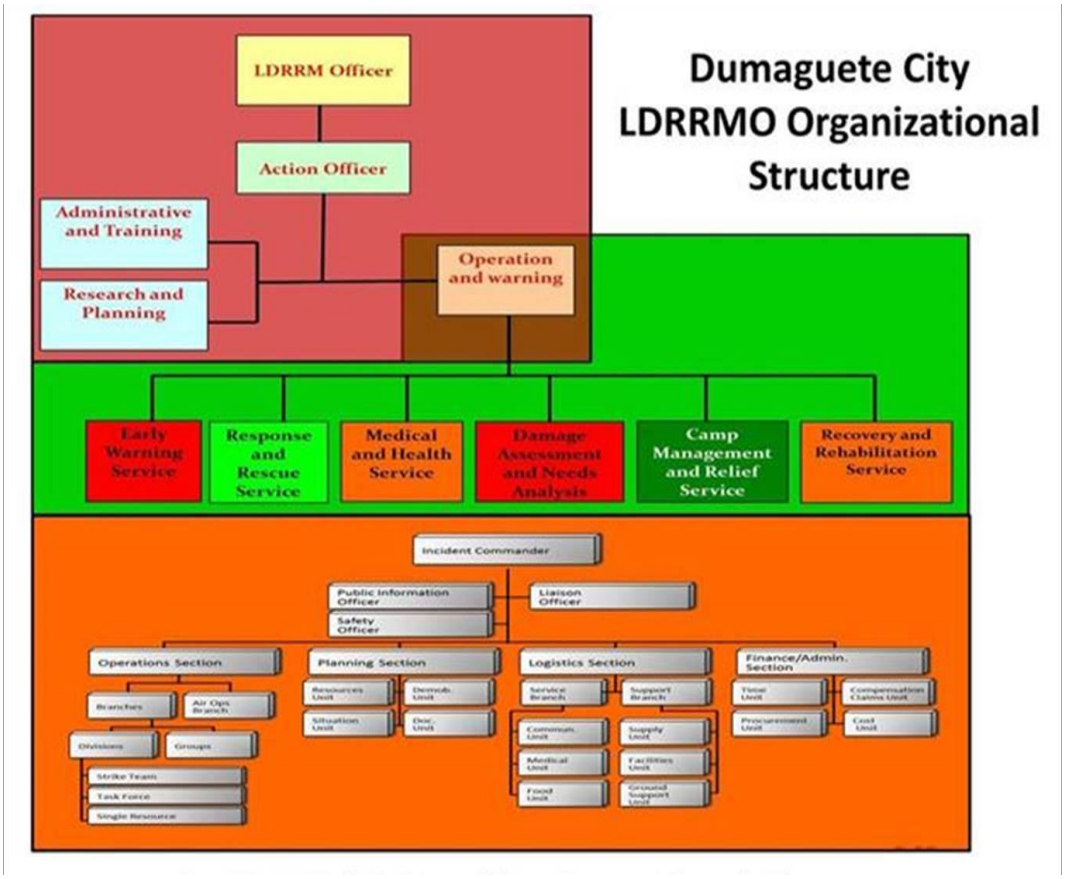

Figure 2-10: LDRRMO Organizational Structure (for Large Scale Emergency, incorporating ICS)

Typical examples of Large scale and/or Complex Emergency/Disaster situations is the occurrence of events such as Tropical Storm SENDONG in December 2011, the February 2012 Guihulngan Earthquake, Tropical Storm PABLO in December 2012, or as may be determined by the LDRRM Council. In Emergency/Disaster situations like this the LDRRMC members have agreed that the adoption and incorporation of the Incident Command System (ICS) as shown in figure 2.10, will be more effective because of its modular structure and adaptability to any rapidly expanding situation, especially with multi-agency participation, and therefore highly functional and will serve as the working structure that will be applied by the LDRRMC/O in Dumaguete City.

The Incident Command System (ICS), with its Incident Command Post near the vicinity of the incident site, and its Incident Management Team under the direction of the Incident Commander, will be operating under the guidance and directive of the Operations Center managed by the LDRRM Council with the City Mayor as Chairman and Over-all Head. The Operations Center will provide the necessary logistical and manpower support to the entire operations of the Incident Management Team.

The LDRRM Officer may be designated by the City Mayor as the Incident Commander, or as the case may be like Sea incidents (Coast Guard), Fire (BFP), Terroristic threats like bombing, chemical or biological (PNP or AFP) etc. such individual or officer of any government office/agency whose background, training, expertise or experience highly qualifies him for that specific incident to be the Incident Commander of the whole operations of the Incident Management Team. In which case, the LDRRM Officer, due to his familiarity with the locality and local organizational set-up, can ably support the designated Incident Commander by being the deputy IC.

The LDRRM Officer, whether designated as Incident Commander or deputy to the IC, shall be responsible for the deployment of personnel of the Action Service Command, or the Department/Institutional service command team leaders and members to various posts as will be required and necessary within the ICS organizational structure. The LDRRM officer shall also ensure that all instructions are clear and well disseminated to everyone concerned as well as provide regular report to the Incident Commander, or as the Incident Commander himself, to the LDRRM Council at the Operations Center.

2.6.2 The Identified Emergency Evacuation Areas of Dumaguete City

In compliance with RA 10121 and Memorandum Circulars on Disaster Risk Reduction issued by the Department of Interior and Local Government (DILG), Dumaguete City

through its Local Disaster Risk Reduction and Management Office (LDRRMO) have identified possible evacuation areas in preparation for a worst case scenario happening. According to the LDRRMO Dumaguete City has a population of around 25,000 families/households. With an assumption that 20% of the population will be affected in a worst case scenario, 5,000 families will have to be evacuated. Taking into account each family will require a minimum of 8 square meter living space, a total of 4 hectares (5,000 families x 8 square meter = 40,000 square meter) will be critically needed as evacuation site.

Surely lacking this huge area requirement at present, the LDRRM Council has settled on a solution of accounting of all available spaces in all private and public schools, the private sector, and the 30 barangays in the city with facilities such as Gymnasiums & Halls, Ball fields & covered Courts, Classrooms, Churches & Chapels, Barangay halls & Government buildings, and other such similar places which have been flood free in the past and assessed to be relatively safe and secure as evacuation sites in the near future.

The LDRRM Office through the mandate of the LDRRM Council shall establish and maintain a strong link and coordination with school heads, barangay captains as well as heads of institutions and the private sector, and if possible execute a memorandum of agreement (MOA) between the city and these entities to ensure that utilization of such facilities will be granted during emergencies.

2.6.3 The Incident Command System of Dumaguete City

Defining the Incident Command System of Dumaguete City will be critical to avoid confusion among the key players in disaster response and will greatly help the LDRRMO and BDRRMCs to facilitate a systematic and orderly response operations when a calamity strikes. The ICS of the city will be divided into two Emergency Command Protocols, 1) The Barangay Emergency Command Protocol and 2) City-wide Emergency Command Protocol.

A. *The Barangay Emergency Command Protocol* – When a disaster strikes in a barangay the responsibility to take lead in the response operations lies with the Barangay Captain, to be assisted by the Barangay Disaster Risk Reduction and Management Committee. All support groups coming from the city and other areas responding to the emergency in the barangay should report first to the Barangay Captain for proper briefing and instructions before any response operation can be initiated by the group. The BDRRMC will as soon as practicable

conduct Damage Assessment and Needs Analysis of the disaster and the information gathered will be the official report to be submitted to LDRRMO for proper action. The BDRRMC will also initiate the establishment of a Command Post or Operations Center, if necessary, to have an organized and effective response.

B. *The City-wide Emergency Command Protocol* – When two or more barangays are affected by an Emergency/Disaster situation, the responsibility for immediate response at all levels rest with the LDRRM Office. The LDRRM Officer or the City Mayor will act as the Incident Commander and Dumaguete City Rescue 348 will immediately initiate the Emergency Command Protocol and coordinate the medical, rescue and evacuation procedures to be assisted by the City Health Office (CHO), City Social Welfare office, Planning and Development Office (CSWDO), Philippine National Police, Bureau of Fire, Red Cross, Dep't of Education, the BDRRMCs concerned, and other agencies tasks with the capability to respond and assist in such an emergency. The City Administrator's Office, as head of DANA-SC of the LDRRMO, will conduct the Damage Assessment and Needs Analyses that will serve as the official documentation/report of the city, to be submitted to the Sangguniang Panglungsod for the declaration of a State of Calamity if necessary, and to the higher authorities for assistance of any kind.

2.6.4 Institutional Working Arrangement

There shall be mutual cooperation among and between the LDRRMO, other city departments such as CSWDO, OCA, CEO, CHO CPDO, CENRO among others, and DepED, BDRRMCs and Accredited Community Disaster Volunteers in the implementation of this comprehensive 5-Year LDRRM Plan.
Quarterly or semi-annual Plans and Progress reports of LDRRM activities shall likewise be made to the City Council and other funding partners for information, technical and management guidance.

The LDRRMC shall actively participate in and support local policy proposals, including discussions and decisions relative to formulation, amendment and/or modifications of local policies pertinent to local disaster risk reduction especially in three core programs namely: disaster prevention, mitigation and preparedness.

Accountability for the regular reporting system to the public and concerned officials belongs to the LDRRM Officer.

2.6.5 General Monitoring and Evaluation Framework

Monitoring and evaluation is the process of gathering, filing, accessing and analyzing information that will enable the City Mayor as LDRRM Council Chairman, to determine the progress of the implementation of the LDRRM Plan, and make timely decisions to ensure that progress is maintained according to schedules and targets.
The public dissemination of the outputs of monitoring and evaluation activities enhances transparency in management.

The LDRRMO shall be primarily responsible in carrying out monitoring and evaluation activities that will be reviewed by the LDRRM Council as the overseeing body of the city for Disaster Risk Reduction and Management and Climate Change Adaptation program. The LDRRM Office shall submit a semi-annual report to the LDRRMC and to the City Mayor informing them of the status of implementation of the approved LDRRM programs and projects for the period.

The 5-year LDRRM Plan (2013 – 2017) of Dumaguete City focuses on the 4 core programs namely: 1) Disaster Prevention - focuses on health, public awareness, research and structural component of Disaster Risk Reduction and Management; 2) Disaster Mitigation and Climate Change Adaptation - aims to protect the environment, physical infrastructure construction and rehabilitation; 3) Vulnerability Reduction – gives emphasis on the installation and sustaining the existing initiative of localized early warning system, enhancing and upgrading DRRM related equipment; 4) Disaster Preparedness and Response – focuses on two aspects. First, upgrading the internal system and second, the organizational development of LDRRMC and LDRRMO.
The members of the LDRRMC shall be strengthened organizationally and technically to ensure their effectiveness in overseeing the LDRMM Plan of the City and provide direction to the LDRRM Office and its staff.

In the meantime that the Local Disaster Risk Reduction and Management Office (LDRRMO) is lacking in key personnel as prescribed under RA 10121 due to the question of the source of funding, the LDRRM Office of Dumaguete City thru initiatives fully supported by the Mayor has managed to utilize volunteers to carry out the tasks of day-to-day operations and implementation of its Comprehensive Disaster Risk Reduction and Management Plan.

The Accredited Community Disaster Volunteers (ACDV's), as what the PDRRM Law prescribed, shall be properly organized and eventually institutionalized through the close monitoring of the Barangay Disaster Risk Reduction and Management Committee

(BDRRMC) with the technical assistance and close supervision of the LDRRMO and Barangay Development Council.

Looking at the organizational structure and command of the Local Disaster Risk Reduction and Management Council (LDRRMC), the Local Disaster Risk Reduction and Management Office (LDRRMO) and the 5-year LDRRM Plan (2013 – 2017) of Dumaguete City, the city is seemed to be well organized and well prepared for any natural calamity.

CHAPTER 3 THE DEVELOPMENT OF COMMUNITY-BASED FLOOD VULNERABILITY FRAMEWORK: ITS COMPONENTS AND INDICATORS FOR URBAN FLOODING

SUMMARY

The development of the proposed community-based flood vulnerability index for urban flooding will be discussed and presented thoroughly in this chapter. The major five (5) vulnerability components and thirty-six (36) indicators are illustrated in the theoretical framework and the interplay of these factors show how it could influence vulnerability.

The major five components namely: hydro-climatic, social, economic, socio-behavioral, and politico-administrative alongside linking them with the factors of vulnerability (exposure, susceptibility, resilience) and indicators in producing a vulnerability index. The hydro-climatic component being hazard dependent, local indicators were identified and considered since they have a direct interaction on this component. The social and economic component, as part of the socio-economic system may predispose these certain groups and to be able to determine the individual's vulnerability appropriate indicators were used. While the socio-behavioral component is one added component in this research work not found in many studies of flood vulnerability index. This is a very important component to consider because the interplay of these indicators influences the actual and direct effects of flooding and disease outbreaks. Lastly, the politico-administrative component is as equally as important as the other components. It is very important to know how far the government has done its preventive, adaptive and coping measures in facing the different challenges of climate change.

The factors of vulnerability in this chapter are properly defined and illustrated with its corresponding entities of indicators in this study. Vulnerability is defined within the local context and within the concept of this study to be able to have a full understanding of this research work. Exposure is a factor of vulnerability whose selection of sub-indicators was based primarily on the local threats that exposed its entities. Susceptibility is another factor of vulnerability, and in this paper it defines susceptibility as the likelihood or those that influence the probabilities of being harmed at times of hazardous floods. While resilience the third factor, is composed of the coping and adaptive capacities of the community. The indicators that were used in this research work clarify the ability of the system to persist if exposed to a certain hazards by recovering during and after the flood event.

The relationship between flood vulnerability components, indicators and factors are presented in Table 3.1

CHAPTER 3
THE DEVELOPMENT OF COMMUNITY-BASED FLOOD VULNERABILITY FRAMEWORK: ITS COMPONENTS AND INDICATORS FOR URBAN FLOODING

The development of community-based flood vulnerability index for urban flooding through using local components and indicators is important in generating a localized-based flood vulnerability index that depicts a more realistic scenario of vulnerability and resilience indexes in a local, national and international setting.

Soliciting the responses from the individual household respondents themselves and the local government units (LGU's) from each of the communities involved and including those who are in the city and provincial disaster coordinating council office and the volunteers from the non-governmental organizations (NGO's) have been the sources of the actual community survey. It is very important to do an actual field survey so that a realistic scenario will be generated and projected.

This research work is done in a more detailed survey, of which the improvement that this work has accomplished when it comes to addressing the socio-economic profile of the individual households, including their socio-behavioral approach in terms of the knowledge, attitudes, and practices towards flood vulnerability and resilience particularly on the items of hazards, risks, exposure, preparedness, response, recovery, coordination, and adaptation strategies. The socio-behavioral approach was conducted in a more detailed way by soliciting the community people's Knowledge, Attitudes and Practices (KAP) particularly on flood preparedness and health impacts and it is measured in terms of their exposure to E.coli, Leptospirosis and Dengue Fever particularly on the nature of these organisms, their mode of transmission, prevention, signs and symptoms, it is fatal, treatment, and the financial cost of treatment. The hydro-climatic and politico-administrative components were also studied in detailed. Measuring the KAP of the respondents from preparedness to recovery, and as well as the KAP on the exposures of the microorganisms in focus and would give us a clue how community people perceived in these kinds of phenomenon which are translated into their attitudes and practices before, during or after any catastrophic events such as typhoons and flooding.

There are five (5) flood vulnerability components and thirty-six (36) indicators that were developed in this work. Each of the indicators is belonging to a specific flood

vulnerability component and to a particular flood vulnerability factors; namely exposure, susceptibility and resilience that would eventually produce flood vulnerability index profile.

The theoretical framework is presented below along with its corresponding description and detailed discussions of the interplay of the different components and indicators in producing a community-based flood vulnerability index.

3.1 The Theoretical Framework

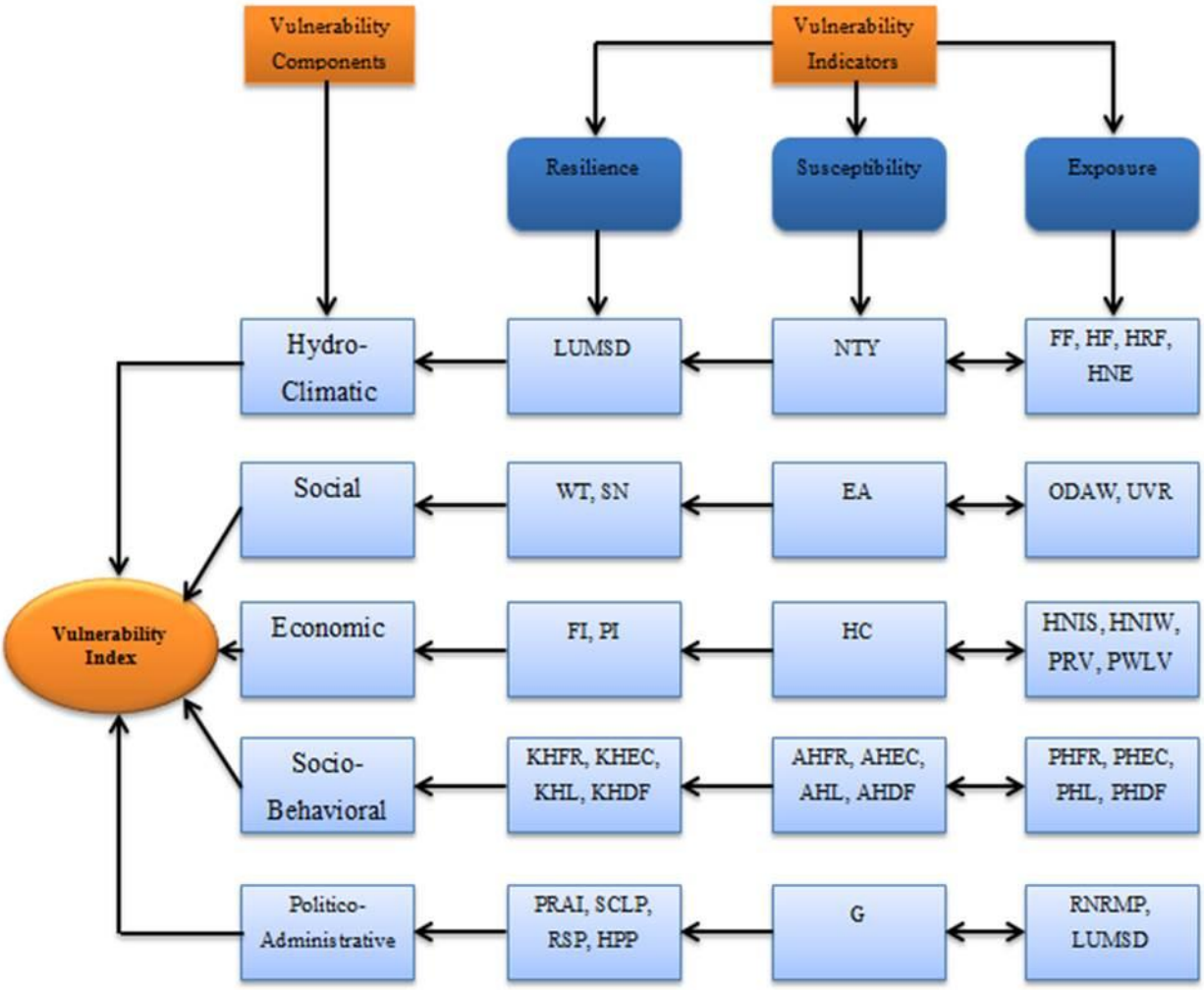

Figure 3-1: Community-Based Flood Vulnerability Components and Indicators

In this theoretical framework for vulnerability (Figure 3-1), the researcher presented the relationship of the vulnerability components along with the three (3) vulnerability factors and its corresponding indicators on how it could influence vulnerability. The indicators

are shown in a more detailed manner (see table 3.1 below) for the detailed description of the abbreviations used. The detailed descriptions and discussions are as follows.

3.2 **Flood Vulnerability Factors**

This section provides an overview of the selected components and indicators in the development and calculation of this Community-Based Flood Vulnerability Index (FVI) for Dumaguete City, Negros Oriental Philippines. This study was done locally among the twelve communities of Dumaguete City and the researcher has based the analysis to the following components: Hydro-Climatic, Social, Economic, Socio-Behavioral and Politico-Administrative components which are general and relevant to the local level. The individual indicators of each of the components will be mentioned below.

There are 3 important factors of vulnerability to consider all throughout the components which determine the vulnerability index. These factors are exposure, susceptibility and resilience. In addition, the concept of vulnerability will also be described below to facilitate a complete understanding of the interplay and influence of the indicators to the components and factors of vulnerability.

Vulnerability is considered as the extent of harm which can be expected under certain conditions of exposure, susceptibility, and resilience. More specifically in the case of floods, a system is susceptible to floods due to exposure in conjunction with its capacity/incapacity to be resilient, to cope, recover or adapt to the extent. Some of the exposed populations are protected from flooding by various structural and non-structural measures that are part of the resilience strategy. On the other hand, some of them have none, or only weak, flood defenses and the exposed populations are more often subject to flooding with the consequent disruption, economic loss and loss of life (Balica, S.F., Wright, N.G., and van der Meulen, F., 2012). In this research, vulnerability is the result of the interplay of the indicators in the exposure, susceptibility and resilience category.

By dividing the FVI into different components, such as hydro-climatic, social, economic, socio-behavioral, and politico-administrative and linking them with the factors of vulnerability (exposure, susceptibility, resilience) can help identify the weak and strong points of a certain community in terms of flood vulnerability and in that way, it helps to propose strategies for improvement and identifies which one is a priority.

3.2.1 Exposure

Exposure in its core meaning in natural hazard research refers to entities exposed and prone to be affected by a hazard event. These entities include persons, resources, infrastructure, production, goods, services or ecosystems and coupled social-ecological systems (United Nations University Institute for Environment and Human Security, 2011).

The selection for the sub-indicators for exposure was based primarily on the local threats that exposed the household respondents to river flooding and possible disease outbreak that goes with it. Within the Flood Vulnerability Index, exposure is related to the likelihood of acquiring and being affected by such phenomenon. The exposure factor considered those indicators that explained how those entities mentioned above are exposed to flood events. The actual practices of the people prior and during the flooding events, the established land use and structural design, and the infrastructures mirror the exposure of certain populations to flooding events.

3.2.2 Susceptibility (Before the floods: Awareness and Preparedness) (During the floods: Dealing and Coping)

Generally, susceptibility is understood as the likelihood of suffering harm and damages in case of the occurrence of a natural hazard (United Nations University Institute for Environment and Human Security, 2011). In this study, susceptibility relates to system and individual characteristics, including the individual level of education, housing conditions, their attitude regarding the risk that they live with (before the flood), the institutions that are involved in mitigating and reducing the effects of the hazards and the existence of possible measures, like flood hazard maps and early warning systems to be used during the floods.

This paper defines susceptibility as the elements exposed within the system, which influences the probabilities of being harmed at times of hazardous floods. The indicators that were used here evaluate the sensitivity of the element or entities at risks.

3.2.3 Resilience (During: Handling and Coping) (After: Survive and Recuperate)

Resilience is the capacity of any kind of system, community, society or environment, potentially exposed to hazards to adapt to any change, by resisting or modifying itself, in order to maintain or to achieve an acceptable level of functioning and structure (Pelling, 2003). Resilience is therefore analyzed through a political, administrative, environmental

and social organizational evaluation (Di Mauro, 2006). In this study, the resilience factor is composed of the coping capacities and adaptive capacities of the individuals, communities and the government that may contribute in reducing the impacts of river flooding and disease outbreaks, and the transformation of societies and socio-ecological systems for long term adaptation to negative impacts of natural hazards and climate change through direct actions and resources. The indicators that were used here clarify the ability of the system to persist if exposed to certain hazards by recovering during and after the flood event.

3.3 Identifying the Key Components and Indicators of Community-Based Flood Vulnerability Index (FVI)

This part deals with the description of the components and its indicators as used on the local scale to capture the aspects of exposure, susceptibility, and resilience as well as their aggregation to the local Community-Based Flood Vulnerability Index. In this study the indicators vary, a totally different indicators used but were chosen based on the same concept developed by the WorldRiskIndex Report and the study of Balica *et.al* (2012) on the development of Flood Vulnerability Index for Coastal City.

This research work is trying to fill those categories that were suggested by those earlier studies that were not included in the global scale, for instance, indicators such as housing conditions; disaster preparedness and early warning; social networks; property insurance; Knowledge, Attitude, Practices (KAP) of respondents on flood resilience; and exposure to microorganisms such as that of E.coli, Leptospirosis and Dengue fever mosquito; the different adaptation strategies such as integration of post-risk assessments; sustainable community livelihood; relocation site projects and health programs for the prevention against diarrhea, leptospirosis and dengue fever which are facilitated by the LGU's and as well as some NGO's.

These five components have been linked with the three factors of vulnerability as shown in Table 3.1 The relationship of these factors and components should increase the robustness of the developed urban FVI as it was also observed in the study of Balica et al. (2012). Thirty-six (36) indicators were used and examined in computing the community-based flood vulnerability index (FVI) for Dumaguete City, Negros Oriental.

By computing the FVI of the city, hotspots to flooding events with the corresponding strong and weak points to vulnerability and resilience will be identified and mapped. By

doing so, this would serve as a tool to assist planners and policymakers in prioritizing their areas of intervention and to provide useful information for awareness rising.

The development of this community-based FVI which is in the Philippines' local context involved the interplay of factors within the water resource system in the event of flooding, a deductive approach was used to identify the best possible indicators based on the existing principles and conceptual framework (Chapter 2).

3.3.1 Hydro-Climatic Component

In spite that the hydro-climatic component is part of the natural river system as being hazard dependent, the following indicators were considered since they have a direct interaction on this component. The hydro-climatic component includes the frequency and height of flooding, the houses reached by flood waters and those houses that were not located on elevated areas near the river are all the indicators for this component that comprise the exposure factor of vulnerability. The frequency of flooding is measured as (every month, every 4 months, every 6 months, every year, sometimes, rarely or never). While the height of flooding is measured as (ankle level, knee, waist, and shoulder high, above the head, roof high and beyond the roof); the number of houses reached by flood and those that are not on elevated area were also accounted for.

The average number of typhoons that passes through the country is 20 but not all of it passes through the Visayan region, thus, in this case only 50% of the total number of typhoons is being considered (susceptibility).

The land use management and structural design (resilience factor) is highly taken into consideration being a positive measure and influences the vulnerability of the area in one way or another. Effective land use and structural design that complement environmental, economic, and community goals and reduce risks from hazards. This includes: how well are the land use policies and building standards that incorporate measures to reduce risks from hazards and protect sensitive habitats are established, monitored, and enforced such as urban planning; how well are the critical infrastructures such as the increasing capacity of our drainage system, good run-off volume control on open retention basin, in-line basins, off-site basins, on-site storage, dry ponds, the efficiency of our dike and bridge systems; how well are the developers and communities incorporate risk reduction into the location and design of structure particularly on existing spatial planning, flood risk adaptive to land use, building regulations, building codes, zoning ordinances, and how established is our education, outreach, and training programs to improve compliance with land use policies and building standards.

3.3.2 Social Component

The social component is part of the socio-economic system which can determine the individual's vulnerability in terms of its social status. The indicators in this component may predispose these certain groups to what extent they will be affected. The social component is pertaining to the educational attainment, it is rated from elementary level education, elementary graduate, high school level, vocational, college level, college graduate up to graduate school respectively which helps determine the susceptibility; social networks among neighborhoods such as helping each other in times of natural calamity; and the water treatment practice during such events are the indicators for resilience; while those factors that may predispose them to certain vulnerability such as open disposal of animal waste and the unwillingness to vacate from the hazard area comprise the exposure factor.

3.3.3 Economic Component

The economic component is also part of the socio-economic system which can determine the individual's vulnerability in terms of its economic status. The indicators in this component may also predispose these certain groups and to what extent they will be affected. But, it can also be a positive source of fast recovery from a previous calamity if a household has a very stable financial status.

The economic component in this study looks into the housing conditions of the households, such as whether it is made of concrete, wood, cartoon, steel, galvanized iron, bricks, tiles, nipa materials, or just coconut leaves, plastic materials and salvage materials (susceptibility); a family income of Php3000-10,000 pesos and if they have made their properties insured (resilience factor); on the other hand, factors that may predispose them to certain vulnerability such as no access to improved sanitation and water sources, presence of rats around the area and water logged in the vicinity is the exposure factor.

3.3.4 Socio-Behavioral Component

This component is an added component not found in many studies on flood vulnerability index. The researcher believed that it is equally important to study the household respondent's knowledge, attitude and practices (KAP) related to these events. The household respondent's KAP predisposes them to the cause and effects of this phenomenon. From what they know (knowledge-resilience) on flood resilience such as on the items of hazards, risks, exposure, preparedness, response, recovery, coordination, and adaptation strategies; also on their knowledge on E.coli, Leptospirosis

and Dengue Fever in terms of its nature, mode of transmission, prevention, signs and symptoms, how fatal it is, treatment and the financial coast of treatment.

How they perceived or what is their opinion and general view (attitude-susceptibility) to such kind of environmental threat by using the same items above but asked in a different way.

For the practices or what they actually do (practices-exposure) is also using the same items but presented in a different way. These items of indicators are very important to consider because the interplay of these factors influences the actual and direct effects of flooding and the occurrence of possible disease outbreaks. For the details of the items on this component and indicators it can be found in the appendix of this paper.

3.3.5 Politico-Administrative Component

The politico-administrative component is as important as the other components and this includes land use management and structural design; and the rivers natural resources and natural features management and program, these comprises the indicators for exposure. The local government's governance including those from the national and other NGO's are also included (susceptibility) which could affect the extent of vulnerability in the area.

The governance particularly includes warning and evacuation; emergency response; disaster recovery; and how well are the community development policies, plans, and programs were implemented and monitored; how accessible are the basic services such as water, transportation, communication, security, health services and evacuation centers to all sectors of society; how well are the participatory collaboration mechanisms among different sectors ad various levels of government used to managed for resilience; how transparent, accountable, and available are the technical and financial support mechanisms to support planned community actions for resilience; and how good are we with our risk reduction efforts. Along with these indicators, the government's adaptation capacities are highly considered because of their strong influences to the extent of vulnerability. It is important to know how far the government has done its adaptive and coping measures in facing the different impacts of climate change.

Post-risk assessment and integration is the first indicator for resilience and it is about how leadership and community members are aware of hazards and risk information is utilized when making decisions and implementing them during and after a particular calamity and this includes (how well are the flood hazard risks assessments completed

and routinely updated; how comprehensive is the flood hazard risk assessments to incorporate risks to all elements of resilience; how well is the community participation in the hazard risk assessment process; how well are the information from risk assessment is accessible and utilized by the community and government). Communities are engaged in diverse and environmentally sustainable livelihoods that are resistant to hazards and this composes for the sustainable community livelihood which is the second indicator for resilience and this includes (how well is our development policies and plans in building social capital and skills for economic diversity and self-reliance; how is the availability of diverse and environmentally sustainable livelihood in the community; how well is our social and cultural networks in promoting self-reliant communities so it would have the capacity to provide support to disaster-stricken areas; how well is out technical services offered and financial resources in promoting stable and robust economies, reducing vulnerabilities to hazards, and aids in disaster recovery. The third indicator for resilience factor is the relocation site project and the fourth is the health and prevention programs for E.coli, Leptospirosis and Dengue fever infection are all part of the adaptive measures (resilience) for long term adaptation.

The relationship between flood vulnerability components, indicators and factors is illustrated in Table 3.1 below. The availability of data, the importance of certain indicators and the condition that all FVIs computed must be made dimensionless for the purposes of comparison that would lead to the formulation of the equations for each vulnerability component.

Table 3-1: Relationship Between Components and Indicators

Flood Vulnerability Components	Vulnerability Indicators		
	Exposure	Susceptibility	Resilience
A. Hydro- Climatic Components	A. Frequency of Flooding (FF) B. Height of flooding (HF) C. Houses reached by floods (HRF) D. Houses not on elevated area (HNE)	A. Number of Typhoons per year (50%) (NTY)	A. Land Use Management And Structural Design (LUMSD)
B. Social Components	A. Open disposal of animal waste (ODAW) B. Unwillingness to vacate and be relocated (UVR)	A. Educational Attainment (High School Level and below) (EA)	A. Water Treatment or Sterilization Practice (WT) B. Social Networks (SN)
C. Economic Components	A. Houses with NO access to improved sanitation (HNIS) B. Houses with NO access to an improved water source (HNIW) C. Presence of rats in the vicinity (PRV) D. Presence of water logged areas in the vicinity (PWLV)	A. Housing Conditions (semi-concrete, tent light materials, and plastic materials) (HC)	A. Family Income (3000-10,000) (FI) B. Property Insurance (PI)
D. Socio- Behavioral Components	A. PRACTICES of households on flood resilience (hazards, risks, exposure, preparedness, response, recovery, coordination, adaptation strategies) (PHFR)	A. ATTITUDE of households on flood resilience (hazards, risks, exposure, preparedness, response, recovery, coordination, adaptation strategies) (AHFR)	A. KNOWLEDGE of households on flood resilience (hazards, risks, exposure, preparedness, response, recovery, coordination, adaptation strategies) (KHFR)
	B. PRACTICES of households on E.coli (nature of E.coli, mode of transmission, prevention, signs and symptoms, it is fatal, treatment, financial cost of treatment) (PHEC)	B. ATTITUDE of households on E.coli (nature of E.coli, mode of transmission, prevention, signs and symptoms, it is fatal, treatment, financial cost of treatment) (AHEC)	B. KNOWLEDGE of households on E.coli (nature of E.coli, mode of transmission, prevention, signs and symptoms, it is fatal, treatment, financial cost of treatment) (KHEC)
	C. PRACTICES of households on Leptospirosis (same factors with letter B above) (PHL)	C. ATTITUDE of households on Leptospirosis (same factors w/letter B above) (AHL)	C. KNOWLEDGE of households on Leptospirosis (same factors w/ letter B above) (KHL)
	D. PRACTICES of households on Dengue Fever (same factors with letter B above) (PHDF)	D. ATTITUDE of households on Dengue Fever (same factors with letter B above) (AHDF)	D. KNOWLEDGE of households on Dengue Fever (same factors with letter B above) (KHDF)
E. Politico-Administrative Components	A. The River's Natural Resources & Natural Features Management and Program (RNRMP) B. Land Use & Management & Structural Design (LUMSD)	A. Governance (Warning and Evacuation, Emergency Response, Disaster Recovery) (G)	A. Post-risk Assessment and Integration (PRAI) B. Sustainable Community Livelihood Programme. (SCLP) C. Relocation Site Project (RSP) D. Health & Prevention Program of E.coli, Leptospirosis & DF (HPP)

CHAPTER 4
APPLICATION OF THE METHODOLOGY OF THE COMMUNITY-BASED FLOOD VULNERABILITY INDEX (FVI) FOR URBAN FLOODING: DATA COLLECTION AND TREATMENT

SUMMARY

This part of the paper shows the methodology and application of the proposed community-based flood vulnerability index (FVI) for urban flooding. The collection of data and treatment are presented in tables, maps, photos and formulated equations.
A total of 357 household respondents were surveyed from 12 communities and 30 respondents from the local government units and non-governmental organizations were also solicited from the survey respectively. The calculation of the proposed community-based flood vulnerability index is based on the accepted general flood vulnerability index formula.

The study site is presented in maps with its boundaries, population, elevation, land use, and the watershed location of the Banica River where these communities lies. A brief community profile of the 12 communities that were involved. Temporary shelters and relocation site are also presented to have a glimpse of the actual scenario of the study area. Situation of the most recent flooding event in 2011 and the daily activities of the community people in relation to the river are shown in photographic images.

The methodology for hydrological data is briefly discussed and crudely done due to unavailability of data and sources. The hydrological data are gathered two times during the dry months of March and the wet months of July and simply for the purposes of bacterial correlations of actual exposures and incidences of diarrhoea from the community people surveyed. The results are shown in tables and the locations for the different stations are presented in maps and photos. The health impact assessment methodology in terms of sampling and microbial analyses is also briefly presented in this chapter. For the laboratory culture, EMB agar was used and aseptic techniques were observed all throughout the procedure. The E.coli counts and exposure are presented in tables. An example of a positive and negative bacterial culture is also shown in photos. Exposures in terms of the amount of water swallowed in activities like swimming/bathing/washing in the river and exposures during and after flooding events are look into.

CHAPTER 4
APPLICATION OF THE METHODOLOGY OF THE COMMUNITY-BASED FLOOD VULNERABILITY INDEX (FVI) FOR URBAN FLOODING: DATA COLLECTION AND TREATMENT

4.1 Community-Based Flood Vulnerability Index Methodology

The first task of this research was to review the different research work, survey and literature about vulnerability index with the purpose of identifying which indices must be included and added in this study. After which the most relevant components have been recognized from the previous studies, a revision of such components were done to be able to have a holistic approach which can be used for local data and on a per country basis shown in figure 4-1 below. The next step was to identify the main indicators that mirror vulnerability to urban flooding. Identifying these different indicators will facilitate the development of equations for the Community-Based Flood Vulnerability Index (FVI). The different indicators were then categorized under exposure, susceptibility and resilience factors. The FVI must have different indicators for the different components and factors which are grouped appropriately. Such indicators must have a direct, indirect or both impacts on vulnerability of the area of study.

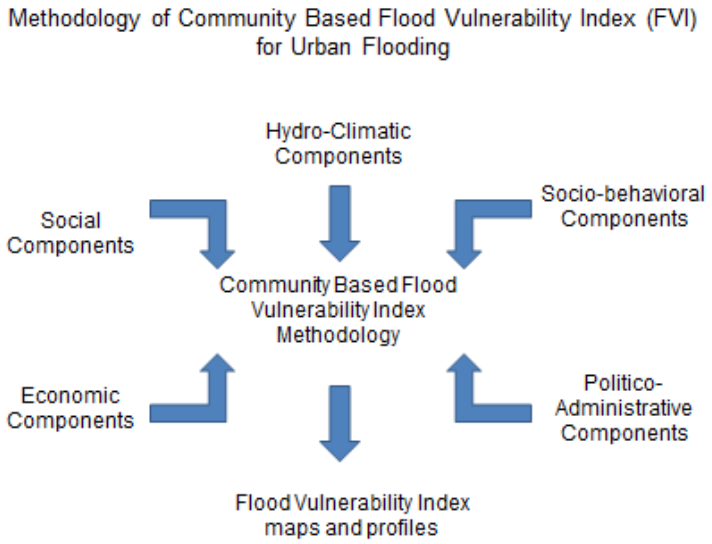

Figure 4-1 Methodology Framework for Community-Based Flood Vulnerability Index for Urban Flooding

Table 4-1: Population Profile and the Suggested Sample Size (SS)

Community	Affected Population	No. of HH	Affected Pop.	Affected HH	No. HH (%)	Sample Size	A HH SS	NA HH SS
Candauay	6000	1200	4550	910	23.68	88	67	21
Junob	900	180	870	174	3.55	13	13	0
Bagacay	2170	434	1700	340	8.57	32	25	7
Balugo	1115	223	160	32	4.40	16	2	14
Batinguel	2355	471	1905	381	9.30	34	28	7
Taclobo	4510	902	1960	392	17.80	66	29	37
Tabuctubig	500	100	420	84	1.97	7	6	1
Polacion 8	2000	400	1800	360	7.89	29	26	3
Cadawinonan	1605	321	900	198	6.34	24	14	9
Calindagan	1500	300	1200	240	5.92	22	18	4
Poblacion 1	1530	306	600	120	6.04	22	9	14
Poblacion 2	1150	230	1070	214	4.54	17	16	1
Total	25335	5067	17135	3445	100.00	371	252	119

A total of 357 household respondents instead of 371 from the 12 communities (Table 4-1) and 30 respondents from the Local Government Units (LGU's) and Non-Governmental Organizations (NGO's) in Dumaguete City Philippines were surveyed through sets of questionnaires and interviews from March 2013 to July 2013. The population being considered consists of households who are situated in areas reported to have experienced fluvial flooding in the past few years. Using the Slovin's formula:

$$n = N/(1+N\ e^2)$$

Where:
n = number of samples
N = total population
E^2 = margin of error

(= 0.05% if 95% confidence level or +5% error to be used) the desired sample size (n) for a total population of 5067 (N) is 371 (http://www.statisticshowto.com/how-to-use-slovins-formula/). The distribution of the number of samples to be taken per community is based on the proportion (%) of the number of households per community to the total number of households. The distribution of the number of samples to be taken for the affected (A) and not affected (NA) households (HH) or families are based on the proportion (%) of the affected and not affected households per community. The sample size of 357 household respondents is still within the 95% confidence level.

The Community-Based Flood Vulnerability Index is calculated using appropriate indicators from the five components namely: hydro-climatic, social, economic, socio-behavioral, and the politico-administrative components shown in Figure 4.1. While Table

3.1 shows the relationship between components and their corresponding indicators (Chapter 3). The selection of the indicators relates among other things, to the aspects of the Hyogo Framework for Action (2005-2015) of the United Nations (Chapter 2)**.** The respondents evaluated none of the suggested variables as irrelevant but some were, of course, judged more important than others. However, after thorough weighing of the variables, for most cases, not significantly different from equal weights hence, the researchers decided to use equal weights in many of the components at the moment and to reassess the weighting of the indicators at a potential later project stage, within the process of fully testing the proposed index.

Depending on the nature of the answer to the question, each question was given a corresponding score. For questions that require a yes or no answer: Yes = 1, No= 0. For questions that require very lightly, lightly, seriously and very seriously answer: very lightly= 1, lightly = 2, seriously = 3, very seriously = 4. For questions that require excellent, very well, good, poor and very poor answer: excellent = 5, very well= 4, good = 3, poor = 2, very poor = 1. To determine the composite score which is expressed in percent, the sum of the item scores were divided by the highest possible score and then multiplied by 100.

The data were summarized per barangay (the smallest political/community unit in the Philippines) in frequency tables and their corresponding relative frequencies (%) as well the average of scores whenever appropriate. Variations in responses are expressed as standard deviation.

4.2 Equation

For the calculation of this Community- Based Flood Vulnerability Index (FVI), each of the components (hydro-climatic, social, economic, socio-behavioral, and politico-administrative) is computed based on the general flood vulnerability index (FVI) formula (Eq. 1).

$$FVI = \frac{E*S}{R} \quad (1)$$

The general formula for FVI is computed by categorizing the indicators to the factors to which they belong (exposure (E), susceptibility (S) and resilience (R). The indicators of exposure and susceptibility are multiplied and then divided by the resilience indicators, because indicators representing exposure and susceptibility increase the flood

vulnerability and are therefore placed in the numerator. The resilience indicators decrease flood vulnerability and are thus part of the denominator (Cendrero, 1997).

The Flood Vulnerability Index (FVI) for the hydro-geological, social, economic, socio-behavioral and politico-administrative components are expressed as follows (Equations 2-9) and equations 10 and 10' the formula for computing the overall FVI. Refer to Table 3.1 for the abbreviations used for the indicators used for the individual formula for the different components.

$$FVI_{\text{hydro-climatic}} = f\ \frac{FF, HF, HRF, HNE * NTY}{LUMSD} \quad (2)$$

$$FVI_{\text{social}} = f\ \frac{ODAW, UVR * EA}{WT, SN} \quad (3)$$

$$FVI_{\text{economic}} = f\ \frac{HNIS, HNIW, PRV, PWLV * HC}{FI, PI} \quad (4)$$

$$FVI_{\text{socio-behavioral on flood resilience}} = f\ \frac{PHFR * AHFR}{KHFR} \quad (5)$$

$$FVI_{\text{socio-behavioral on E. coli}} = f\ \frac{PHEC * AHEC}{KHEC} \quad (6)$$

$$FVI_{\text{socio-behavioral on Leptospirosis}} = f\ \frac{PHL * AHL}{KHL} \quad (7)$$

$$FVI_{\text{socio-behavioral on Dengue fever}} = f\ \frac{PHDF * AHDF}{KHDF} \quad (8)$$

$$FVI_{\text{politico-administrative}} = f\ \frac{RNRMP, LUMSD * G}{PRAI, SCLP, RSP, HPP} \quad (9)$$

$$\text{Overall FVI} = \frac{\text{Hydro-climatic + Social + Economic + Socio-Behavioral + Politico-Administrative}}{5} \quad (10)$$

$$\text{Overall FVI} = \left\{\left(\frac{FF,HF,HRF,HNE*NTY}{UMSD}\right) + \left(\frac{ODAW,UVR*EA}{WT,SN}\right) + \left(\frac{HNIS,HNIW,PRV,PWLV*HC}{FI,PI}\right) + \left(\frac{PHFR*AHFR}{KHFR}\right) + \left(\frac{PHEC*AHEC}{KHEC}\right) + \left(\frac{PHL*AHL}{KHL}\right) + \left(\frac{PHDF*AHDF}{KHDF}\right) + \left(\frac{RNRMP,LUMSD*G}{PRAI,SCLP,RSP,HPP}\right)\right\} \quad (10')$$

The integrated Flood Vulnerability Index is a method to combine multiple aspects of a system into one number. On a global perspective, the results will be presented in values between 0% and 100% for better comprehension: 100% being the highest vulnerability

found in the samples studied and 0% the lowest vulnerability. The community-based flood vulnerability index percentile ratings are as follows with its corresponding interpretation: 0-19% very low; 20-39% low; 40-59% medium; 60-79% high; 80-100% very high vulnerability. Here is how the community-based flood vulnerability index will be interpreted: A very low flood vulnerability index indicates that the community is very well prepared for a flood event. A low flood vulnerability index also indicates that the community is well prepared for a flood event. A medium flood vulnerability index indicates that more work could be done to improve the resilience in this category. A high flood vulnerability index indicates that the community should pay specific attention to this category and should make efforts to address the areas of high vulnerability rating. A very high flood vulnerability index indicates that the community should really pay specific attention to this category and should make more efforts to address the areas of very low rating.

Regardless if the community/city has a HIGH, MEDIUM, or LOW Flood Vulnerability Index, one should learn about and investigate the weaknesses identified during the process.

4.3 Study Area

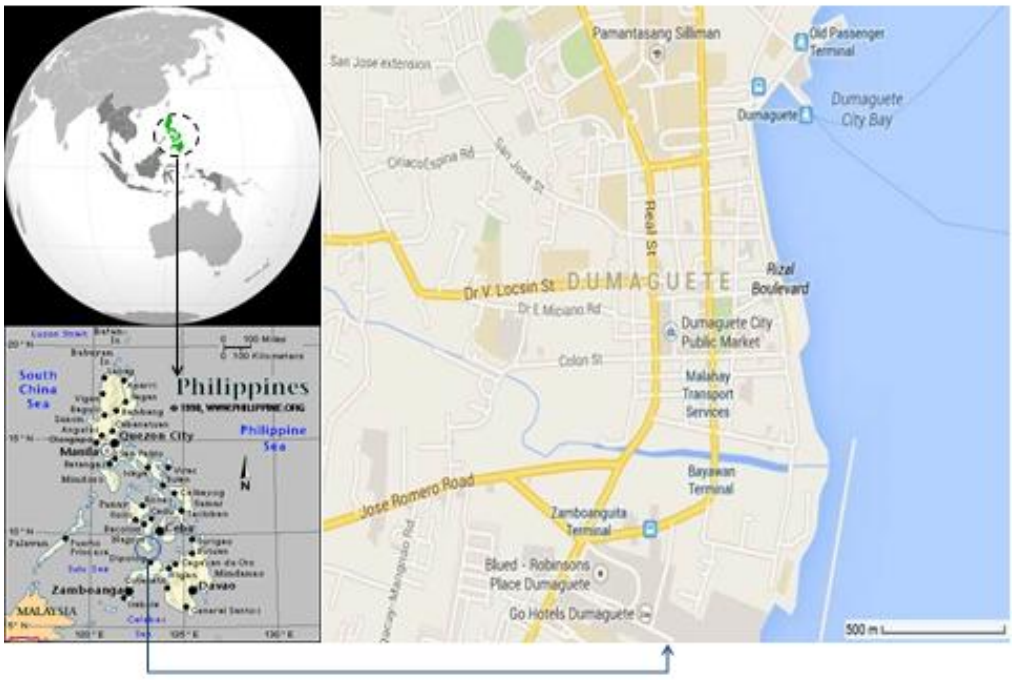

Figure 4-2: Map of the Philippines and the Study Site

Country background: The Philippines

The Philippines (Figure 4-2) is an archipelago with a total discontinuous coastline of 32,400 kilometers, the longest in the world. Being in the Pacific Rim, the Philippines is a hot spot for natural hazard occurrences. It is highly prone to storm surges and riverine flooding, caused by storms and other environmental degradation. This is due to the fact that an average of 20 tropical cyclones passes yearly through the Philippine area and about nine of them crossed land. Flooding usually occurs in the low- lying coastal areas. The eastern side of the country is subject to heavy rains during the Northeast Monsoon season (November to February), while the western side during the Southwest Monsoon season (from May to September). The Southwest Monsoon season coincides with the typhoon season as well.

The Philippines, is an archipelago of some 7,100 islands, only 2000 of which are inhabited, lies in the Pacific Ocean off the coast of Southeast Asia between latitudes 5° and 21° North and longitudes 117º and 127º East. Of the total land area of 300,000 km2, the 11 largest islands contain 94% of the total with the two largest, Luzon and Mindanao, accounting for approximately 66. The country's nearest neighbours are Taiwan to the north, Eastern Malaysia and Brunei to the southwest, and Indonesia to the south.

The islands are home to over 94.04 million people with a population density of 294 persons/km2 but this is unevenly distributed throughout the islands. The population is evenly split between urban and rural and the largest urban centre is the capital Manila. Topographically, the Philippines are part of a western Pacific arc system that is characterized by active volcanoes, earthquakes and frequent seismic activity. The islands typically have narrow coastal plains with sand beaches and numerous swift-running streams, but few open onto spacious lowlands or large plains. With a tropical marine climate, the country is hot and humid year-round and is dominated by a rainy season and a dry season. The summer monsoon brings heavy rains and dangerous storms to most of the archipelago from May to October, whereas the winter monsoon brings cooler and drier air from December to February. Most of the lowland areas are hot and dusty from March to May, but even at this time, however, temperatures rarely rise above 37°C, and mean annual sea-level temperatures rarely fall below 27°C. Droughts and flooding from typhoons are common and annual rainfall varies from as much as 5000 mm in the mountainous east coast section of the country to less than 1000 mm in some of the sheltered valleys. This abundant rainfall is distributed unevenly

across the country, but although there is a high degree of variability from place to place, groundwater levels are generally high, and streams flow continuously.

Water resources and supply

Freshwater storage capacity and the high rate of precipitation theoretically assure the Philippines of an adequate supply of freshwater for its agricultural, industrial and domestic uses. Approximately 70% of the land area of the Philippines is considered as watershed areas (lakes, springs, and streams), comprising over 400 river basins and with an annual average rainfall of over 2,500 mm, there are ample, dependable surface run-off and ground water resources.

Water and health

Figure 4-3: Flooding in Manila, Philippines

There have been numerous large epidemics of waterborne diseases throughout the country, particularly of cholera and typhoid fever during the 1990's. While diarrhoea remains the number one cause of illness in all age groups, the decline in the incidence of cases is accompanied by reports to the National Epidemiology Centre (DOH) of significant reduction in the number of food-borne and water-borne infection outbreaks in the past years. Investigations of these disease outbreaks have identified contaminated sources of drinking water, improper disposal of human waste and unsanitary food handling practices as the main causes. Figure 4-3 above depicts the possibility of acquiring such infections mentioned above.

Diarrhoea and other waterborne diseases still rank among the leading causes of morbidity and mortality in the Philippines. The incidence rate for these diseases is high as 1,997 per 100,000 population while mortality rate is 6.7 per 100,000 populations. A total of 2,471 leptospirosis cases were reported nationwide from January 1 to August 18, 2012. This is 62.35% higher compared to the same time period last year (1,522). Cases were high in morbidity week 1 due to flash flood in Cagayan de Oro. Most of the cases were from the following regions: Region X (37.5%), Region VI (18.4%) and NCR (9.1%). 51,597 dengue cases were reported nationwide from January 1 to July 14, 2012. This is 16.43% higher compared to the same time period last year (44,315). Most of the cases were from the following regions: National Capital Region (22.24%), Region IV-A (14.08%) and Region III (13.65%), (DOH, 2012).

4.3.1 Dumaguete City, Negros Oriental Philippines

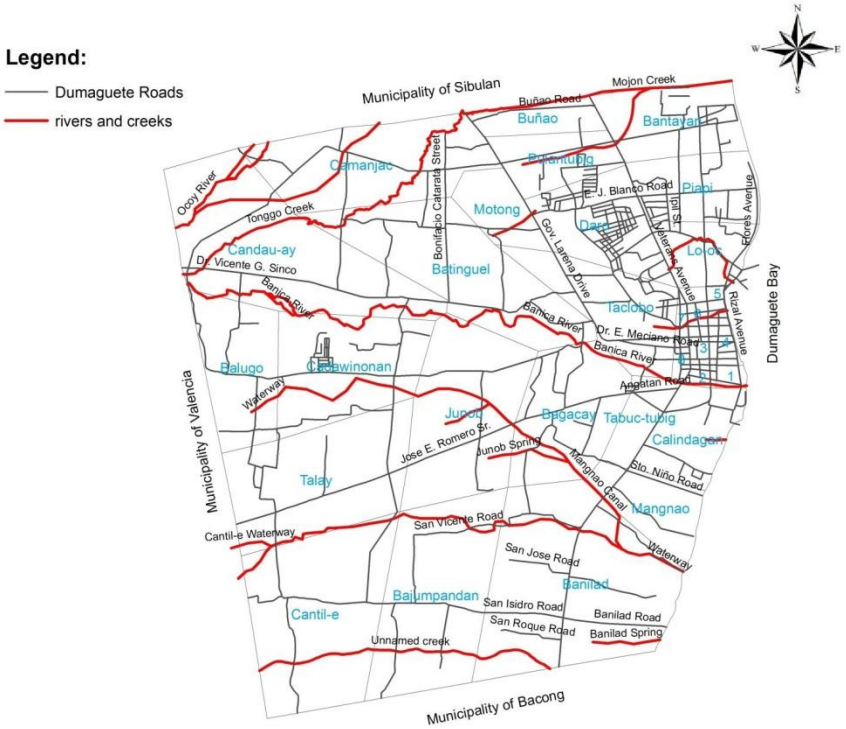

Figure 4-4: Boundary Map of Dumaguete City, Philippines

The city of Dumaguete is classified as a second class city. Dumaguete City, the capital of Negros Oriental is located 9 degrees 18 minutes 28 seconds north latitude and 123 degrees 18 minutes 28 seconds east longitude. It is bounded on the north by the municipality of Sibulan, on the south by Bacong, in the west by Valencia, and on the east by Tañon Strait and Mindanao Sea (Figure 4-4).

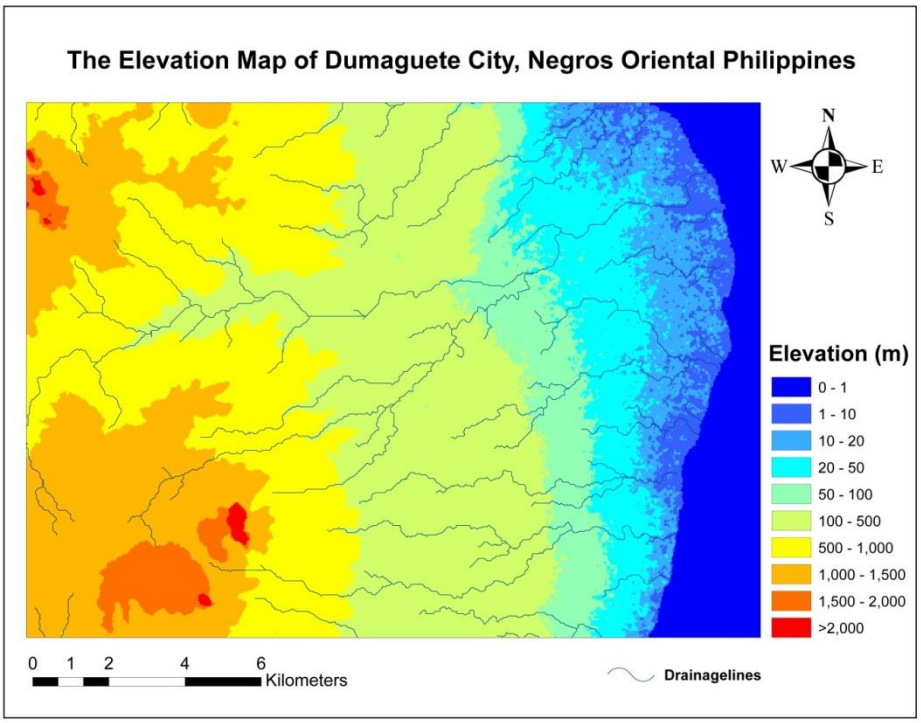

Figure 4-5: Elevation Map of Dumaguete City, Philippines

The total area of Dumaguete City is approximately 3,426 hectares with an estimated population of 120,883 according to the 2010 population census report. Its smallest barangay is Barangay 4 with an area of only 511 hectares, while the biggest barangay is Barangay Banilad with 362.71 hectares. Of the province's 20 municipalities and 5 cities, Dumaguete City is the smallest in terms of land area. The City's topography is generally flat from 2 to 6 kilometers from the shoreline (Figure 4-5). It's slope gently upwards to the adjoining municipality of Valencia. The highest ground elevation is located at the boundary of the municipality of Valencia, about 100 meters above mean sea level. About 93% of the land has slopes of less than 3%. The remaining areas have 3% to 5% slope.

From the soil survey of Dumaguete City, the city's soil type consist of San Miguel-Taal Complex, San Miguel Fine Sandy Loam, Dauin Sandy Loam and Isabela Clay, found only in the Barangays of Looc, Piapi, and Bantayan, is characteristically black, coarse, powdery and loose. Dumaguete City has two seasons, namely; the dry and wet seasons. The wet season covers the period from June to November, and the dry season starts from December to May, the hottest being April and May. The average maximum temperature is 34.31 Degrees celcius and the average minimum temperature is 22.85 Degrees celcius for the past years. The relative humidity of the locality for the

past years was 78.75% with the month of December registering the highest. (Dumaguete City Planning and Development Office, 2000)

Dumaguete City has 30 Barangays, 8 of which belonged to the Poblacion area. Out of the 30 Barangays, 12 were chosen as the study sites which include Barangay Tabuc-Tubig, Junob, Poblacion 1 (Tinago), Calindagan, Balugo, Poblacion 2 (Lukewright), Pobalcion 8, Cadawinonan, Bagacay, Taclobo, Candauy-ay, and Batinguel (Figure 4-4).

The Bio-physical Features of Banica River Watershed

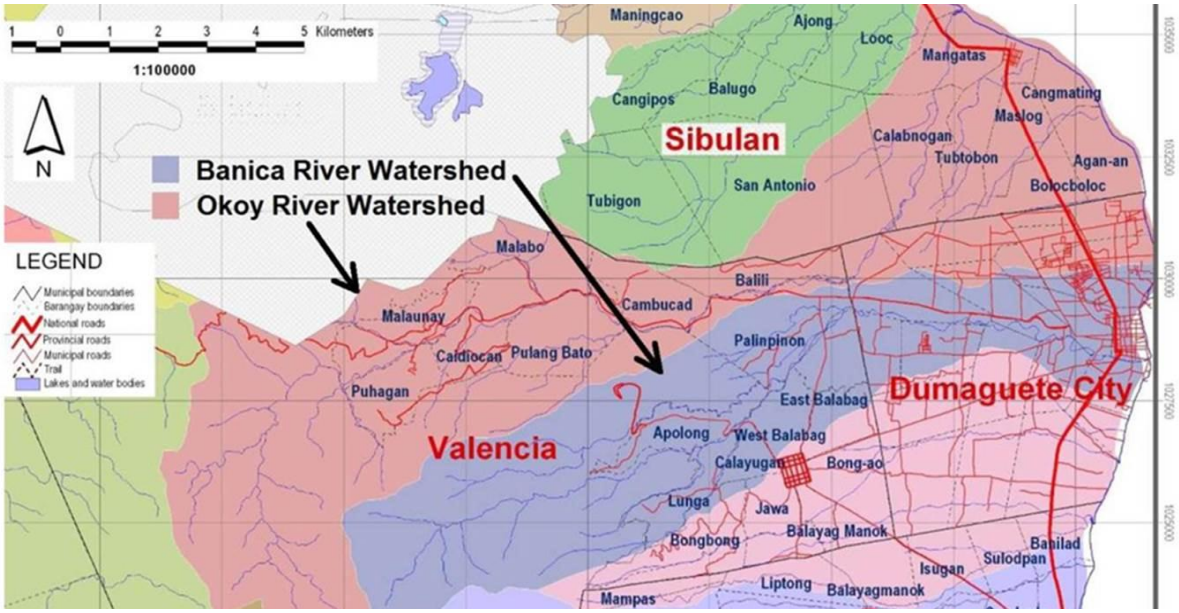

Figure 4-6: Banica and Okoy River Watershed Location Map

Topography

Banica River Watershed (BRW) forms elongated channel from the mouth of Banica River in Dumaguete City to Casaroro Falls in Valencia. The main tributary creeks and rivers of Banica River are Apolong, Bunao Diyot, Kaipuhan and Maite, among others (Figure 4-6). Banica River itself is approximately 18 kilometers long from the coastline to Casaroro Falls. The difference in elevation from Dumaguete's shoreline to the peak of the watershed is 1,580 meters. In Dumaguete, the slope ranges from 1% to 5%, rapidly increases and then rises steeply westward beyond the Valencia poblacion. At the upper watershed, the slopes are much steeper at 172m/km. Thirty eight percent (38%) of the BRW have slopes from 18 to 50% where forest vegetation is found. About fifty percent (50%) of the total area of BRW have elevations from 0 to 100m and about 40% have

elevations from 300m or greater (Figure 4-5). The straight course of Banica River and high gradient signify a short residence time for surface runoff and hence, a great risk and occurrence of flashfloods and riverbed drying.

At the Dumaguete-Valencia boundary in Barangay Balugo, the watershed is approximately 2.0 kilometers wide. The river becomes slower as the gradient decreases and discharges at Poblacion 1 (Tinago) just south of the Dumaguete poblacion into the Mindanao Sea.

The Okoy River watershed, which is actually an allied watershed of Banica River system, drains down to a catchment area of roughly 72 sq km. Okoy River runs for about 27 kilometers. Similar to Banica, its headwaters are located in the town of Valencia, its course passes partly through Dumaguete City at Barangays Candau-ay and Camanjac and eventually discharges to the Mindanao Sea through the town of Sibulan. Headwaters elevation is around 1,200 m (3,900ft) AMSL with a general average river slope of 0.04.

Flow and Uses of Banica River

In the BRW are found numerous small watersheds and streams contributing to the flow of Banica River. The flow of Banica River into the lowland is drastically reduced when the National Irrigation Administration (NIA) irrigation system withdraws its full design rate of 300 liters per second in the dry summer months. In the summer months sections of Banica River in Balugo, Candau-ay, and Cadawinonan are dry for months. At the poblacion where river discharges to the seas, the river during this period is dry and seawater flows inward about one kilometer into the river channel.

There is a big difference in the flow measurements between Candau-ay and Batinguel sections of Banica River, which is attributed to high infiltration rates in Batinguel section. The waters of Banica River and its tributaries are used for irrigation, recreation, laundry, and bathing of both humans and animals. In the upper watershed in Valencia, water is diverted to fill two public and private swimming pools but subsequently discharged back to the river. At Barangay Apolong in Valencia some distance below the swimming area, a greater percentage of water from Banica River are diverted for irrigation purposes. In the lowlands, the water is mainly used for bathing and laundry purposes.

A few years ago, the river water at the upper reaches of the water system was classified by DENR as Class A. However, its present uses would rule out its classification as high

quality surface water (Institutionalization of the Rehabilitation of Banica River Watershed, 2000).

As per geophysical features of the two watersheds, flooding can be characterized as rapid onset (Flash flood) at the upstream to midstream part, becoming moderate at its lower sections. Obvious manifestation of flood response is the river channels' slope and the channel bed which is composed mainly of boulders at the upstream portion, and large rocks and stones, to cobblestones at the midstream part. Interviews conducted in some places revealed that river level rises are quite rapid particularly at the upstream and midstream portions. Also floods lasted for just a few hours at many areas for both watersheds as was observed during the passage of Tropical Storm SENDONG in 2011.

Land Characteristics

There are basically two types of soil in the BRW, namely: clay to sandy clay loam in the upper watershed and sandy loam in the lowlands. In the lowlands, soil is slightly susceptible to erosion but in the uplands, there are pockets wherein soils are highly, moderately and slightly susceptible to erosion.

Land Use

The land uses of the two LGU's show contrasting utilization. Valencia is predominantly agricultural and timberland with small areas for residential use. Within the BRW in Valencia, land is used mainly for agriculture and social reforestation. While Dumaguete City is considered as 100% urbanized, approximately 22.5% of its land in the southern portion of the city is considered as protected prime agricultural land. Its main uses are agriculture, residential, commerce and institutional. As illustrated in Figure 4-7 below, the built up areas are in the poblacion (centre areas) while outside the poblacion area there are still open spaces/idle lots making Dumaguete City not a crowded place.

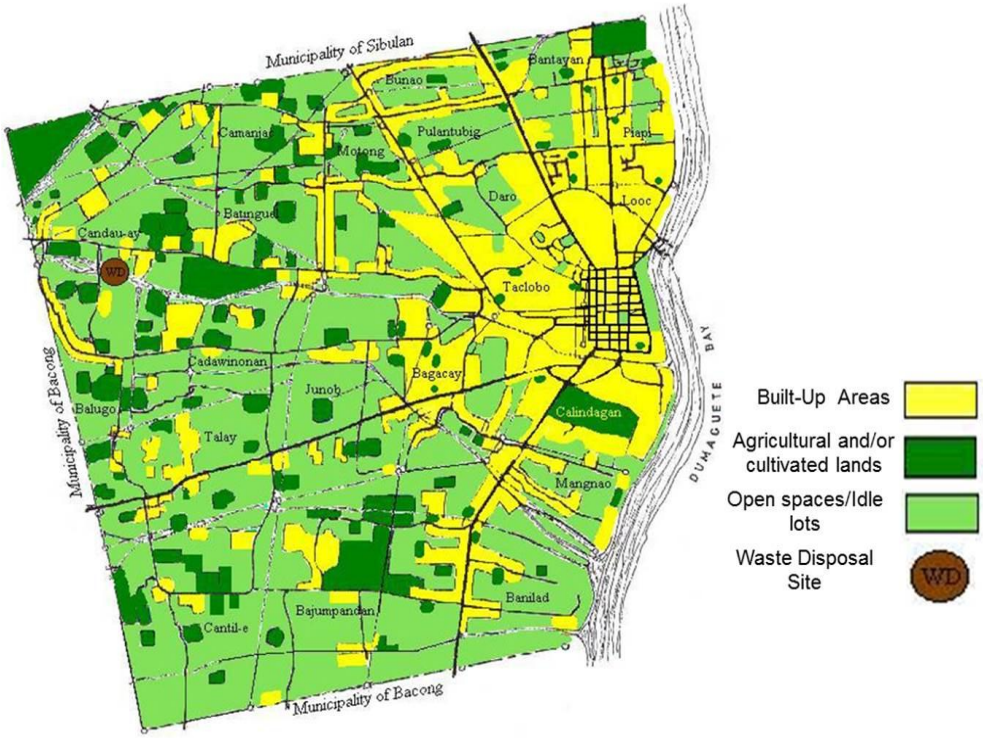

Figure 4-7: Existing General Land Use Map

According to the Local Disaster Risk Reduction and Management Council (LDRRMC) of Dumaguete City, on February 07, 2009, the effects of Amihan produced a low pressure area (LPA) with heavy rainfall which caused a major flooding in Dumaguete City affecting 12 barangays of the City, namely: Tabuc-tubig, Bagacay, Junob, Cadawinonan, Batinguel, Candau-ay, Balugo, Taclobo, Poblacion 8, Bunao, Camanjac and Poblacion 2. The main reason why the flood became devastating was the occurrence of heavy rainfall which happened during high tide which causes a massive increased of flood water level to an estimated height of 1 meter or higher in some areas. Based on the disaster timeline result of the LDRRMC, 60 houses were totally damaged and around 1000 families were affected. Infrastructure and agricultural damage was significant, and based on the report made by the city LDRRMO the flood cost around 25 million pesos worth of damage to the city.

Like many coastal cities and municipalities in the Philippines, Dumaguete City is now frequently visited by typhoons particularly in the months from October to February where the northeast monsoon is passing through the entire province of Negros Oriental. From 2011 up to the present, three significant typhoons passed through the city and the province which brought with it significant damage to the area.

4.4 Community Profile

A brief description of the 12 communities in Dumaguete City, Negros Oriental that were studied are described below. These communities were chosen because they are located along the Banica River that flows into the city. History of the flood events in Dumaguete City has showed that these communities have experienced such flooding phenomenon. A quick assessment conducted by The MGB-Region VII in February 25, 2006 and a more recent assessment was conducted by the Local Disaster Risk Reduction Management Office (LDRRMO) from the most recent flash flood/flooding event caused by Typhoon Sendong (International name: Washi) in December 17, 2011 were incorporated in the community profile.

(1) Tabuc-tubig

Figure 4-8: Barangay Tabuc-tubig

Barangay Tabuc-tubig (Figure 4-8) has an area of .4068sq.km and a population of 1684 people as of the 2010 Population census with 100 household. According to the last human and social capital community assessment by the Local Disaster Risk Reduction Management Office (LDRRMO), there are only five hundred exposed individual (500) from entire community population and 420 of the exposed population were affected during the most recent flash flood in December 17, 2011 caused by Typhoon Sendong (International name: Washi). Eighty four (84) households were affected. Eighty-four percent (84%) of the population was affected. A flood water level of 0.7m has flooded the community covering about (30%) of the area. As observed in this photo, there are a number of houses built along the river banks whose flood barrier were not enough to

contain such huge volume of water during heavy rains and typhoon seasons. Eight (8) respondents were surveyed from this community.

(2) Junob

Figure 4-9: Barangay Junob

This community (Figure 4-9) has a total population of 6054 with180 households and only 900 are the exposed individual. This barangay (community) has an area of 2.2536sq.km. It is the second largest barangay in terms of land area. In that same assessment, one hundred seventy four (174) households were affected. Ninety-seven percent (97%) of the exposed population was affected. A flood water level of 0.5m flooded the community about (10%) of the area. Barangay Junob is outside the Poblacion area. It is not a built-up area but there are spaces along the river that were not protected with dike system making some of the houses more vulnerable. As seen in this photo, these houses are built in the flood plain area which can easily be reached by over-spilling water from the river. Fourteen (14) respondents were surveyed from this community.

(3) Poblacion 1 (Tinago)

Figure 4-10: Poblacion 1 (Barangay Tinago)

The land area of Poblacion 1(Tinago) is 0.0801sq.km (Figure 4-10). It has a total population of 2170 and 1530 are the exposed population. There are three hundred six (306) households in this community. One hundred twenty (120) of the households were affected from the last flooding events affecting about thirty-nine percent (39%) of the exposed population. In February 25, 2006 the Mines and Geosciences Bureau (MGB-Region VII) conducted a geo-hazard survey and based from their results Dumaguete City is vulnerable to flooding. A low flood depth of up to 0.5m was recorded but rarely experienced in Purok Ubos. This community is the first barangay located immediately after the mouth (delta) of the river from the shoreline. It is observed in this photo that during high tide, the seawater generally reached this part of the river. Flowing rubbish are frequently observed as well. The dike system lines the entire stretch but not high enough to protect from flowing waters during unprecedented events. Twenty-two (22) respondents were asked from this community.

(4) Calindagan

Figure 4-11: Barangay Calindagan

Barangay Calindagan (Figure 4-11) has an area of 0.8457sq.km and has 8,056 total population with three hundred (300) households. One thousand five hundred (1500) are the exposed individuals. Two hundred forty (240) of the households were affected from the last flash flood event, affecting eighty percent (80%) of the exposed population. According to the survey conducted by MGB-Region VI, a flash flood with high turbidity can rarely occur in Barangay Calindagan. In addition, a low flood depth of up to 0.5m is seasonally experienced in this barangay. Purok Sampaguita and Purok Orchid had experienced 1m depth floodwaters along the river bank and that is considerably high. Storm surge during typhoon Ruping (about 14 years ago) has devastated the houses that were along the coast. Forty (40) houses were totally damaged. Like its neighbouring barangay (Poblacion 1), Calindagan is also often seen with floating rubbish and some of the household drainage exits to the river. There are twenty-three (23) respondents from Calindagan that were surveyed.

(5) Balugo

Figure 4-12: Barangay Balugo

Barangay Balugo (Figure 4-12) has a land area of 1.3184sq.km. This community has a total population of 2980 with one thousand one hundred fifteen (1015) exposed individual. There are two hundred twenty three households (223) in this community and thirty two (32) households were affected in the last flooding events. Only about fourteen percent (14%) of the exposed population of the community was affected. Ten percent (10%) of the entire area was flooded. From the records conducted by the MGB-Region VII in 2006, a flash flood with low turbidity occurs along this barangay affecting eighteen (18) households. Less number of houses are located near the river bank. Rather, most houses in Balugo are located further inland which is more elevated, thus less vulnerable in terms of exposure. Seventeen (17) respondents were solicited from Balugo.

(6) Poblacion 2 (Lukewright)

Figure 4-13: Poblacion 2 (Barangay Lukewright)

Poblacion 2 (Figire 4-13) has a land area of .0524sq.km and is second smallest in terms of land area among the 12 communities surveyed and has a total population of 1,305. This community has the smallest population among the 12 communities studied. One thousand one hundred fifty (1,150) are the exposed individual. There are two hundred thirty (230) households. Two hundred fourteen (214) of the households were the affected from the last flooding. Ninety-three percent (93%) of the population was affected. The flood water level has reached to about 0.6m, and twenty percent (20%) of the community area was flooded. As observed in this photo, houses are immediately located on the river banks with low flood barrier system (dikes). Floating rubbish were observed especially further downstream. Fifteen (15) respondents were surveyed from Poblacion 2.

(7) Poblacion 8

Figure 4-14: Poblacion 8

Poblacion 8(Figure 4-14) has a land area of .0623sq.km with two thousand three hundred sixty three (2,363) people living in Poblacion 8 and 2000 of which are the exposed individuals. There were 1800 people affected during the last flash flood and there are 400 households in this community. Three hundred sixty (360) of the households were affected leading to ninety percent (90%) affected population. Forty-five percent (45%) of the area was flooded with waters up to 0.8m in depth. Poblacion 8 is second most flooded among the 12 communities surveyed. As seen in this photo, houses are located immediately on the river banks and most houses are located on low lying area behind the dike system. Some parts of the flood barrier have been lowered through deposition of soil and sediments overtime making it easier for the flood water to overspill. Thirty (30) respondents were surveyed from this community.

(8) Cadawinonan

Figure 4-15: Barangay Cadawinonan

Cadawinonan (Figure 4-15) has 4,892 population in an area of 1.7028sq.km. One thousand six hundred five (1605) of which are the exposed individual. There are three hundred twenty-one (321) households were one hundred ninety-eight (198) of which were affected in the last flooding event. Sixty-two (62%) of the population was affected. During the flood event, a 0.6m flood water level spread the area. Twenty-five percent (25%) of the area was flooded. In spite that the flood barriers are quite high enough but some areas were not completely built with the dike system thus flood water escaped from those open areas. The low lying overflow must have also contributed to the blockage of rushing water pushing it to the open side. This area is the location of one of the housing project area of the city. There are more or less 100 houses which are located immediately after the dikes system making it more vulnerable to exposure. Sand-gravel activity is active in this part of the river. Twenty-five respondents were solicited from Barangay Cadawinonan.

(9) Bagacay

Figure 4-16: Barangay Bagacay

Bagacay (Figure 4-16) has an area of 1.6021sq.km with a population of 8,266. Two thousand one hundred seventy (2,170) of which are the exposed individuals. There are four hundred thirty-four (434) families. In the last flooding event, three hundred forty (340) families were affected leading to seventy-eight percent (78%) of the population was affected. The flood water level was up to 0.5m, flooding ten percent (10%) of the area. Not all the river banks in Barangay Bagacay were built with dike system. Other areas are open and expose to the rushing flood water spreading during flash floods. The overflow structure may also contribute to the blockage of rushing waters spreading to the open spaces eventually reaching the nearby houses. As observed in this photo, sand gravel activity is active in this part of the river. Thirty (30) respondents were surveyed from Bagacay.

(10) Taclobo

Figure 4-17: Barangay Taclobo

The land area of Barangay Taclobo (Figure 4-17) is 1.2931sq.km and with a population of 9,691 and four thousand five hundred ten (4,510) individuals are the exposed. There are nine hundred two (902) families in this community. Three hundred ninety two (392) families were affected from the last flooding affecting forty-three percent (43%) of the population. The flood waters reaches up to 0.5m and fifteen percent (15%) of the area was flooded. The entire stretch of Barangay Taclobo on this side of the river is lined with dike system but during the last flash flood the flood waters go beyond this flood barriers spreading to the houses nearby. The opposite side of the river has experienced a more devastating effect because it is not built with flood barriers (dike system) and it is located in much lower area than what is seen here on the photo. The low structure overflow may also have contributed in the over spilling of the rushing water. There were sixty-three (63) respondents interviewed from Taclobo.

(11) Candau-ay

Figure 4-18: Barangay Candau-ay

Candau-ay (Figure 4-18) has 2.7370 sq.km area with a population of 6,583 and six thousand (6000) individuals are exposed. There are one thousand two hundred (1,200) families. Nine hundred ten (910) families were affected out of the one thousand two hundred (1,200). Seventy-six percent of the population was affected from the last flooding event. The flood water level reaches up to a meter (1m) covering a 50% flooded area. The flood barriers of Barangay Candau-ay are in patches, not the entire stretch is lined with dike systems. There is also a government housing project in this community that were located adjacent to the river banks which was the most affected during the last flooding. The low level structure of overflow (bridge system) may have also contributed to the blockage of rushing flood water which spreads to the open spaces and reaching the surrounding houses. Seventy-two (72) respondents were surveyed from Cadawinonan. It has the most number of respondents among the 12 chosen communities.

(12) Batinguel

Figure 4-19: Barangay Batinguel

A total of 2.1691sq.km is the land area of Batinguel (Figure 4-19). This community has a population of 8,148 and two thousand three hundred fifty five (2355) individuals are exposed. There are four hundred seventy one (471) families. Out of the 471 families, three hundred eighty one (381) families were affected from the last flooding event affecting eighty one percent (81%) of the entire population. Barangay Batinguel was also highly affected because the entire river bank was not built with flood barriers and houses are immediately located along the river banks. There were thirty-eight (38) respondents from Batinguel that were surveyed.

4.5 Temporary Shelters

Figure 4-20: Temporary Shelters in Barangay Junob

This is one typical example of a temporary shelter (Figure 4-20). This is a temporary shelter put up by Barangay Junob aided by both the local and national government after the flash flood event in December, 2011. When the researcher of this study was conducting a fieldwork in April of 2013 this temporary shelter was still standing as seen in this photo. The affected families were still waiting for the local government's advice for settlement, and it's been 2 years of waiting (more or less) from that calamity.

Figure 4-21: Temporary Shelters in Barangay Bagacay

This is another typical temporary shelter among the affected barangays in the city. This one is located in Barangay Bagacay (Figure 4-21) who was one of the most affected communities from the December 2011 flooding event. These temporary shelters were also there during the researcher's fieldwork in April of 2013 and are located just immediately after the river banks located at the back of these houses as seen in this photo. Affected families were waiting for settlement provided by both from the local government (LGU's) or the Nongovernmental organizations (NGO's) of the city.

4.6 The Relocation Sites

Figure 4-22: Relocation Site1 and 2

These are the two relocation sites (Figure 4-22) provided to those who were affected from the flash flood in December 2011. This was organized by a local Nongovernmental Organization (NGO) headed by the Parish community in Dumaguete City and by the LGU's of the city. There are more or less 200 of these relocation houses provided, though still not enough to provide those who were homeless after that calamity. It's a pretty decent place to stay and the community people are making it clean, pleasing and healthy to live in. Distance from livelihood and the city centre are some of the respondent's comments but having a nice and safer place to live in is better than nothing. These relocation sites are actually side by side to each other.

4.7 The Situation of the Most Recent Flooding Event in 2011

Figure 4-23: Flash Flood in Dumaguete City, Philippines

This was the scenario during the flashflood in December 17, 2011 that hits Dumaguete City (Figure 4-23). This location is from both Barangay Taclobo and Bagacay with the river separating the two communities from two sides. Houses and people were washed away. As depicted in this photo, the rushing water was so strong, carrying debris along with it. It's composed of muddy rushing water. In some houses the water was as high as the roof level and for some houses it was beyond the rooftop. This was probably one of the most damaging flash flood that occurred in the city from the 1900's up to these recent years. These residents are located obviously in the flood plains of Banica River. Figure 4-24 below shows the daily activities of the community people in relation to the Banica River in Dumaguete City, Negros Oriental.

Figure 4-24: The Daily Activities of the Community People in Relation to Banica River

4.8 Methodology for Hydrological Data of Banica River

The researcher conducted a crude geo-hydrological survey during the dry season (April, 30, 2013) and during the wet season period (July 11, 2013) to be able to have first-hand information since there is no available information on these items published or unpublished. This would give us a bird's eye view of the river of which data can later be used for bacterial loading analysis and for other hydrological studies.

Stream flow is a function of water volume and velocity. Stream flow, or discharge, is the volume of water that moves over a designated point over a fixed period of time. It is often expressed as cubic meter per second (m^3/sec). The flow of a stream is directly related to the amount of water moving off the watershed into the stream channel. It is affected by weather, increasing during rainstorms and decreasing during dry periods. It also changes during different seasons of the year, decreasing during the summer months when evaporation rates are high and shoreline vegetation is actively growing and removing water from the ground.

Calculating flow involves solving an equation that examines the relationship among several variables including stream cross-sectional area, stream length, and water velocity. One way to measure flow is to solve the following equation:

$$\text{Flow } (Q) = A \times V$$

Where:

A = area of the stream (stream width multiplied by average water depth).
V = velocity (distance divided by time)

This formula was used in this research since the shape of the channel is roughly rectangle.

As seen in table 4-2, there is a difference in flow during dry and wet season. The flow during dry season is 0.20m^3/second and 0.17m^3/second in the wet season, respectively. There is also a difference observed in the water depth from 21.67cm to 31.33cm. Figure 4-25 shows the location site for the hydrological data for station 1.

Table 4-2: Hydrological Data of Banica River for Station 1 (S1)

STATION 1 (S1)	(DRY SEASON)	(WET SEASON)
City Pound Bridge Barangay Balugo	30-Apr-13 W = 18.24m	11-Jul-13 W= 18.24m
DRY season Flow (Q) = A x V 0.20m^3/s	D1 = 24.0 cm D2 = 25.0 cm D3 = 16.0 cm Ave. depth: 21.67 cm	D1 = 34.0 cm D2 = 31.0 cm D3 = 29.0 cm Ave. depth: 31.33 cm
WET season Flow (Q) = A x V 0.17m^3/s	F1 = 62.79s F2 = 44.38s F3 = 64.26s Ave. flow: 57.14s	F1 = 56.91s F2 = 124.46s F3 = 121.59s Ave. flow: 100.99s

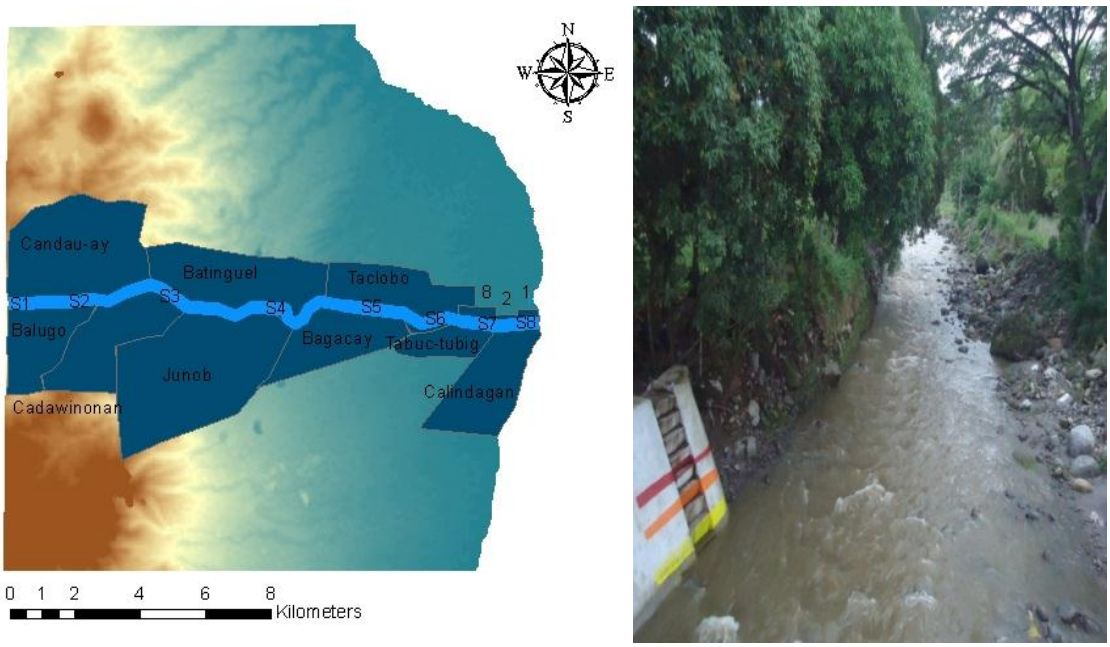

Figure 4-25: Station 1 (S1): City Pound Bridge, Barangay Balugo

The same pattern is observed for station 2 (Figure 4-26), there is a significant difference of the water flow during dry and wet season. A reading of 0.43m^3/second is observed during dry season and 0.64m^3/second for the wet season. The water depth also rises from 24.67cm in the dry season to 29.67cm in the wet season as seen in Table 4-3 below.

Table 4-3: Hydrological Data of Banica River for Station 2 (S2)

STATION 2 (S2)	(DRY SEASON)	(WET SEASON)
Smokey Mountain Overflow Brgy. Candau-ay & Balugo	30-Apr-13 W = 19.50m	11-Jul-13 W = 19.50m
DRY season Flow (Q) = A x V 0.43m^3/s	D1 = 20.0 cm D2 = 25.0 cm D3 = 29.0 cm Ave. depth: 24.67 cm	D1 = 21.0 cm D2 = 29.0 cm D3 = 39.0 cm Ave. depth: 29.67 cm
WET season Flow (Q) = A x V 0.64m^3/s	F1 = 34.51s F2 = 34.93s F3 = 32.62s Ave. flow: 34.02s	F1 = 28.14s F2 = 22.19s F3 = 30.94s Ave. flow: 27.09s

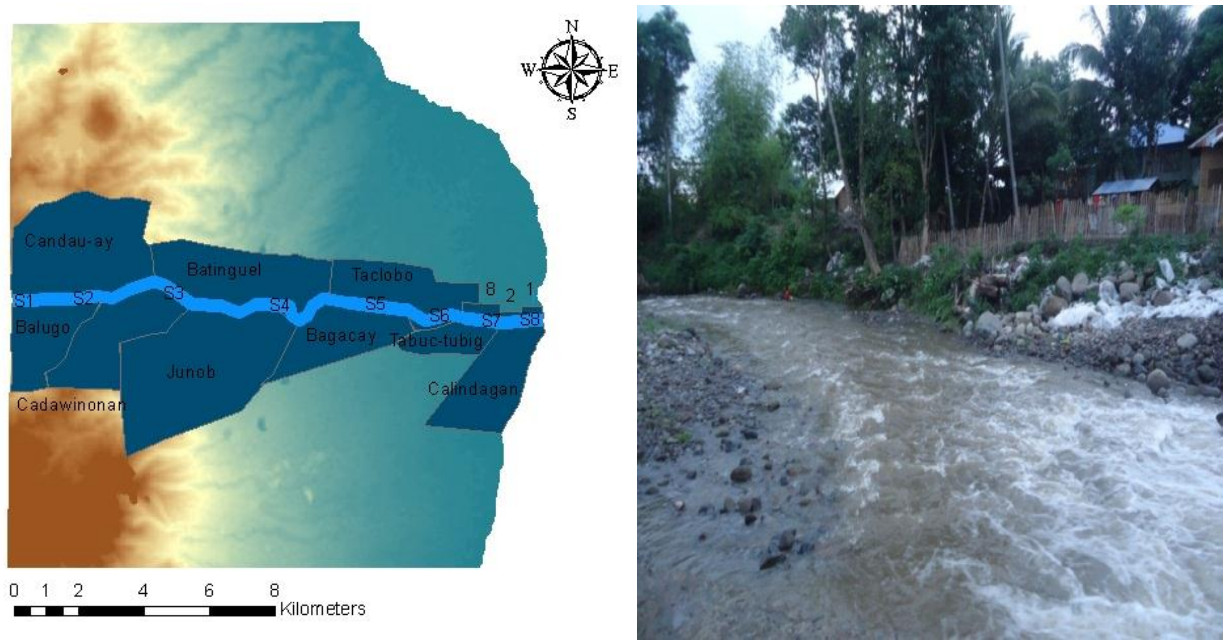

Figure 4-26: Station 2 (S2): Smokey Mountain Overflow, Barangay Balugo and Candau-ay

For station 3 (Table 4-4) and (Figure 4-27), not much difference is observed both the flow and water depth during the time of survey. From 0.25m^3/second to 0.33m^3/second stream flow in the dry and wet season respectively. Water depth increase is also very negligible from 15cm to 15.67cm rise in the wet season.

Table 4-4: Hydrological Data of Banica River for Station 3 (S3)

STATION 3 (S3)	(DRY SEASON)	(WET SEASON)
Barangay Cadawinonan - Candau-ay Overflow	30-Apr-13 W = 20.95m	11-Jul-13 W = 20.95m
DRY season Flow (Q) = A x V 0.25m^3/s	D1 = 12.0 cm D2 = 16.0 cm D3 = 17.0 cm Ave. depth: 15 cm	D1 = 15.0 cm D2 = 20.0 cm D3 = 12.0 cm Ave. depth: 15.67 cm
WET season Flow (Q) = A x V 0.33m^3/s	F1 = 40.32s F2 = 38.50s F3 = 27.72s Ave. flow: 35.51s	F1 = 34.51s F2 = 33.81s F3 = 30.94s Ave. flow: 33.09s

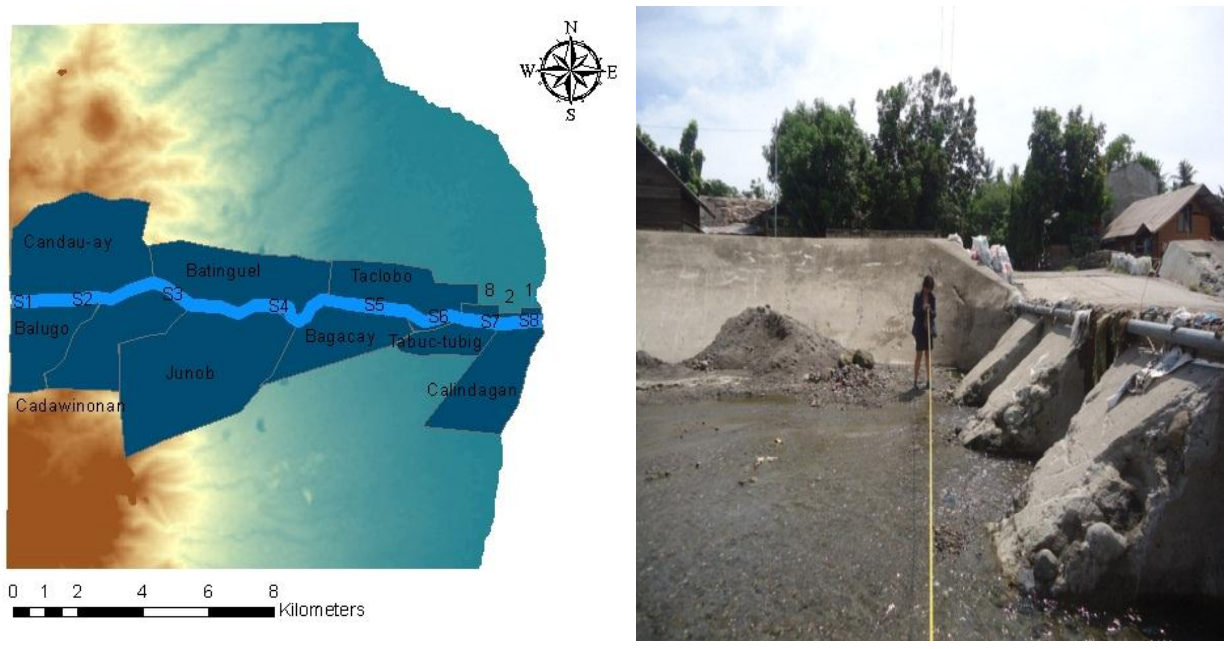

Figure 4-27: Station 3 (S3): Barangay Candau-ay and Cadawinonan

As depicted in table 4-5, increase of water flow during the dry and wet season is observed. From 0.38m^3/second in the dry season to 0.61m^3/second in the wet season. Water depth is also increasing from 28.43cm to 45.67cm respectively. Figure 4-28 shows the location for station 4 for this hydrological data.

Table 4-5: Hydrological Data of Banica River for Station 4 (S4)

STATION 4 (S4)	(DRY SEASON)	(WET SEASON)
Barangay Taclobo Overflow	30-Apr-13 W = 18.95m	11-Jul-13 W = 18.95m
DRY season Flow (Q) = A x V 0.38m^3/s	D1 = 25.0 cm D2 = 57.0 cm D3 = 3.3 cm Ave. depth: 28.43 cm	D1 = 80.0 cm D2 = 35.0 cm D3 = 22.0 cm Ave. depth: 45.67 cm
WET season Flow (Q) = A x V 0.61m^3/s	F1 = 42.49s F2 = 38.08s F3 = 56.98s Ave. flow: 45.85s	F1 = 50.12s F2 = 28.21s F3 = 49.21s Ave. flow: 42.51s

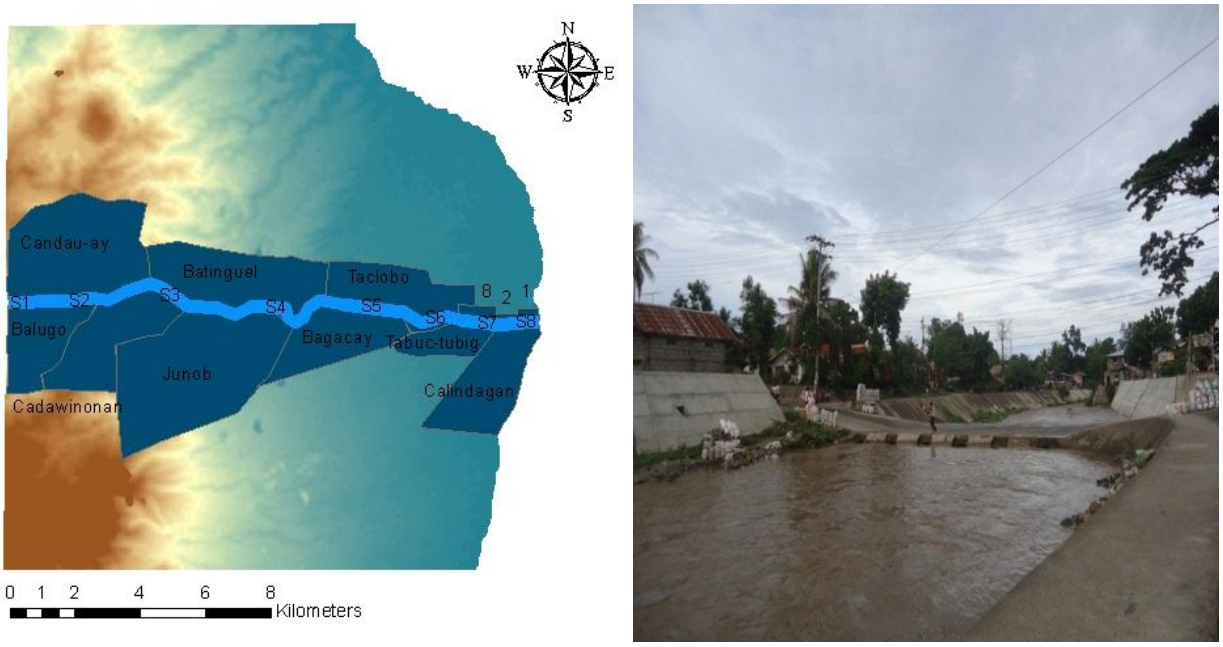

Figure 4-28: Station 4 (S4): Barangay Taclobo Overflow

In table 4-6, a difference of water flow is observed from 0.32m^3/second to 0.58m^3/second in the wet season. Water depth increase is also observed from 23cm to 29.67cm in the wet season. Figure 4-29 shows the location site for obtaining the hydrological data for station 5.

Table 4-6: Hydrological Data of Banica River for Station 5 (S5)

STATION 5 (S5)	(DRY SEASON)	(WET SEASON)
Colon Extension Overflow Barangay Taclobo	30-Apr-13 W = 19.70m	11-Jul-13 W = 19.70m
DRY season Flow (Q) = A x V 0.32m^3/s	D1 = 21.0 cm D2 = 28.0 cm D3 = 20.0 cm Ave. depth: 23 cm	D1 = 41.0 cm D2 = 25.0 cm D3 = 23.0 cm Ave. depth: 29.67 cm
WET season Flow (Q) = A x V 0.58m^3/s	F1 = 34.02 F2 = 27.65s F3 = 67.62s Ave. flow: 43.10s	F1 = 34.93s F2 = 25.69s F3 = 33.11s Ave. flow: 31.24s

Figure 4-29: Station 5 (S5) Colon Extension Overflow (Barangay Taclobo)

For station 6 (Figure 4-30), a difference in water flow is also observable as the season changes from dry to wet, from 0.50m^3/second to 0.49m^3/second respectively. There is a very slight decrease of flow during the wet season. Water depth also increases from 16cm to 22.33cm respectively as shown in Table 4-7.

Table 4-7: Hydrological Data of Banica River for Station 6 (S6)

STATION 6 (S6)	(DRY SEASON)	(WET SEASON)
Barangay Tabuc-tubig Bridge	30-Apr-13 W = 43.70m	11-Jul-13 W = 43.75m
DRY season Flow (Q) = A x V 0.50m^3/s	D1 = 14.0 cm D2 = 23.0 cm D3 = 11.0 cm Ave. depth: 16 cm	D1 = 14.0 cm D2 = 24.0 cm D3 = 29.0 cm Ave. depth: 22.33 cm
WET season Flow (Q) = A x V 0.49m^3/s	F1 = 38.50s F2 = 56.07s F3 = 42.49s Ave. flow: 45.69s	F1 = 58.24s F2 = 45.57s F3 = 62.72s Ave. flow: 55.52s

Figure 4-30: Station 6 (S6): Barangay Tabuc-tubig Bridge

There was a big difference in the water flow when it was conducted (Figure 4-31). It was high tide at that time. The water depth was 35cm and the water was flowing 2.40m^3/second respectively. In the wet season which was surveyed at low tide, the water depth was only 12.33cm and the water was flowing at a rate of 0.10m^3/second compared to when it was a high tide time during the dry season (Table 4-8).

Table 4-8: Hydrological Data of Banica River for Station 7 (S7)

STATION 7	(DRY SEASON)	(WET SEASON)
Barangay Calindagan Bridge	30-Apr-13 HIGH TIDE time W = 20.20m	11-Jul-13 W = 20.10m
DRY season Flow (Q) = A x V 2.40m^3/s	D1 = 30.0 cm D2 = 25.0 cm D3 = 50.0 cm Ave. depth: 35 cm	D1 = 12.0 cm D2 = 18.0 cm D3 = 7.0 cm Ave. depth: 12.33 cm
WET season Flow (Q) = A x V 0.10m^3/s	F1 = 9.52s F2 = 8.33s F3 = 8.26s Ave. flow: 8.70s	F1 = 73.64s F2 = 63.63s F3 = 62.79s Ave. flow: 66.69s

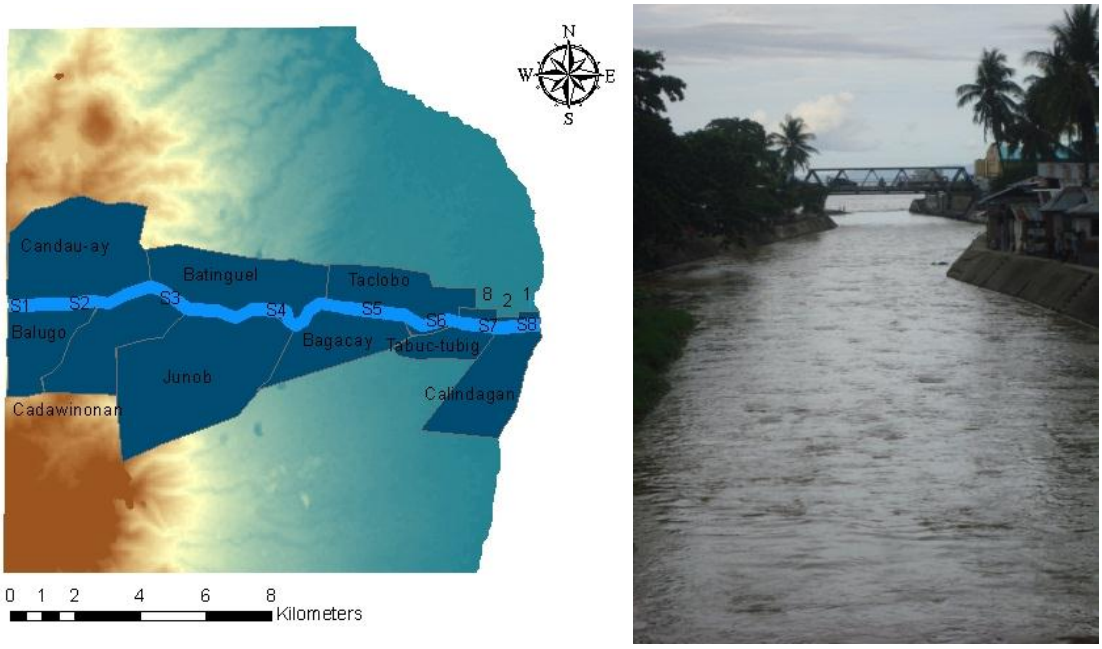

Figure 4-31: Station 7 (S7): Barangay Calindagan Bridge

Station 8 is located very near the delta or the mouth of the river and when it is high tide, water coming from the Mindanao sea moves inward up to several meters from the river's mouth along the shore (Figure 4-32). Some articles and unpublished studies of the Banica river has mentioned that during high tide, sea water can move inland stretching about half a kilometer from the delta. As shown below (Table 4-9), the water depth rises from 18.33cm during low tide in the wet season to 57.13cm. The water flow during high tide in the dry season is -0.01m3/second (backflow) due to incoming seawater while 0.11m^3/second at low tide in the wet season.

Table 4-9: Hydrological Data of Banica River for Station 8 (S8)

STATION 8	(DRY SEASON)	(WET SEASON)
Barangay Tinago Bridge	30-Apr-13 HIGH TIDE time W = 36.00m	11-Jul-13 W = 20.90m
DRY season Flow (Q) = A x V 0.04m^3/s BACKFLOW	D1 = 140.00 cm D2 = 80.00 cm D3 = 90.00 cm Ave. depth: 57.13 cm	D1 = 11.00 cm D2 = 20.00 cm D3 = 24.0 cm Ave. depth: 18.33 cm
WET season Flow (Q) = A x V 0.11m^3/s	F1 = 100.66s BF F2 = 163.73s BF F3 = 263.90s BF Ave. flow: -176.10s	F1 = 112.28s F2 = 89.32s F3 = 130.13s Ave. flow: 110.58s

Figure 4-32: Station 8 (S8) Poblacion 1 (Tinago) Bridge

4.9 Health Impact Assessment Methodology

The health impact assessment was conducted through bacterial culture of E.coli, survey questionnaires (frequency of exposure and amount of ingestion of contaminated water from exposure), literature review and surveillance data.
In conducting health impact assessment, the four key steps are used and directly quoted as follows: (European Commission, 2000).

A. Hazard Identification - The identification of a risk source(s) capable of causing adverse effect(s)/event(s) to humans or the environment species, together with a qualitative description of the nature of these effect(s)/event(s).

B. Hazard Characterization - The quantitative or semi-quantitative evaluation of the nature of the adverse health effects to humans and/or the environment following exposure to a risk source(s). This must, where possible, include a dose/response assessment.

C. Exposure Assessment - The quantitative or semi-quantitative evaluation of the likely exposure of humans and/or the environment to risk sources from one or more media.

D. Risk Characterization - The quantitative or semi-quantitative estimate, including attendant uncertainties, of the probability of occurrence and severity of adverse effect(s)/event(s) in a given population under defined exposure conditions based on hazard identification, hazard characterisation and exposure assessment.

These steps will be conducted slightly differently depending on the particular health impact that is being considered.

For hazard identification, E.coli, leptospirosis and dengue fever cases were the chosen microorganisms to be assessed because of its common occurrence during and after flooding events. Usually, during and after flooding events cases of diarrhoea are in significant numbers. In some places, leptospirosis cases are also occurring. Dengue fever cases is also rampant during rainy or typhoon seasons. But, what is interesting to know is the people's vulnerability or resilience in terms of their knowledge, attitude and practices towards these microorganisms. These items have been addressed solicited from the questionnaires administered to the household respondents.

In doing the hazard characterization, a dose-response assessment was not conducted but instead, results from surveys from the household respondents that indicates their experienced of being sick from any of the focus microorganisms were noted and counted. Top 10 leading causes of morbidity in the city and the country were solicited to counter-check the incidences and occurrences of those diseases.

Exposure assessment was conducted through survey questionnaires. Household respondents were asked if any member in the family has been exposed to E.coli, leptospirosis and dengue fever. The frequency of exposure to the river and the amount of possible ingestion of the contaminated water were asked and recorded.

After gathering the relevant data from hazard identification, characterization and exposure, risk characterization is possible to establish. The level of risks and correlation to exposure in terms of the number of the number of E.coli taken from the different sampling sites, and the number of diarrheal cases per community are mentioned in the results and discussion chapter.

4.9.1 Sampling and Microbial Analyses

The researcher has conducted a five month E.coli counts on a monthly basis from March 2013 to July 2013. There were five (5) stations were the water samples were collected and nine (9) replicates in each sampling sites. These sampling sites include the following; upstream (City Pound Bridge, Barangay Balugo), midstream 1(Barangay Candau-ay and Cadawinonan Overflow), midstream 2 (Colon Extension Overflow, Barangay Taclobo), downstream 1 (Tabuc-tubig Bridge), and downstream 2 (Barangay Calindagan and Tinago) respectively.

E.coli which is among the coliforms is a good indicator organism to use for assessing surface water microbial contamination. They are not generally pathogenic but their presence indicates fecal contamination in the water. The cultivation of E.coli in this study uses the Eosin-Methylene Blue (EMB) agar which is one of the most efficient differential media for E.coli. The water samples from each site were taken between 8 o'clock and 11 o'clock in the morning and were processed immediately after.

During the water sampling collection, the bottle was plunged into the river about 3-4 inches (wrist level) below the surface water and then the bottle was turn into where the current was and waiting for it to be filled. After which, the bottle was brought out from the river and some water were poured out leaving an inch of air space. This was repeated in all of the 5 sampling sites. Since the proximity to the university laboratory is near and the time of collection is quick, all samples were immediately examined within 3-4 hours. Refrigeration and cold temperature during transport was not necessary. All the necessary data field information was recorded.

For the laboratory culture of E. coli, EMB agar was used and aseptic technique was observed all throughout the procedure. The spread plate technique was employed for the determination of E.coli bacteria. A ten-fold dilution series was prepared from the contaminated river water sample with 9ml sterile distilled water in each test tube replicates. From that set up, 0.1ml of dilution was spread onto the surface of EMB agar plates. The EMB agar plates were then incubated for 24 hours to get the results. Positive plates showing E.coli colonies were showing greenish metallic sheen on the surface which was easy to identify and count (Figure 4-33). E.coli bacteria were counted per plate (shown in the succeeding tables below) and then calculated per 100ml using this formula below (Environmental Protection Agency or EPA, 2012). The overall results will be presented in chapter 5.

$$\text{E. coli/100 mL} = \frac{\text{Number of E. coli colonies}}{\text{Volume of sample (mL)}} \times 100$$

Figure 4-33: EMB plate (left) positive for E.coli (greenish metallic sheeen) and EMB plate (right) negative for E.coli colonies

Table 4-10: E.coli counts during dry and wet season (March-July, 2013) Upstream: City Pound Bridge, Barangay Balugo

	20-Mar-13	11-Apr-13	29-May-13	25-Jun-13	17-Jul-13
Upstream1A	0	17	0	0	0
	0	0	0	0	0
	0	0	0	21	0
Upstream1B	0	0	0	0	0
	3	0	0	0	0
	0	0	0	0	0
Upstream1C	0	0	0	0	0
	0	3	0	0	0
	1	1	0	20	0

As shown in table 4-10, the E.coli counts in the upstream were both very negligible especially during the dry season and some isolated counts of 21 and 20 during the wet season respectively. The upper stream sampling is located in Station 1-City Pound Bridge, Barangay Balugo (Figure 4-34). Generally, the water in this part of the river is usually clean and clear and surrounded with trees.

Figure 4-34: Upstream (S1): City Pound Bridge, Barangay Balugo

Table 4-11: E.coli counts during dry and wet season (March-July, 2013) Midstream 1: Barangay Candau-ay and Cadawinonan Overflow

	20-Mar-13	11-Apr-13	29-May-13	25-Jun-13	17-Jul-13
Midstream 1A	6	0	0	0	0
	17	0	0	0	1
	3	1	0	0	1
Midstream 1B	0	0	0	0	1
	12	1	0	0	1
	3	0	5	0	0
Midstream 1C	0	3	0	0	0
	3	1	0	1	1
	7	0	0	0	0

It rained the night before the March 20 sampling day for E.coli. As observed from table 4-11, March 20 sampling showed more E,coli counts than those done in other months including the wet months of June and July were it didn't rain the day before the sampling time. Figure 4-35 shows the location of Midstream 1 sampling area.

Figure 4-35: Midstream 1 (S3): Barangay Candau-ay and Cadawinonan Overflow

Table 4-12: E.coli counts during dry and wet season (March-July, 2013) Midstream 2: Colon Extension Overflow, Barangay Taclobo

	20-Mar-13	11-Apr-13	29-May-13	25-Jun-13	17-Jul-13
Midstream 2A	7	8	0	0	9
	3	1	4	0	0
	5	35	0	0	0
Midstream 2B	0	19	0	0	13
	7	14	8	1	0
	9	11	0	0	5
Midstream 2C	6	3	2	0	0
	0	10	1	0	0
	4	0	0	0	1

E.coli counts were higher in the months of April and March of 2013 when the collection was done (Table 4-12). It rained the night before March 20 and July 17 sampling collection. The high counts in midstream 2 was consistent with the high counts of downstream 1 and 2 where it is densely populated along the river banks and some open drainage system were observed directly connected the river. Figure 4-36 shows the location of Midstream 2.

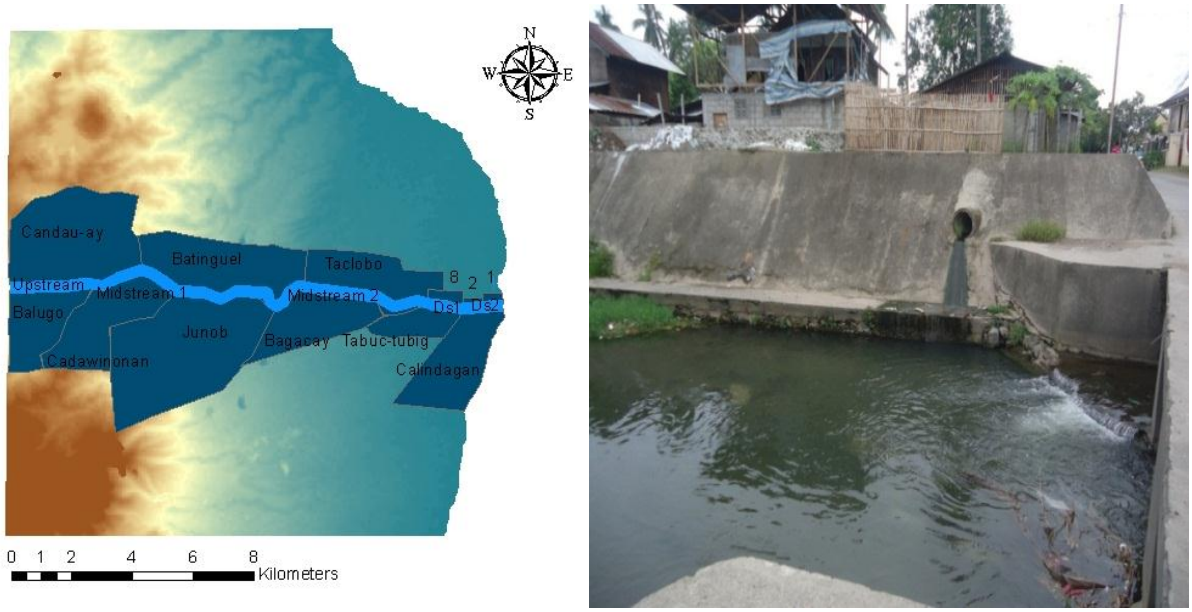

Figure 4-36: Midstream 2 (S5): Colon Extension Overflow, Barangay Taclobo

Table 4-13: E.coli counts during dry and wet season (March-July, 2013) Downstream 1: Tabuc-Tubig Bridge

	20-Mar-13	11-Apr-13	29-May-13	25-Jun-13	17-Jul-13
Downstream 1A	66	3	15	0	0
	34	13	12	0	15
	47	30	8	0	7
Downstream 1B	45	0	50	0	16
	16	9	25	0	12
	23	12	0	0	6
Downstream 1C	15	8	15	1	0
	16	0	14	0	0
	23	15	10	0	1

The E.coli count in this area is consistently high in most months even during the dry months of March to May. In the wet months of July the counts was also high except for the month of June as seen in Table 4-13. Some open drainage systems were also observed. Figure 4-37 belows shows the location for Downstream 1.

Figure 4-37: Downstream 1 (S7): Barangay Tabuc-tubig Bridge

Table 4-14: E.coli counts during dry and wet season (March-July, 2013) Downstream 2: Barangay Calindagan and Tinago

	20-Mar-13	11-Apr-13	29-May-13	25-Jun-13	17-Jul-13
Downstream 2A	33	10	11	0	0
	33	45	8	15	0
	15	20	5	3	1
Downstream 2B	25	45	5	12	0
	33	34	6	9	0
	17	28	0	21	1
Downstream 2C	60	7	30	3	1
	62	5	25	28	0
	30	1	7	25	1

The most downstream part of the river is located in Barangay Calindagan and Tinago and has the most number of E.coli counts which was consistent all throughout the dry and wet season except for the month of July (Table 4-14). A few open drainage systems were observed along this stretch of the river. This part somehow acts as the catchment of all the contaminants coming from the mid-and-upper stream of the river (Figure 4-38).

Figure 4-38: Downstream 2 (S8): Barangay Calindagan and Poblacion 1

4.10 E.coli Exposure of the 12 Communities

The succeeding tables present the E.coli exposure of the 12 communities in terms of the frequency of exposure (swimming or bathing in the river, immersing into the river and the washing of clothes in the river) and the possible amounts of water swallowed during such exposure. By soliciting this information, we may be able to understand the correlation between possible infection or outbreaks in the future.

Table 4-15: E.coli Exposure in Banica River through swimming/bathing (Tabuc-tubig)

Community Tabuc-tubig	Frequency of Swimming/Bathing in the River	Amount of water swallowed
1	Every week	Full shot glass

Out of the 8 household respondents in Barangay Tabuc-tubig, one (1) is showing exposure to E.coli through swimming/bathing in the river, swallowing a full shot glass amount of river water (Table 4-15).

Table 4-16: E.coli Exposure in Banica River through swimming/bathing (Junob)

Community Junob	Frequency of Swimming/Bathing in the River	Amount of water swallowed
1	Very rarely	Half shot glass
2	Everyday	Half shot glass
3	Very rarely	Half spoonful
4	Everyday	Half spoonful
5	Very rarely	Half spoonful
6	Very rarely	Full shot glass

Six (6) out of 14 respondents from Junob were exposed to E.coli though mostly rarely and 2 were exposed almost every day. Amount of river water swallowed ranged from a half-spoon to half-shot glass upon exposure (Table 4-16).

Table 4-17: E.coli Exposure in Banica River through swimming/bathing (Poblacion 1)

Community Poblacion 1	Frequency of Swimming/Bathing in the River	Amount of water swallowed
1	Very rarely	Spoonful
2	Very rarely	Full shot glass
3	Very rarely	More than a full shot glass

Only 3 out of 22 household respondents from Poblacion 1 (Table 4-17) were exposed to swimming/bathing in the river very rarely and of different amount of water swallowed, from spoonful to full shot and more than a full shot glass.

Table 4-18: E.coli Exposure in Banica River through swimming/bathing (Calindagan)

Community Calindagan	Frequency of Swimming/Bathing in the River	Amount of water swallowed
1	Everyday	More than a full shot glass
2	Very rarely	More than a full shot glass

Two (2) of the 23 household respondents (Table 4-18) claimed to have been exposed to E.coli through swimming/bathing in the river every day and very rarely with the same amount of water swallowed upon exposure (more than a full shot glass).

Table 4-19: E.coli Exposure in Banica River through swimming/bathing (Poblacion 2)

Community Poblacion 2	Frequency of Swimming/Bathing in the River	Amount of water swallowed
1	Everyday	Half spoonful
2	Twice a week	Spoonful
3	Very rarely	Spoonful

Three (3) out of 15 (Table 4-19) were exposed from here and variedly in terms of frequency (every day, twice a week, very rarely) and swallowed the river water about (spoonful, and half spoonful) of it.

Table 4-20: E.coli Exposure in Banica River through swimming/bathing (Balugo)

Community Balugo	Frequency of Swimming/Bathing in the River	Amount of water swallowed
1	Everyday	Half spoonful
2	Everyday	Half spoonful
3	Everyday	Half spoonful
4	Everyday	Spoonful
5	Twice a week	Spoonful

There were 5 out of the 17 respondents (Table 4-20) from Barangay Balugo that were exposed through swimming/bathing in the river almost every day and mostly have ingested from half spoonful to spoonful of water from the river respectively.

Table 4-21: E.coli Exposure in Banica River through swimming/bathing (Poblacion 8)

Community Poblacion 8	Frequency of Swimming/Bathing in the River	Amount of water swallowed
1	Every other day	Half a shot glass
2	Everyday	Full shot glass
3	Everyday	Half spoonful
4	Everyday	More than a full shot glass
5	Every other day	Spoonful
6	Every other day	Spoonful
7	Every week	Full shot glass
8	Very rarely	Half spoonful
9	Very rarely	Half a shot glass
10	Very rarely	Half a shot glass

Quite a number of respondents from Poblacion 8 (Table 4-21) were exposed through swimming/bathing in the river at different frequencies (from every day to every other day, every week and to some very rarely) of exposure. The amounts of water ingested varied from (half spoonful to a spoonful, half shot glass to a full shot glass and to more than a full shot glass) of river water.

Table 4-22: E.coli Exposure in Banica River through swimming/bathing (Cadawinonan)

Community Cadawinonan	Frequency of Swimming/Bathing in the River	Amount of water swallowed
1	Very rarely	Spoonful
2	Very rarely	Full shot glass
3	Every week	More than a full shot glass
4	Very rarely	Half a shot glass
5	Very rarely	Half a shot glass
6	Very rarely	Full shot glass

Six (6) out of 25 respondents (Table 4-22) have been exposed to swimming/bathing in the river very rarely and one claimed for an every week exposure. The amounts of water swallowed also varied (spoonful, half shot to full shot and more than a full shot glass) from each individual exposed.

Table 4-23: E.coli Exposure in Banica River through swimming/bathing (Bagacay)

Community Bagacay	Frequency of Swimming/Bathing in the River	Amount of water swallowed
1	Very rarely	Half spoonful
2	Very rarely	More than a full shot glass
3	Very rarely	Half a shot glass
4	Very rarely	Spoonful
5	Everyday	Half spoonful
6	Everyday	Half a shot glass
7	Every week	Half spoonful
8	Very rarely	Spoonful

There were 8 out of 30 of the respondents (Table 4-23) from Bagacay that were exposed through swimming/bathing in the river mostly rarely, then two claimed for every day and one claimed for every week. The ingestion of the water from the river also

varies (half spoonful, spoonful, half a shot glass, to more than a full shot glass) were swallowed upon exposure.

Table 4-24: E.coli Exposure in Banica River through swimming/bathing (Taclobo)

Community Taclobo	Frequency of Swimming/Bathing in the River	Amount of water swallowed
1	Everyday	Half spoonful
2	Very rarely	Full shot glass
3	Very rarely	Half spoonful
4	Everyday	Half spoonful
5	Every other day	Half spoonful
6	Every week	Half spoonful
7	Very rarely	More than a full shot glass
8	Very rarely	Full shot glass
9	Every week	Spoonful
10	Everyday	Spoonful
11	Very rarely	Half spoonful
12	Very rarely	Full shot glass
13	Very rarely	Full shot glass

Out of 63 respondents from Barangay Taclobo, 13 of which were exposed to E.coli through swimming/bathing in the river at different times (every day, every other day, every week, and mostly very rarely). The amount of water ingested also varies (half spoonful, spoonful, half shot glass, full shot glass, and more than a full shot glass) respectively, (Table 4-24).

Table 4-25: E.coli Exposure in Banica River through swimming/bathing (Candau-ay)

Community Candau-ay	Frequency of Swimming/Bathing in the River	Amount of water swallowed
1	Everyday	Half spoonful
2	Everyday	More than a full shot glass
3	Very rarely	Spoonful
4	Twice a week	Full shot glass
5	Very rarely	Half shot glass
6	Twice a week	Half shot glass
7	Everyday	Spoonful
8	Very rarely	Spoonful

Only 8 out of 72 household respondents from Candau-ay (Table 4-25) claimed to have been exposed to E.coli through swimming/bathing in the river at different frequencies (every day, every other day, every week, but mostly very rarely). The amount of water ingested also varies (half spoonful, spoonful, half shot glass, full shot glass and more than a full shot glass) respectively.

Table 4-26: E.coli Exposure in Banica River through swimming/bathing (Batinguel)

Community Batinguel	Frequency of Swimming/Bathing in the River	Amount of water swallowed
1	Very rarely	Half spoonful
2	Everyday	Half spoonful
3	Everyday	Spoonful
4	Everyday	Half spoonful
5	Everyday	Half spoonful
6	Everyday	Half spoonful
7	Everyday	Half shot glass
8	Very rarely	Spoonful
9	Everyday	Full shot glass
10	Every week	Half shot glass
11	Every other day	Half spoonful
12	Everyday	Full shot glass
13	Very rarely	Spoonful
14	Very rarely	Spoonful

Almost half (14) of the 38 respondents in Batinguel (Table 4-26) claimed to have been exposed to E.coli through swimming/bathing in the river at different frequencies (every other day, every week, and very rarely but mostly claimed to have been exposed every day). The amount of water swallowed also varies respectively (half spoonful, spoonful, half shot glass, full shot glass).

Table 4-27: E.coli Exposure in Banica River through immersing/washing of clothes (Tabuc-tubig)

Community Tabuc-tubig	Frequency of immersing or Washing of clothes in the River	Amount of water swallowed
1	Every week	0

One (1) out of eight (8) from Barangay Tabuc-tubig (Table 4-27) was exposed to E.coli through washing of clothes in the river every week but no ingestion of water was involved.

Table 4-28: E.coli Exposure in Banica River through immersing/washing of clothes (Junob)

Community Junob	Frequency of immersing or Washing of clothes in the River	Amount of water swallowed
1	Very rarely	0
2	Everyday	0
3	Everyday	0
4	Everyday	0
5	Everyday	0
6	Twice a week	0

There were 6 out of 14 respondents from Junob (Table 4-28) were exposed through washing of clothes in the river that happens mostly every day, and for one respondent it happens twice a week and the other one very rarely. No amount of water was ingested.

Table 4-29: E.coli Exposure in Banica River through immersing/washing of clothes (Poblacion 1)

Community Poblacion 1	Frequency of immersing or Washing of clothes in the River	Amount of water swallowed
1	Every other day	0
2	Very rarely	0

Two (2) out of 14 respondents (Table 4-29) were exposed through washing of clothes in the river (every other day and very rarely) basis and no amount of water was swallowed.

Table 4-30: E.coli Exposure in Banica River through immersing/washing of clothes (Calindagan)

Community Calindagan	Frequency of immersing or Washing of clothes in the River	Amount of water swallowed
1	Everyday	0

Only 1 is exposed from Calindagan out of the 23 respondents in washing clothes in the river which happens every day and the possible of ingestion of water was zero (0) (Table 4-30).

Table 4-31: E.coli Exposure in Banica River through immersing/washing of clothes (Balugo)

Community Balugo	Frequency of immersing or Washing of clothes in the River	Amount of water swallowed
1	Everyday	0
2	Everyday	0
3	Very rarely	0
4	Every week	0
5	Twice a week	0

Five (5) of the 17 respondents washed their clothes in the river making them exposed to E.coli (Table 4-31). The washing of clothes is (every day, twice a week, every week and very rarely). Ingestion of water from the river is zero (0).

Table 4-32: E.coli Exposure in Banica River through immersing/washing of clothes (Poblacion 2)

Community Poblacion 2	Frequency of immersing or Washing of clothes in the River	Amount of water swallowed
1	Never	0
2	Never	0
3	Never	0

None out of 15 respondents from Poblacion 2 washed their clothes in the river (Table 4-32).

Table 4-33: E.coli Exposure in Banica River through immersing/washing of clothes (Poblacion 8)

Community Poblacion 8	Frequency of immersing or Washing of clothes in the River	Amount of water swallowed
1	Twice a week	0
2	Every other day	0
3	Everyday	0
4	Every week	0
5	Every week	0
6	Everyday	0
7	Very rarely	0

There were 7 out of 30 respondents from Poblacion 8 (Table 4-33) who washed their clothes in the river at different frequencies (every day, every week, every other day, twice a week and very rarely). Ingestion of water from the river is none.

Table 4-34: E.coli Exposure in Banica River through immersing/washing of clothes (Cadawinonan)

Community Cadawinonan	Frequency of immersing or Washing of clothes in the River	Amount of water swallowed
1	Twice a week	0
2	Every week	0
3	Very rarely	0
4	Every week	0

Cadawinonan has 25 household respondents but only 4 were exposed to E.coli (through washing of clothes in the river (every week, twice a week, and very rarely) and with no ingestion of water from the river (Table 4-34).

Table 4-35: E.coli Exposure in Banica River through immersing/washing of clothes (Bagacay)

Community Bagacay	Frequency of immersing or Washing of clothes in the River	Amount of water swallowed
1	Very rarely	0
2	Every other day	0
3	Very rarely	0
4	Very rarely	0
5	Twice a week	0
6	Every week	0

Bagacay has 30 household respondents but only 6 (Table 4-35) has been exposed to E.coli through washing their clothes in the river (very rarely, twice a week, every other day, and every week).There was no ingestion of water from the river.

Table 4-36: E.coli Exposure in Banica River through immersing/washing of clothes (Taclobo)

Community Taclobo	Frequency of immersing or Washing of clothes in the River	Amount of water swallowed
1	Everyday	0
2	Everyday	0
3	Twice a week	0
4	Very rarely	0
5	Very rarely	0
6	Every week	0
7	Very rarely	0
8	Very rarely	0
9	Everyday	0
10	Twice a week	0
11	Very rarely	0

Taclobo has sixty-three (63) household respondents but only 11 (Table 4-36) has claimed to be exposed by E.coli through washing their clothes in the river on the following frequencies (very rarely, every week, twice a week, and every day). The amount of water swallowed from the river is none.

Table 4-37: E.coli Exposure in Banica River through immersing/washing of clothes (Candau-ay)

Community Candau-ay	Frequency of immersing or Washing of clothes in the River	Amount of water swallowed
1	Every other day	0
2	Everyday	0
3	Everyday	0
4	Every week	0
5	Very rarely	0
6	Very rarely	0
7	Very rarely	0
8	Everyday	0
9	Everyday	0

Barangay Candau-ay has seventy-two (72) household respondents with only 9 respondents (Table 4-37) have claimed to be exposed to E.coli through washing their clothes in the river on the following basis (very rarely, every week, every other day and every day). The amount of possible water swallowed is zero (0).

Table 4-38: E.coli Exposure in Banica River through immersing/washing of clothes (Batinguel)

Community Batinguel	Frequency of immersing or Washing of clothes in the River	Amount of water swallowed
1	Very rarely	0
2	Everyday	0
3	Every week	0
4	Every week	0
5	Everyday	0
6	Every other day	0
7	Twice a week	0
8	Twice a week	0
9	Twice a week	0
10	Every other day	0
11	Very rarely	0
12	Twice a week	0
13	Everyday	0
14	Everyday	0

There are thirty-eight (38) household respondents of Barangay Batinguel and almost half of the respondents (14) have been exposed to E.coli (Table 4-38) through washing their clothes in the river on the following basis (very rarely, twice a week, every other day, every day). The ingestion of the water from the river is none (0).

CHAPTER 5
RESULTS AND DISCUSSION

SUMMARY

This chapter presents the results of this research work. It is presented in tables and maps for better understanding with the corresponding discussions and analysis. The individual results of the twelve (12) communities selected as the study area for the application of the Community-Based Flood Vulnerability Index (FVI) for urban flooding, and the process of data collection will be presented, discussed and analyzed. An in-depth case study of Poblacion 2 (Lukewright) will also be presented for better comprehension and analysis of the developed community-based flood vulnerability index within a particular community. The cases and results of each of the community will be presented in a detailed manner and finishing it with the overall results of the FVI of Dumaguete City, Negros Oriental Philippines in maps and profiles.

It is very important to do an actual field survey for the data collection in order to be able to see the feasibility of the developed community-based flood vulnerability index for urban flooding in terms of the flood vulnerability components and indicators used. Through soliciting the responses of the different respondents involved in this work, a more detailed perspective and realistic scenario will be generated based from the components and indicators that were formulated.

The total, average, and overall counts of E.coli are also revealed in this chapter. The individual results and overall results on the assessment on flood resilience adaptation strategies in Dumaguete City that were solicited from the household respondents of the twelve (12) communities and from the local government units (LGU's) and the non-governmental organizations (NGO's) are shown.

This chapter will pinpoint the strengths and weakness of each of the twelve (12) communities studied in detailed based from the results gathered from the proposed community-based flood vulnerability index for urban flooding and why in the first place such a particular community is more vulnerable or resilient than the others. In this way, we would be able to understand fully why they are vulnerable and at risk in the first place.

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It is very important to do an actual field survey for the data collection in order to be able to see the feasibility of the developed community-based flood vulnerability index for urban flooding in terms of the flood vulnerability components and indicators used. Through soliciting the responses of the different respondents involved in this work, a more detailed perspective and realistic scenario will be generated based from the components and indicators that were formulated.

This chapter will also discuss the general problems or limitations encountered in the development and application of the community-based flood vulnerability components and indicators. The accuracy of the data and the possible strengths and weaknesses of the identified indicators will also be looked into through testing the methodology. Lastly, this chapter will pinpoint the weaknesses in details as to why in the first place a particular community is more vulnerable than others.

5.1 Community Profile Results

(1) Barangay Tabuc-tubig

Barangay Tabuc-tubig's hydro-climatic Flood Vulnerability Index (FVI) is 74.19% as shown in Table 5-1 which indicates a high vulnerability in this particular component. The high vulnerability is due to high exposure in terms of the frequency of flooding (60.00%) experienced in this community. Frequency of flooding is expected every year where (70.00%) of the population is exposed per year. Though, 30.00% of the population surveyed claimed that flooding only happens sometimes. The height of flood water experienced in this community was as high as the roof top, and in some areas it is above the head and to some about shoulder high where (20.00%), (30.00%), (10.00%) of the population have experienced such respectively amounting to 60.00%. However, 40.00% from the surveyed household did not indicate the level of flood water in their area for some reasons. Sixty percent (60.00%) of the households are reached by floods every year and only 50.00% of the households are located in an elevated area.

The number of typhoons on average per year that passes through the country is 20. Since not all typhoons passes through Dumaguete City, only 50.00% of the typhoons are accounted and considered as a significant and a safe number and is used in the entire research work. It is important to note that whenever there is a tropical depression (TD) or a low pressure area (LPA) it usually brings rains that last for hours which can predispose to flooding. Thus, 50.00% is a safe number to be used for the possibility of.

The community's land use and management and structural design (LUMSD) as part of its resilience effort is only 38.75%. This indicates a low efficiency when it comes to implementation, thus owing to low resilience and a high vulnerability in terms of these indicators.

The social FVI is 39.13%. Open disposal of animal waste is widely observed (90.00%) from the population. All households that were surveyed are willing to vacate into a new relocation site when advised by the government. They have acknowledged that they are located in a high risk area and they opt to vacate for safety reasons. Educational attainment of most households is only (50.00%) which plays as a critical predisposing factor. The resilience factor that includes water treatment sterilization and social network is 20.00% and 95.00% respectively. The low range of water treatment sterilization resilience effort should be given attention so future disease outbreak that are water-borne can be prevented.

The economic FVI of Barangay Tabuc-tubig is 100.00% which is showing a high vulnerability in this item. All the households have good access to improved sanitation. Unfortunately, there is still 50.00% of this community that has no access to improved water source. Presence of rats in the community is highly observed (100.00%) and (90.00%) of the population live nearby the presence of water logged areas in the vicinity. Most of the housing conditions, only (50.00%) is capable to withstand from strong winds and water invasion during heavy rains and flooding. Forty percent (40.00%) of most households have family income that is around 3000-1000 per month while 20.00% of the population has an income that is below 3,000.00 pesos and the other 20.00% has an income of more than 10,000.00 pesos and the remaining 20.00% did not indicate their income resources. All families that were surveyed in this community did not have their properties insured (0.00%).

The socio-behavioral FVI is 3.96% which is a very low vulnerability. It is a good indication that the community will not suffer from the risks and effects of flooding and the possible disease outbreak during and after any natural calamity. The vulnerability index in terms of the knowledge, attitude and practices that predisposed the household to any flooding event and disease outbreaks that may be caused by E.coli, Leptospirosis and Dengue Fever mosquito is considerably low giving its exposure vulnerability to 22.83%, while susceptibility is only 13.35%, and resilience effort is very good (76.99%) respectively. However, it is important to note that only 30.00% of the household knew if there are flood hazard maps available in their community. And only 43.48% is aware of the negative impacts of flooding. Personal coping mechanism of the people to forget about the previous unfortunate incident brought about by flooding is to seek for counseling, by not mentioning about it or forgetting the unfortunate event and staying calm.

The politico-administrative FVI is 49.69%, which is medium range vulnerability. The exposure vulnerability is 65.63%, considerably high which could be due to poor attention for the river's natural resources and natural features management and program (70.00%) and inefficient implementation of land use and management and structural design (61.25%). On the other hand, the susceptibility is 52.11% (governance) and the resilience effort is 63.25%. The resilience effort includes; post-risk assessment and integration (42.50%), sustainable community livelihood program (37.50%), relocation site project (86.00%) and the health and prevention program for E.coli, leptospirosis and dengue fever mosquito (87.00%) respectively.

The overall FVI for Barangay Tabuc-tubig is 53.39% which is in medium range vulnerability. However, it should be noted that only 10.00% of the effort accounts for protecting and maintaining the river and its natural features and only 20.00% of the community people are actively engaging in planning and implementing the river resource management activities. Participation of the community people and LGU's should be encouraged. Forty percent (40.00%) is the transparency, accountability, and availability of technical and financial support mechanisms to support planned community actions for resilience and 40.00% is invested in the risk reduction effort carried by the LGU's. Furthermore, only 30.00% of the land use policies and building standards are incorporated to reduce risks from hazards and to protect sensitive habitats. Only 38.00% of the developers and communities incorporate the risk reduction effort into the location and design of structures. From that, only 30.00% followed the building codes, and 20.00% followed the zoning ordinances and 20.00% of resilience efforts for education, outreach, training programs to improve compliance with land use policies and building standards are achieved. Forty percent (40.00%) is achieved in the development policies and plans in building social capital skills for economic diversity and self-reliance. There is only 30.00% availability of diverse and environmentally sustainable livelihood in the community which may have an impact during recovery of any natural calamity. The technical and financial resources in promoting self-reliant communities so it would have the capacity to provide support to disaster-stricken areas and in promoting robust economies, to reduce vulnerability to hazards and aid in disaster recovery is 40.00% respectively. Also, only 30.00% of flood hazard risk assessments are completed and routinely updated, and 30.00% indicates how comprehensive is our flood risk assessments in incorporating risks to all elements of resilience. The community is 40.00% ready when it comes to community warning and evacuation systems, policies, plans and procedures in place and capable of alerting vulnerable population in a timely manner. When it comes to the availability of technical services offered and financial resources to support the recovery process such as that of damage assessment facilitating claim procession, reconstruction, charitable funds, and social therapeutic measures is only 40.00%. Special attention must be given to this weak points so that the community will be strengthened and resilient to whatever natural calamity particularly to flooding and typhoon. Barangay Tabuc-tubig's assessment on flood resilience and health programs implemented by the government is 81.10% which is a very high score indicating a very good performance. Though, the dike and drainage systems scored among the lowest (62.00% and 64.00% respectively).

Table 5-1: Barangay Tabuc-Tubig FVI

COMPONENTS	EXPOSURE		SUSCEPTIBILITY		RESILIENCE		FVI
	Indicators	(%)	Indicators	(%)	Indicators	(%)	(%)
A. HYDRO-CLIMATIC	A. FF	60.00	A. NTY	50.00	A. LUMSD	38.75	74.19
	B. HF	60.00					
	C. HRF	60.00					
	D. HNE	50.00					
B. SOCIAL	A. ODAW	90.00	A. EA	50.00	A. WT	20.00	39.13
	B. UVR	0.00			B. SN	95.00	
C.ECONOMIC	A. HNIS	0.00	A. HC	50.00	A. FI	40.00	100.00
	B. HNIW	50.00			B. PI	0.00	
	C. PRV	100.00				20.00	
	D. PWLV	90.00					
D.SOCIO-BEHAVIORAL	A. PHFR	24.48	A. AHFR	20.62	A. KHFR	80.79	3.96
	B. PHEC	14.28	B. AHEC	16.11	B. KHEC	75.72	
	C. PHL	25.30	C. AHL	11.39	C. KHL	75.72	
	D. PHDF	27.27	D. AHDF	5.28	D. KHDF	75.72	
E. POLITICO-ADMINISTRATIVE	A. RNRMP	70.00	A. G	52.11	A. PRAI	42.50	49.69
	B. LUMSD	61.25			B. SCLP	37.50	
					C. RSP	86.00	
					D. HPP	87.00	
Total Average FVI							53.39

(2) Barangay Junob

Barangay Junob's hydro-climatic Flood Vulnerability Index (FVI) is 42.58% as shown in Table 5-2 indicating medium range vulnerability. Its medium range vulnerability is attributed to effective land use and structural design (71.56%) that complement environmental, economic, and community goals that reduced risks from hazards. In spite that there is high exposure in terms of the number of houses reached by floods (81.25%), and 56.25% of the houses are not on elevated area but since the resilience item on land use management and structural design (LUMSD) is high thus the hydro-climatic vulnerability is lowered. Frequency of flooding is expected every year according to 70.00% of the household surveyed though 30.00% says they only experience it sometimes. Flood waters are generally from the knee level and as high as beyond the roof from the last flooding event and this was experienced by 50.00% of the household surveyed. The highest height of floodwater experienced in this community is as high as above the head where (25.00%) of them has experienced and some (18.75%) claimed as high as the roof top.

The social FVI is 13.59%. Open disposal of animal waste is observed (50.00%) from the population. Some 12.50% are not willing to vacate their residence because of the proximity of their source of livelihood and they also have learned how to secure their property when an anticipation of incoming untoward events such as typhoon and flooding. The educational attainment of most households is only (31.25%) which is considerably low thus constant and continuous public awareness should be facilitated. The resilience factor that includes water treatment sterilization and social network is good and very high indicating 56.25% and 87.5% respectively.

The economic FVI of Junob is 100%. All houses surveyed have good access to improved sanitation however, 25.00% among the surveyed population has no access to improved water source. Presence of rats in the community is highly observed (93.75%) and (25.00%) of the households lived in the presence of water logged. Most of the housing conditions, only (18.75%) is capable to withstand from strong winds and water invasion. Most households (31.25%) have family income that is around 3000-1000 per month. All families surveyed in this community did not have their properties insured (0.00%).

The socio-behavioral FVI is 13.25%. The socio-behavioral vulnerability index is very low in terms of the knowledge, attitude and practices that may predisposed the household to the impacts of any flooding event and disease outbreaks that may be caused by E.coli, Leptospirosis and Dengue Fever mosquito. Exposure vulnerability is 37.32%, while susceptibility is only 26.26%, and resilience factor is high (73.95%) respectively. But, it is important to note the practices (52.64%) that may predispose the community people to leptospirosis outbreak particularly on wearing protective sturdy shoes/boots during typhoons and flooding. Also, only 37.50% of the households surveyed have knowledge about the availability of flood hazard maps in their community. It is important that community people must be aware of the flood hazard maps for them to have a priori knowledge of the flood hazard area. With regards to drills on early warning system only 31.25% is aware about it. Awareness of these matters should be improved.

The politico-administrative FVI is 13.43%. The exposure vulnerability is 30.47% with a considerably low exposure because of active management of river's natural resources and natural features management and program, sustained environmental services and livelihoods that reduces risks from flood hazards thus the exposure index value is 28.44% and 32.50% for the land use and management and structural design. Susceptibility is 30.78% (governance) and the resilience factor is 69.81%. The resilience effort includes; post-risk assessment and integration (71.25%), sustainable

community livelihood program (62.50%), relocation site project (73.60%) and the health and prevention program for E.coli, leptospirosis and dengue fever mosquito (71.90%) respectively.

The overall FVI for Barangay Junob is 36.57% indicating a low vulnerability. However, the availability of technical (services offered) and financial resources to support the recovery process particularly on the insurance scheme scored the lowest (20.00%). If this can be improve in the future then Barangay Junob would even have a much lower vulnerability. Barangay Junob's assessment on flood resilience and health programs implemented by the government is 64.38% which is a considerably high score indicating a good performance. However, the use of backhoe in cleaning the Banica river especially when the normal flow is blocked and the dike system scored among the lowest (57.60% and 48.80%) respectively.

Table 5-2: Barangay Junob FVI

	EXPOSURE		**SUSCEPTIBILITY**		**RESILIENCE**		**FVI**
COMPONENTS	Indicators	(%)	Indicators	(%)	Indicators	(%)	(%)
A. HYDRO-CLIMATIC	A. FF	56.25	A. NTY	50.00	A. LUMSD	71.56	42.58
	B. HF	50.00					
	C. HRF	81.25					
	D. HNE	56.25					
B. SOCIAL	A. ODAW	50.00	A. EA	31.25	A. WT	56.25	13.59
	B. UVR	12.50			B. SN	87.50	
C.ECONOMIC	A. HNIS	0.00	A. HC	81.25	A. FI	31.25	100.00
	B. HNIW	25.00			B. PI	0.00	
	C. PRV	93.75				15.63	
	D. PWLV	25.00					
D.SOCIO-BEHAVIORAL	A. PHFR	22.21	A. AHFR	30.98	A. KHFR	69.02	13.25
	B. PHEC	32.36	B. AHEC	24.68	B. KHEC	75.32	
	C. PHL	52.54	C. AHL	24.68	C. KHL	75.72	
	D. PHDF	42.05	D. AHDF	24.68	D. KHDF	75.72	
E. POLITICO-ADMINISTRATIVE	A. RNRMP	28.44	A. G	30.78	A. PRAI	71.25	13.43
	B. LUMSD	32.50			B. SCLP	62.50	
					C. RSP	73.60	
					D. HPP	71.90	
Total Average FVI							36.57

(3) Poblacion 1 (Barangay Tinago)

Barangay Tinago's hydro-climatic Flood Vulnerability Index (FVI) is 60.15% as shown in Table 5-3 indicating high range vulnerability. This can be attributed to high exposure (75.00%) index. Flooding is expected every year as experienced by 72.72% of the household surveyed. Some 27.28% expressed that it rarely and never happens. The level of flood water that was experienced by the community people is from ankle to shoulder high and 95.45% of them have experienced such. Most of the floodwater is knee high (36.36%). In spite that there is a considerably high exposure in terms of the number of houses reached by floods (59.09%), and 72.73% of the houses are not on elevated area but since the resilience item on land use management and structural design (LUMSD) is quite high (62.34%) particularly on having efficient dike and bridge systems (80.00% for both respectively) may have helped reduce the risks from over spilling waters.

The social FVI is 17.65%. Open disposal of animal waste is observed (68.18%) from the population. A considerable percent of 31.82% is not willing to vacate. The household perceived their area as no threat, there was no relocation site provided, the lack of trust to the LGU and the rest did not specify their reasons. Exposure index is 50.00% respectively. The educational attainment of most households is 27.28% which is quite low and may play as a critical predisposing factor. The resilience factor that includes water treatment sterilization and social network is both high indicating 77.27% and 77.30% respectively giving an overall resilience of 77.29% on these items.

The economic FVI for Poblacion 1 is also 100%. There is still 4.55% with no access to improved sanitation and 18.19% of the community population with no access to improved water source. Presence of rats in the community is highly observed (100.00%) and (63.64%) of the household live near the presence of water logged areas in the vicinity. About 45.46% of most houses are susceptible to the effects of flooding and typhoons. Most households (27.27%) have a family income that is around 3000-1000 per month and some families (13.64%) in this community have their properties insured.

The socio-behavioral FVI is 13.12%. The socio-behavioral vulnerability index of Poblacion 1 is also very low in terms of the knowledge, attitude and practices that may predisposed the household to any flooding event and disease outbreaks that may be caused by E.coli, Leptospirosis and Dengue Fever mosquito. Exposure vulnerability is 28.82%, while susceptibility is only 33.25%, and resilience is very good (73.02%) respectively. However, some aspects are needed to be considered, for instance 31.32% are not aware about the availability of flood hazard maps in their community. It is very

important that community people should be aware on this to increase resilience and decrease vulnerability. There is also less awareness (45.45%) on the limitation and level of protection offered by the flood barriers such as the dike system and the drainage system in the community. Only 40.91% of the surveyed household had heard about the presence of flood early warning system and 50.00% were aware about the lectures on early warning system. Furthermore, only 45.45% know about the adaptation strategies adapted in the community. Thus, there is a need to increase the awareness on this matter to increase the capacity of the community people to adapt. There is less participation (31.82%) in the early warning system lectures from the community and less drill participation (31.82%) related to evacuation and response as well. Also, only 45.45% have been given or have attended some debriefing session of the past flooding and 45.45% have attended to some discussions of lessons learned from the past flooding. About 59.09% have less contact to the communities located in the upstream area of the river (Balugo or Valencia) to give updates of the water level in the river. Contacts and coordination between communities should be enhanced to facilitate the sharing of information and updates of the water level condition so people in the downstream will be made alert. And only 50.00% have participated in the adaptation strategies facilitated by the LGU's which is again should be encouraged so people will be more adapted and resilient.

The politico-administrative FVI is 22.18%. The exposure vulnerability is 37.58% with a considerably low exposure because of active management of river's natural resources and natural features management and program and the land use and management and structural design is also well facilitated. On the other hand, the susceptibility vulnerability is 40.00% (governance) and the resilience factor is 67.78%. The resilience effort includes: post-risk assessment and integration (68.13%), sustainable community livelihood program (57.50%), relocation site project (73.60%) and the health and prevention program for E.coli, leptospirosis and dengue fever mosquito (71.90%) respectively. The overall FVI of Poblacion 1 is 42.62% which is considerably medium range vulnerability. However, sustainable community livelihood (50.00%) should be made more available to the community; insurance scheme (30.00%) to support the recovery process should also be given attention and likewise for traumatic and psychological stress debriefings.

Table 5-3: Poblacion 1 (Barangay Tinago) FVI

COMPONENTS	EXPOSURE		SUSCEPTIBILITY		RESILIENCE		FVI
	Indicators	(%)	Indicators	(%)	Indicators	(%)	(%)
A. HYDRO-CLIMATIC	A. FF	72.72	A. NTY	50.00	A. LUMSD	62.34	60.15
	B. HF	95.45					
	C. HRF	59.09					
	D. HNE	72.73					
B. SOCIAL	A. ODAW	68.18	A. EA	27.28	A. WT	77.27	17.65
	B. UVR	31.82			B. SN	77.30	
C.ECONOMIC	A. HNIS	4.55	A. HC	45.46	A. FI	27.27	100.00
	B. HNIW	18.19			B. PI	13.64	
	C. PRV	100.00					
	D. PWLV	63.64					
D.SOCIO-BEHAVIORAL	A. PHFR	33.11	A. AHFR	20.60	A. KHFR	65.29	13.12
	B. PHEC	16.35	B. AHEC	18.18	B. KHEC	75.60	
	C. PHL	32.32	C. AHL	16.79	C. KHL	75.60	
	D. PHDF	33.51	D. AHDF	13.76	D. KHDF	75.60	
E. POLITICO-ADMINISTRATIVE	A. RNRMP	37.66	A. G	40.00	A. PRAI	68.13	22.18
	B. LUMSD	37.50			B. SCLP	57.50	
					C. RSP	73.60	
					D. HPP	71.90	
Total Average FVI							42.62

(4) Barangay Calindagan

Barangay Calindagan's hydro-climatic Flood Vulnerability Index (FVI) is 37.76% as shown in Table 5-4 indicating a low vulnerability in this component. This can be due to its high resilience (87.81%) when it comes to efficient land use and management and structural design. The household that were surveyed had experienced flooding every year about 26.09% of them while (73.90%) of them claimed that flooding only happens rarely/sometimes or never. However, (26.09%) claimed that flooding occurs every year in the area. The level of flood water experienced by the community people is from ankle high to above the head, 86.96% of them had experienced respectively. Generally the flood water is ankle high (39.13%). In spite that there is a considerably high exposure in terms of the number of houses reached by floods (69.57%), and 82.61% of the houses are not on elevated area but since the resilience item on (LUMSD) has been carried out effectively (87.81%) particularly having an efficient dike (80.00%) and bridge systems (100.00%) which may have helped reduce the risks from over spilling waters.

The social FVI is 22.27%. Open disposal of animal waste is observed (56.00%) from the population. There is 17.39% who are not willing to vacate because there was no relocation site allotted for them, the proximity to their livelihood is big a consideration for them to stay, and they have learned to secure their property in the anticipation of certain calamity, while others did not specify their reasons for not acceding to vacate. These two items give an exposure index of 36.70% respectively. The educational attainment of most households is (47.82%) which is not very high and which may plays as a critical predisposing factor. The resilience factor that includes water treatment sterilization and social network is both high indicating 69.57% and 88.04% respectively.

The economic FVI for Barangay Calindagan is 48.24%. There is still 4.25% of the community population with no access to improved sanitation and also 4.25% with no access to improved water source. Presence of rats in the community is highly observed (100.00%) and (60.87%) of the population lived in the presence of water logged areas in the vicinity. 34.68% of most houses are susceptible to the effects of flooding and typhoons. Most households (52.17%) have a family income that is around 3000-1000 per month and some families in this community have their properties insured (8.70%).

The socio-behavioral FVI is 7.10%. However, the socio-behavioral vulnerability index of Barangay Calindagan is also low in terms of the knowledge, attitude and practices that may predisposed the household to any flooding event and disease outbreaks that may be caused by E.coli, Leptospirosis and Dengue Fever mosquito. Exposure vulnerability is 29.58%, while susceptibility is only 17.91%, and resilience is very good (74.62%) respectively. But it is important to note that practices items for Leptospirosis that may predispose the community people is (40.87%). Efforts to increase good practices towards preventing leptospirosis must be given attention. Furthermore, only 34.78% are aware that their area is a flood hazard zone and is of high risk. Only 34.78% know the capacity of flood and just 4.45% are aware about the availability of flood hazard maps in their community. 30.43% of the surveyed population is aware of the limitation and level of protection of the flood control barriers. Barangay Calindagan has very low scores in terms of preparedness. For instance, only 17.39% have heard about the presence of flood early warning system in their community, and 17.39% knows how to interpret it, 17.39% as well for those who are aware about lectures on early warning system, and 8.70% awareness about drills on early warning system conducted in the community and 21.74% knows about the information drive on flood prevention that were spread in the community. There are only 26.09% who have been given or have attended some debriefing session of the past flooding event and 34.78% have attended to some discussions of lessons learned from the past flooding event as well. On the other hand,

in terms of recovery, only 17.39% knows how to conduct oneself in the evacuation centers, and only 21.74% are aware about the different programs initiated by the LGU in times of calamity. Moreover, only 21.74% are aware that the emergency response team and the rest of the units are at work in a coordinated manner. Same 24.74% knows the standard operating procedure during response and evacuation events. Lastly, only 8.70% knows about the adaptation strategies adapted in their community. Looking at these figures, it urges to improve public awareness about the aforementioned items to facilitate knowledge and awareness and coordination among them.

The politico-administrative FVI is 1.47%. Among all the 12 communities surveyed, Barangay Calindagan is the least vulnerable in terms of politico-administrative. The exposure vulnerability is only 13.60% with a considerably very low exposure because of active management of river's natural resources and natural features management and program and efficient implementation of LUMSD which are both considerably high. On the other hand, the susceptibility is only 8.22% (governance) and the resilience factor is 76.29%. The resilience factor includes: post-risk assessment and integration (88.75%), sustainable community livelihood program (80.00%), relocation site project (68.60%) and the health and prevention program for E.coli, Leptospirosis and dengue fever mosquito (67.80%) respectively.

The overall FVI for Barangay Calindagan is 23.37% which is a considerably low vulnerability. Although the overall FVI of Barangay Calindagan is generally low it is very important to give attention to the aforementioned items that scored very low that may predispose the community people to the effects of flooding and possible disease outbreaks. Its low vulnerability is mainly because of very high and good scores in the politico-administrative items that pulled up the scores of the other components and indicators but if you examined closely and in a more detailed manner in terms of its knowledge, attitude and practices to every items of exposure, preparedness, and adaptation strategies, the results are low. Thus, it should be given a priority to increase the community people's awareness on these items.

Table 5-4: Barangay Calindagan FVI

COMPONENTS	EXPOSURE		SUSCEPTIBILITY		RESILIENCE		FVI
	Indicators	(%)	Indicators	(%)	Indicators	(%)	(%)
A. HYDRO-CLIMATIC	A. FF	26.09	A. NTY	50.00	A. LUMSD	87.81	37.76
	B. HF	86.96					
	C. HRF	69.57					
	D. HNE	82.61					
B. SOCIAL	A. ODAW	56.00	A. EA	47.82	A. WT	69.57	22.27
	B. UVR	17.39			B. SN	88.04	
C.ECONOMIC	A. HNIS	4.25	A. HC	24.68	A. FI	52.17	48.24
	B. HNIW	4.25			B. PI	8.70	
	C. PRV	100.00					
	D. PWLV	60.87					
D.SOCIO-BEHAVIORAL	A. PHFR	21.09	A. AHFR	26.09	A. KHFR	55.71	7.10
	B. PHEC	29.07	B. AHEC	21.98	B. KHEC	80.92	
	C. PHL	40.87	C. AHL	16.43	C. KHL	80.92	
	D. PHDF	27.27	D. AHDF	7.13	D. KHDF	80.92	
E. POLITICO-ADMINISTRATIVE	A. RNRMP	12.19	A. G	8.22	A. PRAI	88.75	1.47
	B. LUMSD	15.00			B. SCLP	80.00	
					C. RSP	68.60	
					D. HPP	67.80	
Total Average FVI							23.37

(5) Barangay Balugo

Barangay Balugo's hydro-climatic Flood Vulnerability Index (FVI) is 37.03% as shown in Table 5-5 indicating a low vulnerability in this component. The resilience item for land use and management and structural design (LUSMD) is 38.44%, also quite low. Among the household surveyed, 29.41% have experienced flooding every year in this area. Though (64.70%) of the surveyed household claimed that flooding only happens rarely/sometimes, while the rest did not specify. The community people (88.23%) have experience flooding from ankle high to roof high. But, most of the population surveyed only experienced flood waters that are ankle level except from the last flash flood where some have experienced as high as the roof tops (5.88%) because Barangay Balugo is basically located in an elevated area except to a few houses which are directly located from the river banks. In spite that there is a considerably medium range vulnerability to exposure in terms of the number of houses reached by floods (58.82%), and only 5.88% of the houses are not on elevated area thus lowering the exposure vulnerability in spite that the resilience item is low.

The social FVI is 38.21%. Open disposal of animal waste is observed (58.82%) from the population. There is 11.76% who are not willing to vacate, giving an exposure index of 35.29% respectively. The reason not to vacate was simply because the household perceived their area as no threat to extreme effects of flooding while the rest did not specify their reasons. The educational attainment of most households is (63.70%) which is quite high. The resilience factor that includes water treatment sterilization and social network are 47.06% and 70.59% respectively. Water treatment sterilization must be further encouraged to prevent possible disease outbreak during and after a natural calamity.

The economic FVI for Barangay Balugo is 100.00%. There is still 5.88% of the community population with no access to improved sanitation and 5.88% as well with no access to improved water source. Presence of rats in the community is highly observed (88.24%) and (29.41%) of the population lived in the presence of water logged areas in the vicinity. Among the families surveyed, 76.47% of their houses are susceptible to the effects of flooding and typhoons. Most households (47.06%) have a family income that is around 3000-1000 per month and none of the families surveyed have their properties insured.

The socio-behavioral FVI is 10.15%. The socio-behavioral vulnerability index of Barangay Balugo is also low in terms of the knowledge, attitude and practices that may predisposed the household to any flooding event and disease outbreaks that may be caused by E.coli, Leptospirosis and Dengue Fever mosquito. Exposure vulnerability is 36.55%, while susceptibility is only 19.68%, and resilience is very good (70.84%) respectively. But it is important to note that practices items for Leptospirosis and Dengue Fever mosquito that may predispose the community people is in the medium range vulnerability (43.91% and 41.68%) respectively. Efforts to increase good practices towards preventing leptospirosis and dengue fever outbreak must be given attention. It must also be noted that only 11.76% are aware about the availability of flood hazard map in their community. Also, 47.06% are aware of the limitation and level of protection of the flood control barriers. And 23.53% knows when what particular time of the year flooding can possibly occur. Like the other communities, 47.06% of the household surveyed have heard about the presence of flood early warning system, 41.18% knows how to interpret it, 29. 41% were aware about if there were any lectures on early warning systems, 17.65% were aware if there were any drills on early warning systems in their community, 41.18% knows the location of the evacuation centers, 41.18% knows the standard operating procedure during response and evacuation events and 47.06% knows the adaptation strategies adapted by their community.

Furthermore, only 17.65% have participated in an early warning system lectures in the community and 23.53% have participated in the drills related to evacuation and response. There is only 17.65% have been given or have attended some debriefing session of the past flooding event and 35.29% have attended some discussions of lessons learned from the past flooding event. Again, these aforementioned items of indicators must be given attention so proper coordination and facilitation of programs and improving awareness will be facilitated and realized.

The politico-administrative FVI is 56.19%. Among all the 12 communities surveyed, Barangay Balugo has the highest vulnerability in terms of politico-administrative. The exposure vulnerability (57.03%) is border between medium and high vulnerability. The exposure items which predisposes the management of river's natural resources and natural features management and program to flooding is (61.56%) and (52.50%) for the LUMSD which are both considerably high and in the medium range vulnerability. On the other hand, the susceptibility is 57.39% (governance) and the resilience factor is 58.25% which is not high. The resilience efforts include; post-risk assessment and integration (42.50%), sustainable community livelihood program (47.50%), relocation site project (76.40%) and the health and prevention program for E.coli, Leptospirosis and dengue fever mosquito (66.60%) respectively.

The overall FVI for Barangay Balugo is 48.32% which is considerably medium vulnerability. It is important to note the following items with low scores so it can be improved. The governance in terms of the transparency, accountability and the availability of technical and financial support mechanisms to support planned community actions for resilience is only 40.00%. For its sustainable community livelihood for instance, the technical and financial resources in promoting self-reliant communities so it would have the capacity to provide support to driven-stricken areas is also 40.00%. The RNRMP particularly on how actively engaged the community in planning and implementing river resource management activity is only 30.00% and how well the community and local government value and invest in management and conservation to sustain the river's natural resources and natural features is 40.00%. For how well the critical infrastructures constructed to address risks from priority hazards is 45.00%. Also, for how well are the developers and communities have incorporate risk reduction into location and design structure particularly existing spatial planning, flood risk adaptive to land use, building regulations, building codes, zoning ordinances and how established is the education, outreach, and training programs to improve compliance with land use policies and building standards are as follows, 40.00%, 40.00%, 20.00%, 20.00%, 20.00%, and 40.00% respectively. The post-risk assessment

integration particularly on how well are the flood risk assessments completed and routinely updated; how comprehensive is the flood risk assessments to incorporate risks to all elements of resilience; how well the community participates in the hazard risk assessment process, the accessibility and utilization of the evacuation centers are as follows, 40.00%, 40.00%, 40.00%, and 40.00% respectively. For warning and evacuation items, particularly on how well the community flood warning system is in place and maintained is 30.00% and how well the community evacuation infrastructure in place and maintained is 40.00%; how prepared the community to respond to hazard warning with appropriate actions is 30.00%, and the availability of the technical (service offered) and financial resources in maintaining and improving warning and evacuation systems is also 30.00% respectively. When it comes to disaster recovery particularly on how well us the disaster recovery process was monitored, and improved at periodic intervals is 40.00%, the availability of technical (services offered) and financial resources to support the recovery process particularly on reconstruction and social therapeutic measures is 40.00%, and 40.00% respectively. In here, it is observed that there are several items that needed to be improved and be given attention in spite that the overall FVI is in a medium range (48.32%). It appears that the households and families in Barangay Balugo is a bit reluctant with their participation in the community activities such as on the early warning lectures, discussions and drills probably because they perceived their area as less threat with flooding for it is located in a more elevated location. The community people also respond less with appropriate actions to hazard warning for the same reason. It is important to instill in the minds of the households the readiness and anticipation and cooperation to avoid significant impact in the future if untoward events such as that of flooding and typhoon. There is a need to improve and increase community awareness and involvement so they will be more ready and resilient in the case of natural calamities. There is also a lot to improve in the governance aspect so vulnerability will be lowered and resilience will be increase. Regardless of the vulnerability index of 48.32% one must remember that Barangay Balugo is located on the verge of the Banica river along its banks.

Table 5-5: Barangay Balugo FVI

COMPONENTS	EXPOSURE		SUSCEPTIBILITY		RESILIENCE		FVI
	Indicators	(%)	Indicators	(%)	Indicators	(%)	(%)
A. HYDRO-CLIMATIC	A. FF	29.41	A. NTY	50.00	A. LUMSD	38.44	37.03
	B. HF	88.23					
	C. HRF	58.82					
	D. HNE	5.88					
B. SOCIAL	A. ODAW	58.82	A. EA	63.70	A. WT	47.06	38.21
	B. UVR	11.76			B. SN	70.59	
C.ECONOMIC	A. HNIS	5.88	A. HC	76.47	A. FI	47.06	100.00
	B. HNIW	5.88			B. PI	0.00	
	C. PRV	88.24					
	D. PWLV	29.41					
D.SOCIO-BEHAVIORAL	A. PHFR	31.41	A. AHFR	26.10	A. KHFR	50.91	10.15
	B. PHEC	29.18	B. AHEC	18.79	B. KHEC	77.48	
	C. PHL	43.91	C. AHL	19.28	C. KHL	77.48	
	D. PHDF	41.68	D. AHDF	14.54	D. KHDF	77.48	
E. POLITICO-ADMINISTRATIVE	A. RNRMP	61.56	A. G	57.39	A. PRAI	42.50	56.19
	B. LUMSD	52.50			B. SCLP	47.50	
					C. RSP	76.40	
					D. HPP	66.60	
Total Average FVI							48.32

(6) Poblacion 2 (Barangay Lukewright)

Barangay Lukewright's hydro-climatic Flood Vulnerability Index (FVI) is 67.14% as shown in Table 5-6 indicating a high vulnerability in this component. The resilience item for land use and management and structural design (LUSMD) is 54.69%, which is medium range. About 43.75% of the household surveyed claimed that flooding occurs every year in the area. However, 56.25% claimed that flooding only happens sometimes/rarely. All families surveyed (100.00%) have experience flooding from ankle high to roof high though most of them have experienced flood waters that are as high as above the head (25.00%) and as low as the ankle level (25.00%) because Poblacion 2 is basically located in an a lower area except to a few houses that were located on an elevated area. Vulnerability to exposure in terms of the number of houses reached by floods (87.50%) which is very high, and 62.50% of the houses are not on elevated area thus increasing the exposure vulnerability to (73.44%) in spite that the resilience item is in the medium range.

The social FVI is 9.30%. Open disposal of animal waste is observed (62.50%) from the population. There is 37.50% who are not willing to vacate, because there was no relocation site provided for them and the proximity to their livelihood is also a major consideration. The exposure index is 50.00% respectively. The educational attainment of most households is only (12.50%) which is very low and which plays as a critical predisposing factor in understanding and awareness it has to be made sure that whatever information drive regarding resilience and adaptation must be made sure that it has been delivered to the community people. The resilience factor that includes water treatment sterilization and social network is both high indicating 62.50% and 71.88% respectively.

The economic FVI for Poblacion 2 is 94.77%. All the surveyed households of the community are with access to improved water source and improved sanitation. Presence of rats in the community is highly observed (93.75%) and (37.50%) of the population lived in the presence of water logged areas in the vicinity. Most houses (81.25%) are susceptible to the effects of flooding and typhoons. Most households (50.00%) have a family income that is around 3000-1000 per month and only (6.25%) of the families surveyed have their properties insured.

The socio-behavioral FVI is 25.59%. The socio-behavioral vulnerability index of Poblacion 2 is also low in terms of the knowledge, attitude and practices that may predisposed the household to any flooding event and disease outbreaks that may be caused by E.coli, Leptospirosis and Dengue Fever mosquito. Exposure vulnerability is 29.76%, while susceptibility is 68.62%, which is quite high and resilience items are very good (79.81%) respectively. It is important to note that attitude items for E.coli, Leptospirosis and Dengue Fever mosquito that may predispose the community people is in a high vulnerability range (81.20%, 84.90% and 88.63% respectively). Efforts to increase good attitude towards preventing E.coli, leptospirosis and dengue fever outbreak must be given special attention. When it comes to knowledge, only 43.75% of the households are aware of lectures on early warning system in their community, and 37.50% are aware on the drills on early warning system in their community and only 50.00% of them knew about the different programs of the LGU in times calamities. For items on practices, only 43.75% wore sturdy shoes (boots) during typhoon and flooding. Only 31.25% have participated in the early warning system lecture and 25.00% have participated in drills related to evacuation and response. Furthermore, 37.50% have attended some debriefing session of the past flooding event and also 37.50% have attended to some discussions of lessons learned from the past flooding event and 37.50% as well have participated to any adaptation strategies facilitated by the LGU’s.

The politico-administrative FVI is 45.83%. The exposure vulnerability is (48.91%) a medium vulnerability range. The exposure items which predisposes the management of river's natural resources and natural features management and program to flooding is (45.31%) and (52.50%) for the LUMSD which are both in the medium range vulnerability. On the other hand, susceptibility is 52.39% (governance) and the resilience vulnerability is 55.91%. The resilience effort includes; post-risk assessment and integration (51.25%), sustainable community livelihood program (40.00%), relocation site project (66.20%) and the health and prevention program for E.coli, leptospirosis and dengue fever mosquito (66.20%) respectively.

The overall FVI for Poblacion 2 is 48.53% which is considerably medium vulnerability. Some of the things that should be given attention to in the aspect of governance in Poblacion 2 is the accessibility of the basic services provided for instance, transportation service during calamity has only 40.00% availability and the health services provided is also 40.00%. The transparency, accountability, and availability of technical and financial support system to support planned community actions for resilience and the risk reduction effort is 40.00% and 40.00% respectively. In terms of sustainable community livelihood, particularly on the developed policies and plans in building social capital and skill for economic diversity and self-reliance is also 40.00% while the availability of diverse and environmentally sustainable livelihood in the community is only 20.00%. For the rivers' natural resources and natural features' management on how actively engaged are the community people in planning and implementing river resource management activities is only 40.00%. For land use and management and structural design with respect to how the developers and communities incorporate risk reduction into the location and design of structures particularly on flood risk adaptive to land use is only 30.00%. The post-risk assessment integration in terms of how well the information from the risk assessment accessibility and utilized by the community and government particularly on the availability of flood hazard maps is 40.00%. In terms of emergency response, the on-going training and educating responders for the preparedness activities such as that of drills and simulations is only 40.00%. In the disaster recovery, the disaster recovery process, monitoring, and improving at periodic intervals is 40.00% achieved. 40.00% also goes to how well the pre-established disaster recovery coordination mechanism at international, national, and local levels. Lastly, the availability of the technical (services offered) and financial resources to support the recovery process such as the insurance scheme, reconstruction, charitable funds, social therapeutic measures, rescue equipment and tools, and the traumatic/psychological stress debriefings are: 40.00%, 40.00%, 40.00%, 40.00%, 40.00%, and 20.00% respectively. As seen from these figures, there are a lot

of things to improve in Poblacion 2 and it has to be addressed to improve their adaptive and resilience capacity.

Table 5-6: Poblacion 2 (Barangay Lukewright) FVI

COMPONENTS	EXPOSURE		SUSCEPTIBILITY		RESILIENCE		FVI
	Indicators	(%)	Indicators	(%)	Indicators	(%)	(%)
A. HYDRO-CLIMATIC	A. FF	43.75	A. NTY	50.00	A. LUMSD	54.69	67.14
	B. HF	100.00					
	C. HRF	87.50					
	D. HNE	62.50					
B. SOCIAL	A. ODAW	62.50	A. EA	12.50	A. WT	62.50	9.30
	B. UVR	37.50			B. SN	71.88	
C.ECONOMIC	A. HNIS	0.00	A. HC	81.25	A. FI	50.00	94.77
	B. HNIW	0.00			B. PI	6.25	
	C. PRV	93.75					
	D. PWLV	37.50					
D.SOCIO-BEHAVIORAL	A. PHFR	30.31	A. AHFR	19.73	A. KHFR	67.21	25.59
	B. PHEC	23.51	B. AHEC	81.20	B. KHEC	84.01	
	C. PHL	27.13	C. AHL	84.90	C. KHL	84.01	
	D. PHDF	38.07	D. AHDF	88.63	D. KHDF	84.01	
E. POLITICO-ADMINISTRATIVE	A. RNRMP	45.31	A. G	52.39	A. PRAI	51.25	45.83
	B. LUMSD	52.50			B. SCLP	40.00	
					C. RSP	66.20	
					D. HPP	66.20	
Total Average FVI							48.53

(7) Poblacion 8

Poblacion 8's hydro-climatic Flood Vulnerability Index (FVI) is 82.07% as shown in Table 5-7 indicating a very high vulnerability in this component. The resilience item for land use and management and structural design (LUSMD) is only 43.59%, which is medium range. Among the household surveyed, 48.27% claimed that they experienced flooding every year, the least. Though (51.73%) of them claimed that flooding only happens sometimes/rarely. Most of the population surveyed experienced flood waters from ankle level to beyond the roof from the past flooding where 27.59% of them had experienced it above the head this is because most of the houses in Poblacion 8 is basically located in a lower area and the river water spills over the dike system during the last flooding event and there were many houses located immediately immediately after the flood barrier system (dike). Vulnerability to exposure in terms of the number of

houses reached by floods (82.76%) is very high, and 65.52% of the houses are not on elevated area thus increasing the exposure vulnerability to (71.55%) in spite that the resilience item is in the medium range (43.59%).

The social FVI is 16.49%. Open disposal of animal waste is observed (34.48%) from the population though not highly observed which is a good thing. There is 20.00% who are not willing to vacate because there was no relocation site provided for them, some do not perceived living there as a threat; and due to proximity to the source of their livelihood while others did not specify their personal reasons. The exposure index is 27.24% respectively. The educational attainment of most households is (48.28%) which is medium range and may play as a critical predisposing factor. The resilience factor that includes water treatment sterilization and social network is indicating both a very high resilience 82.76% and 76.73% respectively.

The economic FVI for Poblacion 8 is 92.43%. Among the surveyed households of the community, there is still 3.45% with no access to improved sanitation while all of the surveyed households are with access to improved water source. Presence of rats in the community is highly observed (96.55%) and (41.38%) of the population lived in the presence of water logged areas in the vicinity which could be a predisposing factor for dengue fever mosquito outbreak. 58.62% of most houses are susceptible to the effects of flooding and typhoons. Most households (37.93%) have a family income that is around 3000-1000 per month and only (6.90%) of the families surveyed have their properties insured.

The socio-behavioral FVI is 9.53%. The socio-behavioral vulnerability index of Poblacion 8 is low in terms of the knowledge, attitude and practices that may predisposed the household to any flooding event and disease outbreaks that may be caused by E.coli, Leptospirosis and Dengue Fever mosquito. Exposure vulnerability is 34.75%, while susceptibility is 21.21%, and resilience items are very good (77.30%) respectively. But it is important to note that practice items particularly for Leptospirosis that may predispose the community people is in medium range vulnerability 40.33%. Efforts to increase good practice towards preventing leptospirosis and outbreak must be given attention. Wearing of sturdy shoes (boots) during typhoon and flooding is less practice (31.03%) thus it should be encouraged.

The politico-administrative FVI is 42.85%. The exposure vulnerability (50.55%) is in a medium vulnerability range. The exposure items which predisposes the management of river's natural resources and natural features management and program to flooding is

(43.59%) and (57.50%) for the LUMSD which are both in the medium range vulnerability. On the other hand, the susceptibility is 54.00% (governance) and the resilience vulnerability is 63.70% which is a bit higher. The resilience items include; post-risk assessment and integration (59.38%), sustainable community livelihood program (47.50%), relocation site project (74.40%) and the health and prevention program for E.coli, leptospirosis and dengue fever mosquito (73.50%) respectively.

The overall FVI for Poblacion 8 is 48.6% which is considerably medium vulnerability. However, some items must be considered and be given further attention for instance sustainable community livelihood in terms of its availability in a diverse and environmentally sustainable livelihood is 40.00%. Protecting and maintaining our river and its natural features to reduce risks from flood hazards; how actively engaged the community in planning and implementing river resource management activities; how well the community and local government value and invest in management and conservation to sustain our river's natural resources and natural features is 40.00%, 40.00%, 40.00% respectively. 40.00% as well for how well the land use policies and building standard that incorporate measures to reduce risks from hazards and protect sensitive habitats are established, monitored, and enforced and 40.00% as well for zoning ordinances that were incorporated to reduce risk into the location implemented by the developers and communities. For warning and evacuation, how well the community flood warning system is in place and maintained is 40.00%. The community people is only 40.00% prepared to respond to hazard warnings with appropriate actions and 40.00% are the on-going training in preparedness activities such as drills and simulations to educate responders. In the aspect of disaster recovery, 30.00% is for the availability of technical services offered and financial resources to support recovery process particularly on insurance scheme. Conducting traumatic/psychological stress debriefing is 40.00%.

Table 5-7: Poblacion 8 FVI

COMPONENTS	EXPOSURE		SUSCEPTIBILITY		RESILIENCE		FVI
	Indicators	(%)	Indicators	(%)	Indicators	(%)	(%)
A. HYDRO-CLIMATIC	A. FF	48.27	A. NTY	50.00	A. LUMSD	43.59	82.07
	B. HF	89.65					
	C. HRF	82.76					
	D. HNE	65.52					
B. SOCIAL	A. ODAW	34.48	A. EA	48.28	A. WT	82.76	16.49
	B. UVR	20.00			B. SN	76.73	
C.ECONOMIC	A. HNIS	3.45	A. HC	58.62	A. FI	37.93	92.43
	B. HNIW	0.00			B. PI	6.90	
	C. PRV	96.55					
	D. PWLV	41.38					
D.SOCIO-BEHAVIORAL	A. PHFR	29.02	A. AHFR	29.74	A. KHFR	75.60	9.53
	B. PHEC	29.65	B. AHEC	23.18	B. KHEC	77.87	
	C. PHL	40.33	C. AHL	22.13	C. KHL	77.87	
	D. PHDF	39.00	D. AHDF	9.77	D. KHDF	77.87	
E. POLITICO-ADMINISTRATIVE	A. RNRMP	43.59	A. G	54.00	A. PRAI	59.38	42.85
	B. LUMSD	57.50			B. SCLP	47.50	
					C. RSP	74.40	
					D. HPP	73.50	
Total Average FVI							48.67

(8) Barangay Cadawinonan

Barangay Cadawinonan's hydro-climatic Flood Vulnerability Index (FVI) is 43.75% as shown in Table 5-8 indicating medium range vulnerability in this component. The resilience item for land use and management and structural design (LUSMD) is only 58.28%. The surveyed household (32.00%) claimed that flooding occurs every year in the area. Though (52.00%) of the surveyed household claimed that flooding only happens sometimes/rarely. 76.00% of the community people surveyed have experience flooding from ankle high to above the head level of floodwater though generally the water is ankle level because Barangay Cadawinonan is basically located in a higher elevation compared to those near the center of the city. Vulnerability to exposure in terms of the number of houses reached by floods (60.00%) which is high and only 36.00% of the houses are not on elevated area thus the exposure vulnerability is in the medium range (51.00%).

The social FVI is 28.03%. Open disposal of animal waste is observed (56.00%) from the population. There is 20.00% who are not willing to vacate. Most of them did not specify their reasons but for some, it is for sentimental reasons and for others said they are more ready and more alert for the next undesirable event. The exposure index is 38.00% respectively. The educational attainment of most households is (52.00%) which plays as a critical predisposing factor. The resilience factor that includes water treatment sterilization and social network is indicating both a high and very high resilience 60.00% and 81.00% respectively.

The economic FVI for Barangay Cadawinonan is 27.79%. All the surveyed households have access to improved sanitation. But, there is still 16.00% with no access to improved water source. Presence of rats in the community is highly observed (84.00%) and (32.00%) of the population lived in the presence of water logged areas in the vicinity which could be a predisposing factor for dengue fever mosquito outbreak. 32.00% of most houses are susceptible to the effects of flooding and typhoons. Most households (48.00%) have a family income that is around 3000-1000 per month and (28.00%) of the families surveyed have their properties insured.

The socio-behavioral FVI is 11.45%. The socio-behavioral vulnerability index of Barangay Cadawinonan is low in terms of the knowledge, attitude and practices that may predisposed the household to any flooding event and disease outbreaks that may be caused by E.coli, Leptospirosis and Dengue Fever mosquito. Exposure vulnerability is 33.05%, while susceptibility is 23.61%, which is low and resilience items are good (68.14%) respectively. It is important to maintain such good knowledge, attitude and practices that may predispose the community people from any disease outbreak and to any untoward events from flooding and typhoon. It's good to see that at least half (50.00%) among surveyed household have attended some debriefing session and some discussions of lessons learned from the past flooding event. Among 12 communities, Barangay Cadawinonan has seen being actively involved though more participation (45.83%) should be encouraged to attend and get involved in the adaptation strategies facilitated by the LGU's.

The politico-administrative FVI is 22.50%. The exposure vulnerability is (34.61%). In the exposure items which predisposes the management of river's natural resources and natural features management and program to flooding is (41.72%) and (27.50%) for the LUMSD which are in the medium and low range vulnerability respectively. On the other hand, the susceptibility is 45.44% (governance) and the resilience vulnerability is 69.90% which is a bit higher. Resilience activities includes; post-risk assessment and

integration (61.88%), sustainable community livelihood program (62.50%), relocation site project (76.80%) and the health and prevention program for E.coli, leptospirosis and dengue fever mosquito (78.40%) respectively.

The overall FVI for Barangay Cadawinonan is 26.70% which is considerably a low vulnerability. However, it is important to consider the land use and management and structural design particularly on the efficiency of dike safety system which needs improvement in this community (40.00%). In terms of disaster recovery, insurance scheme should be improved (20.00%), the damage assessment facilitating claim procession (30.00%) should likewise be improved and conducting traumatic/psychological stress debriefing (40.00%) should also be given attention.

Table 5-8: Barangay Cadawinonan FVI

COMPONENTS	EXPOSURE		SUSCEPTIBILITY		RESILIENCE		FVI
	Indicators	(%)	Indicators	(%)	Indicators	(%)	(%)
A. HYDRO-CLIMATIC	A. FF	32.00	A. NTY	50.00	A. LUMSD	58.28	43.75
	B. HF	76.00					
	C. HRF	60.00					
	D. HNE	36.00					
B. SOCIAL	A. ODAW	56.00	A. EA	52.00	A. WT	60.00	28.03
	B. UVR	20.00			B. SN	81.00	
C.ECONOMIC	A. HNIS	0.00	A. HC	32.00	A. FI	48.00	27.79
	B. HNIW	16.00			B. PI	28.00	
	C. PRV	84.00					
	D. PWLV	32.00					
D.SOCIO-BEHAVIORAL	A. PHFR	31.26	A. AHFR	21.00	A. KHFR	70.71	11.45
	B. PHEC	28.77	B. AHEC	27.67	B. KHEC	67.28	
	C. PHL	35.81	C. AHL	30.44	C. KHL	67.28	
	D. PHDF	36.36	D. AHDF	15.33	D. KHDF	67.28	
E. POLITICO-ADMINISTRATIVE	A. RNRMP	41.72	A. G	45.44	A. PRAI	61.88	22.50
	B. LUMSD	27.50			B. SCLP	62.50	
					C. RSP	76.80	
					D. HPP	78.40	
Total Average FVI							26.70

(9) Barangay Bagacay

Barangay Bagacay's hydro-climatic Flood Vulnerability Index (FVI) is 50.37% as shown in Table 5-9 indicating medium range vulnerability in this component. The resilience item for land use and management and structural design (LUSMD) is only 56.25. Among the household surveyed, 46.67% claimed that flooding occurs every year in the area and 53.33% of the surveyed household claimed that flooding only happens sometimes/rarely. However, 83.43% of the community people surveyed have experience flooding from ankle high to above the head flood water level. The above the head flood water level was experienced by 26.67% of the household which registers the highest among the level of floodwaters. The level of flood water in Barangay Bagacay that was experienced by the people is basically because many houses are located in an area where there is no dike system and not in an elevated area. Vulnerability to exposure in terms of the number of houses reached by floods (76.67%) which is high and 20.00% of the houses are not on elevated area. Exposure vulnerability is (56.67%).

The social FVI is 18.08%. Open disposal of animal waste is observed (53.33%) from the population. There is 13.33% who are not willing to vacate because primarily there was no relocation site provided to those who needs it, they have learned to secure their property, and due to proximity to the source of their livelihood. The exposure index is 38.33% respectively. The educational attainment of most households is (40.00%). The resilience factor that includes water treatment sterilization and social network is indicating both have high resilience 66.67% and 80.84% respectively.

The economic FVI for Barangay Bagacay is 100.00%. Among the surveyed households of the community, all have good access to improved sanitation while 46.67% of the surveyed households do not have good access to water source. Presence of rats in the community is highly observed (93.33%) and (53.33%) of the population lived in the presence of water logged areas in the vicinity which could be a predisposing factor for dengue fever mosquito outbreak. 73.34% of most houses are susceptible to the effects of flooding and typhoons which is a high vulnerability. Most households (46.67%) have a family income that is around 3000-1000 per month and (13.33%) of the families surveyed have their properties insured.

The socio-behavioral FVI is 15.72%. The socio-behavioral vulnerability index of Barangay Bagacay is also very low in terms of their knowledge, attitude and practices that may predisposed the household to any flooding event and disease outbreaks that may be caused by E.coli, Leptospirosis and Dengue Fever mosquito. Exposure vulnerability is 39.12%, while susceptibility is 28.33%, which is low and resilience items

are good (70.49%) respectively. It is important to maintain such good knowledge, attitude and practices that may predispose the community people from any disease outbreak and untoward events from flooding and typhoon. However, it is important to note that good practice particularly to leptospirosis and dengue fever mosquito should be encouraged so vulnerability of such will be keep constant if not lowered. Only 40.00% were aware about drills on early warning system carried in the community and only 43.33% practice to use sturdy shoes during typhoons and flooding. Just 40.00% of the households in Barangay Bagacay participated in the early warning lectures in the community and 26.67% of them have had participated the drills related to evacuation and response. Attention must be focus on these items to avoid uncoordinated and undesirable actions during calamities. Very few of them (26.67%) have contacts from community people in the upper stream area of the river such as in Barangay Balugo and Valencia to update them with the floodwater level. Communication and coordination in this matter should be enhanced. Unfortunately, only 16.67% have been given or have attended some debriefing sessions of the past flooding event. Only 43.33% have participated to any adaptation strategies facilitated by LGU's.

The politico-administrative FVI is 21.93%. The exposure vulnerability is (36.88%). The exposure items which predisposes the management of river's natural resources and natural features management and program to flooding is (43.75%) and (30.00%) for the LUMSD which are in the medium and low range vulnerability respectively. On the other hand, the susceptibility is 40.78% (governance) and the resilience vulnerability is 68.58% which is a bit higher. Resilience efforts include; post-risk assessment and integration (78.13%), sustainable community livelihood program (67.50%), relocation site project (54.40%) and the health and prevention program for E.coli, Leptospirosis and dengue fever mosquito (74.30%) respectively.

The overall FVI for Barangay Bagacay is 41.22% which is considerably in medium range vulnerability. However, in the aspect of very efficient bridge system, it is only 40.00%. The overflow bridge between Barangay Taclobo and Barangay Bagacay should be worked out and be replaced with better bridge system so river and flood waters will have easy flow from uphill to downhill rather than cause blockage due to poor overflow bridge system. Zoning ordinances must also be strictly implemented to avoid casualties from people living close by the river banks. Those are among the top priorities that needs special attention.

Table 5-9: Barangay Bagacay FVI

COMPONENTS	EXPOSURE		SUSCEPTIBILITY		RESILIENCE		FVI
	Indicators	(%)	Indicators	(%)	Indicators	(%)	(%)
A. HYDRO-CLIMATIC	A. FF	32.00	A. NTY	50.00	A. LUMSD	58.28	50.37
	B. HF	76.00					
	C. HRF	60.00					
	D. HNE	36.00					
B. SOCIAL	A. ODAW	56.00	A. EA	52.00	A. WT	60.00	18.08
	B. UVR	20.00			B. SN	81.00	
C.ECONOMIC	A. HNIS	0.00	A. HC	32.00	A. FI	48.00	100.00
	B. HNIW	16.00			B. PI	28.00	
	C. PRV	84.00					
	D. PWLV	32.00					
D.SOCIO-BEHAVIORAL	A. PHFR	31.26	A. AHFR	21.00	A. KHFR	70.71	15.72
	B. PHEC	28.77	B. AHEC	27.67	B. KHEC	67.28	
	C. PHL	35.81	C. AHL	30.44	C. KHL	67.28	
	D. PHDF	36.36	D. AHDF	15.33	D. KHDF	67.28	
E. POLITICO-ADMINISTRATIVE	A. RNRMP	41.72	A. G	45.44	A. PRAI	61.88	21.93
	B. LUMSD	27.50			B. SCLP	62.50	
					C. RSP	76.80	
					D. HPP	78.40	
Total Average FVI							41.22

(10) Barangay Taclobo

Barangay Bagacay's hydro-climatic Flood Vulnerability Index (FVI) is 55.31% as shown in Table 5-10 indicating medium range vulnerability in this component. The resilience item for land use and management and structural design (LUSMD) is only 46.25%, which is medium range as well. Among the surveyed household, 30.16% claimed that flooding occurs every year in the area. 55.55% of the rest claimed that flooding only happens sometimes/rarely. 76.20% of the community people surveyed have experience flooding from ankle level to above the head and roof high. Though generally most households surveyed (34.92%) have experienced flooding at ankle level floodwaters only except from the last flash flood event. The low level of floodwaters in ordinary days in Barangay Taclobo is basically because most of the houses along the river banks are located in an area where there is a good dike system. Vulnerability to exposure in terms of the number of houses reached by floods (47.62%) and 50.79% of the houses are not on elevated area thus the exposure vulnerability is only in the medium range (51.19%).

The social FVI is 23.93%. Open disposal of animal waste is observed (96.83%) from the population. There is 20.63% who are not willing to vacate because no relocation site provided for them, they perceived their area as no threat to flooding, for some it for sentimental reasons, the flood barriers (dikes) are still in place and intact, and they are not ready to move into a new place while the rest did not specify their reasons why. The exposure index is 58.73% respectively. The educational attainment of most households is (30.16%) which is very low and which may play as a critical predisposing factor. The resilience factor that includes water treatment sterilization and social network is indicating both a high and very high resilience 73.02% and 75.00% respectively.

The economic FVI for Barangay Taclobo is 39.75%. Among the surveyed households of the community, there is still 4.76% that have no access to improved sanitation and 17.46% of the surveyed households do not have good access to improved water source. Presence of rats in the community is observed (49.21%) and (49.21%) of the population lived in the presence of water logged areas in the vicinity which could be a predisposing factor for dengue fever mosquito outbreak. 40.79% of most houses are susceptible to the effects of flooding and typhoons which should be considered. Most households (44.44%) have a family income that is around 3000-1000 per month and (17.46%) of the families surveyed have their properties insured.

The socio-behavioral FVI is 6.88%. The socio-behavioral vulnerability index of Barangay Taclobo is low in terms of the knowledge, attitude and practices that may predisposed the household to any flooding event and disease outbreaks that may be caused by E.coli, Leptospirosis and Dengue Fever mosquito. Exposure vulnerability is 22.72%, while susceptibility is 22.12%, which is low and resilience items are good (73.07%) respectively. It is important to maintain such good knowledge, attitude and practices that may prevent the community people from any disease outbreak and untoward events from flooding and typhoon. Only 45.90% are aware about lectures on early warning system in the community and 32.79% were aware about drills on early warning system. Furthermore, only 36.07% have been given or attended some debriefing session from the past flooding event and 40.98% have attended to some discussions of lesson learned from the past flooding event. Moreover, only 40.98% have participated in the adaptation strategies the local government unit (LGU's) have implemented.

The politico-administrative FVI is 33.26%. The exposure vulnerability is (48.13%). The exposure items which predisposes the management of river's natural resources and natural features management and program to the effects of flooding is (53.75%) and (42.50%) for the LUMSD which are in the medium and low range vulnerability

respectively. On the other hand, the susceptibility is 44.44% (governance) and the resilience factor is 63.68% which is a bit higher. Resilience effort includes; post-risk assessment and integration (57.50%), sustainable community livelihood program (57.50%), relocation site project (68.20%) and the health and prevention program for E.coli, leptospirosis and dengue fever mosquito (71.50%) respectively.

The overall FVI for Barangay Taclobo is 31.83% which is considerably a low vulnerability. However, there is a need to improve in terms of the efficiency of the dike system (40.00%) and the bridge or overflow system (40.00%) respectively. The bridge overflow system in Barangay Taclobo blocks the river water or floodwaters during heavy rains instead of facilitating faster flow because of how it was built. Also, there is a need to establish well our education, outreach, and training programs to improve compliance with land use policies and building standards to more resilient and adaptive.

Table 5-10: Barangay Taclobo FVI

	EXPOSURE		**SUSCEPTIBILITY**		**RESILIENCE**		**FVI**
COMPONENTS	Indicators	(%)	Indicators	(%)	Indicators	(%)	(%)
A. HYDRO-CLIMATIC	A. FF	30.16	A. NTY	50.00	A. LUMSD	46.25	55.31
	B. HF	76.20					
	C. HRF	47.62					
	D. HNE	50.79					
B. SOCIAL	A. ODAW	96.83	A. EA	30.16	A. WT	73.02	23.93
	B. UVR	20.63			B. SN	75.00	
C.ECONOMIC	A. HNIS	4.76	A. HC	40.79	A. FI	44.44	39.75
	B. HNIW	17.46			B. PI	17.46	
	C. PRV	49.21					
	D. PWLV	49.21					
D.SOCIO-BEHAVIORAL	A. PHFR	30.28	A. AHFR	27.93	A. KHFR	64.93	6.88
	B. PHEC	22.88	B. AHEC	22.84	B. KHEC	75.78	
	C. PHL	23.59	C. AHL	23.59	C. KHL	75.78	
	D. PHDF	14.11	D. AHDF	14.11	D. KHDF	75.78	
E. POLITICO-ADMINISTRATIVE	A. RNRMP	53.75	A. G	44.00	A. PRAI	57.50	33.26
	B. LUMSD	42.50			B. SCLP	57.50	
					C. RSP	68.20	
					D. HPP	71.50	
Ttotal Average FVI							31.83

(11) Barangay Candau-ay

Barangay Candau-ay's hydro-climatic Flood Vulnerability Index (FVI) is 49.18% as shown in Table 5-11 indicating medium range vulnerability in this component. The resilience item for land use and management and structural design (LUSMD) is 68.13. About 40.28% of the household surveyed claimed that flooding occurs every year in the area though 51.39% of them claimed that flooding only happens sometimes/rarely. 91.67% of the community people surveyed have experience flooding from ankle high to roof high. Though generally most households surveyed (25.00%) have experienced flooding at waist level floodwaters. The level of floodwater in Barangay Candau-ay is basically because some of houses are located in an area where there is no dike system protecting them from spilling running floodwaters. Vulnerability to exposure in terms of the number of houses reached by floods (81.94%) which is very high, and 54.17% of the houses are not on elevated area thus the exposure vulnerability is considerably high (67.02%) thus should be given special attention by completing the dike system in those areas.

The social FVI is 24.48%. Open disposal of animal waste is observed (58.34%) from the population. 33.33% of those surveyed are not willing to vacate because no relocation site provided, they are not ready to move to a new place, they perceived their place as no threat to the effects of flooding, due to proximity to the source of their livelihood, they have learned to secure their property, and for some it is for sentimental reasons while the rest did not specify their reasons. The exposure index is 45.84% respectively. The educational attainment of most households is (38.89%) which is very low and which may play as a critical predisposing factor. The resilience factor that includes water treatment sterilization and social network is indicating both a high and very high resilience 69.44% and 76.39% respectively.

The economic FVI for Barangay Candau-ay is 52.30%. Among the surveyed households of the community, there is still (4.17%) that have no access to improved sanitation and 11.11% of the surveyed households do not have good access to improved water source. Presence of rats in the community is highly observed (86.11%) and (44.44%) of the population lived in the presence of water logged areas in the vicinity which could be a predisposing factor for dengue fever mosquito outbreak. 45.83% of most houses are susceptible to the effects of flooding and typhoons which should be considered. Most households (47.22%) have a family income that is around 3000-1000 per month and (16.67%) of the families surveyed have their properties insured.

The socio-behavioral FVI is 13.51%. The socio-behavioral vulnerability index of Barangay Candau-ay is low in terms of the knowledge, attitude and practices that may predisposed the household to any flooding event and disease outbreaks that may be caused by E.coli, Leptospirosis and Dengue Fever mosquito. Exposure vulnerability is 37.44%, while susceptibility is 27.87%, which is low and resilience items are good (77.21%) respectively. It is important to maintain such good knowledge, attitude and practices that will prevent the community people from any disease outbreak and untoward events from flooding and typhoon. Furthermore, it is important to consider the practices (42.71%) of the community people, if this can be improve so much the better to avoid dengue fever outbreak in the future. Also, only 38.89% have been given or have attended a debriefing session from the past flooding event. It is very important that the community people should receive debriefing sessions to help them cope from the unfortunate event. Only 43.06% have participated in an adaptation strategies implemented by the local government units (LGU's) which is also important for people's awareness and participation to create a coordinated flow of implementing the programs and rescue and recovery actions.

The politico-administrative FVI is 16.06%. The exposure vulnerability is (29.69%). The exposure items which predisposes the management of river's natural resources and natural features management and program to the effects of flooding is (31.87%) and (27.50%) for the LUMSD which are in the medium and low range vulnerability respectively. On the other hand, the susceptibility is 36.83% (governance) and the resilience vulnerability is 68.07%. Resilience efforts include; post-risk assessment and integration (71.88%), sustainable community livelihood program (65.00%), relocation site project (65.60%) and the health and prevention program for E.coli, Leptospirosis and dengue fever mosquito (69.80%) respectively.

The overall FVI for Barangay Candau-ay is 31.11% which is considerably low vulnerability. Barangay Candau-ay has spoken. The availability of our technical (services offered) and financial resources to support the recovery process particularly on the insurance scheme, damage assessment facilitating claim procession, reconstruction, charitable funds, and social therapeutic measures are as follows 0.00%, 0.00%, 0.00%, 0.00% and 30.00% respectively. There is much work to be done here to help the community people recover fast and better.

Table 5-11: Barangay Candau-ay FVI

COMPONENTS	EXPOSURE		SUSCEPTIBILITY		RESILIENCE		FVI
	Indicators	(%)	Indicators	(%)	Indicators	(%)	(%)
A. HYDRO-CLIMATIC	A. FF	40.28	A. NTY	50.00	A. LUMSD	68.13	49.18
	B. HF	91.67					
	C. HRF	81.94					
	D. HNE	54.17					
B. SOCIAL	A. ODAW	58.34	A. EA	38.89	A. WT	69.44	24.48
	B. UVR	33.33			B. SN	76.39	
C.ECONOMIC	A. HNIS	4.17	A. HC	45.83	A. FI	69.44	52.30
	B. HNIW	11.11			B. PI	76.39	
	C. PRV	86.11					
	D. PWLV	44.44					
D.SOCIO-BEHAVIORAL	A. PHFR	35.91	A. AHFR	30.38	A. KHFR	66.66	13.51
	B. PHEC	33.36	B. AHEC	31.33	B. KHEC	80.72	
	C. PHL	37.76	C. AHL	31.91	C. KHL	80.72	
	D. PHDF	42.71	D. AHDF	17.86	D. KHDF	80.72	
E. POLITICO-ADMINISTRATIVE	A. RNRMP	31.87	A. G	36.83	A. PRAI	71.88	16.06
	B. LUMSD	27.50			B. SCLP	65.00	
					C. RSP	65.60	
					D. HPP	69.80	
Total Average FVI							31.11

(12) Barangay Batinguel

Barangay Batinguel's hydro-climatic Flood Vulnerability Index (FVI) is 62.73% as shown in Table 5-12 indicating medium range vulnerability in this component. The resilience item for land use and management and structural design (LUSMD) is 61.88%, which is quite good. 68.42% of the household surveyed claimed that flooding occurs every year in the area. Some 28.39% of them claimed that flooding only happens sometimes/rarely. 92.10% of the community people surveyed have experience flooding from ankle level to beyond the roof from the past flooding. Though generally most households surveyed (23.68%) have experienced flooding at waist level floodwaters. The level of flood water in Barangay Batinguel is at different range basically because some houses are located in an area where there is a dike system, while others are living in an exposed area and some in an elevated but many are located in a flat area. Vulnerability to exposure in terms of the number of houses reached by floods (81.58%) which is very high, and 68.42% of the houses are not on elevated area thus the

exposure vulnerability is considerably high (77.63%) thus should be given special attention.

The social FVI is 6.08%. Open disposal of animal waste is observed (60.53%) from the population. There is 34.21% who are not willing to vacate because there was no relocation site provided for them, they perceived their area as no threat to flooding, the flood barrier structures (dike system) are still intact, proximity to the source of their livelihood, for some sentimental reasons and while the others did not specify their reasons. The exposure index is 47.37% respectively. The educational attainment of most households is only (9.21%) which is very low and which may play as a critical predisposing factor. The resilience factor that includes water treatment sterilization and social network is indicating both a high and very high resilience 69.44% and 76.39% respectively.

The economic FVI for Barangay Batinguel is 100.00%. Among the surveyed households of the community, there is still 2.63% that have no access to improved sanitation and 21.05% of the surveyed households do not have good access to improved water source which is a higher than the rest of the communities. Presence of rats in the community is highly observed (92.11%) and (42.11%) of the population lived in the presence of water logged areas in the vicinity which could be a predisposing factor for dengue fever mosquito outbreak. 76.31% of most houses are highly susceptible to the effects of flooding and typhoons which should be considered. Most households (39.47%) have a family income that is around 3000-1000 per month and (5.26%) of the families surveyed have their properties insured.

The socio-behavioral FVI is 8.76%. The socio-behavioral vulnerability index of Barangay Taclobo is low in terms of the knowledge, attitude and practices that may predisposed the household to any flooding event and disease outbreaks that may be caused by E.coli, Leptospirosis and Dengue Fever mosquito. Exposure vulnerability is 33.48%, while susceptibility is 19.53%, which is low and resilience items are good (74.63%) respectively. It is important to maintain such good knowledge, attitude and practices that may prevent the community people from any disease outbreak and untoward events from flooding and typhoon. However, it is important to consider the practices towards Leptospirosis outbreak (41.21%) to keep it low. In terms of knowledge and awareness, only 42.11% are aware about the availability of flood hazard maps in their community. Only 50.00% are aware about lectures on early warning system conducted in their community. About 42.11% are aware on the drills on early warning system facilitated in their community. In terms of the people's practices, 47.37% have participated in the

early warning system lectures in their community. 50.00% have participated in drills related to evacuation and response. Proper information dissemination must be carried over to the rest of the community people so everyone will be alert and aware of the different response and recovery strategy of the LGU's. Barangay Batinguel has 47.37% in terms of neighborhood association or support members in terms of need during flooding. Only 44.74% have contacts from other communities in the upper stream (Balugo, Valencia) to keep them inform about the floodwater level before it would reach down the lower parts of the river.

The politico-administrative FVI is 21.10%. The exposure vulnerability is (37.81%). The exposure items which predisposes the management of river's natural resources and natural features management and program to flooding is (38.12%) and (37.50%) for the LUMSD which are in the medium and low range vulnerability respectively. On the other hand, susceptibility is 35.83% (governance) and the resilience factor is 64.45. Resilience efforts include; post-risk assessment and integration (67.50%), sustainable community livelihood program (65.00%), relocation site project (61.60%) and the health and prevention program for E.coli, leptospirosis and dengue fever mosquito (63.70%) respectively. The overall FVI for Barangay Batinguel is 39.73% which is considerably low vulnerability.

Table 5-12: Barangay Batinguel FVI

COMPONENTS	EXPOSURE		SUSCEPTIBILITY		RESILIENCE		FVI
	Indicators	(%)	Indicators	(%)	Indicators	(%)	(%)
A. HYDRO-CLIMATIC	A. FF	68.42	A. NTY	50.00	A. LUMSD	61.88	62.73
	B. HF	92.10					
	C. HRF	81.58					
	D. HNE	68.42					
B. SOCIAL	A. ODAW	60.53	A. EA	9.21	A. WT	71.05	6.08
	B. UVR	34.21			B. SN	72.37	
C.ECONOMIC	A. HNIS	2.63	A. HC	76.31	A. FI	39.47	100.00
	B. HNIW	21.05			B. PI	5.26	
	C. PRV	92.11					
	D. PWLV	42.11					
D.SOCIO-BEHAVIORAL	A. PHFR	27.97	A. AHFR	27.38	A. KHFR	72.03	8.76
	B. PHEC	30.05	B. AHEC	20.47	B. KHEC	75.49	
	C. PHL	41.21	C. AHL	20.25	C. KHL	75.49	
	D. PHDF	34.69	D. AHDF	10.01	D. KHDF	75.49	
E. POLITICO-ADMINISTRATIVE	A. RNRMP	38.12	A. G	35.83	A. PRAI	67.50	21.10
	B. LUMSD	37.50			B. SCLP	65.00	
					C. RSP	61.60	
					D. HPP	63.70	
Total Average FVI							39.73

5.2 DETAILED ANALYSIS: Building Scale for Poblacion 2 (Barangay Lukewright)

Here is a brief view of the household respondents in Poblacion 2 (Barangay Lukewright) in reference to their location from the river and their vulnerability index to the different components. Households were solicited for their answers with the corresponding flood vulnerability components. This study opted to do a detailed case study to have a closer look how each household differs their outlooks and perceptions in the different components and indicators of urban flood vulnerability index giving us an in-depth understanding of the community. To cover the entire community, adjacent households were assumed to have the same data values from the ones that were actually surveyed.

Figure 5-1: Hydro-Climatic Component of FIood Vulnerability Index of Poblacion 2

In the hydro-climatic flood vulnerability index (FVI), parts of its components for the vulnerability indicators are as follows: the frequency of flooding, height of flooding, houses reached by floods, and houses not on elevated area are all part of the exposure indicator. The number of typhoons per year (50%) is the susceptibility indicator. While the land use and management and structural design stands for its resilience indicator.

Table 5-13: Hydro-Climatic Component of FIood Vulnerability Index of Poblacion 2

RANK	Longitude (°E)	Latitude (°N)	Hydro-Climatic FVI (%)
1	9.30243	123.30566	76.32
1	9.30243	123.30566	76.32
3	9.30206	123.30713	75.92
4	9.30236	123.30687	73.06
5	9.30214	123.30539	72.65
6	9.30240	123.30631	70.61
7	9.30215	123.30671	60.82
7	9.30225	123.30518	60.82
9	9.30218	123.30819	58.37
10	9.30227	123.30591	57.55
11	9.30236	123.30713	49.80
12	9.30207	123.30830	47.98
13	9.30323	123.30870	45.83
14	9.30235	123.30552	43.67
15	9.30169	123.30669	43.26
16	9.30206	123.30713	37.37
17	9.30276	123.30651	34.69
18	9.30288	123.30656	11.84

Figure 5-1 and Table 5-13 shows the the Hydro-Climatic FVI of Poblacion 2 (Barangay Lukewright) indicating a considerably high vulnerability, 76.32% being the highest and 11.84% for its lowest rating. Those households that are in the lower left portion of the map depicted with dark blue colors are those households that are highly vulnerable in terms of the number of flooding incidences that they have experienced for these past few years. Many of the houses were reached by flood waters as high as their roof tops during the flash floods in 2011 and 2012 respectively were it rained for several hours. Most of the houses that were immediately located after the flood barrier (dike system) were not in an elevated ground thus spill over of river floods easily reached to the doorsteps of these houses. While those that were on the opposite side of the main road (upper part of the map) shown in light colored blue are located in elevated areas thus floodwaters do not usually reached to these houses. The land use and management and structural design along these areas were not strictly implemented and followed by the residence of this community and the constructed flood protection barriers (dike system) have underestimated the possible volume of floodwaters during such events. In this results, it can be observed that households of the same community have different experiences in terms of the hydro-climatic factors. Clearly, those houses located closeby the river are the ones highly affected when it comes to hydro-climatic

components and those that are located farther away and in an elevated area are less likely to be affected as shown in the map and table above.

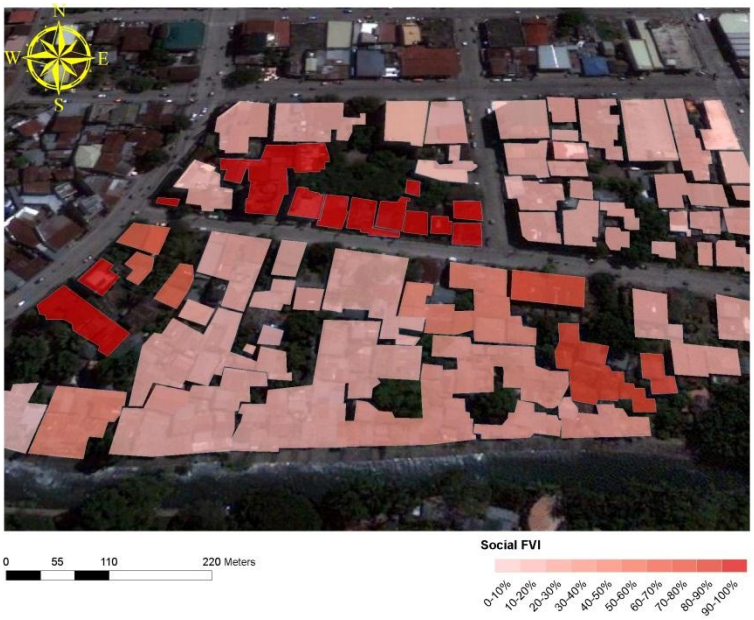

Figure 5-2: Social Component of Flood Vulnerability Index of Poblacion 2

For the social flood vulnerability index (FVI) it includes the open disposal of animal waste and unwillingness to vacate (exposure indicator). The educational attainment is the susceptibility indicator. On the other hand, water treatment/sterilization practice and its social network reflects it resilience capacity.

Table 5-14: Social Component of FIood Vulnerability Index of Poblacion 2

RANK	Longitude (°E)	Latitude (°N)	Social FVI (%)
1	9.30206	123.30713	100.00
1	9.30235	123.30552	100.00
1	9.30276	123.30651	100.00
4	9.30206	123.30713	73.33
5	9.30236	123.30713	66.67
6	9.30243	123.30566	53.32
7	9.30214	123.30539	39.99
8	9.30236	123.30687	33.33
9	9.30215	123.30671	27.27
10	9.30169	123.30669	20.51
11	9.30227	123.30591	16.67
12	9.30218	123.30819	14.10
13	9.30323	123.30870	11.11
14	9.30288	123.30656	10.26
14	9.30240	123.30631	10.26
16	9.30243	123.30566	10.25
16	9.30207	123.30830	10.25
18	9.30225	123.30518	5.13

Figure 5-2 and Table 5.14 reveals the Social FVI. Generally, 12 out of 18 household respondents that were surveyed (light colored pink shade) showed low to medium range Social FVI while 6 among those household respondents (dark pink shade) are showing a very high social vulnerability index. This can attributed to their refusal to vacate apparently because there was no relocation site provided for them. Another two major contributing factor to its considerably high vulnerability is due to high open disposal of animal waste practice and low level of educational attainment among the respondents. More than half of the respondents do not have a good educational background which can be a predisposing factor if information drive are not delivered well to each household in the community. Almost all of the respondents dispose their animal waste on the ground which considerably added to the high social flood vulnerability index of Poblacion 2 respectively.

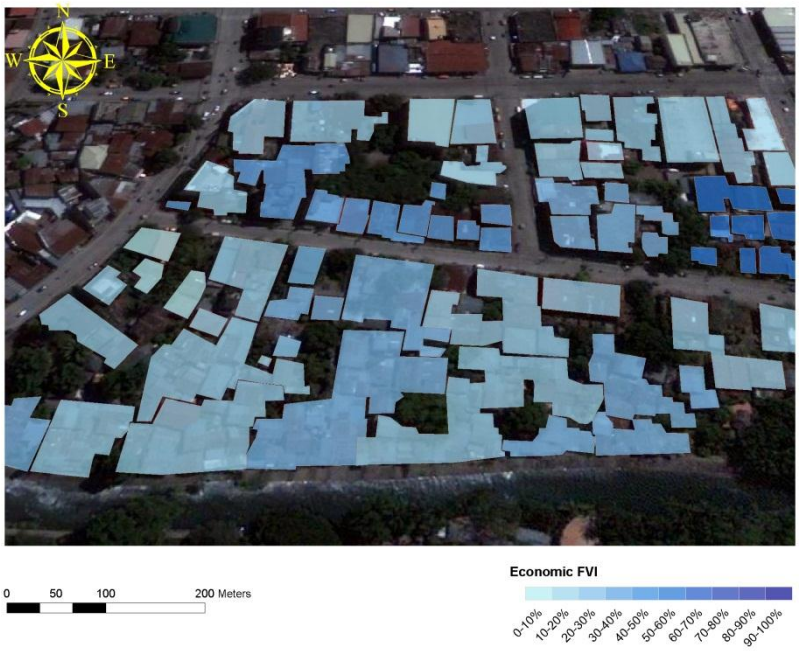

Figure 5-3: Economic Component of FIood Vulnerability Index of Poblacion 2

The economic flood vulnerability index (FVI) component for Poblacion 2 (Lukewright) includes houses with no access to improved sanitation, houses with no access to improved water source, presence of rats in the vicinity, presence of waterlogged areas in the vicinity (exposure indicator); the housing condition which could be semi-concrete, tent light materials, and plastic materials (susceptibility indicator); family income between 3000-10,000 pesos and property insurance (resilience indicator).

Table 5-15: Economic Component of FIood Vulnerability Index of Poblacion 2

RANK	Longitude (°E)	Latitude (°N)	Economic FVI (%)
1	9.30218	123.30819	59.99
2	9.30206	123.30669	40.00
3	9.30276	123.30651	36.00
4	9.30169	123.30669	30.00
4	9.30240	123.30631	30.00
6	9.30206	123.30713	24.00
6	9.30243	123.30566	24.00
8	9.30225	123.30518	22.50
9	9.30235	123.30552	18.00
10	9.30214	123.30539	15.00
10	9.30236	123.30687	15.00
10	9.30236	123.30713	15.00
10	9.30288	123.30656	15.00
10	9.30207	123.30830	15.00
10	9.30323	123.30870	15.00
16	9.30227	123.30591	12.00
16	9.30215	123.30671	12.00
18	9.30243	123.30566	6.00

Figure 5-3 and Table 5.15 showed the Economic FVI of the household respondent surveyed in Poblacion 2 (Barangay Lukewright). The Economic FVI is relatively low where 16 out of the 18 respondents and those immediate adjacent to it (very light shade of blue to lighter shades) the values are ranging from 6.00% to 36.00% which falls in the low vulnerability range. While 40.00% and 59.99% are in the medium range vulnerability (more lighter blue shade). The medium range vulnerability can be accounted to a favorable high family income which follows good housing conditions, with access to good sanitation and improved water source among these respondents. Almost all of them have their property insured. In spite that there are presence of water logged areas in the vicinity and visibility of rats in the surroundings which could attribute to health hazards particularly of dengue fever and leptospirosis outbreak, yet, since they have good income and housing conditions, the vulnerability index is lowered at a minimal level. The disparity of values is quite high (6.00% to 59.99%) but generally, the results between households are in a close range.

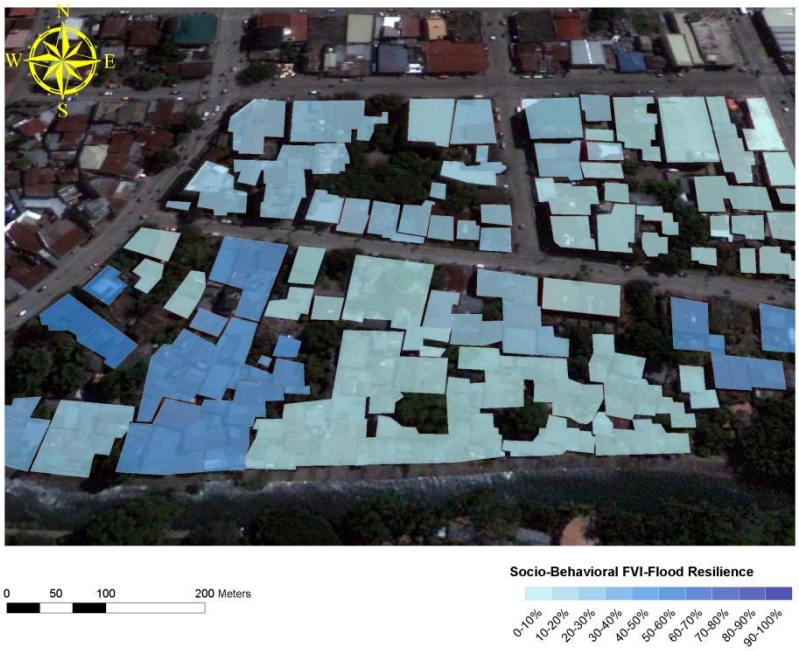

Figure 5-4: Socio-Behavioral Component of FIood Vulnerability Index of Poblacion 2

The socio-behavioral FVI of Poblacion 2 particularly on flood resilience includes the following items: practices of households on flood resilience in terms of its hazards, risks, exposure, preparedness, response, recovery, coordination, and adaptation strategies (exposure indicators); attitude of households in terms of the same items on hazards, risks, exposure, preparedness, response, recovery, coordination, and adaptation strategies (susceptibility indicators); and lastly, the knowledge of the household respondents in terms of the same items on hazards, risks, exposure, preparedness, response, recovery, coordination, and adaptation strategies (resilience indicators) in preparation to any natural calamity to occur particularly on typhoons and flooding before, during and after it happened. It is very important to have a closer and detailed investigation on these items so that strengths and weaknesses can be easily identified and addressed to.

Table 5-16: Socio-Behavioral Component of FIood Vulnerability Index on Flood Resilience of Poblacion 2

RANK	Longitude (°E)	Latitude (°N)	Socio-Behavioral FVIfr
1	9.30235	123.30552	42.58
2	9.30207	123.30830	33.34
3	9.30227	123.30591	31.02
4	9.30225	123.30518	24.56
5	9.30206	123.30713	22.40
6	9.30276	123.30651	18.42
7	9.30288	123.30656	18.31
8	9.30214	123.30539	16.86
9	9.30236	123.30687	10.71
10	9.30206	123.30713	7.68
11	9.30215	123.30671	5.73
12	9.30243	123.30566	5.51
13	9.30236	123.30713	5.37
14	9.30243	123.30566	4.66
15	9.30169	123.30669	2.61
16	9.30240	123.30631	0.00
16	9.30218	123.30819	0.00
16	9.30323	123.30870	0.00

Figure 5-4 and Table 5.16 is the Socio-Behavioral FVI for flood resilience of Poblacion 2 (Lukewright). The vulnerability index is from very low to low result values of 0.00% to 33.34% respectively (very light shades of blue to lighter shades of blue), with one household registering a medium vulnerability index (42.58%) shown in a more lighter shade of blue in the map. It is good thing to see that these household respondents are more or less ready for any flooding scenario as its vulnerability index is from low to medium range Their knowledge, attitude and practices towards hazard, risks, exposure, preparedness, response, recovery, coordination, and adapatation strategies are more or less good. The overall score for the knowledge aspect in terms of what to do is very high. However, there is a need to increase the attitude and practice aspect in order to be well coordinated specially during and after the each events so that no the same mistakes will be repeated in the future. Attitude and practices, especially the latter is very significant for that is how the actual response of the households during and after such calamities thus it has to be strengthened.

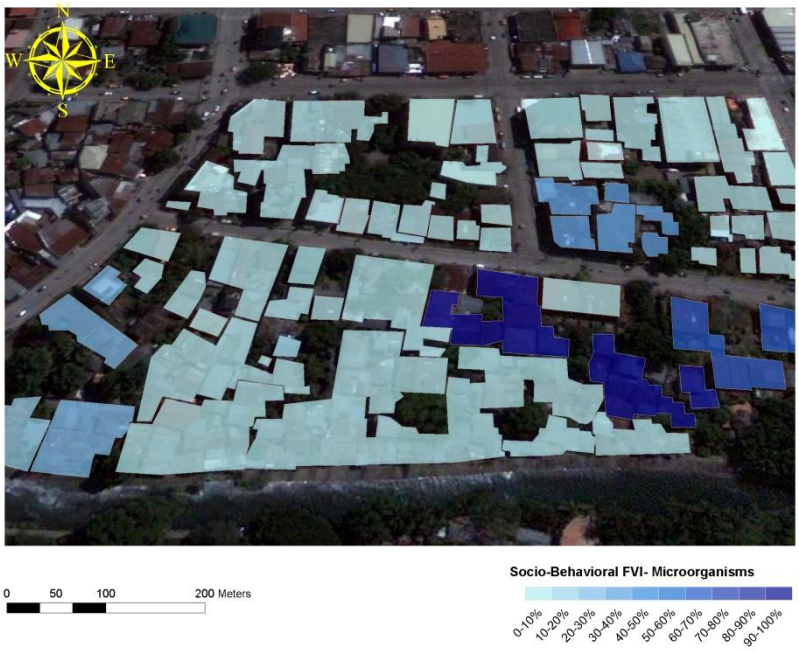

Figure 5-5: Socio-Behavioral on Flood Vulnerability Index on the Exposure of Microorganisms (E.coli, Leptospirosis, and Dengue Fever Mosquito of Pobalcion 2

The socio-behavioral FVI of Poblacion 2 (Lukewright) on the knowledge, attitude and practices of household respondents in predisposing to certain microorganisms such as those of E.coli, Leptospirosis and Dengue fever mosquito which may increase in incidences during and after a flooding or typhoon events. This component includes the following vulnerability indicators: practices in terms of the nature of E.coli, Leptospirosis, and Dengue fever, its mode of transmission, prevention, signs and symptoms, fatality, treatment and the financial cost of treatment (exposure indicators); attitude of households in terms of the same items above (susceptibility indicators); and the knowledge of households in terms of the same items mentioned above (resilience indicators).

Table 5-17: Socio-Behavioral Components on Flood Vulnerability Index on the Exposure of Microorganisms (E.coli, Leptospirosis, Dengue Fever Mosquito) of Poblacion 2

RANK	Longitude (°E)	Latitude (°N)	Socio-Behavioral FVImqs
1	9.30236	123.30687	100.00
2	9.30206	123.30713	99.98
3	9.30207	123.30830	66.91
4	9.30243	123.30566	31.04
5	9.30235	123.30552	25.23
6	9.30214	123.30539	21.09
7	9.30225	123.30518	16.08
8	9.30236	123.30713	8.74
9	9.30288	123.30656	8.72
10	9.30169	123.30669	7.34
11	9.30206	123.30713	5.55
12	9.30276	123.30651	2.71
13	9.30218	123.30819	1.75
14	9.30243	123.30566	1.04
15	9.30227	123.30591	0.00
15	9.30215	123.30671	0.00
15	9.30240	123.30631	0.00
15	9.30323	123.30870	0.00

Figure 5-5 and Table 5-17 shows the Socio-Behavioral FVI of Poblacion 2 for dealing with the microorganisms that are usually involved during flooding event (E.coli, Leptospirosis and the Dengue Fever mosquitoes). Three (3) of the respondents are showing a high to a very high vulnerability 66.91%, 99.98%, and 100.00% respectively (light to dark shade of blue in the map) in terms of dealing these microorganisms that may predispose the community people. While generally most households indicating very low to low vulnerability. The practice items scored very high in terms of its exposure to these microorganisms but with low susceptibility attitude scores thus owing to generally low vulnerability with only two registering very high vulnerability index, 100%, 99.98% respectively. The knowledge items (resilience) also garnered better scores thus gives a good combination lowering its vulnerability index. But, it must be noted that the practice items are of high vulnerability particularly on the exposure items of indicators. This identified weakness must be given attention proper attention so outbreaks of such kind will be at minimum if not prevented to happen in the future.

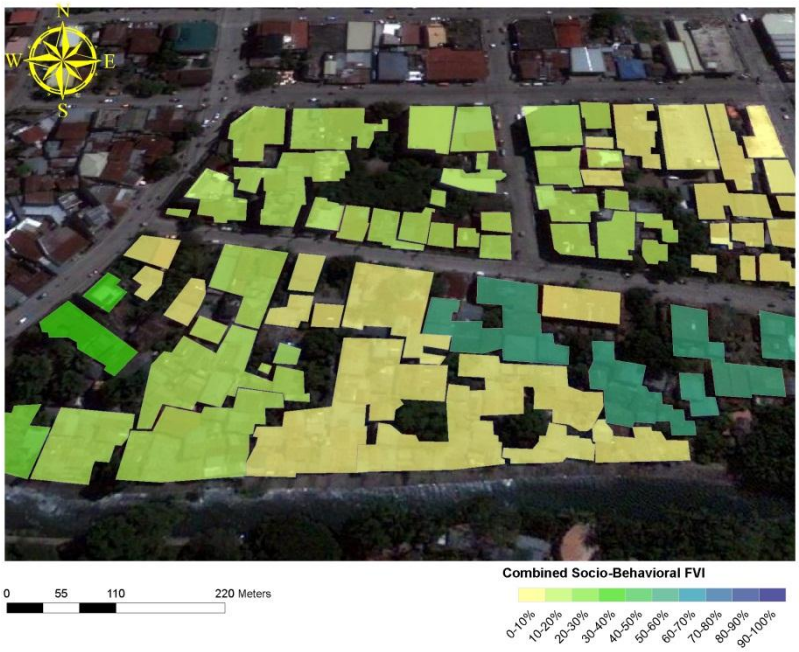

Figure 5-6: Combined Socio-Behavioral Components on Flood Vulnerability Index on Flood Resilience and Microorganisms of Poblacion 2

The combined socio-behavioral FVI of Poblacion 2 includes the following items: practices of households on flood resilience in terms of its hazards, risks, exposure, preparedness, response, recovery, coordination, and adaptation strategies (exposure indicators); attitude of households in terms of the same items mentioned above (susceptibility indicators); and lastly, the knowledge of the household respondents in terms of the same items (resilience indicators) in preparation to any natural calamity to occur particularly on typhoons and flooding before, during and after it happened. Then, the practices in terms of the nature of E.coli, Leptospirosis, and Dengue fever, its mode of transmission, prevention, signs and symptoms, fatality, treatment and the financial cost of treatment (exposure indicators); attitude of households in terms of the same items above (susceptibility indicators); and the knowledge of households in terms of the same items mentioned above (resilience indicators).

Table 5-18: Combined Socio-Behavioral Components on Flood Resilience Index on Flood Resilience and Exposure to Microorganisms of Poblacion 2

RANK	Longitude (°E)	Latitude (°N)	Socio-Behavioral FVIc
1	9.30236	123.30687	55.36
2	9.30206	123.30713	53.83
3	9.30207	123.30830	50.13
4	9.30235	123.30552	33.91
5	9.30225	123.30518	20.32
6	9.30214	123.30539	18.98
7	9.30243	123.30566	17.85
8	9.30227	123.30591	15.51
9	9.30206	123.30713	13.98
10	9.30288	123.30656	13.52
11	9.30276	123.30651	10.57
12	9.30236	123.30713	7.06
13	9.30169	123.30669	4.98
14	9.30243	123.30566	3.28
15	9.30215	123.30671	2.87
16	9.30218	123.30819	0.88
17	9.30240	123.30631	0.00
17	9.30323	123.30870	0.00

Figure 5-6 and Table 5.18 shows the combination results of Socio-Behavioral FVI for flood resilience and dealing with the microorganisms associated in flooding in Poblacion 2 (Lukewright). The vulnerability index for this combination of items are ranging from very low to medium (0.00% to 33.91%) shown in pale yellow to light green shade in the map and three with high vulnerability index of (55.36%, 53.83%, 50.13%) shown in greenish blue shade respectively. It is therefore important to keep at low range the vulnerability indicators that would predispose community people in the effects of flooding during and after the event so that serious negative impacts will be prevented and at the same time recovery will be attained in the soonest time as possible before the next calamity beset in which such case is a common scenario in the Philippines or in some other region in the world where this kind of calamities are more common. The same is true to the knowledge, attitude and practices (KAP) of the community people in dealing those microorganisms before, during and after each flooding events.

Figure 5-7: Politico-Administrative Components on Flood Vulnerability Index of Poblacion 2

The Politico-administrative FVI of Poblacion 2 (Barangay Lukewright) include the following items: land use and management and structural design, the river's natural resources and natural features management and program (exposure indicator); governance which includes warning and evacuation, emergency response, and disaster recovery (susceptibility indicators); post-risk assessment and integration, sustainable community livelihood program, relocation site project, and the health and prevention program for E.coli, Leptospirosis, and Dengue fever mosquito (resilience indicators). The Local government units (LGU's) proper and maximum facilitation of the different programs of the national government is very important for it will also determines the fate of the community people in terms of how they would response, the available help and resources that they could have during the event, and how fast they could recover from the previous event before the next one comes.

Table 5-19: Politico-Administrative Component on Flood Resilience Index of Poblacion 2

RANK	Longitude (°E)	Latitude (°N)	Politico-Administrative FVI %
1	9.30206	123.30713	57.76
2	9.30243	123.30566	51.91
2	9.30215	123.30671	51.91
4	9.30227	123.30591	50.21
5	9.30214	123.30539	47.17
6	9.30206	123.30713	47.14
6	9.30236	123.30687	47.14
6	9.30236	123.30713	47.14
9	9.30276	123.30651	45.73
9	9.30288	123.30656	45.73
11	9.30243	123.30566	43.17
11	9.30240	123.30631	43.17
13	9.30235	123.30552	41.99
14	9.30169	123.30669	39.81
15	9.30225	123.30518	39.81
16	9.30207	123.30830	25.85
17	9.30218	123.30819	21.53
18	9.30323	123.30870	15.03

Figure 5-7 and Table 5.19 shows the Politico-Administrative FVI of Poblacion 2. The Politico-Administrative FVI in this community is generally in the medium high (41.99% to 57.76%) while 4 of the respondents are in the low range and one in the very low range (the different shades of blue from lighter to darker mirrors the degree of vulnerability from low to high as shown in the map) respectively. It is practically consistent within those ranges of vulnerability index. Thus, there is a need to look into consideration of some of the governmental program such as that of the strict and serious implementation of land use and management and structural design; strict observance and serious support to the river's natural resources and natural features and management program. Lastly, the governance itself in terms of the up to date giving of warning and evacuation before a flooding event occurs, and also particularly in facilitating disaster recovery particularly on the availability of techinical services offered and financial resources to support recovery process of the affected households while they are still in the evacuation centers or in the temporary shelters. In addition to that, coordination among those involved were not facilitated properly. This is one of the major weak points in terms of governance that must be addressed seriously.

Table 5-20: Overall Flood Vulnerability Index for Poblacion 2

RANK	Longitude (°E)	Latitude (°N)	Overall FVI
1	9.30206	123.30713	49.05
2	9.30206	123.30713	45.09
3	9.30169	123.30669	44.48
4	9.30235	123.30552	43.63
5	9.30243	123.30566	35.64
6	9.30243	123.30566	35.45
7	9.30227	123.30591	33.11
8	9.30225	123.30518	31.86
9	9.30214	123.30539	28.82
10	9.30215	123.30671	28.18
11	9.30236	123.30687	27.03
12	9.30236	123.30687	26.95
13	9.30276	123.30651	22.94
14	9.30288	123.30656	22.37
15	9.30240	123.30631	22.01
16	9.30218	123.30819	21.22
17	9.30207	123.30830	17.63
18	9.30323	123.30870	12.42

Table 5-20 shows the overall rating of Flood Vulnerability Index for Poblacion 2 (Barangay Lukewright) from the 18 households that were surveyed respectively. The lowest vulnerability is 12.42%. While the highest vulnerability index for this community is 49.05% which falls in the medium range vulnerability. If we look at the results, the disparity in terms of how they percieved and value preparedness and cooperation between households are on the same trend. Yet, there have been some weak points from the different components and indicators that were mentioned and discussed above that needs a practical consideration and must be addressed accordingly in order to lower more the vulnerability index among these households and in that way they will become more resilient and will have that sense of readiness in every natural calamity particularly of typhoons and flooding that may beset the place.

5.3 The Total E.coli counts (colony forming units or CFU's) per 100ml Water Sample during Dry and Wet Season from the Different Stations of the Banica River

Table 5-21: Total E.coli counts per 100mL for the month of March, 2013

Sampling Sites	E.coli Counts in 3/20/2013
Upstream	444/100 mL
Midstream 1	5667/100 mL
Midstream 2	4556/100 mL
Downstream 1	31667/100 mL
Downstream 2	34222/100 mL
Overall Average	15311/100 mL

As shown in table 5-21, downstream 2 (Barangay Calindagan and Tinago) registers the highest total E.coli counts for the month of March, 2013 followed by downstream 1 (Tabuc-tubig Bridge) , midstream 1 (Barangay Candau-ay and Cadawinonan Overflow), midstream 2 (Colon Extension Overflow, Barangay Taclobo) and upstream (City Pound Bridge, Barangay Balugo**)** respectively. It is important to note that midstream 1 has higher counts than midstream 2 which is located much further down the river. The overall average of the E.coli counts per 100 mL for the month of March is 15,311 cfu's/100 mL. It is also important to note that it rained the night before the sampling day thus it is observed from this table that the E.coli counts were higher compared to other months were it was not raining the night or day before the water sampling schedule.

Table 5-22: Total E.coli counts per 100mL for the month of April, 2013

Sampling Sites	E.coli Counts in 4/11/2013
Upstream	2222/100 mL
Midstream 1	667/100 mL
Midstream 2	11222/100 mL
Downstream 1	10000/100 mL
Downstream 2	21667/100 mL
Overall Average	9156/100 mL

For the month of April, downstream 2 (Barangay Calindagan and Tinago) has the highest counts per 100 mL followed by midstream 2 (Colon Extension Overflow, Barangay Taclobo), downstream 1 (Tabuc-tubig Bridge), upstream (City Pound Bridge, Barangay Balugo**),** and midstream 1 (Barangay Candau-ay and Cadawinonan Overflow)

respectively. During this sampling, upstream has significantly higher count (Table 5-22) than midstream 1 which is located further down the river. There was a light rain the night before and that same morning when water sampling was conducted thus again higher counts are observed than those of other months were it did not rain prior to the collection. The rain has probably drained the fecal materials from the nearby surroundings thus showing a high counts during the sampling.

Table 5-23: Total E.coli counts per 100mL for the month of May, 2013

Sampling Sites	E.coli Counts in 5/29/2013
Upstream	0/100 mL
Midstream 1	556/100 mL
Midstream 2	1667/100 mL
Downstream 1	16556/100 mL
Downstream 2	10778/100 mL
Overall Average	5911/100 mL

The water sampling in May showed that downstream 1 (Tabuc-tubig Bridge) has the highest E.coli counts per 100 mL followed by downstream 2 (Barangay Calindagan and Tinago), midstream 2 (Colon Extension Overflow, Barangay Taclobo), midstream 1 (Barangay Candau-ay and Cadawinonan Overflow) and upstream (City Pound Bridge, Barangay Balugo**)** respectively as shown in Table 5-23. The upper and midstream part of the river stay consistent to have lower counts of E.coli in that part of the river. The zero (0) count does not necessarily mean zero bacteria but it simply means that the number of bacteria per 100 mL is undetectable thus it registered zero or no growth of colonies. As expected, there should be less E.coli in the upper stream portion of the river because there are few houses located immediately after the river banks and the water also appears very clear and clean although presence of animals were observed but no open drainage that is directly dispose into the river system. This part of the river looks pristine compared to those areas in the lower portion of the Banica River.

Table 5-24: Total E.coli counts per 100mL for the month of June, 2013

Sampling Sites	E.coli Counts in 6/25/2013
Upstream	0/100 mL
Midstream 1	111/100 mL
Midstream 2	111/100 mL
Downstream 1	16556/100 mL
Downstream 2	12889/100 mL
Overall Average	5933/100 mL

For the month of June, the E.coli counts from upstream (City Pound Bridge, Barangay Balugo) down to midstream 1 (Barangay Candau-ay and Cadawinonan Overflow) and midstream 2 (Colon Extension Overflow, Barangay Taclobo) were considerably low per 100 mL water sample. The downstream areas such as downstream 1 (Tabuc-tubig Bridge) and downstream 2 (Barangay Calindagan and Tinago) remained consistent with its higher counts respectively as shown in Table 5.24.

Table 5-25: Total E.coli counts per 100mL for the month of July, 2013

Sampling Sites	E.coli Counts in 7/17/2013
Upstream	0/100 mL
Midstream 1	556/100 mL
Midstream 2	3111/100 mL
Downstream 1	6333/100 mL
Downstream 2	444/100 mL
Overall Average	2089/100 mL

The month of July has the lowest E.coli counts among all the 5 consecutive months of water sampling. Though, it is still considerably high when compared to the acceptable value of at-risk concentration levels at a one-time concentration or sampling which is 235 CFU's or E.coli colonies/ 100 mL set by the Environmental Protection Agency (Environmental Protection Agency or EPA, 2012). Downstream 1 (Tabuc-tubig Bridge) showed the highest counts followed by midstream 2 (Colon Extension Overflow, Barangay Taclobo). Upstream has zero (0) counts which simply means the number of E.coli is undetectable at this particular volume and concentration. The overall average total count is 2089/100 mL (Table 5.25).

5.4 The Overall Average E.coli counts per 100ml Water Sample during Dry and Wet Season from the Different Stations of the Banica River

Table 5-26: The Overall Average E.coli counts per 100mL during dry and wet season for Upstream (Station 1)

Sampling Period	E.coli Counts in Upstream
20-Mar-13	444/100 mL
11-Apr-13	2222/100 mL
29-May-13	0/100 mL
25-Jun-13	0/100 mL
17-Jul-13	0/100 mL
Overall Average	533/100 mL

For upstream 1 (City Pound Bridge, Barangay Balugo**)**, it registered the highest counts (2222/100 mL) for the month of April and followed by the month of March and the rest of the three remaining months (May, June, July) were all zero (0) counts but this doesn't mean that there were no E.coli in the water but it simply implies that the numbers were too small to be detected at this particular dilution and volume. The average of E.coli counts in this station is 533cfu's/100 mL (Table 5-26) above the standard counts for safe recreational water which is 235 cfu's set by the Environmental Protection Agency (EPA). The upstream station is with few houses along the river and no open drainage that is connected to the river. Presence of animals were observed though nearby. The water in station 1 is much clearer and cleaner by visual inspection compared to other sites.

Table 5-27: The Overall Average E.coli count per 100mL during dry and wet season for Midstream 1 (Station 2)

Sampling Period	E.coli Counts in Midstream 1
20-Mar-13	5667/100 mL
11-Apr-13	667/100 mL
29-May-13	556/100 mL
25-Jun-13	111/100 mL
17-Jul-13	556/100 mL
Overall Average	1511/100 mL

The month of March registered the highest counts of E.coli (5667 cfu's/100 mL) for midstream 1 (Barangay Candau-ay and Cadawinonan Overflow) followed by the months of April, May, July and June respectively. The average count for the entire 5 months of sampling is 1511 cfu's/100 mL which is way higher than the set values for recreational waters which is 235 cfu's/100 mL. The E.coli count for the month of June (111 cfu's/100 mL) (Table 5-27) is lower than the 235 cfu's/100 mL set by EPA. This station is lined with houses along the river banks and domesticated and farm animals were observed in the vicinity. In addition, this area is less than a kilometer from the dumping site of Dumaguete City located along the river bank where all sorts of rubbish are dumped. Possible seepage and contamination may have been introduced into the river contributing to its high counts.

Table 5-28: The Overall Average E.coli counts per 100mL during dry and wet season for Midstream 2 (Station 5)

Sampling Period	E.coli Counts in Midstream 2
20-Mar-13	4556/100 mL
11-Apr-13	11222/100 mL
29-May-13	1667/100 mL
25-Jun-13	1667/100 mL
17-Jul-13	3111/100 mL
Overall Average	4445/100 mL

For station 3 or midstream 2 (Colon Extension Overflow, Barangay Taclobo) the highest counts (11,222 cfu's/100 mL) was in the month of April followed by March, July, May and June respectively. The average count for the entire 5 months of sampling is 4445 cfu's/100 mL (Table 5-28) which is generally high than the set standard of 235 cfu's/100 mL by the EPA. Station 3 covers 2 big communities namely Barangay Batinguel and Barangay Taclobo with several houses located along the river banks, open drainage system were observed and end up into the Banica River. The water looks murky, dirty and polluted visually compared to stations 2 and 1.

Table 5-29: The Overall Average E.coli counts per 100mL during dry and wet season for Downstream 1 (Station 7)

Sampling Period	E.coli Counts in Downstream 1
20-Mar-13	31667/100 mL
11-Apr-13	10000/100 mL
29-May-13	16556/100 mL
25-Jun-13	111/100 mL
17-Jul-13	6333/100 mL
Overall Average	12933/100 mL

Downstream 1 (Tabuc-tubig Bridge) or station 4 is second in terms of highest and average counts of E.coli among all the stations sampled. The highest count is 31667 cfu's/100mL in the month of March followed by the month of May (16556 cfu's/100mL), April (10000 cfu's/100 mL), July (6333/100 mL) and June (111cfu's/100 mL) respectively. The month of June in this station also registered a lower count of 111 cfu's/100 mL (Table 5-29) which is lower than the standard set by EPA (235 cfu's/ mL). The average count for the entire 5 months of sampling is very high (12,933 cfu's/100 mL). Downstream 1 has also several houses along the river banks and open drainage system that drains into the river is highly observed. Domesticated animals were also

observed in the vicinity. The water in the river is also much dirtier, muddy and polluted as compared to the three upper stations (upstream, midstream 1 and 2) respectively.

Table 5-30: The Overall Average counts per 100mL during dry and wet season for Downstream 2 (Station 8)

Sampling Period	E.coli Counts in Downstream 2
20-Mar-13	34222/100 mL
11-Apr-13	21667/100 mL
29-May-13	10778/100 mL
25-Jun-13	12889/100 mL
17-Jul-13	444/100 mL
Overall Average	16000/100 mL

Downstream 2 (Barangay Calindagan and Tinago) or station 5 has the highest E.coli counts (34222 cfu's/100 mL) among all the 5 stations sampled. It also has the highest average counts for the 5 consecutive months sampling period (16,000 cfu's/100 mL). The month of March registered the highest counts followed by the month of April, June, May, and July respectively (Table 5.30). The counts are incredibly high compared to the acceptable safe counts set by EPA which is 235 cfu's/100 mL water sample. It was observed that along downstream 2 there were several houses located along the river banks and with many open drainage system drained into the river. Domesticated animals were also observed in the area. The water is much more polluted, muddy and murky, from all the rest of the sampling sites. Furthermore, stagnation in some areas due to rubbish and accumulation of sediments in some areas of the river were observed. In addition, during high tide phenomenon, a reverse flow stagnate the outgoing flow from the river which may accumulate the floating bacteria such as E.coli and other pollutants before it is released into the sea. Thus, this could be the possible explanation why downstream 2 had the highest E.coli counts from the rest of the sampling area.

5.5 Assessment on Flood Resilience Adaptation Strategies in Dumaguete City Solicited from the Household Respondents of the 12 Communities

This research work has made some assessment on the flood resilience adaptation strategies implemented in Dumaguete City, Negros Oriental. There are 20 questions given to the 357 household respondents from the 12 communities surveyed that relates on resilience adaptation strategy of the city. Table 5-31 to table 5-50 are the results of their responses to each of the items.

Table 5-31: Implementation and monitoring of the policies, plans and programs for the different natural calamities particularly typhoons and flooding events

COMMUNITY	%
Tabuc-tubig	88.00
Batinguel	76.30
Poblacion 2	76.24
Poblacion 1	75.44
Bagacay	75.32
Calindagan	72.94
Cadawinonan	72.80
Taclobo	71.74
Balugo	73.00
Candau-ay	70.82
Junob	70.00
Poblacion 8	68.96
Overall Average	74.30

In terms of implementation and monitoring of the policies, plans, and programs particularly on typhoon and flooding, Barangay Tabuc-tubig gave the highest score (88.00%) indicating that it is well implemented and monitored. On the other hand, Poblacion 8 gave the lowest score (68.96%) among the 12 communities though it is still a favorable score. The overall average score given for this item is 74.30% which is favorably high (Table 5-31).

Table 5-32: Transparency and trustworthiness of the LGU's in terms of the facilitation and distribution of the budget and donations for the affected population in the community during calamity

COMMUNITY	%
Tabuc-tubig	92.00
Poblacion 1	69.08
Cadawinonan	68.80
Taclobo	66.60
Junob	62.50
Poblacion 8	62.06
Bagacay	62.00
Candau-ay	60.56
Batinguel	60.52
Calindagan	60.00
Poblacion 2	57.60
Balugo	52.94
Overall Average	64.56

The transparency and trustworthiness of the LGU's in terms of the facilitation and distribution of the budget and donations for the affected population in the community during calamity scored generally high (Table 5-32) with Barangay Tabuc-tubig indicating 92.00% on its assessment while Barangay Balugo scored 52.94% for this item. The overall average score is 64.56% which indicates a good score though generally most of the communities the scoring is from 52.00% to 69.00% respectively.

Table 5-33: Livelihood and financial aid for the community people to help them recover again from such calamity

COMMUNITY	%
Tabuc-tubig	76.00
Poblacion 1	69.08
Poblacion 8	65.50
Bagacay	64.00
Cadawinonan	62.50
Taclobo	61.58
Junob	61.24
Candau-ay	60.82
Batinguel	59.46
Calindagan	58.26
Poblacion 2	56.24
Balugo	46.24
Overall Average	61.74

For the livelihood and financial support for the affected communities, the score is generally lower than the previous items with Barangay Balugo giving 46.24% on its assessment which is below 50.00%. While Barangay Tabuc-tubig gave 76.00% respectively. The range of the scoring is within 46.00% to 76.00% (Table 5-33). If we look at the transparency and trustworthiness score in Table 5.32, the scoring range is more or less within the same bracket.

Table 5-34: Programmes and policies in saving and protecting the Banica River

COMMUNITY	%
Tabuc-tubig	74.20
Poblacion 1	70.90
Batinguel	70.52
Cadawinonan	70.00
Poblacion 8	69.28
Bagacay	67.34
Taclobo	65.80
Calindagan	64.54
Candau-ay	63.04
Junob	61.24
Poblacion 2	60.00
Balugo	48.22
Overall Average	65.42

Generally, the scores for the programs and policies in saving and protecting the Banica River are high. With Barangay Balugo giving the lowest assessment (48.22%) and Barangay Tabuc-tubig giving the highest assessment score (74.20%). In spite that this item receives a favorable score among the 12 communities, it was sad to observe that programs and policies in saving and protecting the Banica River is not well implemented and well respected by the community people (Table 5.34). The open drainage system that ends up in the river, the throwing of garbage into the river, and some illegal activities along the river such as small scale quarrying is visible.

Table 5-35: Cooperation of the community people including you (household respondents) in protecting the Banica River

COMMUNITY	%
Tabuc-tubig	86.00
Batinguel	75.78
Poblacion 1	75.22
Cadawinonan	72.80
Calindagan	71.30
Taclobo	71.10
Poblacion 8	70.34
Candau-ay	70.26
Junob	70.00
Poblacion 2	68.74
Bagacay	68.66
Balugo	67.04
Overall Average	72.27

The cooperation of the community people in protecting the river is generally high. Barangay Tabuc-tubig is again topping the list and Barangay Balugo also consistently on the bottom list giving low scores among the 12 communities though in this item, 67.04% is considerably high (Table 5-35). Unfortunately, that cooperation is not very visible in some areas though in some communities, others are trying their best to keep the river clean by cleaning and removing stagnated garbage. The researcher has personally witnessed such activity in Poblacion 8.

Table 5-36: On the drainage systems

COMMUNITY	%
Poblacion 1	70.90
Poblacion 8	65.52
Bagacay	65.72
Calindagan	65.22
Cadawinonan	64.80
Tabuc-tubig	64.00
Poblacion 2	63.76
Taclobo	63.48
Candau-ay	62.64
Batinguel	62.62
Balugo	51.76
Junob	48.76
Overall Average	62.43

The assessment of the drainage system along the river banks varies from 48.76% to 70.90%. Barangay Junob gave the lowest assessment score (48.76%) while Poblacion 1 gave the highest assessment score (Table 5-36). It is surprising to note that those communities near the city center and downstream find it favorable to have that kind of open drainage system that ends in the river. Most communities located in the mid and upstream of the river are more conscious about this open drainage system except for Barangay Cadawinonan which happens to give a positive score of 64.80% on this item. Ocular visits proved the upstream to be much cleaner and much preserved than those in the downstream part of the Banica River.

Table 5-37: On the dike systems

COMMUNITY	%
Poblacion 1	74.54
Bagacay	71.34
Cadawinonan	70.40
Batinguel	68.42
Calindagan	68.18
Poblacion 8	66.42
Poblacion 2	65.00
Balugo	64.70
Junob	63.76
Taclobo	63.18
Candau-ay	62.22
Tabuc-tubig	62.00
Overall Average	66.68

The flood barrier system (dike system) of Dumaguete City is protecting some areas and communities in the city but not the whole stretch of the river is built with these flood barriers. There are open spaces with exposed households who are basically living in the flood plains. In some areas the dike system is well maintained and is still functioning though the city government is trying to make this as a priority by putting up and filling up a dike system in those open spaces where there's exposed population. Generally the assessment score for the dike system of the city is favorable (62.00% to 74.54%) respectively with an overall average score of 66.68% (Table 5-37).

Table 5-38: On the bridge system

COMMUNITY	%
Tabuc-tubig	84.00
Poblacion 1	80.90
Poblacion 8	72.14
Cadawinonan	70.40
Bagacay	70.00
Calindagan	69.56
Poblacion 2	67.50
Batinguel	66.84
Junob	66.26
Taclobo	63.18
Candau-ay	61.94
Balugo	61.34
Overall Average	69.51

There are three good and high bridge system in the city and are shared with the following Barangays; Poblacion 1, Calindagan, Poblacion 2, Tabuc-tubig, and Poblacion 8. The rest are overflow-bridges seen among the rest of the communities. It is built in a very low height and causes blockage during flooding events or rainy season. Basically, the assessment score is very high ranging from 61.34% to 84.00% respectively, with an overall average score of 69.51% (Table 5-38).

Table 5-39: On the community flood hazard maps

COMMUNITY	%
Poblacion 1	71.42
Tabuc-tubig	71.00
Cadawinonan	70.40
Poblacion 8	69.68
Calindagan	66.94
Balugo	65.10
Poblacion 2	65.00
Bagacay	64.82
Taclobo	61.62
Junob	60.00
Batinguel	60.00
Candau-ay	57.46
Overall Average	65.29

Barangay Candau-ay was the pilot community for the flood drill activity preparedness conducted last June, 2013. But, surprisingly the community people seemed to be not so

aware about their community flood map with only 57.46% assessment score (Table 5-39). The researcher has seen and has procured the said flood map. There is a need of proper dissemination of information to the entire community so that community people will be more aware and will be more prepared.

Table 5-40: The use of backhoe in cleaning the Banica River especially when normal flow is blocked

COMMUNITY	%
Tabuc-tubig	78.00
Bagacay	64.42
Poblacion 8	63.44
Cadawinonan	63.20
Calindagan	61.72
Poblacion 1	60.90
Taclobo	59.68
Candau-ay	58.88
Balugo	58.82
Junob	57.50
Batinguel	54.22
Poblacion 2	52.50
Overall Average	61.11

With regards to the use of backhoe in cleaning the Banica river when the normal flow is blocked, the assessment score is favorably high ranging from 52.50% to 78.00% and an overall average score of 61.11% respectively (Table 5-40). The city government is quite quick enough to clean up the river after every flooding episode to facilitate normal flow before the next flooding event besets.

Table 5-41: Distribution of donations, goods and relief

COMMUNITY	%
Tabuc-tubig	88.00
Cadawinonan	68.80
Poblacion 8	68.28
Poblacion 1	68.20
Junob	65.00
Taclobo	64.76
Bagacay	63.34
Candau-ay	62.22
Poblacion 2	60.00
Batinguel	57.90
Balugo	56.26
Calindagan	55.66
Overall Average	64.87

This item has also received a good and positive score assessment ranging from 55.66% to 88.00% and with an overall average score of 64.87% respectively. However, during the survey the researcher has received some negative claims and comments from the household respondents of Barangay Batinguel and Poblacion 2 claiming that the distribution of donations, goods and relief were not fairly and appropriately distributed. There were those who were badly affected (for example, houses that were completely damaged and wash away) that did not received a fair share while those that were only partially affected have received more than what they are supposed to received. Those household respondents have all pointed out political reasons as the main culprit for such uneven distribution of aid.

Table 5-42: Distribution of brochures and the information drive that would increase knowledge on the negative impacts from typhoon and flooding events for the purposes of prevention and recovery

COMMUNITY	**%**
Tabuc-tubig	82.00
Poblacion 8	73.10
Poblacion 1	70.00
Cadawinonan	70.00
Calindagan	68.70
Taclobo	68.26
Junob	67.50
Bagacay	67.34
Candau-ay	66.46
Batinguel	65.26
Balugo	64.70
Poblacion 2	60.00
Overall Average	68.61

It seems that the distribution of brochures and the information drive that would increase knowledge on the negative impacts from typhoon and flooding events for the purposes of prevention and recovery is well disseminated among the 12 communities surveyed. The assessment scores were high ranging from 60.00% to 82.00% and with an overall average score of 68.61% respectively (Table 5-42). Again, in some aspects of information drive such as that of community flood maps, it has to be made tangible to the community people so that they will have a thorough understanding of the preparedness and resilience strategies conducted by the city and barangay government units.

Table 5-43: On the flood warning systems

COMMUNITY	%
Tabuc-tubig	82.20
Cadawinonan	75.84
Poblacion 8	73.10
Poblacion 1	70.90
Balugo	70.60
Calindagan	70.44
Poblacion 2	68.76
Taclobo	65.40
Candau-ay	65.00
Junob	65.00
Bagacay	64.66
Batinguel	64.32
Overall Average	69.69

At the moment, there is no concrete presence of a flood warning device that is put up nearby to these 12 communities. Word of mouth, traditional warning noises and mobile connection among community officials served as warning systems. Some painted water level signals are written on the walls of the dike system in some areas like those found in Barangay Candau-ay, Balugo, and Cadawinonan that gives hint for the community people for emergency evacuation. Unfortunately, not all communities are as equipped and as well coordinated. The assessment score on this item (Table 5-43) is very favorable (69.69%).

Table 5-44: Preparedness and flood drill activity in the community to increase resilience from typhoons and floods

COMMUNITY	%
Tabuc-tubig	84.00
Cadawinonan	70.84
Poblacion 8	68.28
Poblacion 1	67.62
Calindagan	66.08
Bagacay	66.00
Poblacion 2	65.00
Junob	64.00
Taclobo	63.22
Candau-ay	63.88
Batinguel	58.94
Balugo	58.82
Overall Average	66.39

The assessment score on the preparedness and flood drill activity in the community to increase resilience from typhoons and floods is also very favorable except to a few communities like Barangay Batinguel and Balugo (58.94% and 58.82%) respectively (Table 5-44). After this survey was conducted, Barangay Candau-ay along with Barangay Balugo a major flood preparedness drill was initiated by the local government and the barangay officials last June 2013.

Table 5-45: Response and preparedness of the DRRMC, PDRRMC, and other NGO volunteers during rescue events

COMMUNITY	**%**
Bagacay	84.28
Balugo	81.18
Poblacion 8	80.72
Tabuc-tubig	80.00
Calindagan	77.40
Candau-ay	77.22
Poblacion 2	77.14
Taclobo	75.86
Cadawinonan	75.66
Junob	75.00
Batinguel	74.22
Poblacion 1	72.40
Overall Average	77.59

This particular item on the response and preparedness of the DRRMC, PDRRMC and other NGO volunteers during rescue events garnered a very high scores indicating that these rescue groups are doing well in their rescue efforts. The scores were all generally high from all the 12 communities surveyed ranging from 72.40% to 84.28% and with an overall average of 77.59% respectively (Table 5-45).

Table 5-46: The basic emergency and relief services such as food, water, sanitation, transportation, communication, medical help, provisional repairs of damaged properties

COMMUNITY	%
Tabuc-tubig	82.00
Poblacion 8	79.32
Balugo	77.64
Cadawinonan	76.80
Bagacay	75.34
Candau-ay	75.00
Poblacion 1	73.64
Taclobo	72.70
Poblacion 2	72.00
Calindagan	71.30
Batinguel	69.48
Junob	61.26
Overall Average	73.87

The basic emergency and relief services such as food, water, sanitation, transportation, communication, medical help, provisional repairs of damaged properties were also been well distributed during emergency and post-calamity situations. The assessment scores were favorably high from 61.26% to 82.00% and with an overall average score of 73.87% respectively (Table 5-46).

Table 5-47: Operation clean-up affected places, giving of insurances, claims, financial aids, traumatic and psychological stress debriefings

COMMUNITY	%
Tabuc-tubig	90.00
Poblacion 8	73.80
Poblacion 1	72.72
Cadawinonan	72.00
Candau-ay	69.72
Taclobo	68.58
Bagacay	66.66
Junob	65.00
Balugo	64.70
Poblacion 2	63.76
Batinguel	63.16
Calindagan	62.60
Overall Average	69.39

Although these items have received a favorable high scores (Table 5-47) ranging from 62.60% to 90.00% respectively yet there are some household respondents who claimed

that the distribution of claims and financial aids and the psychological debriefings were not enough and not well facilitated. There is a need of psychological debriefings that has to be given to affected households to minimize the trauma that they have experienced. Financial aids from the government and donating agencies must be made sure that it has reached those community people that were affected.

Table 5-48: Relocation sites provided by the LGU's to those who were affected from the last flooding and to those who live in the flood prone area

COMMUNITY	%
Tabuc-tubig	86.00
Cadawinonan	76.60
Balugo	76.48
Poblacion 8	74.48
Poblacion 1	73.64
Calindagan	68.70
Taclobo	68.26
Poblacion 2	66.26
Candau-ay	65.56
Junob	63.76
Batinguel	61.58
Bagacay	54.48
Overall Average	69.65

The assessment scores for the relocation sites provided by the LGU's to those who were affected from the last flooding and to those who live in the flood prone area is high (54.548% to 86.00%) as shown in Table 5-48. Two relocation sites were provided by the city government and by a non-governmental organization that provided 200 houses more or less. For those who have received were very lucky but there were still a few who have not been relocated and would like to be relocated in a safer place. They have been staying in those temporary houses/tents two years after the flash flood and still waiting to be relocated but unfortunately, the city government has no place for them at the moment. Long term plans and goals must be a priority of the city and making sure in the implementation of building codes and illegal settlers along the river banks must be strictly implemented and followed to avoid such an unfortunate events.

Table 5-49: Health programmes for diarrhoae and Leptospirosis such as medical help, information drive and among others so outbreaks can be prevented

COMMUNITY	%
Tabuc-tubig	86.00
Cadawinonan	78.40
Poblacion 8	71.12
Poblacion 1	70.90
Bagacay	70.66
Taclobo	67.94
Calindagan	66.96
Poblacion 2	66.26
Junob	66.26
Candau-ay	66.12
Batinguel	64.74
Balugo	63.54
Overall Average	69.91

Health programs for diarrhea and Leptospirosis such as medical help, information drive and among others so outbreaks can be prevented were well facilitated and disseminated in the communities as seen in these assessment scores (63.54% to 86.00%) respectively (Table 5-49). However, there were 161 cases of diarrhea and 8 cases of leptospirosis among the household respondents that were surveyed. Moreover, diarrhea is also part of the top 10 leading causes of morbidity in Dumaguete City from 2010-2012 respectively (Table 1.8, 1.9, and 1.10). Leptospirosis is not on the top 10.

Table 5-50: Different prevention and control programmes for Dengue Fever infection such as fogging, chemical/biological control, information drive brochures, lectures, clean-up

COMMUNITY	%
Tabuc-tubig	88.00
Cadawinonan	78.40
Bagacay	78.00
Poblacion 8	75.86
Taclobo	74.92
Candau-ay	73.34
Poblacion 1	72.72
Junob	72.50
Balugo	69.42
Calindagan	68.70
Poblacion 2	66.26
Batinguel	62.64
Overall Average	73.40

The assessment on the different prevention and control programs for Dengue Fever infection such as fogging, chemical/biological control, information drive brochures, lectures, clean-up were also well facilitated and implemented in the communities. The assessment scores were very high ranging from (62.64% to 88.00%) respectively (Table 5-50). In spite of these efforts, there were 67 cases of dengue fever among the community households that were surveyed. In addition, dengue fever is also part of the city's top 10 leading causes of morbidity in Dumaguete City for the year 2010 and 2012 respectively (Table 1.8 and table 1.10).

Table 5-51: Assessment on Flood Resilience Adaptation Strategies solicited from the Local Government Units (LGU's) and the Non-Governmental Organizations (NGO's) and from the Household Respondents

Flood Resilience Adaptation Strategies with the Corresponding Respondents	%
A. Governance	
Local Government Units (LGU's) and Non-Governmental Organizations (NGO's) Respondents	65.89
Household Respondents	70.54
B. Sustainable Community Livelihood	
Local Government Units (LGU's) and Non-Governmental Organizations (NGO's) Respondents	59.33
Household Respondents	61.74
C. The River's Natural Resource and Natural Features' Management	
Local Government Units (LGU's) and Non-Governmental Organizations (NGO's) Respondents	60.33
Household Respondents	68.85
D. Land Use and Management and Structural Design	
Local Government Units (LGU's) and Non-Governmental Organizations (NGO's) Respondents	59.98
Household Respondents	66.21
E. Risks Knowledge-Post Risk Assessment Integration	
Local Government Units (LGU's) and Non-Governmental Organizations (NGO's) Respondents	63.17
Household Respondents	68.17

Generally the assessment score on flood resilience adaptation strategies that were solicited from the Local Government Units (LGU's) and the Non-Governmental Organizations (NGO's) and from the household respondents were high except for the items on disaster recovery (57.47%) as shown in Table 5-51 that needs to be improved and facilitated accordingly in the community level.

This section below presents the overall results and discussions of the study. It is presented in tables and maps for better understanding with the corresponding discussions and analysis. The overall results of the twelve (12) communities selected as the research area for the application of the Community-Based Flood Vulnerability Index (FVI) for urban flooding will be presented, discussed and analyzed in a detailed manner and finishing it with the overall results of the FVI in Dumaguete City, Negros Oriental Philippines.

5.6 The Overall Results for the Flood Vulnerability Index (FVI) of Dumaguete City

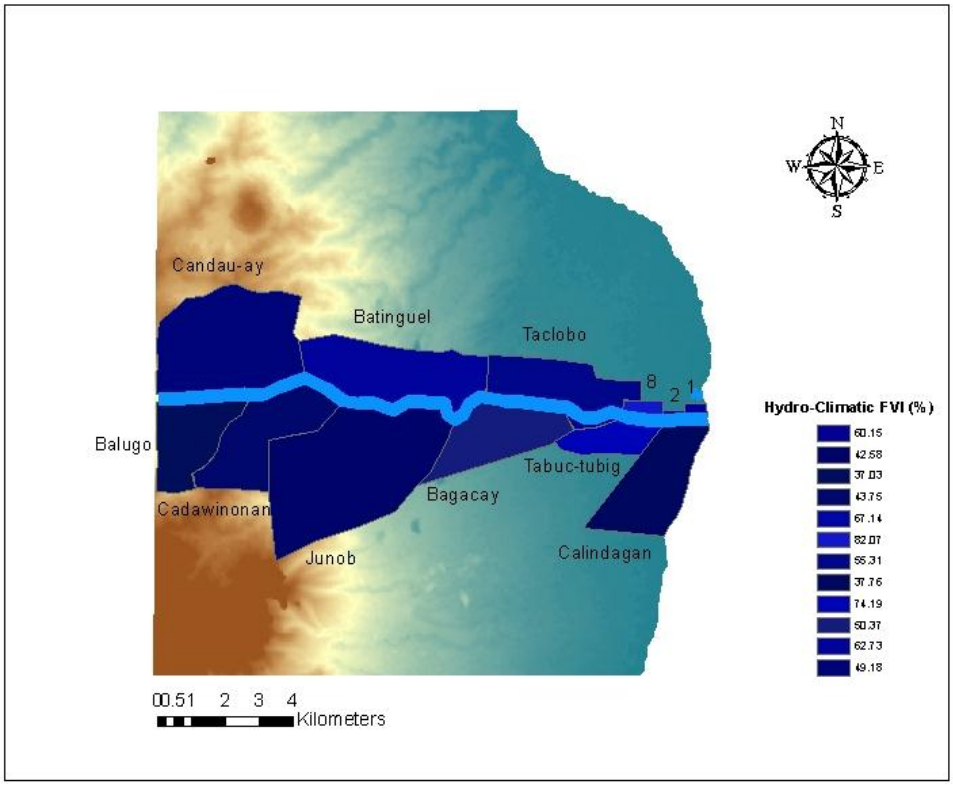

Figure 5-8: Hydro-Climatic Component of Flood Vulnerability Index

The values of the hydro-climatic component and its indicators were used for Equation 2 as described in chapter 4. In this study, the researcher included susceptibility and resilience in computing for the hydro-climatic component simply because the susceptibility and resilience factors influence the extent of vulnerability to these kinds of exposures thus it is considered in this research work. The result of the hydro-climatic FVI is shown in Table 5.52 in the succeeding pages. Six (6) indicators were used to determine the hydro-climatic FVI values. After examining the hydro-climatic

components, it can be seen that Poblacion 8 (82.07%) is the most vulnerable as shown in Figure 5-8 above. This can be attributed to a slightly lower values in the land use and management and structural design as part of its resilience strategies wherein the other leading communities for instance Batinguel, ranks first in terms of exposure it has a slightly higher values for its the land use and management and structural design thus in the overall vulnerability index for hydro-climatic component it only ranks 4th. Tabuc-tubig and Poblacion 2 (Lukewright) follows next to Poblacion 8 respectively. Those who are in the top 3 follows the same pattern wherein, the land use and management and structural design values are low to medium and with very high exposures in terms of the height of flooding and the number of houses reached by floods. Poblacion 1 (Tinago) ranks 5th with a very high exposure to floods in terms of height in flooding but has a high value in the land use and management and structural design (resilience) thus putting it in a much lower vulnerability. The least vulnerable communities are Barangay Balugo (37.03%) and Calindagan (37.76%). However, this does not imply that these communities are not vulnerable to fluvial flooding. All these communities have already been subject to urban river flooding for the past years with loss of lives and significant cost of damaged from properties. Its reason for its least vulnerability is attributed to low exposure to floodwaters wherein most houses of Balugo community were situated on an elevated area while Calindagan has very high values for the land use and management and structural design.

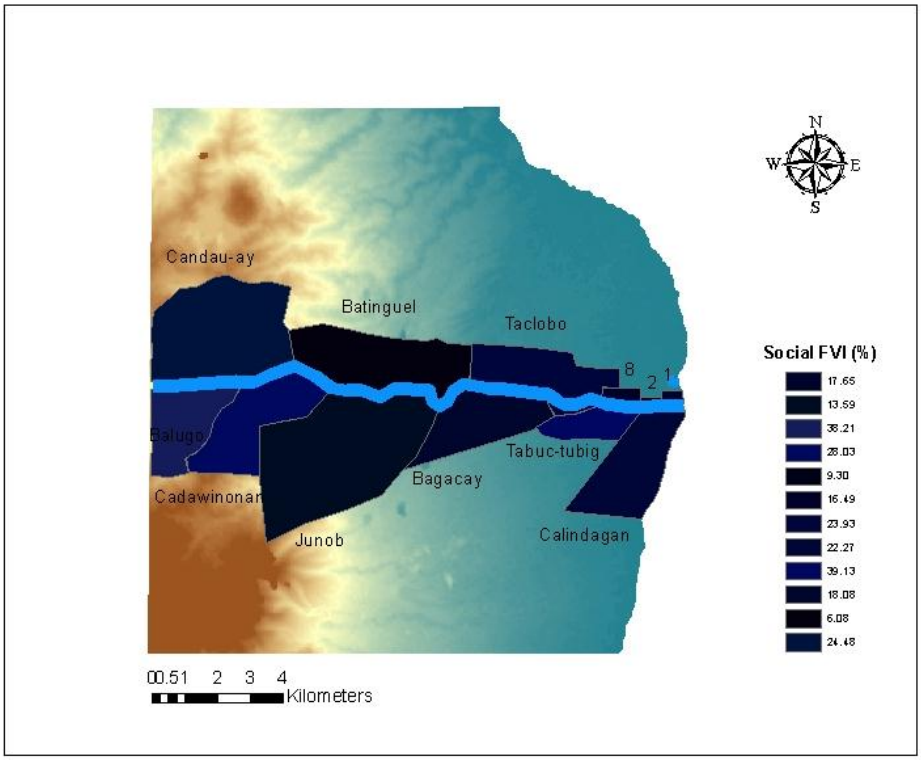

Figure 5-9: Social Component of Flood Vulnerability Index

The values of the social component indicators were used for Equation 3, as described in chapter 4. The results of the social component are shown in Table 5-52. There are five indicators from this component, belonging to all factors of vulnerability, but assigned correspondingly as exposure factor, susceptibility and resilience factors and were used to determine the social FVI values. These indicators include the following: open disposal of animal waste, unwillingness to vacate and be relocated, educational attainment (high school level and below), water treatment or sterilization practice, and social networks. These 5 indicators have an effect on flood exposure and possible disease outbreak before, during and after any flood event which is another major focus of this study. Using these indicators, Tabuc-tubig (39.13%) stands out to be the most vulnerable to possible disease outbreak due to its high values of practice in open disposal of animal waste (95.00%) and with very low values for water treatment or sterilization practice (20.00%).

Barangays Balugo and Cadawinonan follow respectively. Unwillingness to vacate with extremely low values makes Balugo vulnerable to future urban river flooding and with similar reasons for Cadawinonan. Batinguel and Poblacion 2 (Lukewright) are the least

vulnerable to fluvial flooding when it comes to social component for the following reasons: the scores for water treatment practices and social networks among their neighborhoods are very good and with a very high educational attainment. Poblacion 2 (Lukewright) follows the same pattern of results. Communities along the river have high social resilience as depicted in Figure 5-9.

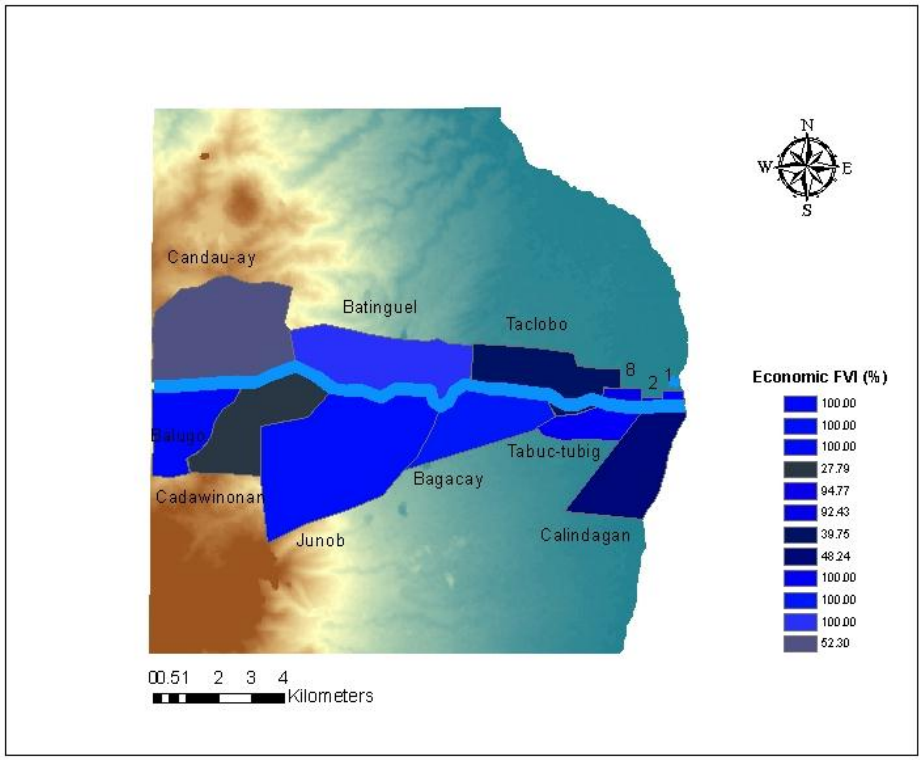

Figure 5-10: Economic Component of Flood Vulnerability Index

The economic FVI values were computed using its indicators, and were used in equation 4, as described in chapter 4. The results of the economic components are shown in Table 5-52.There are seven (7) indicators in this category and were assigned accordingly as exposure indicators, susceptibility and resilience indicators and were used to compute for the economic FVI. The indicators are the following; houses with no access to improved sanitation and no access to improved water source, presence of rats in the vicinity, and presence of water logged in the area are part of the exposure factors. While housing conditions comprise the susceptibility indicator. Family income and property insurance are placed in the resilience factor.

This component and indicators has an impact in the vulnerability of the community people in terms of their exposure to the different risks factors but at the same time, the

susceptibility and resilience factors also determines their overall vulnerability, thus it is important to look at the interplay of these factors on how they affect each other.

Using the economic components, communities like Tabuc-tubig, Junob, Poblacion 1, Balugo, Bagacay, Batinguel, Poblacion 2 (Lukewright) and Poblacion 8, all of them are highly vulnerable with a 100.00%, 94.77%, and 92.43% scores respectively for their FVI in the economic components (Figure 5-10). Mainly, these can all be attributed to dirty environments (presence of rats in the vicinity), poor housing conditions, low income and no insurance for property in most cases. Barangay Candau-ay, Calindagan, Taclobo and Cadawinonan are the least vulnerable communities in terms of economic components. These communities have good housing conditions, fairly good family income and have their property insured.

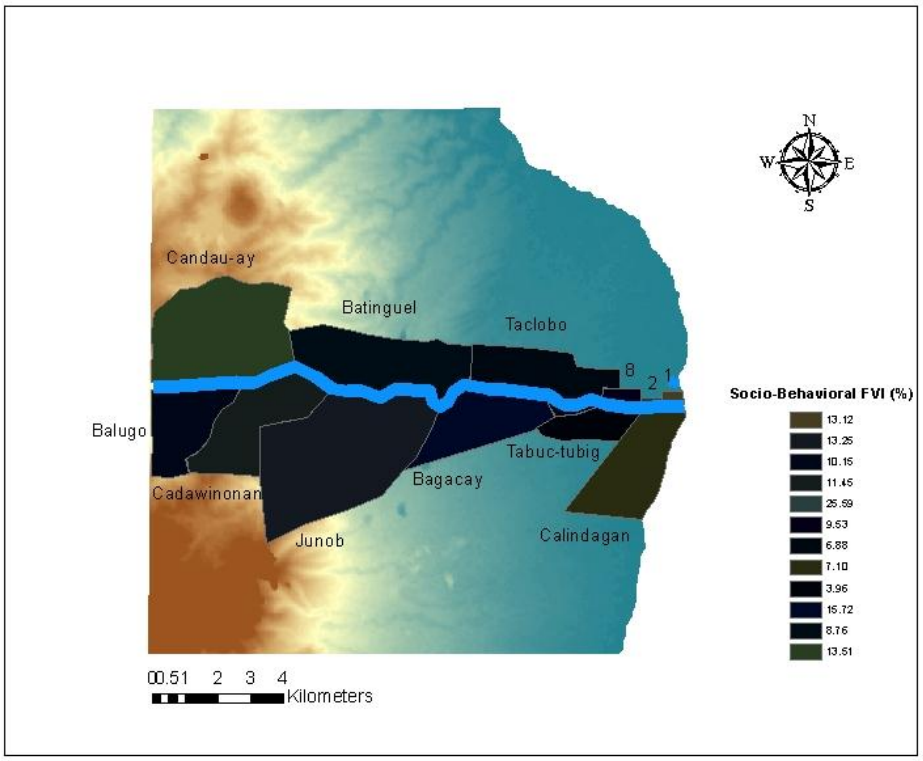

Figure 5-11: Socio-Behavioral Component of Flood Vulnerability Index

There are 12 indicators for the socio-behavioral component. The values were computed using Equation 5-8 described in chapter 4 and the results are shown in Table 5-52. Using these indicators Barangay 2 (Lukewright) with a score of 25.59% is the most vulnerable when it comes to KAP of flood resilience and KAP of prevention and management of diseases from E.coli, Leptospirosis and Dengue Fever. It is followed by

Bagacay and Candau-ay respectively. In spite that Barangay 2 showed a very high knowledge score (resilience) yet still ranks to be the most vulnerable due to high bad attitude (susceptibility) scores which is (68.62%). It follows the same pattern for those next in rank except that it's bad practice (exposure) rather than attitude that scores high in those cases. On the other hand, the least vulnerable community is Tabuc-tubig (3.96%) followed by Taclobo and Calindagan respectively (Figure 5-11). The common pattern for this is usually, knowledge (resilience) score is sufficiently high and with extremely low bad attitude (susceptibility) or extremely low bad practices (exposure) against flood resilience and in the exposure of those diseases associated with flooding.

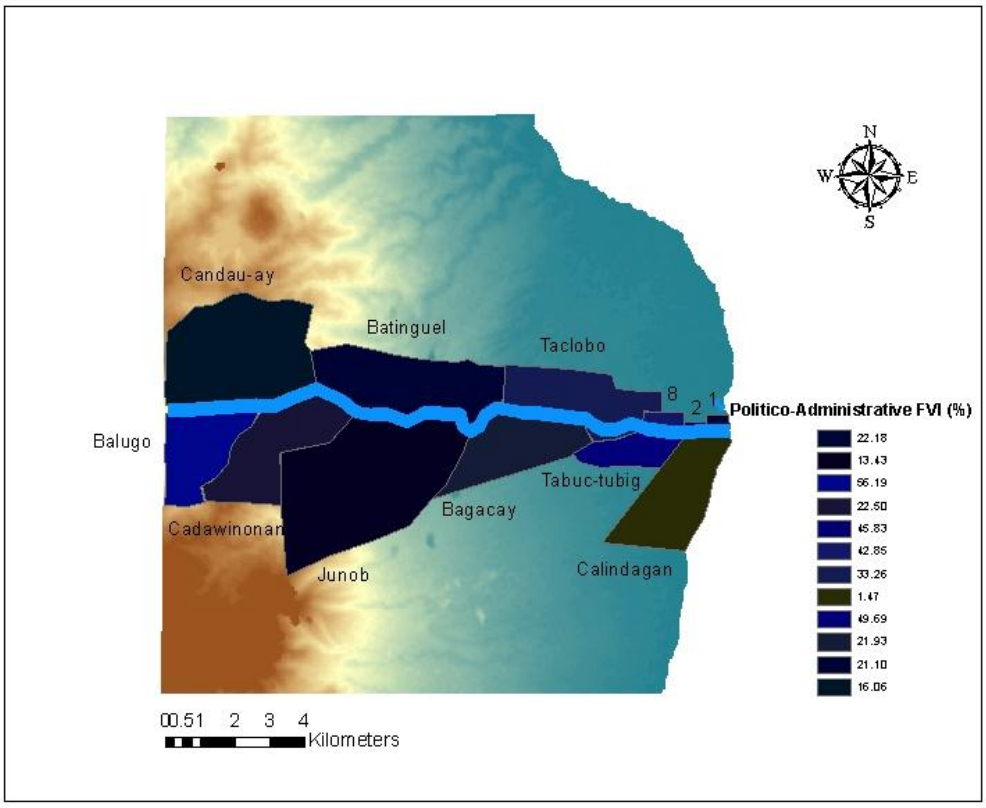

Figure 5-12: Politico-Administrative Component of Flood Vulnerability Index

The politico-administrative component of this study shows the involvement of institutional organizations in the flood management process, including those policies and programs that were laid prior to any catastrophic events and its long term adaptation strategies. These institutional organizations are composed of the following: the LGU's from each of the communities studied, the Local Disaster Risk Reduction Management Council (LDRRMC) of the City, the Provincial Disaster Risk Reduction

Management Council (PDRRMC) of the Province of Negros Oriental and some of the NGO's in Dumaguete City, namely; the Silliman Volunteer for Fire and Rescue Unit (SUVFRU), One Rescue EMS, the GIZ, and the CNDR-SMART. The computation of the values uses Equation 9 described in chapter 4.

As seen in Table 5-52, the most vulnerable politico-administrative is Barangay Balugo (56.19%) followed by Tabuc-tubig and Poblacion 2 respectively. This is due to low resilience score in some of the indicators under this component, like for instance, the post-risk assessment and integration (42.50%) and sustainable community livelihood (47.50%) and it follows the same for Tabuc-tubig and Barangay 2 where the lowest score for sustainable community livelihood (resilience) is 37.50% respectively. The latter 2 Barangays were consistent as they are highly exposed to flood hazards (hydro-climatic component) ranking 2nd and 3rd respectively. Surprisingly Balugo ranks the least exposed community in terms of flood hazard and its hydro-climatic component due to its high elevation from the river banks it ranks to be the most vulnerable when it comes to politico-administrative components simply because it also ranks second (57. 03%) for its exposure indicator and low resilience scores. Barangay Calindagan is the least vulnerable to this component with very high scores (76.29%) on its resilience strategies. Moreover, it also has good governance score (91.78%), thus making it the least vulnerable community when it comes to the politico-administrative components. Junob and Candau-ay follows respectively. Junob shows low exposure scores with good governance and high resilience. Same is true to Barangay Candau-ay it follows the same pattern with Barangay Junob respectively as all shown in Figure 5-12.

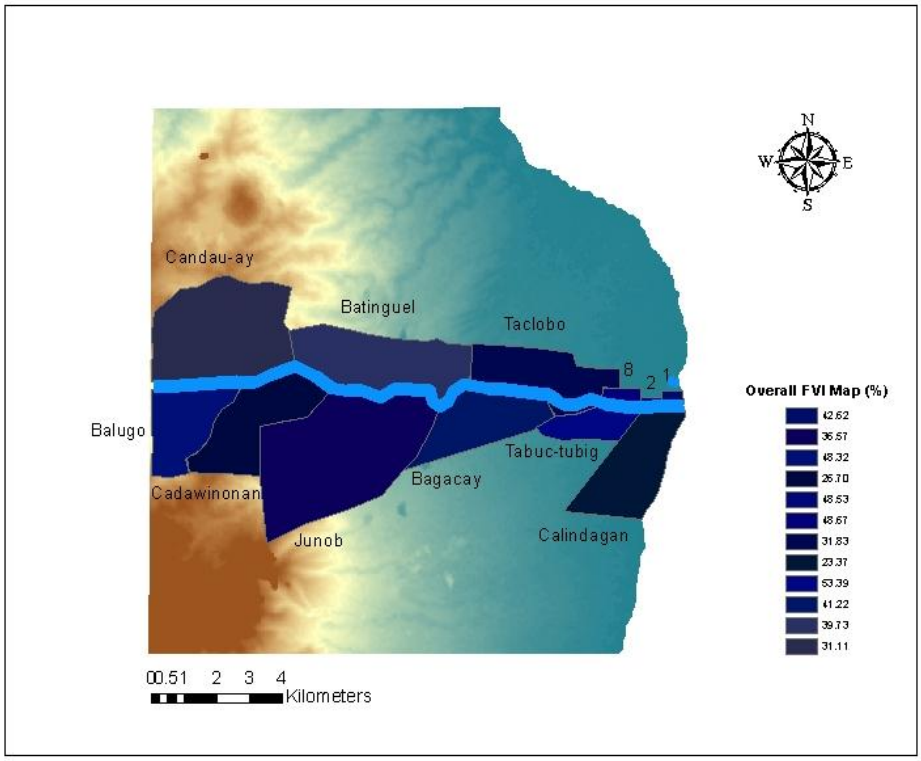

Figure 5-13: Overall Flood Vulnerability Index for the 12 Communities

Figure 6-6 and Table 5-52 shows the Overall Flood Vulnerability Index (FVI) of the twelve communities examined (39.34%). Tabuc-tubig is the most vulnerable to urban river floods (53.39%). Its vulnerability is owing to its high vulnerability index in economic and hydro-climatic components and low resilience to the latter. Poblacion 8 ranks 2nd in the overall result mainly because it has very high vulnerability to exposure (hydro-climatic factors). Barangay 2 (Lukewright) is next in line. It has high vulnerability to hydro-climatic exposure and politico-administrative components. Though the socio-behavioral is relatively low in vulnerability but it is still significant considering that it ranks highest in that component among the twelve communities. Barangay Balugo ranks 4th mainly because of high economic vulnerability and low resilience to hydro-climatic exposures and significantly higher in the politico-administrative index. Poblacion 1 (Tinago) is rank 5th, Bagacay on the 6th whom both similarly owing to high economic vulnerability, but for Bagacay it is significantly higher than the rest in terms of socio-behavioral component vulnerability. Batinguel ranks 7th, largely due to its very high economic vulnerability index and considerably high in the hydro-geological exposure factors. Junob is on the 8th rank owing to its high economic vulnerability. Taclobo is on the 9th rank, showing a considerable vulnerability in hydro-climatic exposure. Barangay

Candau-ay, Cadawinonan and Calindagan are the least vulnerable among the twelve communities respectively (Figure 5-13). All these three latter communities have very good resilience in most of the components examined.

Table 5.52: Overall FVI and the FVI of each the Five (5) Components

Community	OVERALL FVI	Hydro-Climatic FVI	Social FVI	Economic FVI	Socio-Behavioral FVI	Politico-Administrative FVI
Tabuc-tubig	53.39%	74.19%	39.13%	100%	3.96%	49.69%
Junob	36.57%	42.58%	13.59%	100.00%	13.25%	13.43%
Poblacion 1 (Tinago)	42.62%	60.15%	17.65%	100%	13.12%	22.18%
Calindagan	23.37%	37.76%	22.27%	48.24%	7.10%	1.47%
Balugo	48.32%	37.03%	38.21%	100.00%	10.15%	56.19%
Poblacion 2 (Lukewright)	48.53%	67.14%	9.30%	94.77%	25.59%	45.83%
Poblacion 8	48.67%	82.07%	16.49%	92.43%	9.53%	42.85%
Cadawinonan	26.70%	43.75%	28.03%	27.79%	11.45%	22.50%
Bagacay	41.22%	50.37%	18.08%	100.00%	15.72%	21.93%
Taclobo	31.83%	55.31%	23.93%	39.75%	6.88%	33.26%
Candau-ay	31.11%	49.18%	24.48%	52.30%	13.51%	16.06%
Batinguel	39.73%	62.73%	6.08%	100.00%	8.76%	21.10%

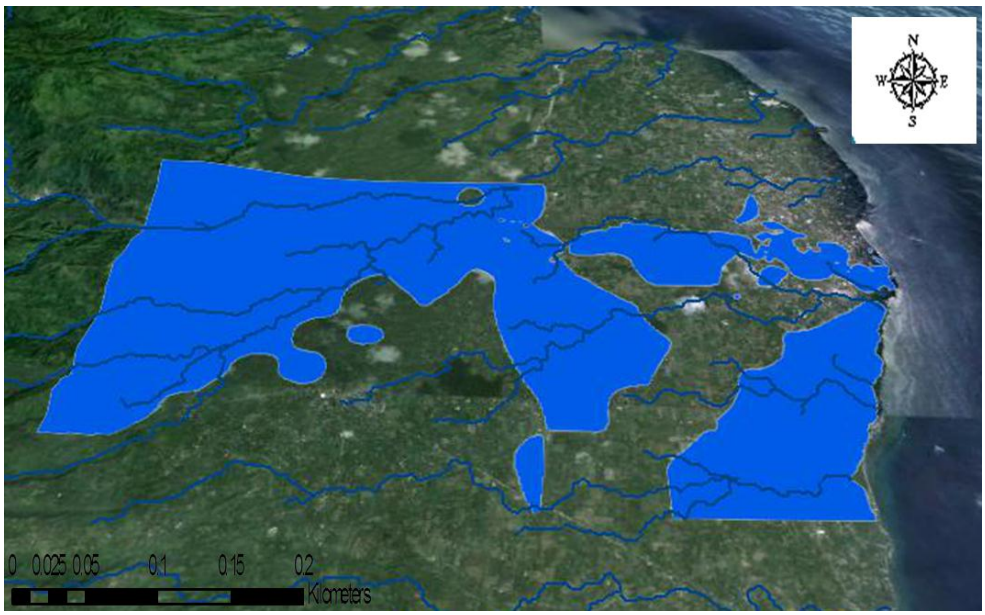

Figure 5-14: The Flood Map of Dumaguete City, Philippines

This is a very crude and simple flood map of Dumaguete City (Figure 5-14) generated from the history accounts of those household respondents that have experienced flooding for the past three years and from the 6 hour one month rainfall data. The blue colour indicates the spread of flooding from an overspill of Banica River and its tributaries around. Due to very limited data available the researcher has only generated this simple flood plan.

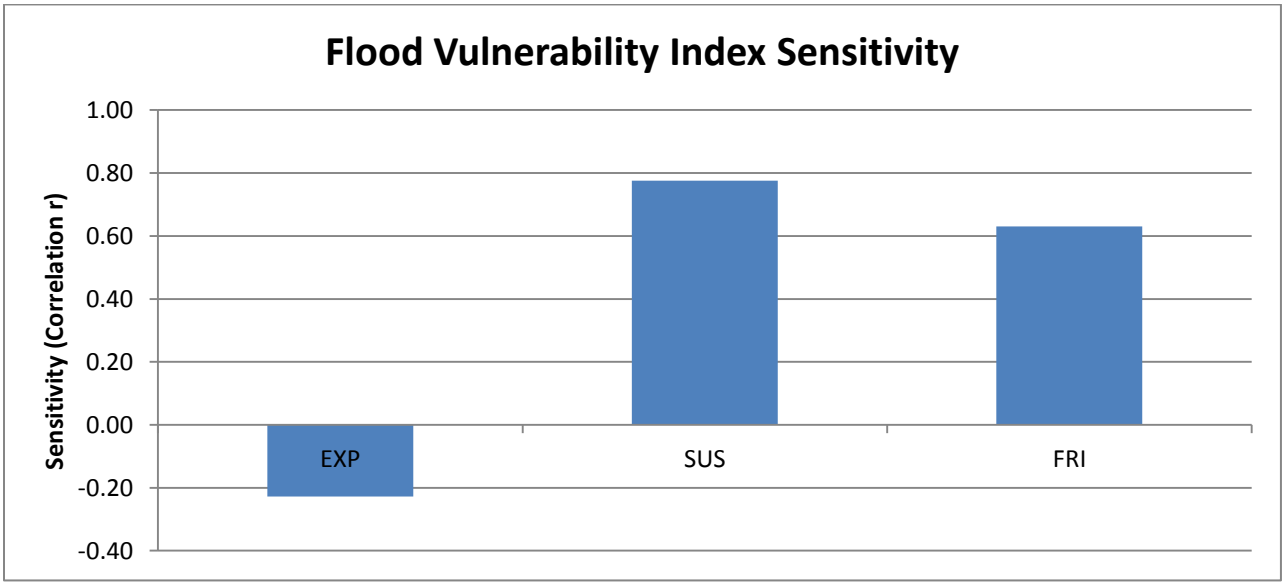

Figure 5-15: Flood Vulnerability Index Sensitivity

Table 5-53: Flood Vulnerability Index: Pearson Product Moment Correlation Matrix (r)

	FVI	EXP	SUS	FRI
Flood Vulnerability Index (FVI)		-0.2281	0.7760	0.6305
Exposure (EXP)	-0.2281		-0.1747	0.6054
Susceptibility (SUS)	0.7760	-0.1747		0.5024
Flood Resilience Index(FRI)	0.6305	0.6054	0.5024	

The mark values are correlation values (r) that are significant (at alpha=0.05) as shown in Table 5-53. The Flood Vulnerability Index in this study is significantly sensitive to susceptibility and flood resilience variables as shown in Figure 5-15.

5.7 The OVERALL Result from Assessment on Flood Resilience Adaptation Strategies

The overall result from the Assessment on Flood Resilience Adaptation Strategies Solicited from the Local Government Units (LGU's) and the Non-Governmental Organizations (NGO's) and from the Household Respondents is 64.43% shown in Table 5-54 which is generally high but special attention must be given to some of the items under disaster recovery particularly on availability of technical (services offered) and financial resources to support the recovery process.

Table 5.54: The OVERALL Result from Assessment on Flood Resilience Adaptation Strategies solicited from the Local Government Units (LGU's) and from the Non-Governmental Organizations (NGO's)

ASSESSMENT on Flood Resilience Adaptation Strategies	**%**
A. Governance	68.22
B. Sustainable Community Livelihood	60.54
C. The River's Natural Resource and Natural Features' Management	64.59
D. Land Use and Management and Structural Design	63.10
E. Risks Knowledge-Post Risk Assessment Integration	65.67
F. Warning and Evacuation	65.93
G. Emergency Response	69.93
H. Disaster Recovery	57.47
Overall	64.43

5.8 The OVERALL counts of E.coli (CFU's) per 100 mL water sample from the 5 Stations

Downstream 2 (Barangay Calindagan and Tinago) and Downstream 1 (Tabuc-tubig Bridge) that covers Poblacion 8, and parts of Barangay Taclobo (Table 5-55) correlates with the number of diarrhoeal cases among the household respondents. Poblacion 8 tops the list with 65.52% diarrhoeal cases, followed by Barangay Batinguel with 63.16% cases and Poblacion 1 with 54.55% diarrhoeal cases respectively.

Table 5-55: The OVERALL counts of E.coli (CFU's) per 100mL water sample from the five (5) Stations

Stations	Colony Forming Units (CFU's)
Upstream	533/100 mL
Midstream 1	1511/100 mL
Midstream 2	4445/100 mL
Downstream 1	12933/100 mL
Downstream 2	16000/100 mL
OVERALL Average	7084/100 mL

CHAPTER 6
CONCLUSIONS AND PERSPECTIVES

The results of the Flood Vulnerability Index (FVI) of the 5 components and the overall FVI are summarized in Table 5.52. Thirty-six (36) local indicators have been formulated for the five (5) components that fit and suit in in the local context. A new Flood Vulnerability Index (FVI) for Dumaguete City was developed in this study that incorporates the hydro-climatic and socio-economic components. Perspectives of the community people in terms of their knowledge, attitude, and practices towards flood resilience and adaptation, hygiene practices against E.coli, Leptospirosis and Dengue Fever mosquito exposure were included for the socio-behavioral component. Furthermore, the politico-administrative component was also included since it could have a profound effect in all of these components in the long run.

The Overall Flood Vulnerability Index (FVI) for Dumaguete City is 39.34% (Table 5-52) which could be considered medium range vulnerability. Among the 12 communities studied, Barangay Tabuc-tubig is the most vulnerable (53.39%). Its high vulnerability is due to high FVI in hydro-climatic exposure and economic components. Moreover, it has low resilience in terms of adaptation strategies for adapting urban flooding. On the other hand, Barangay Calindagan is the least vulnerable (23.37%) owing to very good politico-administrative and socio-behavioral components. The most exposed community in terms of the hydro-climatic component is Poblacion 8 (82.07%) and the least exposed is Barangay Balugo (37.03%) respectively. The 12 communities have different vulnerabilities among the five (5) components and thirty-six (36) local indicators used. However, what is true to all, the Flood Vulnerability Index in this study is significantly sensitive to susceptibility and flood resilience variables.

The assessment score solicited from the Local Government Units (LGU's) and the Non-governmental Organization (NGO's) themselves is favorably good (64.43%) with regards to the level of governance in facilitating the flood resilience strategies and adaptation in the city, however, there is a need to prioritise on some of the items under disaster recovery which scored the lowest (57.47%) among the items surveyed. These items are pertaining to the availability of technical (services offered) and financial resources to support the recovery process particularly on insurance scheme, conducting traumatic/psychological stress debriefings, damage assessment facilitating claim procession, distribution of charitable funds, and on social therapeutic measures which helps and support in the recovery process. Apart from these intangible (non-structural) matters, reconstruction, the land use management and structural design must be

seriously and strictly implemented. Attention must also be given on these items, the building code regulation and zoning ordinances, flood risk adaptive to land use, and improving of flood barriers structures such as bridges and dike systems to achieved long term solutions.

There were 20 items related to flood resilience and adaptation strategy that were assessed in this study and were administered to the household respondents found in chapter 5 (pages 214-227) revealing different results though generally favorable but with with some exceptions in some items that need special attention to improve it better. For instance, the transparency and trustworthiness of the LGU's in terms of the facilitation and distribution of the budget and donations for the affected population in the community during calamity, it must have been given appropriately to those affected households in the community. Another item that needs attention is the livelihood and financial aid for the community people to help them recover again from any calamity before another one strikes. The programs and policies in saving and protecting the Banica River must also be given attention before it gets worse and before the damage would be irreversible. The open drainage system that ends into the river is also another serious form of pollution that has to be addressed, and likewise the practice of dumping garbage into the river by the people living along the river banks must also be stopped. The regular use of backhoe in cleaning up the river especially when normal flow is blocked should also be facilitated to avoid further blockage and stagnation when rainy season comes or before any flooding episode happens and as well as post-flooding events. Proper and equal distribution of donations, goods, and relief must be given on time, appropriately and efficiently. Relocation sites must be provided to those who were affected and to those who live in the flood prone area if financial resources are available.

This study has also included the examination of the presence of E.coli in the river for the period of 5 months covering both the dry and wet season (March to July). It was observed from the collected water samples, the E.coli counts (cfu's) in Banica river is significantly high (15,311 cfu's/100 mL) in the month of March 2013 compared to the 235 cfu's/100 mL set by the Environmental Agency (EPA). Among the five (5) sampling stations, Downstream 2 (Barangay Calindagan and Tinago) has the highest E.coli counts (34,222 cfu's/100 mL) with an overall average of 16,000 cfu's/100 mL. Therefore, there is an urgent need to address this problem to avoid further contamination and disease outbreak in the future especially that 41.46% of the household surveyed are exposed to the river on a regular basis in activities such as immersing/washing of clothes and swimming/bathing in the river. Furthermore,

Downstream 2 (Barangay Calindagan and Tinago) and Downstream 1 (Tabuc-tubig Bridge) that covers Poblacion 8, and parts of Barangay Taclobo correlates with the number of diarrheal cases among the household respondents. Poblacion 8 tops the list with 65.52% diarrheal cases, followed by Barangay Batinguel with 63.16% cases and Poblacion 1 with 54.55% diarrheal cases respectively.

The average flow of Banica river reveals some areas with slow and reverse flow (chapter 4) during high tide that may stagnate the floating bacteria and other pollutants that may possibly cause harm to the community people particularly of Poblacion 1 (Tinago), Calindagan, Poblacion 2 (Lukewright), Poblacion 8 and Tabuc-Tubig respectively.

The conclusion of this study covers five aspects and advantages:

(1) The Community-Based Flood Vulnerability Index (FVI) Methodology and Use. The advantage of developing this community-based FVI can make the community and the government aware of the different vulnerabilities that each community has and at the same time, this can be used as a network of knowledge to learn from each other and to increase the resilience of each community and which progress needs to be prioritised. With the FVI, the impacts can be predicted in different scenarios. In this way, it helps policymakers, environmental, water and disaster agencies to define what measurements must be taken and possible appropriation of funds for adaptation and reduction of flood vulnerability in urban areas will be allocated. The FVI is a powerful tool for mapping of vulnerable areas in the city.

(2) Baseline of Community-based Flood Vulnerability Index. Using the thirty-six (36) local indicators one can clearly compare the vulnerabilities of communities in a thorough perspective which can later be used between cities and countries of similar societies. The focus of doing this study is more of a holistic approach rather than just a political per se. No published studies have been conducted similar to this in Dumaguete City where a thorough survey using local-based indicators vulnerability approach that includes: individual exposure, the magnitude and frequency of flood; the community people's vulnerability perception; and the resilience and adaptation approach. Thus, this study would serve as a baseline study for Dumaguete City, and a Vulnerability Flood Index (FVI) for urban flooding.

(3) Involvement of Local Authority, Stakeholders and Community. For a FVI to be widely accepted, local authorities, stakeholders, community people and the non-governmental

agencies has to be involved in the weighting of the indicators which this study has accomplished. It is only through this involvement that the interconnectedness of several indicators and local specificities will be thoroughly captured and presented. For programs and adaptation strategies to be well facilitated and implemented, collaboration among them is crucial and important so proper response will be appropriately achieved.

(4) Sensitivity of Flood Vulnerability Index. The Flood Vulnerability Index in this study is significantly sensitive to susceptibility and flood resilience variables. Precisely, the community people are vulnerable in the first place because of these variables. After an in-depth study of this newly developed Community-Based Flood Vulnerability Index (FVI) for Dumaguete City, there is a need to increase awareness towards adaptation measures by raising anticipatory mentality of the local population towards flood preparedness and adaptation strategies; a change of behavior towards caring for the environment; and a sense of awareness in the importance of good hygiene practices; and the collaboration between the LGU's, multiple stakeholders, local and international organizations and the community people must be realized so measurements that would lessen the vulnerability and impact would be undertaken.

(5) Future Extension of the Proposed Methodology. As this study deals particularly on community-based indicators methodology in producing a flood vulnerability index, for future studies, an interdisciplinary approach by bringing engineering and social approaches together is recommended to help in assessing flood vulnerable areas or other types of natural calamities. Using the ideal components and indicators that addressed to the current status of the community people in terms of their vulnerability and resilience to flooding is important to be able to have a more realistic scenario that is at the community level. Once these components are identified and established, then later this can be utilized as part of the criteria for hydrological models that will incorporate both structural and social vulnerabilities. It is important to incorporate these community-based flood vulnerability components and indicators so that a holistic approach and results will be obtained. In this way, vulnerability and resilience assessments in hydrological models or in a socio-economic approach will be more meaningful and comprehensive. In doing so, such issues will be analyzed in different aspects.

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APPENDICES

Appendix 1 ENGLISH HOUSEHOLD SURVEY FORM QUESTIONNAIRE

In this appendix the following form of questionnaires used in the survey is presented as follows:

1. Data of the household respondents on its socio-demographic profile, socio-economic, physical and social environment
2. Knowledge, Attitude, and Practices (KAP) on Community Flood Resilient Assessment
3. KAP of Household Respondents on Environmental Microbial Health Risks (*E. coli, Leptospira spp., Dengue Fever Mosquito*)
4. Assessment on Flood Resilience & Health Program of the Local Government Units and NGO's

Questionnaire No: _____ GPS Location _____

Data of Household Respondents on its Socio-Demographic Profile, Physical and Social Environment

Name of the Community: _____ Name of Zone : _____	Were you victims of the last typhoon/flooding Sendong? ____ Yes/No ____
Number of family members: _____ Number of extended family members: _____	Name (OPTIONAL) _____ Age : _____ ____ Female/Male ____
Number of Female and Male in the Family: ___Female/Male ___ Your level of Educational Attainment: _____	Was there any one from the family members who had experienced **DIARRHEA** especially during rainy, typhoon or flooding seasons____ Yes/No ____ If Yes, how many have experienced it? _____
Was there any one from the family members who had experienced **DENGUE** especially during rainy, typhoon or flooding seasons ____ Yes/No ____ If Yes, how many have experienced it? _____	Was there any one from the family members who had experienced **LIPTOSPIROSIS** especially during rainy, typhoon or flooding seasons ____ Yes/No ____ If Yes, how many have experienced it? _____

SOCIO-ECONOMIC

1. Occupational background of the respondent or anyone working in the family. Please put a check mark on the choices below. ___ Fisherman ___ Skilled worker ___ Laborer/Helper ___ Saleslady/Salesman ___ Public Employee ___ Private Employee ___ Pedicab/Easyride Driver ___ Private Driver ___ Laundry Others, pls. specify _____
2. Estimated Monthly Income from all sources of livelihood. Please put a check mark on the choices below. ___ Below 3000 ___ 3001-10,000 ___ 10,001 above Others, pls. specify _____
3. Do you own your residential place, both the house and lot? ___ Yes ___ No ___ Just the House ___ Just the Lot
4. Is your housing property insured? ___ Yes ___ No
5. What construction material is your house mostly made of? Please put a check mark on the choices below. ___ Concrete ___ Wood ___ Cartoon ___ Steel ___ Galvanized Iron ___ Coconut leaves ___ Nipa material ___ Plastic ___ Bricks ___ Tiles ___ Salvage materials Others, pls. specify _____

PHYSICAL ENVIRONMENT

1. How often is your place flooded from heavy rains?___ Every month ___ Every 4 months ___ Every year ___ Every 6 months ___ Every Year ___ Sometimes ___ Rarely ___ Never
2. Did it reach inside your home? ___Yes ___ No
3. How high was the flood waters in your immediate surrounding have reached? ___ Ankle high ___ Knee high ___Waist high ___ Shoulder high ___ Above the head ___ Roof high ___ Beyond the roof Others, pl. specify _____
4. Is the immediate surroundings of your home clean? ___ Yes ___ No
5. Are there water logged areas in your surroundings? ___ Yes ___ No
6. Are there open sewage or canals in your surroundings? ___ Yes ___ No
7. Is your house situated near a river, creek/pond or coastal? Write down your answer _____
8. Is your house located in an elevated area? ___ Yes ___ No
9. Location where adult/child member of the household usually go to defecate: ___ In your own latrine ___ In a neighbors latrine ___ Public latrine ___ On the ground ___ In a water body ___ Anywhere Others, pls. specify _____
10. What type of latrine do you have at home?___ Water-sealed ___ Antipolo type ___ Pour flush ___ We don't have a latrine Others, pls. specify_____
11. Where do you dispose your household water waste?___ Into the septic tank ___ Brgy. drainage ___ Into the pit ___ Anywhere Others, pls. specify _____
12. Where do you dispose your household solid waste?___ Garbage collected by LGU ___ Composting ___ Burying in the ground ___ Burning ___ Throwing into the river Others, pls. specify_____
13. Do you practice segregation? ___Yes ___ No
14. Major source of drinking water at home during ordinary days: ___ Communal faucet ___ House to house connection ___ Spring ___ Well ___ River ___ Water pump ___ Commercial water seller dispensers___ Bottled water from industries ___ Others pls. specify _____
15. Major source of drinking water at home during heavy rains or flooding: ___ Communal faucet ___ House to house connection ___ Spring ___ Donations ___ Well ___ River ___ Water pump ___ Commercial water seller dispensers___ Bottled water from industries Others pls. specify _____
16. Do you think your source of drinking water is clean? ___Yes ___No

17. How is your drinking water treated or sterilize?___ Boiling in less than 10 minutes ___ Boiling in 10 minutes ___ Chlorination ___ Settling ___ Filter___ Nothing Others, pls. specify _____
18. Check the following domesticated animals that you owned: ___ Pig ___ Cow ___ Chicken ___ Goats ___ Birds ___ Doves ___ Cats ___ Dogs ___ Horse Others, pls. specify _____
19. Where do you dispose the fecal materials from your domesticated animals?___ In your own latrine ___ In a neighbors latrine ___ Public latrine ___ On the ground ___ In a water body (river) ___ Into the pit ___ Anywhere Others, pls. specify _____
20. What are the domesticated animals you have observed from your neighbor's vicinity?___ Pig ___ Cow ___ Chicken ___ Goats ___ Birds ___ Doves ___ Cats ___ Dogs ___ Horse Others, pls. specify _____
21. Is it permitted to raise domesticated animals in your vicinity? ___ Yes ___ No
22. Have you seen rats roaming around your vicinity? ___ Yes ___ No
23. Have you seen rats roaming around your neighbor's vicinity?___ Yes ___ No
24. Have you seen domesticated animals without an owner roaming outside your vicinity ? ___ Yes ___ No
25. What sanitation and hygiene programs you have heard before? ___ About water safety ___ Environmental sanitation ___ Garbage Segregation ___ Disease outbreaks during typhoon and flooding ___ The right way of washing of hands with soap and water ___ Owning a latrine
26. From whom you have heard about the sanitation and hygiene program? ___ Own family ___ From neighbors ___ NGO worker ___ LGU's ___ Health Center ___ Brgy. Officials ___ Brgy. Health ___ Workers ___ School/Teachers ___ Religious Groups ___ TV ___ Radio ___ Newspaper/Magazines ___ Billboard ____ Others, pls. specify _____

SOCIAL ENVIRONMENT

1. Are you friends with your neighbors? ___ Yes ___ No
2. Are you willing to help your neighbor if in need of your help during or after heavy rains or flooding? ___Yes ___ No
3. Were there any health related meetings held in your place every now and then? ___ Yes ___ No Did you participate on this? ___ Yes ___ No
4. Have you observed your neighbors helping each other in whatever way they can during typhoon and flooding events?___ Yes ___ No
5. If your house is very near from the river (about 5-10 meters) do you know that you can be at risk of flooding? ___ Yes ___ No If the government would advice that your area is no longer safe, are you willing to vacate your place? ___Yes ___ No If your answer is YES, then why? Give your reasons _____ If your answer is NO, then why? Give your reasons _____

KAP on Community Flood Resilient Assessment

On the KNOWLEDGE OF HOUSEHOLD RESPONDENTS on Flood Resilience in terms of the following items:

Items	Questions
HAZARDS (harms)	1. Are you aware that your area is a flood hazard zone and you are at high risks? ___ Yes ___ No 2. Do you know the nature and capacity of floods? ___ Yes ___ No 3. Have you experienced flooding in this area and still continue to live here? ___ Yes ___ No 4. Have you seen presence of overloaded drainage infrastructures during heavy rains/typhoons and have seen its potential risks? ___ Yes ___ No 5. Have you seen debris from all kinds during and after flooding? ___ Yes ___ No 6. Do you know if there are flood hazard maps available for your locality? ___ Yes ___ No
RISKS (likelihood)	1. Are you aware that flooding can occur during and after heavy downpour? ___ Yes ___ No 2. Are you aware of the limitation and level of protection of the flood control barriers? ___ Yes ___ No 3. Do you know what time of the year flooding can usually occur? ___ Yes ___ No 4. Do you think It can also happen at any time and one just needs to be ready all the time? ___ Yes ___ No
EXPOSURE	1. Are you aware of the negative impacts of flooding? (injury, infection, death, and loss of property) ___ Yes ___ No 2. Have you or anyone in the household have been exposed to flooding before? ___ Yes ___ No 3. Have you or anyone in the household have been injured from the previous flooding? ___ Yes ___ No 4. Have you or anyone in the household have been sick during or after flooding/rainy season? ___ Yes ___ No 5. Have your household have experienced loss of love ones due to flooding and the impacts it has brought such as injury and infection? ___ Yes ___ No 6. Have you lost any of your property from the previous flooding? ___ Yes ___ No
PREPAREDNESS	1. Have you heard about the presence of flood early warning systems in your community? ___ Yes ___ No 2. Do you know how to interpret it? ___ Yes ___ No 3. Were you aware if there were any lectures on Early Warning Systems in your community? ___ Yes ___ No 4. Were you aware if there were any drills on Early Warning Systems in your community? ___ Yes ___ No 5. Do you know about the information drive on flood prevention spread around in your community? ___ Yes ___ No Check (all that apply) the following information drive in your community and where you have learned from: ___ Own family ___Other villagers ___ NGO worker ___ LGU's ___ Health Center___ Brgy. Officials ___ Brgy. Health Workers ___ Physicians/Nurses/ Pharmacist ___ School/Teachers ___ Religious Groups ___ TV ___ Radio ___Newspaper/Magazines ___ Billboard Others, pls. specify _____
RESPONSE	1. Are you aware that we have a local emergency response group in our community and city?

	___ Yes ___ No 2. Do you know the locations of the evacuation centers? ___ Yes ___ No
RECOVERY	1. Do you know how to conduct yourself in the evacuation centers? (proper hygiene and sanitation). ___ Yes ___ No 2. Are you aware of the different programs of the local government in times of calamities? ___ Yes ___ No
COORDINATION	1. Are you aware that the emergency response team and the rest of the units work in a coordinated manner? ___ Yes ___ No 2. Do you know the Standard Operating Procedures during response and evacuations events so coordination is facilitated? ___ Yes ___ No
ADAPTATION STRATEGIES	1. Do you know any adaptation strategies adapted in your community? ___Yes ___ No

How much importance (ATTITUDE) did you give for the following items: Put a check mark on the lines of your choices.

	Very Lightly	**Lightly**	**Seriously**	**Very Seriously**
a. HAZARDS (e.g. flood prone area)	_____	_____	_____	_____
b. RISKS (e.g. low and inefficient dike and overflow bridges, clogged and overloaded drainage systems)	_____	_____	_____	_____
c. EXPOSURE (e.g. by not vacating the place, watching the flash flood and running waters, picking up debris while flooding, immersing in flood waters without proper gears, drinking unsafe water)	_____	_____	_____	_____
d. PREPAREDNESS (e.g. awareness of the flood early warning systems, attending lectures and drills on early warning systems)	_____	_____	_____	_____
e. RESPONSE (e.g. readiness, cooperation with the emergency team, constant and regular TV, radio, online, text messages monitoring, and checking the water level closely)	_____	_____	_____	_____
f. RECOVERY (e.g staying in the evacuation centers while not safe yet, staying away from clearing area so delays will be prevented, early reporting of damage so basic needs can be facilitated, cooperation in the evacuation centers, immediate repair of damage at home, food and water safety, attend debriefing sessions and go to doctors for check-up in case one is sick from the family)	_____	_____	_____	_____
g. COORDINATION (e.g. cooperation to the programs facilitated by LGU's, sharing one's knowledge on flood preparedness, and continuous support and cooperation to the LGU's)	_____	_____	_____	_____
h. ADAPTATION STRATEGIES (e.g. supporting the adaptation strategies and other programs by the LGU's, attending lectures and drills, and applying what was learned from these programs)	_____	_____	_____	_____

On the PRACTICES of HOUSEHOLD RESPONDENTS on Flood Resilience in terms of the following items:

ITEMS	Questions
HAZARDS	1. If you know that your house is in a flood prone area, would you still continue to live here? ___ Yes ___ No If your answer is YES, then why. Give your reason _____ _____ If your answer is YES, then why. Give your reason _____ _____
RISKS	1. Do you consider or give importance to the hazards involved in flooding? ___ Yes ___ No 2. Do you consider or give importance to the risks involved in flooding? ___ Yes ___ No
EXPOSURE	1. Do you wear protective clothing (raincoat) and sturdy shoes(boots) during typhoons and flooding?___ Yes ___ No 2. Would you immediately evacuate to designated areas when a flood warning announcement is given by those in authority? ___ Yes ___ No 3. Would you tend to watch and stay near the flowing water while flooding? ___ Yes ___ No 4. Would you tend to pick up floating and stocked debris during flooding?___ Yes ___ No
PREPAREDNESS	1. Do you prepare matches, lighters, candles, traditional lamp and chargeable lamp and other things ready and safe during heavy rains or expected flooding? ___ Yes ___ No 2. Do you unplug all appliances including the main switch when heavy rain and typhoon is coming? ___ Yes ___ No 3. If you do not have any transportation, do you make arrangements with relatives, friends, or the local government? ___ Yes ___ No 4. Do you gather water, food, clothing, and emergency supplies before any typhoon and flooding occurs? ___ Yes ___ No 5. Do you secure your house by boarding or placing shutter on all windows/doors and all loose items such as garbage can lids, empty drums, gardening tools, and any other material that could become airborne during high winds? ___ Yes ___ No 6. Do you fuel your motorbikes, tricycles or car prior to the typhoon and flooding?___ Y___ N 7. Did you participate in an Early Warning System lectures in your community? ___ Yes ___ No 8. Did you participate in drills related to evacuation and response? ___ Yes ___ No
RESPONSE	1. Are you always alert all the time for possible flooding especially if it rains hard for several hours? ___ Yes ___ No 2. Do you listen to the radio, watch the TV, read the newspaper, keep track online updates and mobile text messages and call authorities (local officials and city/prov. Rescue Headquarters) for further information and warning during heavy rains, typhoons and flooding events? ___ Yes ___ No 3. Do you have neighborhood associations or support members in times of need during flooding? ___ Yes ___ No 4. Do you check from time to time the water levels of the river near you whenever there is a heavy rain? ___ Yes ___ No 5. Do you have contacts from people further up to your area (Balugo or Valencia) so you will know the water levels there? ___ Yes ___ No

	6. Would you be ready to cooperate if local officials and rescue operations directing evacuation routes? ___ Yes ___ No
RECOVERY	1. Do you remain in the evacuation center, until informed by local authorities that it is safe to leave?___ Yes ___ No 2. Do you stay away from disaster areas? (Sightseers should not interrupt crucial rescue and recovery work) ___ Yes ___ No 3. Do you avoid loose or dangling power wires, broken sewer or water mains and report them immediately to local officials? ___ Yes ___ No 4. Do you check food for spoilage and other food supply including water that is safe to eat and drink?___ Yes ___ No 5. Do you stay away from river banks until all potential flooding has passed?___ Yes ___ No 6. Would you be willing to stay and cooperate to whatever programs and procedures (health, sanitation practices) that they will facilitate in the evacuation center during flooding calamity? ___ Yes ___ No 7. Do you immediately clean up your house after a flooding event? ___ Yes ___ No 8. Do you immediately repair whatever damage to your property after a flooding event? ___ Yes ___ No 9. Do you immediately go for a medical check-up if one is sick from diarrhea in your family especially during or after a typhoon or flooding events? ___ Yes ___ No 10. Have you been given or have you attended some debriefing session of the past flooding event? ___ Yes ___ No 11. Have you attended to some discussions of lessons learned from the past flooding event? ___ Yes ___ No 12. Do you usually do a survey by yourself of the scope of the damaged the past flooding has brought? ___ Yes ___ No 13. Do you find ways to cope from the last flooding incident? ___ Yes ___ No If YES, then in what ways. Provide your answer. _____
COORDINATION	1. Do you cooperate with the coordination procedures of the local government for the resilience program in your community? ___ Yes ___ No 2. Would you share your information to your neighbors about your knowledge of an issued flood warning? ___ Yes ___ No
Adaptation Strategies	1. Are you in favor of whatever adaptation strategies the local government is implementing or in planned? ___ Yes ___ No 2. Have you participated to any adaptation strategies facilitated by the LGU's? ___ Yes ___ No 3. Have you applied what you have learned from the adaptation strategies? ___ Yes ___ No

KAP of Household Respondents on Environmental Microbial Health Risks
(*E. coli, Leptospira spp., Dengue Fever Mosquito*)

KNOWLEDGE on Environmental Microbial Health Risks

Questions

1. Have you heard about the following bacteria and virus:
Escherichia coli or E. coli? ___ Yes ___ No
Leptospira spp.? ___ Yes ___ No
Dengue Fever causing mosquito? ___ Yes ___ No

2. Have you heard about that there are bad and dangerous bacteria in water? ___ Yes ___ No

3. Are you aware that E. coli, Leptospira spp. & Dengue Fever mosquito can be deadly?___ Yes ___No

4. Do you know how the following bacteria and virus can be transmitted?

E. coli ___ Yes ___ No
If your answer is YES, please check the items below that you think is the mode of transmission:

___ failure to wash hands thoroughly with soap and water following contact with animals or animal waste
___drinking contaminated water
___ swimming in water even with very low levels of sewage contamination
___ accidental ingestion of contaminated water

Leptospira spp. ___ Yes ___ No
If your answer is YES, please check the items below that you think is the mode of transmission:
___ walking barefoot in flood waters; contacts of mucous membranes or broken skin with water (swimming or immersion) contaminated with the urine of infected animals
___ swimming in water
___ wading in flood waters

Dengue Fever causing mosquito ___ Yes ___ No
If your answer is YES, please check the items below that you think is the mode of transmission:
___ mosquito bite infected from Aedes spp.

5. Have you heard that infections brought about by these bacteria and virus can be prevented? ___ Yes ___ No
If your answer is yes, check the items below that you think can help in the prevention of infection?

E.coli
___ washing of hands thoroughly with soap and water
___ boiling of water at 100 degrees celcius for 10 minutes
___ prohibiting animals near bodies of water
___treating water with chlorine
___ avoid swimming in fecally contaminated waters

Leptospirosis spp.
___ avoid contact with flood waters by swimming or immersion with an open wound
___ use of sturdy boots during heavy rains and flooding
___ avoid walking barefoot
___ securing the environment free from its reservoir and fecal contamination

Dengue Fever Causing Mosquito

___ mosquito control (eradicate mosquitoes as possible)
___ solid waste management (proper disposal of waste)
___ chemical control
___ improvement of water supply and storage (putting all unused containers upside down)
___ modification of man-made larval habitats (discourage presence of water-logged areas)
___ biological control (use of larvivoparous fish)
___ personal protection (use of insect repellent and appropriate clothing)

6. Do you know the signs and symptoms of E.coli infection? ___ Yes ___ No

If your answer is yes, check the items below that you think are the signs and symptoms.

___ severe abdominal cramps ___ watery diarrhea ___ vomiting ___ Fever ___ severe neurological complications
___ sometimes bloody diarrhea ___ HUS (acute visceral failure, hemolytic anemia)

Do you know the signs and symptoms of Leptospirosis infection? ___ Yes ___ No

If your answer is yes, check the items below that you think are the signs and symptoms.

___ nausea ___ vomiting ___ abdominal pain ___ diarrhea ___ arthralgia ___ headache
___ prostration ___ myalgia (particularly calf muscles)

Do you know the signs and symptoms of Dengue Fever infection? ___ Yes ___ No

If your answer is yes, check the items below that you think are the signs and symptoms.

___ high fever of acute onset ___ hemorrhagic manifestations (presence of spots on the body)
___ hepatomegally ___ bleeding ___ shock ___ myalgia and arthralgia (severe joint and muscle pain)
___ lymphadenopathy ___ nausea and vomiting ___ pain in eyeballs ___ pain in back, body and joints
___ severe headache ___ colds and fl

7. Do you know how E. coli infection, Liptospira spp. and Dengue Fever infection can be fatal? ___ Yes ___ No

8. Do you know that E. coli, Leptospira spp. & Dengue Fever mosquito can also be treated? __ Yes ___ No

9. Where did you get your sources of information on E. coli infection, Liptospira spp. and Dengue Fever infection? Pls. check items below for your answers.

___ TV ___ radio programs ___ newspapers ___ books ___ school discussions ___ Family
___ Brgy. Discussions ___ health care personal ___ internet/online post ___ mobile messages
___ Brgy. Officials ___ Personal experience Others, please specify _____

How much importance (ATTITUDE) did you give for the following items regarding on *E. coli* infections:

Put a check mark on the lines of your choices.

	Very Lightly	**Lightly**	**Seriously**	**Very Seriously**
a. The Nature of E.coli	_____	_____	_____	_____
b. MODE of TRANSMISSION	_____	_____	_____	_____
c. PREVENTION	_____	_____	_____	_____
d. SIGNS and SYMPTOMS	_____	_____	_____	_____

e. It is FATAL	_____	_____	_____	_____
f. TREATMENT	_____	_____	_____	_____
g. FINANCIAL cost of TREATMENT	_____	_____	_____	_____
h. The INFECTION itself	_____	_____	_____	_____
i. Information Drive	_____	_____	_____	_____

How much importance (ATTITUDE) did you give for the following items regarding on *Leptospirosis* infections: Put a check mark on the lines of your choices.

	Very Lightly	**Lightly**	**Seriously**	**Very Seriously**
a. The Nature of Liptospirosis	_____	_____	_____	_____
b. MODE of TRANSMISSION	_____	_____	_____	_____
c. PREVENTION	_____	_____	_____	_____
d. SIGNS and SYMPTOMS	_____	_____	_____	_____
e. It is FATAL	_____	_____	_____	_____
f. TREATMENT	_____	_____	_____	_____
g. FINANCIAL cost of TREATMENT	_____	_____	_____	_____
h. The INFECTION itself	_____	_____	_____	_____
i. Information Drive	_____	_____	_____	_____

How much importance (ATTITUDE) did you give for the following items regarding on Dengue Fever infections: Put a check mark on the lines of your choices.

	Very Lightly	**Lightly**	**Seriously**	**Very Seriously**
a. The Nature of Dengue Fever	_____	_____	_____	_____
b. MODE of TRANSMISSION	_____	_____	_____	_____
c. PREVENTION	_____	_____	_____	_____
d. SIGNS and SYMPTOMS	_____	_____	_____	_____
e. It is FATAL	_____	_____	_____	_____
f. TREATMENT	_____	_____	_____	_____
g. FINANCIAL cost of TREATMENT	_____	_____	_____	_____
h. The INFECTION itself	_____	_____	_____	_____
i. Information Drive	_____	_____	_____	_____

On the PRACTICES of HOUSEHOLD RESPONDENTS regarding on *E. coli* infection in terms of the following items.

Questions
1. Do you or other members in the family go swimming or bathing in the river? ___ Yes ___ No or Deep Well ___Y ___N How often? ___ Everyday ___ Every other day ___ Twice a week ___ Every week ___ Very rarely ___ Never Were there any chances that you have accidentally swallowed the water from the river? ___ Yes ___ No How much have you swallowed in one of your recalled experiences if you were to estimate?

___ a half spoonful ___ a spoonful ___ a half-shot glass ___ a full shot glass ___ more than a full shot glass Others, please specify _____
2. Do you immerse yourself other members in the family into the river? ___ Yes ___ No or Deep Well ___Y ___N How often? ___ Everyday ___ Every other day ___ Twice a week ___ Every week ___ Very rarely ___ Never Were there any chances that you have accidentally swallowed the water from the river? ___ Yes ___ No How much have you swallowed in one of your recalled experiences if you were to estimate? ___ a half spoonful ___ a spoonful ___ a half-shot glass ___ a full shot glass ___ more than a full shot glass Others, please specify _____
3. Do you wash your clothes in the river? ___ Yes ___ No or Deep Well ___Y ___N How often? ___ Everyday ___ Every other day ___ Twice a week ___ Every week ___ Very rarely ___ Never Were there any chances that you have accidentally swallowed the water from the river? ___ Yes ___ No How much have you swallowed in one of your recalled experiences if you were to estimate? ___ a half spoonful ___ a spoonful ___ a half-shot glass ___ a full shot glass ___ more than a full shot glass Others, please specify _____
4. Do you use water from the river/deep well to wet your ground, flush your toilet, and water your plants? ___ Yes ___ No How often? ___ Everyday ___ Every other day ___ Twice a week ___ Every week ___ Very rarely ___ Never Were there any chances that you have accidentally swallowed the water from the river? ___ Yes ___ No How much have you swallowed in one of your recalled experiences if you were to estimate? ___ a half spoonful ___ a spoonful ___ a half-shot glass ___ a full shot glass ___ more than a full shot glass Others, please specify _____
5. Do you wash your hands with soap and water thoroughly after contact with domesticated animals? ___ Yes ___ No
6. Do you boil your water for 10 minutes during unusual events such as during typhoons & flooding?___ Yes ___ No
7. Do you keep your animals away from bodies of water? ___ Yes ___ No
8. If one is sick from severe diarrhea in the family, do you immediately sick for medical help? ___ Yes ___ No
9. Do you self-medicate? ___ Yes ___ No
10. Do you follow the prescription given? ___ Yes ___ No
11. Do you go for a regular health check up? ___Yes ___ No

On the PRACTICES of HOUSEHOLD RESPONDENTS regarding on *Leptospirosis* infection in terms of the following items.

Similar Questions for Leptospirosis Infection from E.coli questions(Numbers 1-4) 1. If one is sick from severe fever in the family, do you immediately sick for medical help? ___ Yes ___ No 2. Do you use rubber boots during heavy rains, typhoons or flooding? ___ Yes ___ No 3. Do you take Doxycyline antibiotics as prevention during rainy or flooding season? ___ Yes ___ No

On the PRACTICES of HOUSEHOLD RESPONDENTS regarding on *Dengue Fever* infection in terms of the following items.

1. Do you clean your immediate surroundings and empty from the following usual mosquito breeding sites? ___ Yes ___ No If your answer is yes, check the items below that correspond to your answer. ___ flower pot ___ hardened soil of potted plants ___ collar of toilet bowl ___ gully trap ___ roof gutter ___ flower pot plate ___ road side drain ___ scupper drain ___ abandoned water tank
2. Do you clean your immediate surroundings and empty from the following unusual/uncommon mosquito breeding Sites? ___ Yes ___ No If your answer is yes, check the items below that correspond to your answer. ___ tree hole ___ plant axil ___ aircon tray ___ BBQ pit ___ canvass sheet discarded receptacles such as: ___ tire ___ plastic caps ___ coconut shells ___ empty bottles ___ cans ___ buckets ___ jars ___ blocked roof gutters ___ tarps ___ drums
3. Do you make sure that your home is airy, bright, and safe from moisture? ___ Yes ___ No
4. Do you have fixed net on doors and windows? ___ Yes ___ No
5. Do you close the overhead tanks after using? ___ Yes ___ No ___ Not applicable
6. Do you keep your water in water containers for a week? ___ Yes ___ No
7. Do you let water to accumulate inside and outside your home? ___ Yes ___ No
8. Do you let water to stay in the flower pots or vases for a week? ___ Yes ___ No
9. Have you had fogging activities in your home or community? ___ Yes ___ No
10. Have you had apply chemical control against larval stages of dengue mosquitoes? ___ Yes ___ No
11. Have you had apply biological control against larval stages of dengue mosquitoes? ___ Yes ___ No

Assessment on Flood Resilience & Health Program of the Local Government Units and NGO's

In your own perspective and views based from your own personal experiences, and from what you have seen and heard from reliable sources how would you rate the programs of the LGU and NGO. Please put a check mark on the lines provided that reflect your choices.

	Excellent	**Very Well**	**Good**	**Poor**	**Very Poor**
1. The implementation and monitoring of the policies, plans, and programs for the different natural calamities particularly typhoon and flooding events.	_____	_____	_____	_____	_____
2. The transparency and trustworthiness of the LGU in terms of the facilitation and distribution of the budget and donations for the affected population in the community.	_____	_____	_____	_____	_____
3. For the livelihood or financial aid for the community people to recover again from such calamity.	_____	_____	_____	_____	_____

4. For the programs and policies _____ _____ _____ _____ _____
in saving and protecting the BANICA River.

5. The cooperation of the community _____ _____ _____ _____ _____
people including you in protecting the Banica river.

6. The drainage systems _____ _____ _____ _____ _____

7. The dike systems _____ _____ _____ _____ _____

8. The bridge systems _____ _____ _____ _____ _____

9. The flood hazard maps _____ _____ _____ _____ _____

10. The use of backhoe in cleaning _____ _____ _____ _____ _____
the Banica river especially when the normal flow is blocked.

11. The distribution of donations, _____ _____ _____ _____ _____
goods and relief.

12. The distribution of brochures _____ _____ _____ _____ _____
and the information drive that would increase knowledge on the negative impacts from typhoon and flooding events for the purposes of prevention and recovery.

13. Flood early warning systems _____ _____ _____ _____ _____

14. Preparedness and drill _____ _____ _____ _____ _____
to increase resilience from typhoons and floods.

15. The response and preparedness _____ _____ _____ _____ _____
of the DRRMC, PDRRMC and other NGO volunteers during rescue events.

16. The basic emergency and _____ _____ _____ _____ _____
relief services such as food, water, sanitation, transportation, communication, medical help, provisional repairs of damaged properties.

17. The operation clean-up _____ _____ _____ _____ _____
of affected places, giving of insurances, claims, financial aids, traumatic and psychological stress debriefings.

18. The relocation sites _____ _____ _____ _____ _____
provided by the LGU's to those who were affected from the last flooding and to those who live in the flood prone area.

19. The health programs for _____ _____ _____ _____ _____ diarrhea and Liptospirosis such as medical help, information drive and among others so outbreaks can be prevented.

20. The different prevention _____ _____ _____ _____ _____ and control programs for Dengue Fever infection such as fogging, chemical/biological control, information drive brochures, lectures, clean-up and other similar means at the community level.

Appendix 2 Visayan HOUSEHOLD SURVEY FORM QUESTIONNAIRE

For the details of items for appendix 2, the lists are the same in appendix 1.

Questionnaire No: _____ GPS Location _____

Data of Household Respondents on its Socio-Demographic Profile, Physical and Social Environment

Ngalan sa Barangay: _____ Ngalan sa Purok : _____	Nabiktima ba kamo sa niaging Baha nga Sendong? ____ Yes/No ____
Pila mo kabuok tanan sa Pamilya: _____ Pila Kabuok ang mga Ni-ipon Ninyo: _____	Imong Ngalan (OPTIONAL) _____ Imong Edad : _____ ____ Babayi/Lalaki ____
Pila Kabuok Babayi ug Lalaki sa Pamilya : ___Babayi/Lalaki ___ Unsang Grado Imong Nakab-ot : _____	Sa tibuok nimongbanay, aduna bay nakasulay nag **DIARRHEA or KALIBANGA** hilabi na sa panahon sa ulan-ulan, bagyo ug baha?____ Yes/No ____ Kung Yes, Pila man kabuok nakasulay na _____
Sa tibuok nimong banay, aduna bay nakasulay nag sakit nga **DENGUE FEVER** hilabi na sa panahon sa ulan-ulan, bagyo ug baha?____ Yes/No ____ Kung Yes, Pila man kabuok nakasulay na _____	Sa tibuok nimong banay, aduna bay nakasulay nag sakit nga **LIPTOSPIROSIS (sakit nga gikan sa ihi sa ilaga)** hilabi na sa panahon sa ulan-ulan, bagyo ug baha?____ Yes/No ____ Kung Yes, Pila man kabuok nakasulay na _____

SOCIO-ECONOMIC

1. Unsay imong trabaho or trabaho sa imong bana or Anak? Palihug ug check kung asa sa ilalom ang imong mga tubag. ___ Mananagat ___ Skilled worker ___ Laborer/Helper ___ Tindera ___ Sa Gobyerno ___ Private Employee ___ Pedicab/ Easyride ___ Private Driver ___Labandera Isulat kung wala diri _____
2. Estimate nga income sa Pamilya matag Bulan gikan sa tanan ninyong ma income. ___ Ubos 3000 ___ Gikan sa 3001 hangtud 10,000 ___ Sobra sa 10,001 Isulat kung wala diri _____
3. Inyoha ba kining ma-ong balay ug yuta nga inyong gipuy-an karon? ___ Yes ___ No ___ Ang Balay ra ___ Ang yuta ra
4. Insured ba kining inyong balay? ___ Yes ___ No
5. Unsa nga construction material ang gigamit sa imong balay? Puedeng daghan ang imong tubag. Palihug ug acheck asa. ___ Concrete ___ Kahoy ___ Karton ___ Steel ___ Galvanized Iron ___ Coconut leaves ___ Nipa material ___ Plastic ___ Bricks ___ Tiles ___ Salvage materials Isulat kung wala diri _____

PHYSICAL ENVIRONMENT

1. Kapila kasagaran magbaha ug ginagmay or dinagko dinhi duol sa inyong dapit? ___ Kada Bulan ___ Kada 4 kabulan ___ Kada unom ka bulan ___ Kada Tu-ig ___ Usahay ra ___ Panalagsa kaayo ___ Wala dyud
2. Nisulod ba sa inyong balay ang baha? ___Yes ___ No
3. Kung magbaha dinhi, unsa ka taas kasagaran? ___ Sa may ti-il ra ___ Sa may tuhod ___Sa may hawak ___Sa may abaga ___ Lapaw sa ulo ___ Abot sa atop ___ Lapaw pas atop Ibutang kung wala dinhi ang imong tubag _____
4. Limpyo ba kasagaran ang iyong palibot? ___ Yes ___ No
5. Aduna bay mga basa-basa nga lugar dapit dinhi ___ Yes ___ No
6. Aduna bay mga abre nga kanal dinhi? ___Yes ___No
7. Ang imong balay duol ba ug suba? Basa-basa? Creek/Pond? Dagat? Isulat imong tubag _____
8. Ang imong balay nahimutang ba sa taas-taas nga dapit? ___ Yes ___ No
9. Asa kasagaran malibang inyong anak o sakop?___ Sa inyong kasilyas ___ Kasilyas sa silingan ___ Sa publiko nga kasilyas ___ Sa yuta ___ Sa suba ___ Bisan asa Ibutang kung wala dinhi ang imong tubag _____
10. Unsay klase/type sa inyong kasilyas? ___ Water-sealed ___ Antipolo type ___ Pour flush ___ WALA mi Kasilyas Ibutang kung wala dinhi ang imong tubag _____
11.Asa kasagaran paingun inyong tubig nga hinugas, tubig nga gikan sa banyo?___ Paingun sa septic tank ___ Sa Brgy. drainage ___ Sa yuta ___ Sa dalan Ibutang kung wala dinhi ang imong tubag _____
12. Asa ninyo kasagaran ginalabay inyong basura? ___ Garbage truck collected by LGU ___ Composting ___ Ilubong sa yuta ___ Ginasunog ___ Gilabay sa suba Ibutang kung wala dinhi ang imong tubag _____
13. Nag segregate ba kamo o wala ba ninyo ginasagulsagol ang inyong mga basura? ___Yes ___ No
14. Asa gikan ang inyong tubig nga imnunon sa matag adlaw? ___ gripo sa Barangay ___ Gripo sa balay ___ Tubod ___ Atabay ___ Suba ___ Sa bomba ___ Gapalit gikan sa commercial water seller dispensers ___ Gapalit ug bottled water from industries ___ Ibutang kung wala dinhi ang imong tubag _____
15. Asa gikan ang inyong tubig nga imnunon sa matag sa timpong ting ululan, bagyo o baha? ___ gripo sa Barangay ___ Gripo sa balay ___ Tubod ___ Donations ___ Atabay ___ Suba ___ Sa bomba ___ Gapalit gikan sa commercial water seller dispensers ___ Gapalit ug bottled water from industries ___ Ibutang kung wala dinhi ang imong tubag _____
16. Para nimo, limpyo ba kaayo ang maong tubig nga inyong gina-inom ug safe ba kini? ___Yes ___No
17. Giunsa ninyo pag sterize inyong tubig nga imnunon? ____ Pagpabukal nga dili kaabot ug 10 minutes ___ Pagpabukal ug 10 minutes ___ Pagbutang ug Chlorine ___ Gpa settle lang ___ Gamit ug filter ___ Wala Ibutang kung wala dinhi ang imong tubag _____
18. Asa dinhi ang mga hayop nga inyong buhi? ___ Baboy ___ Baka ___ Manok ___ Kanding ___ Langgam ___ Salapati ___ Iring ___ Iro ___ Kabayo Ibutang kung wala dinhi ang imong tubag _____
19. Asa ninyo kasagaran ginalabay ang mga tae sa hayop nga inyong buhi? ___ Sa inyong kasilyas ___ Kasilyas sa silingan ___ Sa publiko nga kasilyas ___ Sa yuta ___ Sa suba ___ Bisan asa Ibutang kung wala dinhi ang imong tubag _____
20. Unsay mga kasagarang hayop ang buhi sa inyong silingan? ___ Baboy ___ Baka ___ Manok ___ Kanding ___ Langgam ___ Kalapati ___ Iring ___ Iro ___ Kabayo Ibutang kung wala dinhi ang imong tubag _____
21. Gitugutan ra ba sa inyong lugar ang pagpamuhi aning maong mga hayop? ___ Yes ___ No
22. Nakita kabag ilaga dinhis inyong lugar? ___ Yes ___ No
23. Nakita kabag ilaga sa inyong silingan?___ Yes ___ No
24. Kita ka bag mga hayop nga nagsuroy suroy nga walay tag-iya? ___ Yes ___ No
25. Unsay mga programaha nga kabahin sa panglawas ug palibot ang imong naduggan nga gihimo sa Barangay ? ___ Kabahin kung unsaon pag sigurado nga limpyo ang tubig ___ Kabahin sa Sanitisyon sa palibot

___ Kabahin sa segregation sa basura ___ Mahitungod sa mga sakit nga mudagsang sa timpong bagyo ug baha
___ Mahitungod sa unsaon paghugas maayo sa kamot ___ Ang paggamit ug pag angkon ug Kaugalingong C.R.
26. Diin nimo nahibal-an ang maong mga programaha? ___ Sulod sa pamilya ___ Sa silingan ___ NGO worker
___ LGU's ___ Health Center ___ Brgy. Officials ___ Brgy. Health Workers ___ School/Teachers ___ Religious Groups
___ TV ___ Radio ___ Newspaper/Magazines ___ Billboard , Ibutang kung wala dinhi ang imong tubag _____

SOCIAL ENVIRONMENT

1. Maayo ba inyong relasyon sa imong silingan, in good terms or friends ba mo? ___ Yes ___ No
2. Andam ba ka nga mutabang sa imong silingan hilabi na sa panahon sa bagyo ug baha? ___Yes ___ No
3. Aduna bay mga health meetings or activities nga ginahimo sa Barangay dinhi sa inyong lugar? ___ Yes ___ No
   Ni apil ka ba sa maong activity? ___ Yes ___ No
4. Nakita ba nimo ang panagtinabangay sa imong silingan panahon sa kalamidad sama sa bagyo ug baha? ___ Yes ___ No
5. Kung ang imong balay duol kaayo sa suba (mga 5-10 metros gikan sa suba) nasayod ka ba nga puede kang maabot sa baha? ___ Yes ___ No
   Kung muingon ang gobyerno nga dili kini safe ang imong lugar, andam ka ba nga mo biya niini? ___ Yes ___ No
   Kung imong tubag Yes, ngano _____
   Kung ang imong tubag No, ngano _____

KAP on the Community Flood Resilient Assessment

On the KNOWLEDGE OF HOUSEHOLD RESPONDENTS on Flood Resilience in terms of the following items:

Items	Questions
HAZARDS (harms)	1.Nasayod ka ba nga kining imong gipuy-an nasulod sa flood hazard zone ug puede kang maabot sa baha? ___ Yes ___ No 2. Nasayod ka ba sa capasidad ug puedeng mahimo sa baha? ___ Yes ___ No 3. Nakasulay naba kamo ug baha dinhing dapita, apan padayon ra gihapun kamo ug puyo dinhi? ___ Yes ___ No 4.Naka saksi ka ba nga napuno ang mga drainage sytem ug nahibalo nga peligro ka na ilabi na kung timpong bagyo o kusog ug dugay nga ulan? ___ Yes ___ No 5. Kita ka ba sa mga lain-laing anod gikan sa baha ug ang peligro niini? ___ Yes ___ No 6. Nahibalo ka ba nga adunay flood hazard map sa inyong lugar? ___ Yes ___ No
RISKS (likelihood)	1.Nasayod ka ba nga puedeng mo baha kada nay kusog nga ulan or inanay apan dugay nga undang nga ulan? ___ Yes ___ No 2. Nasayod ka ba sa limitasyon kung asa ra kutob ang puedeng ika protektar sa maong mga flood control barriers or sagang sa baha sama sa dike ug overflow bridges? ___ Yes ___ No 3. Kahibalo ka ba kung unsang mga bulana kasagaran mo baha? ___ Yes ___ No 4. Sa imong panglantaw, ang baha puedeng mahitabo walay gipiling bulan or panahon maong kinahanglan igmat sa tanang panahon? ___ Yes ___ No
EXPOSURE	1. Nasayod ka ba sa mga negatibong epekto sa baha sama sa injury, infection, makamatay, maka hanaw sa atong kabtangan? ___ Yes ___ No 2. Aduna na bay nakasulay ninyo ug sinati ug baha?___ Yes ___ No 3. Aduna na bay nakasulay sa imong banay nga injured o nasamad tungod sa baha?___ Yes ___ No 4. Aduna na bay nakasulay sa imong banay nga nag sakit tungod sa bagyo ug baha? ___ Yes ___ No

	5. Nakasulay na ba kamo nga nawad-an ug banay tungod sa baha ug bagyo? ___ Yes ___ No 6. Nakasulay nab a kamo nga nawad-an sa inyong mga butang or balay tungod sa baha? ___ Yes ___ No
PREPAREDNESS	1. Aduna bay flood early warning systems o mo signal nga mo baha na sa inyong barangay?_ Ys _ No 2. Kahibalo ba mo unsaon pag interpret o pagsabot kung unsay mga signal niini kung adunay kalamidad nga sama sa baha nga umalabot? ___ Yes ___ No 3. Kahibalo ba ka nga adunay mga lectures kabahin sa Early Warning Systems sa inyong Barangay? ___ Yes ___ No 4. Kahibalo ba ka nga adunay mga pagbansay-bansay o drills mahitungod sa Early Warning Systems dinhi sa inyong lugar? ___ Yes ___ No 5. Kahibalo ba ka nga adunay mga pagpakalap ug impormasyon mahitungod sa flood Prevention o mahitungod unsaon paglikay epekto sa baha dinhi sa inyong lugar? ___ Yes ___ No Diin mo nadungog o nahibal-an ang maong mga impormasyon? ___ Sulod sa pamilya ___ LGU's ___ Sa silingan ___ NGO worker ___ Health Center ___ Brgy. Officials ___ Brgy. Health Workers ___ School/Teachers ___ Religious Groups ___ TV ___ Radio ___ Newspaper/Magazines ___ Billboard Ibutang kung wala dinhi ang imong tubag _____
RESPONSE	1. Nasayod ba kamo nga duna kitay mga local emergency response group dinhi sa atong lugar hilabi asa panahon sa mga kalamidad?___ Yes ___ No 2. Kahibalo ba mo kung asa nahimutang ang mga evacuation centers? ___ Yes ___ No
RECOVERY	1. Kahibalo ba mo unsay angay nga buhaton kung ato-a na sa mga evacuation centers sama sa maayong pag-atiman sa lawas o pag mintenar sa limpyo nga palibot?___ Yes ___ No 2. Nasayod ka ba sa mga lain-laing programa nga gitagana sa gobyerno hilabi na sa panahon sa kalamidad, sama sa baha? ___ Yes ___ No
COORDINATION	1.Nasayod ka ba nga ang mga emergency response team ug ubang mga organisayon coordinated ilang pag facilitate sa panahon sa baha ug uban pang kalimidad?___ Yes ___ No 2. Nasayod ka ba sa Standard Operating Procedures o angay nga buhaton panahon sa rescue ug pag evacuate aron hapsay ug dali ang pag facilitate niini? ___ Yes ___ No
ADAPTATION STRATEGIES	1. Nakadungog baka kabahin sa mga adaptation strategies or mga programa aron mahilayo o maprotektaran kita sa mga kalamidad?___Yes ___ No

Unsay imong paghatag ug IMPORTANSYA (Attitude) kabahin sa mga sumusunod nga items:
Palihug ug butangi ug check ang linya sa imong tubag.

	Gibaliwala Kaayo	**Medyo Gibaliwala**	**Medyo Seryoso**	**Giseryoso Kaayo**
a. HAZARDS (ex. baha-unon ang imong lugar ug peligro kini)	_____	_____	_____	_____
b. RISKS (ex. mubo ra ang dike system, overflow bridges, bara nga mga drainage system o kanal so mag-igmat)	_____	_____	_____	_____
c. EXPOSURE (ex. pagdili pag biya sa lugar, pag lantaw o saksi sa gahaguros nga baha, pagpamulot sa mga anod, pagtampisaw sa baha nga walay boots, ang dili pag sigurado sa seguridad sa tubig nga imnonon)	_____	_____	_____	_____
d. PREPAREDNESS (ex. ang pag igmat sa mga sinyales sa early warning systems, pag apil sa mga lecture ug bansay-bansay mahitangod sa early warning system)	_____	_____	_____	_____

e. RESPONSE _____ _____ _____ _____

(ex. kanunay ka bang alerto sa, andam nga mo kooperar sa mga emergency response team, kanunay nga nag monitor sa radio, TV, online, text messages, ug pag susi sa level sa tubig sa suba)

f. RECOVERY _____ _____ _____ _____

(ex. muhawa lang sa evacuatin centers o sa balay kung safe na, dili mo disturb sa clearing area aron dili maka delay sa operasyon, magpahibalo dayon sa LGU's sa mga na damage aron nga ma repair dayon ang mga basic services sama sa kuryente, tubig ug uban pa, mo kooperar sa angay nga buhaton samtang naa sa evacuation centers, manglimpyo ug ayuhon dayon ang mga naguba nga property sa balay, seguraduhon nga limpyo ug safe ang mga tubig ug pagkaon, mo attend sa mga debriefing kabahin sa epekto sa baha, magpa check-up kung nasakit sa maong panahon)

g. COORDINATION _____ _____ _____ _____

(ex. Pag kooperar sa programa sa LGU's mahitungod sa baha, pag pa ambit sa nahibal-an, kanunayong pag lambigit sa LGU aron updated sa mga bag-ong kalambu-an.

h**. ADAPTATION STRATEGIES** _____ _____ _____ _____

(ex. Uyon ka bas a mga programa nga gihimo sa LGU's sama sa adaptation strategies aron mukunhod ang mga negatibong epekto sa baha, pag attend sa maong mga kalihokan, pag apply sa mga nahibal-an gikan sa maong kalihokan)

Mga PRACTICES nga adunay kalambigitan sa mga sumusunod nga items:

Items	Questions
HAZARDS	1. Kung nasayod ka nga ang imong balay nahimutang sa flood prone area o puedeng maabot sa baha, o nabaha na, mupadayon ra ba ka sa pag puyo gihapun dinhi? ___ Yes ___ No NGANO MANG Yes imong tubag or NGANON MANG No ang imong tubag? Palihug ug sulat sa imong rason. _____
RISKS	1. Imo bang gitagaan ug importantsya ang mga hazard o delikadong puedeng mahitabo sa baha? ___ Yes ___ No 2. Imo bang gitagaan ug importantsya ang mga risk o risgo nga puedeng maka pa grabeh sa baha? ___ Yes ___ No
EXPOSURE	1. Nag gamit ba kamo ug raincoat, boots or sapatos sa panahon sa bagyo ug baha? ___ Yes ___ No 2. Andam ba kamo nga mo evacuate sa mga evacuation centers kung adunay abiso?___ Yes ___ No 3. Mupadu-ol ba kamo sa baha ug maglantaw ni-ini samtang nagahitabo?___ Yes ___ No 4. Puluton ba ninyo ang mga anod samtang nag baha pa? ___ Yes ___ No
PREPAREDNESS	1. Naga-andam ba kamo sige ug posporo, lighter, kandila o lampara or chargeable lamp ug uban pa sa panahon sa bagyo ug baha?___ Yes ___ No 2. Inyo bang gina-off and mga appliances asta ang main switch sa susamang panahon sa bagyo ug baha? ___ Yes ___ No 3. Kung wala kamoy kaugalingong sakyanan, nakigsabot ba kamo sa inyong mga paryente o kaila, LGU's ingkaso kinahanglan mo ug tabang sa panahon sa bagyo ug baha?___ Yes ___ No 4. Ginaandam ba ninyo kanunay ang inyong mga sanina, tubig, pagkaon, emergency supplies sa dili pa muabot ang bagyo o baha? ___ Yes ___ No 5. Inyo bang gisigurado inyong balay nga dili mapalid sa hangin hilabi na ang mga atop, bintana ug portahan, ug uban pang gamit sa gawas nga puede ipalid sa haingin? ___ Yes ___ No 6. Andam ba kanunay ang inyong sakyanan sama sa motor, pedicab ug uban pa ingkaso kinahanglan Sa panahon sa emergency kung mag bagyo o baha? ___ Yes ___No

	7. Niapil ka ba sa mga flood safety measures nga gihimo dinhi sa inyong Barangay? ___ Yes ___ No 8. Niapil ba mo sa drill o bansay-bansay mahitungod sa evacuation ug response? ___ Yes ___ No
RESPONSE	1. Andam ba kamo kanunay sa baha hilabi na kung magsigeg ulan ug dugay or adunay bagyo?_ Y _ N 2. Kanunay ba kamong nagmonitor sa radio, TV, , newspaper, online updates, mobile text messages, or manawag sa LGU's ug provincial response team panahon sa bagyo o baha aron ma updated sa mga angay nga buhaton?___ Yes ___ No 3. Aduna ba kamoy mga organisayon sa Barangay nga maoy puede tawagon panahon sa bagyo o baha?___ Yes ___ No 4. Naga obserbar ka ba kanunay sa level sa tubig sa suba labi na kung panahon sa bagyo ug baha? ___ Yes ___ No 5. Aduna ba kamoy kontak nga kaila sa Valencia o Balugo aron mahibalo dayon kung unsa nay level sa atubig ug unsa nay dagan sa baha?___ Yes ___ No 6. Andam ba kamo nga mo kooperar sa LGU emergency response team kung kinahanglan ng mo evacuate sa inyong lugar?___ Yes ___ No
RECOVERY	1. Andam ba kamo nga mupundo sa evacation center samtang dili pa safe mubalik sa inyong balay? ___ Yes ___ No 2. Wala ba kamo nagsamok-samok sa mga clearing area or disaster area aron dili ma disturbo ang pag rescue ug pag repair? ___ Yes ___ No 3. Gina report ba ninyo sayon sa mga autoridad ang mga gubang poste, buak nga tubo sa tubig, or mga nag clog nga kanal o drainage aron ma repair dayon?___ Yes ___ No 4. Ginasiguro ba ninyo nga safe inyong pagkaon ug tubig? ___ Yes ___ No 5. Wala ba mo nagpaduol sa suba samtang aduna pay baha? ___ Yes ___ No 6. Andam ba kamo nga mo kooperar sa evacuation center kung unsay ilang mga programa sa panglawas ug palibot nga i-facilitate? ___ Yes ___ No 7. Paghuman sa baha, limpyohan ba ninyo dayon ang inyong balay? ___ Yes ___ No 8. Paghuman sa baha, ayohon ba ninyo dayon ang mga naguba nga inyong kabtangan? ___ Yes ___ No 9. Kung adunay nasakit sama sa (diarrhea, etc.)sa pamilya tungod sa bagyo ug baha, ipa check-up ba ninyo dayon kini?___ Yes ___ No 10. Nakasulay ba kamo ug debriefing mahitungod sa niaging baha?___ Yes ___ No 11. Naka attend ba kamo ug mga discussion mahitungod sa mga nakat-unan sa niaging baha aron malikayan pag usab kung adunay baha? ___ Yes ___ No 12. Mag survey o susi ba ka dayon kung unsa ka dako ang negatibong epekto sa niaging baha ug asa kini niaabot? ___ Yes ___ No 13. Aduna ka bay imong kaugalingong paagi aron ma ka cope-up sa mga trauma or dili maayong eksperyensa sa niaging baha? ___ Yes ___ No Unsa nga paagi? Isulat palihug imong tubag: _____
COORDINATION	1. Nikooperar o mo koopearar ba ka sa coordination procedures aron hapsay ang pag pasilidad sa mga LGU's sa resilience program sa baha?___ Yes ___ No 2. Andam ka bang mo paambit o share sa impormasyon sa imong silingan kung nag issue na ug flood warning? ___ Yes ___ No
Adaptation Strategies	1. Uyon ka ba sa mga adaptation strategies o programa nga gibuhat sa LGU's ug NGO's nga adunay kalambigitan sa baha ug uban pang kalamidad?___ Yes ___ No 2. Naka tambong ka ba sa mga panagtigum kabahin nianang mga programaha? ___ Yes ___ No

	3. Imo bang gigamit ang imong mga nakat-unan kabahin sa maong programa? ___ Yes ___ No

KAP of Household Respondents on Environmental Microbial Health Risks
(*E. coli, Leptospira spp., Dengue Fever Mosquito*)

KAHIBALO (KNOWLDEGE) on Environmental Microbial Health Risks

1. Nakadungog naba kamo sa mga sumusunod nga bacteria/kagaw ug virus: Escherichia coli or E. coli? ___ Yes ___ No
Leptospira spp.? ___ Yes ___ No Dengue Fever causing mosquito? ___ Yes ___ No

2. Kahibalo ba kamo nga adunay mga bacteria or kagaw nga nagdala ug sakit nga atong makuha dinhas sa tubig nga atong gi-inom or naa sa suba? ___ Yes ___ No

3. Nasayod ba kamo nga ang kaning mga maong kagaw sama sa (E. coli, Leptospira spp. & Dengue Fever mosquito) puedeng maka matay?___ Yes ___No

4. Nasayod ba kamo kung sa unsang paagi nato kini puede makuha o matakod? ___ Yes ___ No
***E. coli* or Kagaw/Bacteria sa tubig** ___ Yes ___ No
Kung ang imong tubag YES, palihug ug butang ug check dinha sa linya sa ilalom kung sa imong huna-huna mao nay paagi nga makuha matakod nato ang maong kagaw:

___ kung dili manghinaw pag-ayo unya gikan naghikap ug hayop or nakahikap sa tae sa hayop unya dili mugamit ug sabon ug tubig
___ang pag inom sa hugaw ug kontaminado nga tubig
___ ang pagkaligo sa hugaw ug kontaminado nga suba bisan tuod dyutay mang ganing ra ang kagaw nga naa sa suba
___ aksidente nga pag inom sa kontaminadong tubig nga gikan sa suba, gripo, atabay o tubod

***Leptospira spp.* or Kagaw nga naa sa ihi sa ilaga or balagtok**___ Yes ___ No
Kung ang imong tubag YES, palihug ug butang ug check dinha sa linya sa ilalom kung sa imong huna-huna mao nay paagi nga makuha nato ang maong kagaw:

___ maglakaw nga walay sanilas, sapatos o boots sa baha nga tubig o suba nya naa kay samad nga gamay kaayo
___ pagkaligo sa suba o atabay ___ pag tusnob-tusnob sa baha

Lamok nga nagdala ug *Dengue Fever* ___ Yes ___ No
Kung ang imong tubag YES, palihug ug butang ug check dinha sa linya sa ilalom kung sa imong huna-huna mao nay paagi nga makuha nato ang maong kagaw: ___ paak sa lamok nga Aedes spp. nag nagdala ug dengue fever

5. Nasayod ka ba nga ang kaning maong mga sakit nga dala ani nga mga kagaw puede nato malikayan? ___ Yes ___ No
Kung ang imong tubag yes palihug ug butang ug check dinha sa linya sa ilalom kung sa imong huna-huna makatabang kana nga puede nato malikayan:
***E.coli* or Kagaw/Bacteria sa tubig**
___ ang paghugas maayo sa kamot gamit ang tubig ug sabon ___ pagpabukal sa tubig sulod sa 10 minutos
___ ang pagdili sa mga hayop nga maduol sa tubig/suba/atabay ___ ang pag gamit ug chorine sa pag disinfect sa tubig
___ ang dili pagkaligo sa suba/atabay nga adunay tae sa hayop

***Leptospirosis spp.*or Kagaw nga naa sa ihi sa ilaga or balagtok**
___ ang dili pag basa-basa sa baha or pagkaligo sa baha nga tubig hilabi na kung adunay samad sa tiil o lawas

___ ang paggamit ug boots kung timpong ulan-ulan ug baha ___ ang paglikay sa pagtini-il kung baha
___ ang pag sigurado sa lugar nga walay mga ilaga sa palibot

Lamok nga nagdala ug *Dengue Fever*
___ pagpatay or control sa mga lamok ___ ang maayong pag segregar ug paglabay sa atong mga basura
___ pag gamit ug chemical sa pagpatay sa larva sa lamok
___ ang pag sigurado nga walay tubig nga nagpundo sa container nga abre
___ ang pag wala sa mga basa-basa sa palibot or mga punong-punong sa palibot
___ ang paggamit ug isda sa pagpatay sa larva sa lamok nga naa sa mga kanal-kanal
___ ang pag protektar sa kaugalingun pinaagi sa paggamit tag-as nga sanina/karsones/long sleeve/midyas ug mga insect repellent

6. Nasayod ka ba sa mga sintomas sa E.coli infection sama sa diarrhea/kalibanga? ___ Yes ___ No
Kung ang imong tubag yes palihug ug butang ug check dinha sa linya sa ilalom kung sa imong huna-huna mao ka na ang mga sintomas:
___ grabe nga sakit sa tiyan ___ murag puro tubig ang diarrhea ___ pagsuka ___ hilanat ___ complications sa utok
___ usahay adunay dugo ang diarrhea ___ HUS (acute visceral failure, hemolytic anemia)
Nasayod ka ba sa mga sintomas sa Leptospirosis infection? ___ Yes ___ No
Kung ang imong tubag yes palihug ug butang ug check dinha sa linya sa ilalom kung sa imong huna-huna mao ka na ang mga sintomas:
___ lipong-lipong ___ pagsuka ___ sakit sa tiyan ___ diarrhea ___ sakit ang mga joints ___ labad ang ulo
___ grabe nga kakapoy, wala nay kusog ___ sakit ang mga muscles labi na ang bagtak
Nasayod ka ba sa mga sintomas sa Dengue Fever infection? ___ Yes ___ No
Kung ang imong tubag yes palihug ug butang ug check dinha sa linya sa ilalom kung sa imong huna-huna mao ka na ang mga sintomas:
___ taas ug kali tang hilanat ___ adunay mga pasa-pasa sa lawas ___ nihubag ang atay ___ daling mo dugo ___ shock
___ sakit ang mga musclesug joints ___ adunay mga pamlog or hubag-hubag ___ lipong-lipong ug suka
___ sakit ang mata, luyo, lawas ug ulo ___ colds and flu

7. Nasayod ka ba nga ang mga sakit nga dala sa E. coli, Leptospira spp. & Dengue Fever mosquito puedeng makamatay?
__ Yes ___ No

8. Nasayod ka ba nga ang mga sakit nga dala sa E. coli, Leptospira spp. & Dengue Fever mosquito puede matambalan?
__ Yes ___ No

9. Di-in nimo nahibal-an ang mga kabahin niining mga kagaw ug sakit nga E.coli/diarrhea, Liptospirosis ug Dengue Fever? Palihug ug butang ug check sa imong tubag.
___ TV ___ radio programs ___ newspapers ___ libro ___ discussions sa eskelahan ___ pamilya
___ sa Barangay ___ health care personel ___ internet/online post ___ mobile/cellphone messages
___ Barangay officials ___kaugalingong experience ibutang kung asa pa _____

Unsay imong paghatag ug IMPORTANSYA (Attitude) kabahin sa E.coli diarrhea sa mga sumusunod nga items: Palihug ug butangi ug check ang linya sa imong tubag.

	Gibaliwala Kaayo	**Medyo Gibaliwala**	**Medyo Seryoso**	**Giseryoso Kaayo**
a. Ang Kabahin sa E.coli (Nature)	_____	_____	_____	_____
b. Ang Pagtakod o Pagsulod sa Lawas	_____	_____	_____	_____
c. PREVENTION o Paglikay	_____	_____	_____	_____

d. Mga Sintomas	_____	_____	_____	_____
e. Nga Makapatay	_____	_____	_____	_____
f. Ang Pagpatambal o Tambal	_____	_____	_____	_____
g. Ang Bayad sa Pagpatambal	_____	_____	_____	_____
h. Ang sakit mismo	_____	_____	_____	_____
i. Information Drive o Mga Pagpahibalo	_____	_____	_____	_____

Unsay imong paghatag ug IMPORTANSYA (Attitude) kabahin sa Liptospirosis nga sakit sa mga sumusunod nga items: : Palihug ug butangi ug check ang linya sa imong tubag.

	Gibaliwala Kaayo	**Medyo Gibaliwala**	**Medyo Seryoso**	**Giseryoso Kaayo**
a. Ang Kabahin sa Liptospirosis	_____	_____	_____	_____
b. Ang Pagtakod o Pagsulod sa Lawas	_____	_____	_____	_____
c. PREVENTION o Paglikay	_____	_____	_____	_____
d. Mga Sintomas	_____	_____	_____	_____
e. Nga Makapatay	_____	_____	_____	_____
f. Ang Pagpatambal o Tambal	_____	_____	_____	_____
g. Ang Bayad sa Pagpatambal	_____	_____	_____	_____
h. Ang sakit mismo	_____	_____	_____	_____
i. Information Drive o Mga Pagpahibalo	_____	_____	_____	_____

Unsay imong paghatag ug IMPORTANSYA (Attitude) kabahin sa Dengue Fever nga sakit sa mga sumusunod nga items: : Palihug ug butangi ug check ang linya sa imong tubag.

	Gibaliwala Kaayo	**Medyo Gibaliwala**	**Medyo Seryoso**	**Giseryoso Kaayo**
a. Ang Kabahin sa Dengue Fever	_____	_____	_____	_____
b. Ang Pagtakod o Pagsulod sa Lawas	_____	_____	_____	_____
c. PREVENTION o Paglikay	_____	_____	_____	_____
d. Mga Sintomas	_____	_____	_____	_____
e. Nga Makapatay	_____	_____	_____	_____
f. Ang Pagpatambal o Tambal	_____	_____	_____	_____
g. Ang Bayad sa Pagpatambal	_____	_____	_____	_____
h. Ang sakit mismo	_____	_____	_____	_____
i. Information Drive o Mga Pagpahibalo	_____	_____	_____	_____

Mga PRACTICES nga adunay kalambigitan sa *E. coli* infection/diarrhea sa mga sumusunod nga items:

1. Aduna bay miyembro sa pamilya nga tigkaligo sa suba? ___ Yes ___ No o atabay ? ___ Yes ___ No
   Kanus-a or kapila kasagaran? ___ Kada Adlaw ___ Kada sunod Adlaw ___ Ka Duha kada semina
   ___ Kada Semina ___ Panagsa Kaayo ___ Wala/Dili
   Aduna bay higayon nga nka inom or tulon ug tubig samtang naligo sa suba/atabay? ___ Yes ___ No

   Unsa kaha kadaghana (estimate) ang imong na inom or tulon nga tubig sa imong mahinumduman?

___ tunga sa kutsara ___ Usa ka kutsara ___ Tunga sa gamay nga baso (shot glass) ___ Usa ka shot glass ___ Sobra pa sa shot glass Kung wala dinhi unsa ka daghana, ibutang kung unsa kadaghana_____
2. Tig tusnob-tusnob ba kamo sa suba? ___ Yes ___ No o atabay? ___ Yes ___ No Kanus-a or kapila kasagaran? ___ Kada Adlaw ___ Kada sunod Adlaw ___ Ka Duha kada semina ___ Kada Semina ___ Panagsa Kaayo ___ Wala/Dili Aduna bay higayon nga nka inom or tulon ug tubig samtang naligo sa suba/atabay? ___ Yes ___ No Unsa kaha kadaghana (estimate) ang imong na inom or tulon nga tubig sa imong mahinumduman? ___ tunga sa kutsara ___ Usa ka kutsara ___ Tunga sa gamay nga baso (shot glass) ___ Usa ka shot glass ___ Sobra pa sa shot glass Kung wala dinhi unsa ka daghana, ibutang kung unsa kadaghana_____
3. Tigpang laba ba kamo sa suba? ___ Yes ___ No o atabay? ___ Yes ___ No Kanus-a or kapila kasagaran? ___ Kada Adlaw ___ Kada sunod Adlaw ___ Ka Duha kada semina ___ Kada Semina ___ Panagsa Kaayo ___ Wala/Dili Aduna bay higayon nga nka inom or tulon ug tubig samtang naligo sa suba/atabay? **___ Yes ___ No** Unsa kaha kadaghana (estimate) ang imong na inom or tulon nga tubig sa imong mahinumduman? ___ tunga sa kutsara ___ Usa ka kutsara ___ Tunga sa gamay nga baso (shot glass) ___ Usa ka shot glass ___ Sobra pa sa shot glass Kung wala dinhi unsa ka daghana, ibutang kung unsa kadaghana_____
4. Gigamit ba ninyo ang tubig sa suba/atabay sa pag bisbis sa gawas, pang flush sa C.R., ug pang bubo sa tanum?_ Yes _ No Kanus-a or kapila kasagaran? ___ Kada Adlaw ___ Kada sunod Adlaw ___ Ka Duha kada semina ___ Kada Semina ___ Panagsa Kaayo ___ Wala/Dili Aduna bay higayon nga nka inom or tulon ug tubig samtang naligo sa suba/atabay? **___ Yes ___ No** Unsa kaha kadaghana (estimate) ang imong na inom or tulon nga tubig sa imong mahinumduman? ___ tunga sa kutsara ___ Usa ka kutsara ___ Tunga sa gamay nga baso (shot glass) ___ Usa ka shot glass ___ Sobra pa sa shot glass Kung wala dinhi unsa ka daghana, ibutang kung unsa kadaghana_____
5. Manghinaw ba ka pag-ayo gamit ang sabon ug tubig kada human nimog kahikap ug hayop nga naas palibot?___ Y ___ N
6. Ginapabukal ba ninyo ang inyong tubig ug 10 minutes hilabi na kung adunay bagyo ug baha? ___ Yes ___ No
7. Inyo bang gisuguro nga ang mga hayop ninyo dili maduol sa suba/atabay,gripo? ___ Yes ___ No
8. Kung adunay magkalibanga sa pamilya, inyo ba dayon kini nga tagdon pina-agi sa pagtambal nini or pagadto dayon sa doctor or hospital? ___ Yes ___ No
9. Kamo-kamo lang ba ang gagtambal kung unsay sakit sa pamilya sama sa ordinaryo nga diarrhea? ___ Yes ___ No
10. Ginatuman ba ninyo ang resita sa doctor kungmag pa check-up mo? ___ Yes ___ No
11. Regular ba kamo nga magpa health check-up sa doctor (ka usa or ka duha sa usa ka tuig)? ___Yes ___ No

Mga PRACTICES nga adunay kalambigitan sa Liptospirosis infection sa mga sumusunod nga items:

Similar Questions for Leptospirosis Infection from E.coli questions(Numbers 1-4; 15-17) 1. Kung adunay gihilantan sa pamilya, ipa check-up ba dayon ninyo? ___ Yes ___ No 2. Nagamit ba kamo ug rubber boots panahon sa bagyo ug baha?___ Yes ___ No 3. Nag-inom ba kamo ug antibiotic nga Doxycyline para dili magka Liptospirosis hilabi na panahon sa bagyo ug baha? ___ Yes ___ No

Mga PRACTICES nga adunay kalambigitan sa *Dengue Fever* infection sa mga sumusunod nga items:

1. Kanunay ba kamo naga panglimpyo sa inyong balay ug palibot ug gisiguro nga walay tubig nga napundo sa mga lugar nag nka lista sa ilalom nga kasagarang puy-an sa mga lamok?___ Yes ___ No

Kung ang imong tubag yes, butangi ug check ang items nga naa sa ilalom nga maoy imong tubag. ___ mga kaang sa tanum ___ mga nigahi nga yuta sa mga tanum ___ collar sa toilet bowl ___ gutter sa atop ___ mga gagmay kanal-kanal gully trap ___ wala na gigamit nga water tank ___ flower pot plate ___ road side drain ___ tubo sa mga drainage gikan sa atop
2. Kanunay ba kamo naga panglimpyo sa inyong balay ug palibot ug gisiguro nga walay tubig nga napundo sa mga lugar nag nka lista sa ilalom nga dili kasagarang puy-an sa mga lamok? ___ Yes ___ No Kung ang imong tubag yes, butangi ug check ang items nga naa sa ilalom nga maoy imong tubag. ___ mga bangag sa kahoy ___ mga tanum ___ aircon tray ___ BBQ pit ___ canvass sheet Mga wala gigamit or gilabay nga mga receptacles, containers sama sa: ___ ligid ___ plastic caps ___ bagol sa lubi ___ mga botilya ___ lata ___ baldi ___ jars ___ stocked-up nga gutters ___ tarpulins ___ drums
3. Gisiguro ba ninyo nga ang inyong balay ang hangin makagawas ug sulod? ___ Yes ___ No
4. Naa bay mga screen inyong portahan ug binatana? ___ Yes ___ No
5. Inyo bang ginasigurado nga kada human ninyong gamit sa drum/tangke sa tubig inyo kining gisirado? ___ Yes ___ No ___ Wala
6. Ang inyo bang tubig maabtan ug semana sa mga gibutangan ninyo sama sa drum or baldi ug uban pa? ___ Yes ___ No
7. Ok lang ba ninyo nga adunay mga tubig nga napundo sulod ug gawas sa inyong balay? ___ Yes ___ No
8. Gipasagdan ba ninyo ang tubig sa mga flower pot or vases nga muabot ug usa ka semana? ___ Yes ___ No
9. Adunay bay fogging nga gihimo sa inyong balay or Barangay? ___ Yes ___ No
10. Nakagamit ba kamo ug chemical sa pagpatay sa mga larva sa lamok? ___ Yes ___ No
11. Nakagamit ba kamo ug biological nga paagi sama sa pag gamit ug isda sa pagpatay sa mga larva sa lamok?___ Y ___ N

Assessment on Flood Resilience & Health Program of the Local Government Units and NGO's

Sa imong mga panglantaw ug panghuna-huna base sa imong na experensya ug nakita o nadungog, kung unsa ka maayo ang mga programa sa gobyerno ug NGO. Palihug ug butang ug check sa linya nga maoy imong tubag.

	Maayo Kaayo (Excellent)	**Maayo** (Very Well)	**Ok Lang** (Good)	**Dili Maayo** (Poor)	**Dili Dyud Maayo** (Very Poor)
1. Ang pag implementar ug monitor sa mga polisiya, plano ug programa para sa mga kalimidad sama sa bagyo ug baha.	_____	_____	_____	_____	_____
2. Nga matinud-anon ang gobyerno sa mga budget ug donasyon nga para sa mga katawhan nga naapektahan sa maong mga kalamidad.	_____	_____	_____	_____	_____
3. Sa mga livelihood o tabang pinansyal aron maka negosyo ug makabangon sa epekto sa baha ug bagyo.	_____	_____	_____	_____	_____
4. Sa mga polisiya ug programa para sa pag protektar sa atong suba.	_____	_____	_____	_____	_____
5. Ang inyong pag kooperar aron ma-protektaran ang atong suba gikan sa kadaut niini.	_____	_____	_____	_____	_____
6. Ang mga drainage system	_____	_____	_____	_____	_____
7. Ang mga dike system	_____	_____	_____	_____	_____
8. Ang mga bridge system/taytayan	_____	_____	_____	_____	_____

Community-Based Flood Vulnerability Index for Urban Flooding: Understanding Social Vulnerabilities and Risks

Date of Interview : _____ dd _____ mm _____ 2013	Questionnaire Number: _____
Commune/Barangay Name: _____	Respondent's Name (OPTIONAL) _____
Interviewer's Name:	Respondent's Sex: ____ Male/Female ____

9. Ang mga flood hazard maps _____ _____ _____ _____ _____
10. Ang pag limpyo o kabkab/kalot _____ _____ _____ _____ _____
    sa suba kung dili na maayo ang pag flow sa tubig niini.
11. Ang mga pag apud-apud sa _____ _____ _____ _____ _____
    donations, goods and relief
12. Ang pagpanghatag ug _____ _____ _____ _____ _____
    information drive brochures o mga balasahon nga makatabang mahitangud sa paglikay sa epekto sa baha o bagyo ug ang pagbangon gikan niini.
13. Ang mga early flood warning systems _____ _____ _____ _____ _____
14. Ang mga pagbansay-bansay _____ _____ _____ _____ _____
    (preparedness and drills) aron maandam sa unsa nga mga kalimidad hilabi na sa bagyo ug baha
15. Ang mga organisasyon ug _____ _____ _____ _____ _____
    volunteers sa gobyerno o NGO's nga motabang ug mo- responder sa panahon sa bagyo ug baha.
16. Ang mga basic emergency and _____ _____ _____ _____ _____
    relief services sama sa pagkaon, tubig, sanitation, transportasyon, komunikasyon, medical help, provisional repairs o pag-ayo sa mga naguba o damage nga property sa gobyerno, pribado o sa mga katawhan dinhi sa barangay.
17. Ang pag clean-up (limpyo) sa _____ _____ _____ _____ _____
    mga lugar nga apektado, ang paghatag ug insurance, claims (tabang pinansyal), traumatic and psychological stress debriefings (pag check-up ug paghatag ug advice sa mga na shock sa mga nanghitabo sa baha o bagyo.
18. Ang mga gitagana nga _____ _____ _____ _____ _____
    relocation area sa gobyerno para sa mga katawhan nga naa sa flood prone area.
19. Ang mga programa sa diarrhea _____ _____ _____ _____ _____
    ug Liptospisoris aron malikayan kini sama sa mga information drive, medical help ug uban pa.
20. Ang mga programa sa _____ _____ _____ _____ _____
    pagsumpo sa sakit nga Dengue Fever sama sa fogging, chemical/biological control, information drive brochures ug lectures, clean-up ug uban pang mga paagi dinhi sa Barangay.

Appendix 3 LOCAL GOVERNMENT UNITS (LGU's) and NONGOVERMENTAL ORGANIZATIONS (NGO's)

In this appendix the following form of questionnaires used in the survey is presented as follows:

1. Local Government Units (LGU's) and Non-governmental Organizations (NGO's) Assessments on Flood Resilience interms of:
   A. Governance
   B. Sustainable Community Livelihood
   C. The River's Natural Resources and Natural Features Management
   D. Land Use Management and Structural Design
   E. Post-Risk Assessment and Integration
   F. Warning and Evacuation
   G. Emergency Response
   H. Disaster Recovery

SURVEY FORM QUESTIONNAIRE

ASSESSMENTS ON FLOOD RESILIENCE IN THE FOLLOWING ITEMS:

Benchmarks	
A. GOVERNANCE	Leadership, legal framework, and institutions provide enabling conditions for resilience through community involvement with government. **A1. How well are the community development policies, plans, and programs implemented and monitored?** ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent **A2. How accessible are the basic services to all sectors of society?** A2a. Water ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent A2b. Transportation ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent A2c. Communication ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent A2c. Security ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent A2d. Health services ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent A2e. Evacuation centers

	___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent **A3. How well are the participatory collaboration mechanisms among different sectors and various levels of government used to manage for resilience?** ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent **A4. How transparent, accountable, and available are the technical** (services offered) **and financial support mechanisms to support planned community actions for resilience?** ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent **A5. How good are we with our risk reduction efforts?** ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent
B. SUSTAINABLE COMMUNITY LIVELIHOOD	Communities are engaged in diverse and environmentally sustainable livelihoods resistant to hazards. **B1. How well is our development policies and plans in building social capital and skills for economic diversity and self reliance?** ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent **B2. How is the availability of diverse and environmentally sustainable livelihood in the community?** ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent **B3. How well is our social and cultural networks in promoting self-reliant communities so it would have the capacity to provide support to disaster-stricken areas?** ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent **B4. How well is our technical** (services offered) **and financial resources in promoting stable and robust economies, reduce vulnerability to hazards, and aid in disaster recovery?** ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent
C. THE RIVER'S NATURAL RESOURCES & NATURAL FEATURES' MANAGEMENT	Active management of river's natural resources & natural features, sustained environmental services and livelihoods that reduces risks from flood hazards. **C1. How well are our policies and plans implemented and monitored to effectively manage our communities along the river?** ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent **C2. How well are we protecting and maintaining our rivers and its natural features to reduce risk from flood hazards?** ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent **C3. How actively engaged our communities in planning and implementing river resource management activities?**(e.g. the river's natural resources and natural features) ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent **C4. How well are our communities and local governments value and invest in management and conservation to sustain our river's natural resources and natural features?**

	___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent
D. Land Use Management and Structural Design	Effective land use and structural design that complement environmental, economic, and community goals and reduce risks from hazards. **D1. How well are the land use policies and building standards that incorporate measures to reduce risks from hazards and protect sensitive habitats are established, monitored and enforced?** (e.g. urban planning) ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent **D2. How well are critical infrastructures** (drainage system, retention and storage basins, dry ponds, dike system, bridges) **constructed to address risks from priority hazards?** D2a. Increasing capacity of our drainage system ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent D2b. Good runoff volume control on open retention basin, in-line basins, off-site basins, on-site storage, dry ponds ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent D2c. Very efficient dike safety system ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent D2d. Very efficient bridge system ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent **D3. How well are developers and communities incorporate risk reduction into the location and design of structures?** D3a. Existing spatial planning ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent D3b. Flood risk adaptive to land use ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent D3c. Building regulations ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent D3d. Building codes ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent D3e. Zoning ordinances ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent **D4.How established is our education, outreach, and training programs to improve compliance with land use policies and building standards?** ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent
E. POST-RISK	Leadership and community members are aware of hazards and risk information is utilized when

ASSESSMENT AND INTEGRATION	making decisions. **E1. How well are the flood hazard risk assessments completed and routinely updated?** ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent **E2. How comprehensive is our flood hazard risk assessments to incorporate risks to all elements of resilience?**(e.g. livelihoods, river management and land use) ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent **E3. How well our community participates in the hazard risk assessment process?** ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent **E4. How well are our information from risk assessment is accessible and utilized by the community and government?** E4a. Information drive-brochures ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent E4b. Understanding the early warning systems ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent E4**c.** Flood hazard maps ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent E4d. Evacuation centers ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent
F. WARNING and EVACUATION	Community is capable of receiving notifications and alerts of flood hazards, warning at-risk populations, and individuals acting on the alert. **F1. How well is our community warning and evacuation systems, policies, plans, and procedures are in place and capable of alerting vulnerable populations in a timely manner?** ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent **F2. How well is our community flood warning system in place and maintained?** ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent **F3. How well is our community evacuation infrastructure in place and maintained?** ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent **F4. How prepared is the community to respond to hazard warnings with appropriate actions?** ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent **F5. How is the availability of our technical** (services offered) **and financial resources in maintaining and improving warning and evacuation systems?**

	___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent
G. EMERGENCY RESPONSE	Mechanisms and networks are established and maintained to respond quickly to urban pluvial flooding disasters and address emergency needs at the community level. **G1. How established are our pre-defined roles and responsibilities for immediate action at all levels.** ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent **G2. How is the availability of the basic emergency and relief services?** (e.g. food, water, sanitation, transportation, communication, medical help, provisional repairs) ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent **G3. How well are our preparedness activities** (drills and simulations) **are ongoing to train and educate responders?** ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent **G4. How well are the organizations and volunteers are in placed with technical** (services offered) **and financial resources to support emergency response activities?** ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent
H. DISASTER RECOVERY	Plans are in place prior to hazard events that accelerate disaster recovery, engage communities in the recovery process, and minimize negative environmental, social, and economic impacts. **H1. How well is our disaster recovery plan pre-established that addresses economic, environmental, and social concerns of the community?**(e.g. clean-up, repairs, donations) ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent **H2. How well is our disaster recovery process is monitored, evaluated, and improved at periodic intervals?** (e.g. disaster response committee that meets regularly for exchange of information and review of past experiences from flooding) ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent **H3. How well is coordination mechanisms at international, national, and local levels are pre-established for disaster recovery?** ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor___ None Existent **H4. How is the availability of our technical** (services offered) **and financial resources to support the recovery process?** H4a. Insurance scheme ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent H4b. Damage assessment facilitating claim procession ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent H4c. Reconstruction ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent

	H4d. Charitable funds ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent H4e. Social therapeutic measures ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent **H5. How good are we in conducting traumatic/or psychological stress debriefings?** ___ Excellent ___Very Well ___ Good ___ Poor ___ Very Poor ___ None Existent
FOR COMMENTS & SUGGESTIONS	

APPENDIX 4 RESULTS for the Respondent's Profile

In this appendix the results of the surveyed questionnaires from the household respondents is presented as follows:

1. Results of the household respondents profile on socio-demographic, socio-economic, physical and social environment
2. Results on the Knowledge, Attitude, and Practices (KAP) on Community Flood Resilient Assessment
3. Results on the KAP of Household Respondents on Environmental Microbial Health Risks (*E. coli, Leptospira spp., Dengue Fever Mosquito*)
4. Results on the Assessment on Flood Resilience & Health Program of the Local Government Units and NGO's

Age and Sex Distribution

Barangay	Number of Respondents	Gender				Age		
		Female		Male		Mean	Range	
		Number	%	Number	%		Minimum	Maximum
Tabuc-tubig	10	7	77.78	2	22.22	38.75	25	65
Junob	16	15	93.75	1	6.25	39.75	19	63
Poblacion 1	22	14	77.78	4	22.22	45.00	17	86
Batinguel	38	24	82.76	5	17.24	37.55	22	60
Candua-ay	72	51	79.69	13	20.31	38.21	18	70
Taclobo	63	40	81.63	9	18.37	40.50	19	82
Bagacay	30	20	76.92	6	23.08	35.23	18	62
Cadawinonan	25	14	82.35	3	17.65	40.76	24	65
Poblacion 8	29	21	91.30	2	8.70	44.88	20	79
Barangay 2	16	11	78.57	3	21.43	40.08	25	62
Balugo	17	8	61.54	5	38.46	45.50	23	70
Calindagan	23	17	80.95	4	19.05	39.05	22	76
Overall	361	242	80.94	57	19.06	39.84	17	86

Note: only 299 indicated their gender

Educational Attainment

Educational Attainment	Tabuc-tubig		Junob		Poblacion 1		Batinguel		Candua-ay	
	Number	%	Number	%	Number	%	Number	%	Number	%
Graduate School	1	10.00	0	0.00	0	0.00	0	0.00	0	0.00
College Graduate	0	0.00	1	6.25	5	22.73	2	5.26	6	8.33
College Level	0	0.00	3	18.75	3	13.64	7	18.42	15	20.83
Vocational	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
High School Graduate	0	0.00	7	43.75	4	18.18	5	13.16	12	16.67
High School Level	3	30.00	2	12.50	3	13.64	6	15.79	18	25.00
Elementary Graduate	0	0.00	0	0.00	2	9.09	2	5.26	0	0.00
Elementary Level	2	20.00	3	18.75	3	13.64	10	26.32	10	13.89
Did not indicate	4	40.00	0	0.00	2	9.09	6	15.79	11	15.28
Total	10	100.00	16	100.00	22	100.00	38	100.00	72	100.00

Educational Attainment	Taclobo		Bagacay		Cadawinonan		Poblacion 8		Barangay 2	
	Number	%	Number	%	Number	%	Number	%	Number	%
Graduate School	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
College Graduate	11	17.46	0	0.00	3	12.00	1	3.45	2	12.50
College Level	16	25.40	5	16.67	5	20.00	7	24.14	5	31.25
Vocational	1	1.59	0	0.00	0	0.00	0	0.00	0	0.00
High School Graduate	5	7.94	5	16.67	2	8.00	3	10.34	2	12.50
High School Level	9	14.29	4	13.33	8	32.00	8	27.59	2	12.50
Elementary Graduate	2	3.17	3	10.00	1	4.00	1	3.45	0	0.00
Elementary Level	8	12.70	5	16.67	4	16.00	5	17.24	0	0.00
Did not indicate	11	17.46	8	26.67	2	8.00	4	13.79	5	31.25
Total	63	100.00	30	100.00	25	100.00	29	100.00	16	100.00

Educational Attainment … continued

Educational Attainment	Balugo		Calindagan		Overall	
	Number	%	Number	%	Number	%
Graduate School	0	0.00	0	0.00	1	0.28
College Graduate	2	11.76	3	13.04	36	9.97
College Level	1	5.88	1	4.35	68	18.84
Vocational	0	0.00	0	0.00	1	0.28
High School Graduate	2	11.76	7	30.43	54	14.96
High School Level	3	17.65	8	34.78	74	20.50
Elementary Graduate	2	11.76	0	0.00	13	3.60
Elementary Level	6	35.29	3	13.04	59	16.34
Did not indicate	1	5.88	1	4.35	55	15.24
Total	17	100.00	23	100.00	361	100.00

Household Profile

Number of Family Members

Barangay	Total Number of Family Members			Number of Extended Family Members			Mean Gender Distribution (%)	
	Average	Minimum	Maximum	Average	Minimum	Maximum	Female	Male
Tabuc-tubig	5.30	3	9	1.10	0.00	5.00	47.17	52.83
Junob	4.73	2	6	0.40	0.00	4.00	50.95	49.05
Poblacion 1	8.14	3	16	3.19	0.00	12.00	52.05	47.95
Batinguel	5.15	2	12	0.76	0.00	5.00	53.13	46.88
Candua-ay	6.04	3	16	1.24	0.00	9.00	52.15	47.85
Taclobo	6.16	2	13	1.69	0.00	8.00	50.71	49.29
Bagacay	5.55	3	13	1.34	0.00	6.00	49.32	50.68
Cadawinonan	6.64	3	13	1.59	0.00	5.00	51.16	48.84
Poblacion 8	6.89	2	12	1.63	0.00	12.00	56.32	43.68
Barangay 2	5.38	2	10	1.62	0.00	6.00	44.59	55.41
Balugo	6.53	4	13	2.00	0.00	7.00	47.17	52.83
Calindagan	5.78	1	13	1.09	0.00	6.00	56.62	43.38
Overall	6.07	1	16	1.46	0.00	12.00	51.68	48.32

Recent Typhoon/Flood ("Sendong") Affected Households

Barangay	Typhoon/Flood "Sendong" Victim			
	Yes		No	
	Number	%	Number	%
Tabuc-tubig	6	60.00	4	40.00
Junob	14	87.50	2	12.50
Poblacion 1	13	59.09	9	40.91
Batinguel	31	81.58	6	15.79
Candua-ay	60	83.33	12	16.67
Taclobo	30	47.62	33	52.38
Bagacay	23	76.67	7	23.33
Cadawinonan	15	60.00	10	40.00
Poblacion 8	25	86.21	4	13.79
Barangay 2	14	87.50	2	12.50
Balugo	11	64.71	6	35.29
Calindagan	15	65.22	8	34.78
Total	257	71.19	103	28.53

Diarrhea Experience

Barangay	Experienced Diarrhea				Mean Number of Family Members that Experienced Diarrhea
	Yes		No		
	Number	%	Number	%	
Tabuc-tubig	5	50.00	5	50.00	3.50
Junob	4	25.00	12	75.00	4.25
Poblacion 1	12	54.55	10	45.45	3.67
Batinguel	24	63.16	14	36.84	2.55
Candua-ay	27	37.50	45	62.50	2.81
Taclobo	24	38.10	39	61.90	2.65
Bagacay	10	33.33	20	66.67	4.10
Cadawinonan	10	40.00	15	60.00	2.25
Poblacion 8	19	65.52	10	34.48	3.45
Barangay 2	8	50.00	8	50.00	2.38
Balugo	9	52.94	8	47.06	3.67
Calindagan	9	39.13	14	60.87	2.22
Total	161	44.60	200	55.40	3.00

Dengue Experience

Barangay	Experienced Dengue				Mean Number of Family Members that Experienced Dengue
	Yes		No		
	Number	%	Number	%	
Tabuc-tubig	0	0.00	10	100.00	0.00
Junob	2	12.50	14	87.50	2.00
Poblacion 1	9	40.91	13	59.09	2.00
Batinguel	8	21.05	30	78.95	1.38
Candua-ay	10	13.89	62	86.11	1.30
Taclobo	12	19.05	51	80.95	1.54
Bagacay	3	10.00	27	90.00	1.33
Cadawinonan	5	20.00	20	80.00	1.00
Poblacion 8	8	27.59	21	72.41	1.25
Barangay 2	4	25.00	12	75.00	1.00
Balugo	2	11.76	15	88.24	1.00
Calindagan	4	17.39	19	82.61	1.50
Total	67	18.56	294	81.44	1.42

Liptospirosis Experience

Barangay	Experienced Liptospirosis				Mean Number of Family Members that Experienced Liptospirosis
	Yes		No		
	Number	%	Number	%	
Tabuc-tubig	0	0.00	10	100.00	0.00
Junob	0	0.00	16	100.00	0.00
Poblacion 1	1	4.55	21	95.45	2.00
Batinguel	0	0.00	38	100.00	0.00
Candua-ay	2	2.78	70	97.22	1.00
Taclobo	1	1.59	62	98.41	4.00
Bagacay	1	3.33	29	96.67	3.00
Cadawinonan	0	0.00	25	100.00	0.00
Poblacion 8	2	6.90	27	93.10	1.50
Barangay 2	0	0.00	16	100.00	0.00
Balugo	1	5.88	16	94.12	1.00
Calindagan	0	0.00	23	100.00	0.00
Total	8	2.22	353	97.78	1.42

SOCIO-ECONOMIC

Occupation

Occupation	Tabuc-tubig		Junob		Poblacion 1		Batinguel		Candua-ay	
	Number	%	Number	%	Number	%	Number	%	Number	%
Fishermen	0	0.00	0	0.00	2	9.09	0	0.00	1	1.39
Skilled Worker	0	0.00	1	6.25	2	9.09	3	7.89	8	11.11
Laborer/Helper	2	20.00	2	12.50	2	9.09	5	13.16	16	22.22
Saleslady/Salesman	3	30.00	3	18.75	4	18.18	7	18.42	12	16.67
Public Employee	0	0.00	1	6.25	3	13.64	2	5.26	5	6.94
Private Employee	0	0.00	0	0.00	4	18.18	7	18.42	22	30.56
Pedicab/Easyride Driver	1	10.00	1	6.25	0	0.00	3	7.89	11	15.28
Private Driver	0	0.00	0	0.00	0	0.00	4	10.53	0	0.00
Laundry	0	0.00	1	6.25	0	0.00	4	10.53	1	1.39
Others	2	20.00	4	25.00	5	22.73	0	0.00	3	4.17
No Work	0	0.00	1	6.25	1	4.55	2	5.26	1	1.39
Did not specify	2	20.00	2	12.50	1	4.55	3	7.89	3	4.17

Occupation … continued

Occupation	Taclobo		Bagacay		Cadawinonan		Poblacion 8		Barangay 2	
	Number	%	Number	%	Number	%	Number	%	Number	%
Fishermen	1	1.59	1	3.33	2	8.00	0	0.00	0	0.00
Skilled Worker	2	3.17	5	16.67	4	16.00	2	6.90	2	12.50
Laborer/Helper	9	14.29	6	20.00	7	28.00	6	20.69	1	6.25
Saleslady/Salesman	16	25.40	6	20.00	3	12.00	7	24.14	1	6.25
Public Employee	7	11.11	3	10.00	8	32.00	4	13.79	3	18.75
Private Employee	17	26.98	6	20.00	7	28.00	2	6.90	3	18.75
Pedicab/Easyride Driver	2	3.17	0	0.00	2	8.00	4	13.79	0	0.00
Private Driver	0	0.00	0	0.00	0	0.00	2	6.90	2	12.50
Laundry	0	0.00	1	3.33	5	20.00	2	6.90	0	0.00
Others	7	11.11	1	3.33	0	0.00	6	20.69	3	18.75
No Work	1	1.59	0	0.00	0	0.00	0	0.00	0	0.00
Did not specify	6	9.52	4	13.33	1	4.00	1	3.45	1	6.25

Occupation … continued

Occupation	Balugo		Calindagan		Overall	
	Number	%	Number	%	Number	%
Fishermen	0	0.00	5	21.74	12	3.32
Skilled Worker	2	11.76	3	13.04	34	9.42
Laborer/Helper	4	23.53	3	13.04	63	17.45
Saleslady/Salesman	0	0.00	6	26.09	68	18.84
Public Employee	3	17.65	1	4.35	40	11.08
Private Employee	1	5.88	6	26.09	75	20.78
Pedicab/Easyride Driver	2	11.76	2	8.70	28	7.76
Private Driver	0	0.00	1	4.35	9	2.49
Laundry	1	5.88	0	0.00	15	4.16
Others	3	17.65	2	8.70	36	9.97
No Work	0	0.00	0	0.00	6	1.66
Did not specify	2	11.76	1	4.35	27	7.48

Family Income

Income	Tabuc-tubig		Junob		Poblacion 1		Batinguel		Candua-ay	
	Number	%	Number	%	Number	%	Number	%	Number	%
Below 3,000	2	20.00	6	37.50	6	27.27	16	42.11	18	25.00
3001-10,000	4	40.00	5	31.25	6	27.27	15	39.47	34	47.22
10,001 and above	2	20.00	3	18.75	7	31.82	2	5.26	13	18.06
No Income	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Did not specify	2	20.00	2	12.50	3	13.64	5	13.16	7	9.72

Income	Taclobo		Bagacay		Cadawinonan		Poblacion 8		Barangay 2	
	Number	%	Number	%	Number	%	Number	%	Number	%
Below 3000	18	28.57	12	40.00	4	16.00	14	48.28	6	37.50
3001-10,000	28	44.44	14	46.67	12	48.00	11	37.93	8	50.00
10,001 and above	13	20.63	1	3.33	6	24.00	2	6.90	2	12.50
No Income	0	0.00	0	0.00	0	0.00	2	6.90	0	0.00
Did not specify	4	6.35	3	10.00	3	12.00	0	0.00	0	0.00

Income	Balugo		Calindagan		Overall	
	Number	%	Number	%	Number	%
Below 3000	4	23.53	6	26.09	112	31.02
3001-10,000	8	47.06	12	52.17	157	43.49
10,001 and above	2	11.76	3	13.04	56	15.51
No Income	0	0.00	0	0.00	2	0.55
Did not specify	3	17.65	2	8.70	34	9.42

Residential House and Lot Ownership

Ownership	Tabuc-tubig		Junob		Poblacion 1		Batinguel		Candua-ay	
	Number	%	Number	%	Number	%	Number	%	Number	%
House and Lot	1	10.00	0	0.00	5	22.73	7	18.42	19	26.39
House Only	8	80.00	10	62.50	11	50.00	24	63.16	25	34.72
Lot Only	1	10.00	2	12.50	2	9.09	2	5.26	6	8.33
Do Own any Property	0	0.00	4	25.00	4	18.18	5	13.16	16	22.22
Did not specify	0	0.00	0	0.00	0	0.00	0	0.00	6	8.33

Ownership	Taclobo		Bagacay		Cadawinonan		Poblacion 8		Barangay 2	
	Number	%	Number	%	Number	%	Number	%	Number	%
House and Lot	24	38.10	2	6.67	16	64.00	7	24.14	2	12.50
House Only	19	30.16	21	70.00	4	16.00	13	44.83	8	50.00
Lot Only	11	17.46	2	6.67	1	4.00	6	20.69	3	18.75
Do Own any Property	9	14.29	5	16.67	4	16.00	3	10.34	2	12.50
Did not specify	0	0.00	0	0.00	0	0.00	0	0.00	1	6.25

Ownership	Balugo		Calindagan		Overall	
	Number	%	Number	%	Number	%
House and Lot	4	23.53	6	26.09	93	25.76
House Only	2	11.76	3	13.04	148	41.00
Lot Only	0	0.00	0	0.00	36	9.97
Do Own any Property	8	47.06	12	52.17	72	19.94
Did not specify	3	17.65	2	8.70	12	3.32

Property Insurance

Barangay	Insured					
	Yes		No		Not Specified	
	Number	%	Number	%	Number	%
Tabuc-tubig	0	0.00	10	100.00	0	0.00
Junob	0	0.00	16	100.00	0	0.00
Poblacion 1	3	13.64	19	86.36	0	0.00
Batinguel	2	5.26	36	94.74	0	0.00
Candua-ay	12	16.67	51	70.83	9	12.50
Taclobo	11	17.46	43	68.25	9	14.29
Bagacay	4	13.33	22	73.33	4	13.33
Cadawinonan	7	28.00	16	64.00	2	8.00
Poblacion 8	2	6.90	25	86.21	2	6.90
Barangay 2	1	6.25	12	75.00	3	18.75
Balugo	0	0.00	17	100.00	0	0.00
Calindagan	2	8.70	21	91.30	0	0.00
Overall	44	12.19	288	79.78	29	8.03

Housing Materials

Material	Tabuc-tubig		Junob		Poblacion 1		Batinguel		Candua-ay	
	Number	%	Number	%	Number	%	Number	%	Number	%
Concrete	0	0.00	0	0.00	2	9.09	4	10.53	6	8.33
Semi-Concrete	5	50.00	3	18.75	10	45.45	5	13.16	32	44.44
Semi-Concrete with Light Roofing Materials	2	20.00	0	0.00	1	4.55	1	2.63	3	4.17
Wood	1	10.00	1	6.25	5	22.73	14	36.84	15	20.83
Wood with Light Roofing Materials	1	10.00	4	25.00	4	18.18	10	26.32	8	11.11
Light Materials	1	10.00	5	31.25	0	0.00	2	5.26	7	9.72
Tent/Plastic	0	0.00	3	18.75	0	0.00	2	5.26	0	0.00
Did not specify	0	0.00	0	0.00	0	0.00	0	0.00	1	1.39

Material	Taclobo		Bagacay		Cadawinonan		Poblacion 8		Barangay 2	
	Number	%	Number	%	Number	%	Number	%	Number	%
Concrete	6	9.52	3	10.00	6	24.00	1	3.45	1	6.25
Semi-Concrete	21	33.33	5	16.67	11	44.00	11	37.93	2	12.50
Semi-Concrete with Light Roofing Materials	0	0.00	2	6.67	3	12.00	2	6.90	2	12.50
Wood	21	33.33	10	33.33	5	20.00	9	31.03	7	43.75
Wood with Light Roofing Materials	7	11.11	8	26.67	0	0.00	6	20.69	2	12.50
Light Materials	3	4.76	2	6.67	0	0.00	0	0.00	2	12.50
Tent/Plastic	1	1.59	0	0.00	0	0.00	0	0.00	0	0.00
Did not specify	4	6.35	0	0.00	0	0.00	0	0.00	0	0.00

Housing Materials … continued

Material	Balugo		Calindagan		Overall	
	Number	%	Number	%	Number	%
Concrete	1	5.88	2	8.70	32	8.86
Semi-Concrete	3	17.65	13	56.52	121	33.52
Semi-Concrete with Light Roofing Materials	0	0.00	1	4.35	17	4.71
Wood	5	29.41	3	13.04	96	26.59
Wood with Light Roofing Materials	3	17.65	3	13.04	56	15.51
Light Materials	5	29.41	1	4.35	28	7.76
Tent/Plastic	0	0.00	0	0.00	6	1.66
Did not specify	0	0.00	0	0.00	5	1.39

Notes: Semi-Concrete: concrete and wood; Light Roofing Materials: coconut/nipa shingles, Light Materials: bamboo, cartoon and scavenged materials, coconut/nipa shingles.

Physical Environment

Flooding Frequency in Place

Frequency	Tabuc-tubig		Junob		Poblacion 1		Batinguel		Candua-ay	
	Number	%	Number	%	Number	%	Number	%	Number	%
Every month	0	0.00	0	0.00	2	9.09	3	7.89	8	11.11
Every 4 months	1	10.00	2	12.50	0	0.00	8	21.05	2	2.78
Every 6 months	3	30.00	2	12.50	0	0.00	4	10.53	4	5.56
Every year	3	30.00	5	31.25	8	36.36	11	28.95	15	20.83
Sometimes	3	30.00	2	12.50	6	27.27	7	18.42	17	23.61
Rarely	0	0.00	4	25.00	2	9.09	4	10.53	20	27.78
Never	0	0.00	1	6.25	3	13.64	1	2.63	4	5.56
Did not Specify	0	0.00	0	0.00	1	4.55	0	0.00	2	2.78

Frequency	Taclobo		Bagacay		Cadawinonan		Poblacion 8		Barangay 2	
	Number	%	Number	%	Number	%	Number	%	Number	%
Every month	1	1.59	0	0.00	1	4.00	0	0.00	0	0.00
Every 4 months	5	7.94	5	16.67	0	0.00	4	13.79	0	0.00
Every 6 months	2	3.17	1	3.33	0	0.00	1	3.45	1	6.25
Every year	11	17.46	8	26.67	7	28.00	9	31.03	6	37.50
Sometimes	18	28.57	7	23.33	6	24.00	7	24.14	3	18.75
Rarely	17	26.98	9	30.00	7	28.00	8	27.59	6	37.50
Never	9	14.29	0	0.00	2	8.00	0	0.00	0	0.00
Did not Specify	0	0.00	0	0.00	2	8.00	0	0.00	0	0.00

Flooding Frequency in Place … continued

Frequency	Balugo		Calindagan		Overall	
	Number	%	Number	%	Number	%
Every month	0	0.00	1	4.35	16	4.43
Every 4 months	0	0.00	1	4.35	28	7.76
Every 6 months	0	0.00	1	4.35	19	5.26
Every year	5	29.41	3	13.04	91	25.21
Sometimes	9	52.94	7	30.43	92	25.48
Rarely	2	11.76	7	30.43	86	23.82
Never	0	0.00	3	13.04	23	6.37
Did not Specify	1	5.88	0	0.00	6	1.66

Number of Houses Reached by Flooding

Reached by Flooding	Tabuc-tubig		Junob		Poblacion 1		Batinguel		Candua-ay	
	Number	%	Number	%	Number	%	Number	%	Number	%
Yes	6	60.00	13	81.25	13	59.09	31	81.58	59	81.94
No	4	40.00	3	18.75	9	40.91	7	18.42	13	18.06
Did not Specify	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Reached by Flooding	Taclobo		Bagacay		Cadawinonan		Poblacion 8		Barangay 2	
	Number	%	Number	%	Number	%	Number	%	Number	%
Yes	30	47.62	23	76.67	15	60.00	24	82.76	14	87.50
No	32	50.79	7	23.33	10	40.00	5	17.24	2	12.50
Did not Specify	1	1.59	0	0.00	0	0.00	0	0.00	0	0.00

Reached by Flooding	Balugo		Calindagan		Overall	
	Number	%	Number	%	Number	%
Yes	10	58.82	16	69.57	254	70.36
No	7	41.18	7	30.43	106	29.36
Did not Specify	0	0.00	0	0.00	1	0.28

Depth of Flood Waters in the Immediate Surroundings

Depth	Tabuc-tubig		Junob		Poblacion 1		Batinguel		Candua-ay	
	Number	%	Number	%	Number	%	Number	%	Number	%
Ankle High	0	0.00	0	0.00	7	31.82	8	21.05	13	18.06
Knee High	0	0.00	3	18.75	8	36.36	5	13.16	16	22.22
Waist High	0	0.00	0	0.00	4	18.18	9	23.68	18	25.00
Shoulder High	1	10.00	1	6.25	2	9.09	2	5.26	11	15.28
Above the Head	3	30.00	4	25.00	0	0.00	5	13.16	5	6.94
Roof High	2	20.00	3	18.75	0	0.00	2	5.26	3	4.17
Beyond the Reef	0	0.00	2	12.50	0	0.00	4	10.53	0	0.00
Did not Specify	4	40.00	3	18.75	1	4.55	3	7.89	6	8.33

Depth	Taclobo		Bagacay		Cadawinonan		Poblacion 8		Barangay 2	
	Number	%	Number	%	Number	%	Number	%	Number	%
Ankle High	22	34.92	5	16.67	6	24.00	3	10.34	4	25.00
Knee High	7	11.11	2	6.67	4	16.00	5	17.24	3	18.75
Waist High	5	7.94	5	16.67	2	8.00	2	6.90	2	12.50
Shoulder High	4	6.35	4	13.33	4	16.00	2	6.90	2	12.50
Above the Head	5	7.94	8	26.67	3	12.00	8	27.59	4	25.00
Roof High	5	7.94	1	3.33	0	0.00	3	10.34	1	6.25
Beyond the Reef	0	0.00	0	0.00	0	0.00	3	10.34	0	0.00
Did not Specify	15	23.81	5	16.67	6	24.00	3	10.34	0	0.00

Depth of Flood Waters in the Immediate Surroundings … continued

Depth	Balugo		Calindagan		Overall	
	Number	%	Number	%	Number	%
Ankle High	5	29.41	9	39.13	82	22.71
Knee High	3	17.65	6	26.09	62	17.17
Waist High	4	23.53	3	13.04	54	14.96
Shoulder High	1	5.88	1	4.35	35	9.70
Above the Head	0	0.00	1	4.35	46	12.74
Roof High	1	5.88	0	0.00	21	5.82
Beyond the Reef	1	5.88	0	0.00	10	2.77
Did not Specify	2	11.76	3	13.04	51	14.13

Immediate Surrounding Cleanliness

Frequency	Tabuc-tubig		Junob		Poblacion 1		Batinguel		Candua-ay	
	Number	%	Number	%	Number	%	Number	%	Number	%
Yes	10	100.00	14	87.50	15	68.18	31	81.58	57	79.17
No	0	0.00	2	12.50	7	31.82	7	18.42	15	20.83
Did not Specify	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Frequency	Taclobo		Bagacay		Cadawinonan		Poblacion 8		Barangay 2	
	Number	%	Number	%	Number	%	Number	%	Number	%
Yes	53	84.13	23	76.67	23	92.00	25	86.21	12	75.00
No	10	15.87	6	20.00	2	8.00	4	13.79	4	25.00
Did not Specify	0	0.00	1	3.33	0	0.00	0	0.00	0	0.00

Frequency	Balugo		Calindagan		Overall	
	Number	%	Number	%	Number	%
Yes	15	88.24	15	65.22	293	81.16
No	2	11.76	8	34.78	67	18.56
Did not Specify	0	0.00	0	0.00	1	0.28

Presence of Water Logged Areas in Surroundings

Frequency	Tabuc-tubig		Junob		Poblacion 1		Batinguel		Candua-ay	
	Number	%	Number	%	Number	%	Number	%	Number	%
Yes	9	90.00	4	25.00	14	63.64	16	42.11	32	44.44
No	1	10.00	12	75.00	8	36.36	22	57.89	39	54.17
Did not Specify	0	0.00	0	0.00	0	0.00	0	0.00	1	1.39

Frequency	Taclobo		Bagacay		Cadawinonan		Poblacion 8		Barangay 2	
	Number	%	Number	%	Number	%	Number	%	Number	%
Yes	31	49.21	14	46.67	8	32.00	12	41.38	6	37.50
No	32	50.79	16	53.33	17	68.00	17	58.62	10	62.50
Did not Specify	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Frequency	Balugo		Calindagan		Overall	
	Number	%	Number	%	Number	%
Yes	5	29.41	14	60.87	165	45.71
No	11	64.71	9	39.13	194	53.74
Did not Specify	1	5.88	0	0.00	2	0.55

Presence of Open Sewage or Canal in Surroundings

Frequency	Tabuc-tubig		Junob		Poblacion 1		Batinguel		Candua-ay	
	Number	%	Number	%	Number	%	Number	%	Number	%
Yes	9	90.00	4	25.00	15	68.18	16	42.11	35	48.61
No	1	10.00	12	75.00	7	31.82	22	57.89	37	51.39
Did not Specify	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Frequency	Taclobo		Bagacay		Cadawinonan		Poblacion 8		Barangay 2	
	Number	%	Number	%	Number	%	Number	%	Number	%
Yes	32	50.79	16	53.33	12	48.00	15	51.72	9	56.25
No	30	47.62	14	46.67	13	52.00	13	44.83	7	43.75
Did not Specify	1	1.59	0	0.00	0	0.00	1	3.45	0	0.00

Frequency	Balugo		Calindagan		Overall	
	Number	%	Number	%	Number	%
Yes	5	29.41	18	78.26	186	51.52
No	12	70.59	5	21.74	173	47.92
Did not Specify	0	0.00	0	0.00	2	0.55

Proximity of House to Bodies of Water

Body of Water	Tabuc-tubig		Junob		Poblacion 1		Batinguel		Candua-ay	
	Number	%	Number	%	Number	%	Number	%	Number	%
River	10	100.00	14	87.50	14	63.64	31	81.58	46	63.89
Creek/Pond	0	0.00	0	0.00	0	0.00	2	5.26	4	5.56
Coastal	0	0.00	0	0.00	4	18.18	0	0.00	4	5.56
Far from Water System	0	0.00	0	0.00	1	4.55	0	0.00	2	2.78
Did not Specify	0	0.00	2	12.50	3	13.64	5	13.16	16	22.22

Body of Water	Taclobo		Bagacay		Cadawinonan		Poblacion 8		Barangay 2	
	Number	%	Number	%	Number	%	Number	%	Number	%
River	28	44.44	19	63.33	16	64.00	19	65.52	10	62.50
Creek/Pond	2	3.17	0	0.00	0	0.00	0	0.00	0	0.00
Coastal	0	0.00	0	0.00	0	0.00	1	3.45	2	12.50
Far from Water System	2	3.17	1	3.33	0	0.00	5	17.24	3	18.75
Did not Specify	31	49.21	10	33.33	9	36.00	4	13.79	1	6.25

Body of Water	Balugo		Calindagan		Overall	
	Number	%	Number	%	Number	%
River	7	41.18	10	43.48	224	62.05
Creek/Pond	0	0.00	1	4.35	9	2.49
Coastal	0	0.00	8	34.78	19	5.26
Far from Water System	1	5.88	0	0.00	15	4.16
Did not Specify	9	52.94	4	17.39	94	26.04

Location of House in Elevated Areas

Frequency	Tabuc-tubig		Junob		Poblacion 1		Batinguel		Candua-ay	
	Number	%	Number	%	Number	%	Number	%	Number	%
Yes	5	50.00	7	43.75	6	27.27	12	31.58	31	43.06
No	5	50.00	9	56.25	16	72.73	26	68.42	39	54.17
Did not Specify	0	0.00	0	0.00	0	0.00	0	0.00	2	2.78

Frequency	Taclobo		Bagacay		Cadawinonan		Poblacion 8		Barangay 2	
	Number	%	Number	%	Number	%	Number	%	Number	%
Yes	32	50.79	24	80.00	14	56.00	10	34.48	6	37.50
No	31	49.21	6	20.00	9	36.00	19	65.52	10	62.50
Did not Specify	0	0.00	0	0.00	2	8.00	0	0.00	0	0.00

Frequency	Balugo		Calindagan		Overall	
	Number	%	Number	%	Number	%
Yes	16	94.12	4	17.39	167	46.26
No	1	5.88	19	82.61	190	52.63
Did not Specify	0	0.00	0	0.00	4	1.11

Place Where Children/Adult Defecate

Place	Tabuc-tubig		Junob		Poblacion 1		Batinguel		Candua-ay	
	Number	%	Number	%	Number	%	Number	%	Number	%
Own Latrine	10	100.00	12	75.00	19	86.36	34	89.47	68	94.44
Neighbors Latrine	0	0.00	3	18.75	0	0.00	3	7.89	1	1.39
Public Latrine	0	0.00	1	6.25	2	9.09	0	0.00	0	0.00
On the Ground	0	0.00	0	0.00	1	4.55	0	0.00	1	1.39
Water Body	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Anywhere	0	0.00	0	0.00	0	0.00	1	2.63	2	2.78
Did not Specify	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Place	Taclobo		Bagacay		Cadawinonan		Poblacion 8		Barangay 2	
	Number	%	Number	%	Number	%	Number	%	Number	%
Own Latrine	59	93.65	28	93.33	24	96.00	28	96.55	16	100.00
Neighbors Latrine	1	1.59	1	3.33	1	4.00	0	0.00	0	0.00
Public Latrine	0	0.00	1	3.33	0	0.00	0	0.00	0	0.00
On the Ground	3	4.76	0	0.00	0	0.00	1	3.45	0	0.00
Water Body	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Anywhere	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Did not Specify	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Place Where Children/Adult Defecate … continued

Place	Balugo		Calindagan		Overall	
	Number	%	Number	%	Number	%
Own Latrine	13	76.47	21	91.30	332	91.97
Neighbors Latrine	2	11.76	0	0.00	12	3.32
Public Latrine	1	5.88	1	4.35	6	1.66
On the Ground	1	5.88	1	4.35	8	2.22
Water Body	0	0.00	0	0.00	0	0.00
Anywhere	0	0.00	0	0.00	3	0.83
Did not Specify	0	0.00	0	0.00	0	0.00

Type of Latrine

Type	Tabuc-tubig		Junob		Poblacion 1		Batinguel		Candua-ay	
	Number	%	Number	%	Number	%	Number	%	Number	%
Water Sealed	10	100.00	4	25.00	10	45.45	18	47.37	36	50.00
Antipolo Type	0	0.00	1	6.25	0	0.00	3	7.89	9	12.50
Pour Flushed	0	0.00	9	56.25	11	50.00	13	34.21	18	25.00
No Latrine	0	0.00	2	12.50	1	4.55	4	10.53	3	4.17
Did not Specify	0	0.00	0	0.00	0	0.00	0	0.00	6	8.33

Type	Taclobo		Bagacay		Cadawinonan		Poblacion 8		Barangay 2	
	Number	%	Number	%	Number	%	Number	%	Number	%
Water Sealed	30	47.62	17	56.67	10	40.00	11	37.93	9	56.25
Antipolo Type	4	6.35	0	0.00	1	4.00	3	10.34	1	6.25
Pour Flushed	24	38.10	9	30.00	11	44.00	15	51.72	6	37.50
No Latrine	1	1.59	0	0.00	2	8.00	0	0.00	0	0.00
Did not Specify	4	6.35	4	13.33	1	4.00	0	0.00	0	0.00

Type	Balugo		Calindagan		Overall	
	Number	%	Number	%	Number	%
Water Sealed	7	41.18	11	47.83	173	47.92
Antipolo Type	1	5.88	0	0.00	23	6.37
Pour Flushed	6	35.29	11	47.83	133	36.84
No Latrine	3	17.65	0	0.00	16	4.43
Did not Specify	0	0.00	1	4.35	16	4.43

Sewage Drain

Sewage Drain	Tabuc-tubig		Junob		Poblacion 1		Batinguel		Candua-ay	
	Number	%	Number	%	Number	%	Number	%	Number	%
Septic Tank	2	20.00	3	18.75	5	22.73	7	18.42	19	26.39
Barangay Drainage	8	80.00	4	25.00	9	40.91	8	21.05	16	22.22
Pit	0	0.00	8	50.00	7	31.82	20	52.63	33	45.83
Anywhere	0	0.00	1	6.25	0	0.00	1	2.63	1	1.39
River	0	0.00	0	0.00	1	4.55	1	2.63	0	0.00
Did not Specify	0	0.00	0	0.00	0	0.00	1	2.63	3	4.17

Sewage Drain	Taclobo		Bagacay		Cadawinonan		Poblacion 8		Barangay 2	
	Number	%	Number	%	Number	%	Number	%	Number	%
Septic Tank	19	30.16	6	20.00	3	12.00	11	37.93	4	25.00
Barangay Drainage	10	15.87	3	10.00	8	32.00	11	37.93	4	25.00
Pit	24	38.10	16	53.33	8	32.00	4	13.79	5	31.25
Anywhere	3	4.76	1	3.33	4	16.00	1	3.45	0	0.00
River	1	1.59	2	6.67	1	4.00	0	0.00	3	18.75
Did not Specify	6	9.52	2	6.67	1	4.00	2	6.90	0	0.00

Sewage Drain … continued

Sewage Drain	Balugo		Calindagan		Overall	
	Number	%	Number	%	Number	%
Septic Tank	6	35.29	7	30.43	92	25.48
Barangay Drainage	2	11.76	7	30.43	90	24.93
Pit	6	35.29	9	39.13	140	38.78
Anywhere	2	11.76	0	0.00	14	3.88
River	0	0.00	0	0.00	9	2.49
Did not Specify	1	5.88	0	0.00	16	4.43

Solid Waste Disposal

Place of Disposal	Tabuc-tubig		Junob		Poblacion 1		Batinguel		Candua-ay	
	Number	%	Number	%	Number	%	Number	%	Number	%
Collected by LGU	10	100.00	4	25.00	20	90.91	15	39.47	28	38.89
Composting	1	10.00	0	0.00	0	0.00	4	10.53	12	16.67
Burying in the Ground	1	10.00	5	31.25	1	4.55	5	13.16	14	19.44
Burning	0	0.00	6	37.50	2	9.09	16	42.11	19	26.39
Throwing into the River	0	0.00	2	12.50	0	0.00	1	2.63	2	2.78
Did not Specify	0	0.00	0	0.00	0	0.00	0	0.00	4	5.56

Place of Disposal	Taclobo		Bagacay		Cadawinonan		Poblacion 8		Barangay 2	
	Number	%	Number	%	Number	%	Number	%	Number	%
Collected by LGU	50	79.37	18	60.00	18	72.00	28	96.55	16	100.00
Composting	2	3.17	1	3.33	4	16.00	0	0.00	0	0.00
Burying in the Ground	2	3.17	5	16.67	4	16.00	0	0.00	0	0.00
Burning	9	14.29	8	26.67	0	0.00	0	0.00	0	0.00
Throwing into the River	1	1.59	1	3.33	0	0.00	1	3.45	0	0.00
Did not Specify	0	0.00	0	0.00	1	4.00	0	0.00	0	0.00

Solid Waste Disposal … continued

Place of Disposal	Balugo		Calindagan		Overall	
	Number	%	Number	%	Number	%
Collected by LGU	11	64.71	17	73.91	235	65.10
Composting	1	5.88	0	0.00	25	6.93
Burying in the Ground	2	11.76	5	21.74	44	12.19
Burning	3	17.65	0	0.00	63	17.45
Throwing into the River	0	0.00	1	4.35	9	2.49
Did not Specify	0	0.00	0	0.00	5	1.39

Practicing Solid Waste Segregation

Frequency	Tabuc-tubig		Junob		Poblacion 1		Batinguel		Candua-ay	
	Number	%	Number	%	Number	%	Number	%	Number	%
Yes	9	90.00	8	50.00	13	59.09	23	60.53	38	52.78
No	1	10.00	8	50.00	8	36.36	15	39.47	30	41.67
Did not Specify	0	0.00	0	0.00	1	4.55	0	0.00	4	5.56

Frequency	Taclobo		Bagacay		Cadawinonan		Poblacion 8		Barangay 2	
	Number	%	Number	%	Number	%	Number	%	Number	%
Yes	29	46.03	15	50.00	18	72.00	17	58.62	10	62.50
No	33	52.38	15	50.00	6	24.00	12	41.38	6	37.50
Did not Specify	1	1.59	0	0.00	1	4.00	0	0.00	0	0.00

Frequency	Balugo		Calindagan		Overall	
	Number	%	Number	%	Number	%
Yes	11	64.71	12	52.17	203	56.23
No	6	35.29	10	43.48	150	41.55
Did not Specify	0	0.00	1	4.35	8	2.22

Source of Drinking Water (Ordinary Days)

Source	Tabuc-tubig		Junob		Poblacion 1		Batinguel		Candua-ay	
	Number	%	Number	%	Number	%	Number	%	Number	%
Communal Faucet	1	10.00	1	6.25	1	4.55	6	15.79	11	15.28
House to House Connection	5	50.00	7	43.75	15	68.18	21	55.26	50	69.44
Spring	1	10.00	2	12.50	1	4.55	1	2.63	1	1.39
Well	0	0.00	1	6.25	0	0.00	5	13.16	0	0.00
River	0	0.00	0	0.00	0	0.00	0	0.00	1	1.39
Water Pump	4	40.00	1	6.25	3	13.64	2	5.26	6	8.33
Commercial Water Dispensers	0	0.00	4	25.00	5	22.73	0	0.00	5	6.94
Bottled Water	0	0.00	0	0.00	0	0.00	2	5.26	2	2.78
Did not Specify	0	0.00	0	0.00	0	0.00	3	7.89	3	4.17

Source	Taclobo		Bagacay		Cadawinonan		Poblacion 8		Barangay 2	
	Number	%	Number	%	Number	%	Number	%	Number	%
Communal Faucet	7	11.11	2	6.67	1	4.00	15	51.72	3	18.75
House to House Connection	37	58.73	13	43.33	17	68.00	12	41.38	10	62.50
Spring	1	1.59	0	0.00	1	4.00	0	0.00	0	0.00
Well	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
River	4	6.35	9	30.00	0	0.00	0	0.00	0	0.00
Water Pump	10	15.87	5	16.67	3	12.00	0	0.00	0	0.00
Commercial Water Dispensers	7	11.11	0	0.00	5	20.00	3	10.34	3	18.75
Bottled Water	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Did not Specify	2	3.17	2	6.67	0	0.00	0	0.00	1	6.25

Source of Drinking Water (Ordinary Days) … continued

Source	Balugo		Calindagan		Overall	
	Number	%	Number	%	Number	%
Communal Faucet	5	29.41	2	8.70	55	15.24
House to House Connection	9	52.94	18	78.26	214	59.28
Spring	1	5.88	0	0.00	9	2.49
Well	0	0.00	0	0.00	6	1.66
River	0	0.00	0	0.00	14	3.88
Water Pump	0	0.00	1	4.35	35	9.70
Commercial Water Dispensers	3	17.65	1	4.35	36	9.97
Bottled Water	0	0.00	1	4.35	5	1.39
Did not Specify	0	0.00	0	0.00	11	3.05

Source of Drinking Water (During Heavy Rains or Flood)

Source	Tabuc-tubig		Junob		Poblacion 1		Batinguel		Candua-ay	
	Number	%	Number	%	Number	%	Number	%	Number	%
Communal Faucet	1	10.00	1	6.25	0	0.00	6	15.79	1	1.39
House to House Connection	6	60.00	6	37.50	16	72.73	14	36.84	42	58.33
Spring	1	10.00	1	6.25	1	4.55	1	2.63	0	0.00
Donations	1	10.00	1	6.25	1	4.55	6	15.79	5	6.94
Well	0	0.00	0	0.00	0	0.00	1	2.63	2	2.78
River	1	10.00	0	0.00	0	0.00	0	0.00	0	0.00
Water Pump	0	0.00	2	12.50	1	4.55	1	2.63	3	4.17
Commercial Water Dispensers	0	0.00	4	25.00	5	22.73	5	13.16	16	22.22
Bottled Water	1	10.00	0	0.00	3	13.64	5	13.16	6	8.33
Did not Specify	0	0.00	1	6.25	0	0.00	0	0.00	1	1.39

Source	Taclobo		Bagacay		Cadawinonan		Poblacion 8		Barangay 2	
	Number	%	Number	%	Number	%	Number	%	Number	%
Communal Faucet	4	6.35	1	3.33	1	4.00	5	17.24	1	6.25
House to House Connection	21	33.33	13	43.33	14	56.00	8	27.59	7	43.75
Spring	3	4.76	0	0.00	1	4.00	1	3.45	0	0.00
Donations	1	1.59	2	6.67	1	4.00	7	24.14	1	6.25
Well	0	0.00	0	0.00	0	0.00	1	3.45	0	0.00
River	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Water Pump	6	9.52	12	40.00	0	0.00	0	0.00	2	12.50
Commercial Water Dispensers	21	33.33	2	6.67	6	24.00	5	17.24	5	31.25
Bottled Water	7	11.11	2	6.67	1	4.00	4	13.79	2	12.50
Did not Specify	3	4.76	1	3.33	1	4.00	0	0.00	0	0.00

Source of Drinking Water (During Heavy Rains or Flood) … continued

Source	Balugo		Calindagan		Overall	
	Number	%	Number	%	Number	%
Communal Faucet	6	35.29	3	13.04	30	8.31
House to House Connection	6	35.29	13	56.52	166	45.98
Spring	2	11.76	1	4.35	12	3.32
Donations	1	5.88	1	4.35	28	7.76
Well	0	0.00	0	0.00	4	1.11
River	0	0.00	0	0.00	1	0.28
Water Pump	0	0.00	1	4.35	28	7.76
Commercial Water Dispensers	2	11.76	3	13.04	74	20.50
Bottled Water	1	5.88	1	4.35	33	9.14
Did not Specify	0	0.00	0	0.00	7	1.94

Perception on Cleanliness of Water

Frequency	Tabuc-tubig		Junob		Poblacion 1		Batinguel		Candua-ay	
	Number	%	Number	%	Number	%	Number	%	Number	%
Yes	8	80.00	14	87.50	19	86.36	32	84.21	59	81.94
No	2	20.00	2	12.50	2	9.09	6	15.79	11	15.28
Did not Specify	0	0.00	0	0.00	1	4.55	0	0.00	2	2.78

Frequency	Taclobo		Bagacay		Cadawinonan		Poblacion 8		Barangay 2	
	Number	%	Number	%	Number	%	Number	%	Number	%
Yes	47	74.60	24	80.00	23	92.00	19	65.52	13	81.25
No	14	22.22	4	13.33	2	8.00	10	34.48	3	18.75
Did not Specify	2	3.17	2	6.67	0	0.00	0	0.00	0	0.00

Frequency	Balugo		Calindagan		Overall	
	Number	%	Number	%	Number	%
Yes	13	76.47	16	69.57	287	79.50
No	4	23.53	7	30.43	67	18.56
Did not Specify	0	0.00	0	0.00	7	1.94

Home Water Treatment or Sterilization Process

Process	Tabuc-tubig		Junob		Poblacion 1		Batinguel		Candua-ay	
	Number	%	Number	%	Number	%	Number	%	Number	%
Boiling in less than 10 minutes	0	0.00	1	6.25	3	13.64	4	10.53	12	16.67
Boiling in 10 minutes	2	20.00	6	37.50	11	50.00	15	39.47	13	18.06
Chlorination	0	0.00	2	12.50	0	0.00	4	10.53	5	6.94
Settling	0	0.00	0	0.00	1	4.55	1	2.63	0	0.00
Filter	0	0.00	1	6.25	1	4.55	2	5.26	4	5.56
Nothing	8	80.00	7	43.75	5	22.73	11	28.95	22	30.56
Did not Specify	0	0.00	0	0.00	1	4.55	1	2.63	16	22.22

Process	Taclobo		Bagacay		Cadawinonan		Poblacion 8		Barangay 2	
	Number	%	Number	%	Number	%	Number	%	Number	%
Boiling in less than 10 minutes	9	14.29	3	10.00	3	12.00	4	13.79	2	12.50
Boiling in 10 minutes	19	30.16	12	40.00	6	24.00	14	48.28	4	25.00
Chlorination	5	7.94	3	10.00	3	12.00	2	6.90	2	12.50
Settling	2	3.17	0	0.00	0	0.00	0	0.00	1	6.25
Filter	7	11.11	0	0.00	1	4.00	0	0.00	1	6.25
Nothing	17	26.98	10	33.33	10	40.00	5	17.24	6	37.50
Did not Specify	4	6.35	3	10.00	2	8.00	4	13.79	1	6.25

Home Water Treatment or Sterilization Process … continued

Process	Balugo		Calindagan		Overall	
	Number	%	Number	%	Number	%
Boiling in less than 10 minutes	1	5.88	1	4.35	43	11.91
Boiling in 10 minutes	6	35.29	12	52.17	120	33.24
Chlorination	0	0.00	1	4.35	27	7.48
Settling	0	0.00	0	0.00	5	1.39
Filter	1	5.88	1	4.35	19	5.26
Nothing	9	52.94	7	30.43	117	32.41
Did not Specify	0	0.00	1	4.35	33	9.14

Owned Domesticated Animals

Animal	Tabuc-tubig		Junob		Poblacion 1		Batinguel		Candua-ay	
	Number	%	Number	%	Number	%	Number	%	Number	%
Pig	2	20.00	2	12.50	2	9.09	9	23.68	14	19.44
Cow	1	10.00	2	12.50	0	0.00	2	5.26	2	2.78
Chicken	4	40.00	4	25.00	3	13.64	14	36.84	29	40.28
Goats	0	0.00	1	6.25	2	9.09	0	0.00	5	6.94
Birds	0	0.00	0	0.00	1	4.55	0	0.00	2	2.78
Doves	0	0.00	0	0.00	1	4.55	1	2.63	1	1.39
Cats	5	50.00	4	25.00	7	31.82	6	15.79	14	19.44
Dogs	5	50.00	5	31.25	3	13.64	15	39.47	17	23.61
Horse	0	0.00	1	6.25	1	4.55	2	5.26	3	4.17
Did not Specify	1	10.00	7	43.75	8	36.36	8	21.05	20	27.78

Animal	Taclobo		Bagacay		Cadawinonan		Poblacion 8		Barangay 2	
	Number	%	Number	%	Number	%	Number	%	Number	%
Pig	7	11.11	3	10.00	9	36.00	3	10.34	2	12.50
Cow	2	3.17	1	3.33	3	12.00	0	0.00	1	6.25
Chicken	16	25.40	10	33.33	1	4.00	4	13.79	5	31.25
Goats	0	0.00	1	3.33	1	4.00	0	0.00	0	0.00
Birds	1	1.59	0	0.00	1	4.00	0	0.00	1	6.25
Doves	2	3.17	1	3.33	2	8.00	0	0.00	0	0.00
Cats	27	42.86	3	10.00	6	24.00	5	17.24	3	18.75
Dogs	24	38.10	9	30.00	9	36.00	5	17.24	2	12.50
Horse	2	3.17	1	3.33	0	0.00	0	0.00	1	6.25
Did not Specify	16	25.40	9	30.00	4	16.00	19	65.52	3	18.75

Owned Domesticated Animals … continued

Animal	Balugo		Calindagan		Overall	
	Number	%	Number	%	Number	%
Pig	5	29.41	5	21.74	63	17.45
Cow	4	23.53	0	0.00	18	4.99
Chicken	12	70.59	4	17.39	106	29.36
Goats	1	5.88	1	4.35	12	3.32
Birds	0	0.00	0	0.00	6	1.66
Doves	0	0.00	1	4.35	9	2.49
Cats	4	23.53	6	26.09	20	5.54
Dogs	5	29.41	6	26.09	58	16.07
Horse	0	0.00	0	0.00	52	14.40
Did not Specify	2	11.76	12	52.17	109	30.19

Domestic Animal Fecal Materials Disposal

Place	Tabuc-tubig		Junob		Poblacion 1		Batinguel		Candua-ay	
	Number	%	Number	%	Number	%	Number	%	Number	%
Own Latrine	0	0.00	1	6.25	0	0.00	2	5.26	2	2.78
Neighbors Latrine	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Public Latrine	0	0.00	0	0.00	0	0.00	1	2.63	0	0.00
On the Ground	8	80.00	7	43.75	11	50.00	23	60.53	39	54.17
Water Body	1	10.00	1	6.25	2	9.09	0	0.00	1	1.39
Pit	0	0.00	0	0.00	2	9.09	2	5.26	2	2.78
Anywhere	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Did not Specify	1	10.00	7	43.75	7	31.82	10	26.32	28	38.89

Place	Taclobo		Bagacay		Cadawinonan		Poblacion 8		Barangay 2	
	Number	%	Number	%	Number	%	Number	%	Number	%
Own Latrine	3	4.76	1	3.33	2	8.00	0	0.00	1	6.25
Neighbors Latrine	0	0.00	0	0.00	0	0.00	0	0.00	1	6.25
Public Latrine	0	0.00	1	3.33	0	0.00	0	0.00	0	0.00
On the Ground	29	46.03	15	50.00	13	52.00	10	34.48	7	43.75
Water Body	3	4.76	0	0.00	0	0.00	0	0.00	2	12.50
Pit	0	0.00	1	3.33	1	4.00	0	0.00	1	6.25
Anywhere	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Did not Specify	28	44.44	12	40.00	9	36.00	19	65.52	4	25.00

Domestic Animal Fecal Materials Disposal

Place	Balugo		Calindagan		Overall	
	Number	%	Number	%	Number	%
Own Latrine	2	11.76	1	4.35	15	4.16
Neighbors Latrine	0	0.00	0	0.00	1	0.28
Public Latrine	1	5.88	0	0.00	3	0.83
On the Ground	7	41.18	5	21.74	174	48.20
Water Body	1	5.88	2	8.70	13	3.60
Pit	2	11.76	2	8.70	13	3.60
Anywhere	0	0.00	0	0.00	0	0.00
Did not Specify	4	23.53	13	56.52	142	39.34

Neighbor Owned Domesticated Animals

Animal	Tabuc-tubig		Junob		Poblacion 1		Batinguel		Candua-ay	
	Number	%	Number	%	Number	%	Number	%	Number	%
Pig	2	20.00	10	62.50	6	27.27	7	18.42	37	51.39
Cow	0	0.00	4	25.00	0	0.00	6	15.79	23	31.94
Chicken	5	50.00	12	75.00	9	40.91	27	71.05	50	69.44
Goats	0	0.00	8	50.00	0	0.00	11	28.95	29	40.28
Birds	0	0.00	5	31.25	2	9.09	0	0.00	7	9.72
Doves	0	0.00	4	25.00	1	4.55	5	13.16	6	8.33
Cats	7	70.00	9	56.25	6	27.27	9	23.68	41	56.94
Dogs	9	90.00	10	62.50	16	72.73	30	78.95	43	59.72
Horse	0	0.00	0	0.00	1	4.55	0	0.00	8	11.11
Did not Specify	0	0.00	0	0.00	0	0.00	0	0.00	4	5.56

Animal	Taclobo		Bagacay		Cadawinonan		Poblacion 8		Barangay 2	
	Number	%	Number	%	Number	%	Number	%	Number	%
Pig	20	31.75	13	43.33	17	68.00	8	27.59	9	56.25
Cow	3	4.76	3	10.00	8	32.00	0	0.00	0	0.00
Chicken	25	39.68	19	63.33	11	44.00	20	68.97	9	56.25
Goats	7	11.11	5	16.67	5	20.00	1	3.45	1	6.25
Birds	1	1.59	0	0.00	3	12.00	1	3.45	1	6.25
Doves	5	7.94	1	3.33	4	16.00	0	0.00	2	12.50
Cats	32	50.79	12	40.00	17	68.00	20	68.97	8	50.00
Dogs	42	66.67	14	46.67	9	36.00	23	79.31	5	31.25
Horse	1	1.59	1	3.33	0	0.00	1	3.45	0	0.00
Did not Specify	5	7.94	3	10.00	0	0.00	3	10.34	0	0.00

Neighbor Owned Domesticated Animals … continued

Animal	Balugo		Calindagan		Overall	
	Number	%	Number	%	Number	%
Pig	9	52.94	12	52.17	150	41.55
Cow	4	23.53	1	4.35	52	14.40
Chicken	10	58.82	16	69.57	213	59.00
Goats	2	11.76	3	13.04	72	19.94
Birds	0	0.00	2	8.70	22	6.09
Doves	0	0.00	4	17.39	32	8.86
Cats	7	41.18	14	60.87	88	24.38
Dogs	11	64.71	14	60.87	128	35.46
Horse	0	0.00	3	13.04	112	31.02
Did not Specify	1	5.88	1	4.35	17	4.71

Perception on the Allowing of Raising Animals in the Community

Frequency	Tabuc-tubig		Junob		Poblacion 1		Batinguel		Candua-ay	
	Number	%	Number	%	Number	%	Number	%	Number	%
Yes	10	100.00	15	93.75	20	90.91	38	100.00	51	70.83
No	0	0.00	1	6.25	0	0.00	0	0.00	13	18.06
Did not Specify	0	0.00	0	0.00	2	9.09	0	0.00	8	11.11

Frequency	Taclobo		Bagacay		Cadawinonan		Poblacion 8		Barangay 2	
	Number	%	Number	%	Number	%	Number	%	Number	%
Yes	53	84.13	26	86.67	19	76.00	25	86.21	14	87.50
No	9	14.29	2	6.67	3	12.00	2	6.90	2	12.50
Did not Specify	1	1.59	2	6.67	3	12.00	2	6.90	0	0.00

Frequency	Balugo		Calindagan		Overall	
	Number	%	Number	%	Number	%
Yes	15	88.24	19	82.61	305	84.49
No	1	5.88	4	17.39	37	10.25
Did not Specify	1	5.88	0	0.00	19	5.26

Presence of Rats in the House

Frequency	Tabuc-tubig		Junob		Poblacion 1		Batinguel		Candua-ay	
	Number	%	Number	%	Number	%	Number	%	Number	%
Yes	10	100.00	15	93.75	22	100.00	35	92.11	62	86.11
No	0	0.00	1	6.25	0	0.00	3	7.89	10	13.89
Did not Specify	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Frequency	Taclobo		Bagacay		Cadawinonan		Poblacion 8		Barangay 2	
	Number	%	Number	%	Number	%	Number	%	Number	%
Yes	61	96.83	28	93.33	21	84.00	28	96.55	16	100.00
No	2	3.17	2	6.67	3	12.00	1	3.45	0	0.00
Did not Specify	0	0.00	0	0.00	1	4.00	0	0.00	0	0.00

Frequency	Balugo		Calindagan		Overall	
	Number	%	Number	%	Number	%
Yes	15	88.24	23	100.00	336	93.07
No	2	11.76	0	0.00	24	6.65
Did not Specify	0	0.00	0	0.00	1	0.28

Presence of Rats in the Neighborhood

Frequency	Tabuc-tubig		Junob		Poblacion 1		Batinguel		Candua-ay	
	Number	%	Number	%	Number	%	Number	%	Number	%
Yes	10	100.00	13	81.25	22	100.00	31	81.58	57	79.17
No	0	0.00	3	18.75	0	0.00	7	18.42	15	20.83
Did not Specify	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Frequency	Taclobo		Bagacay		Cadawinonan		Poblacion 8		Barangay 2	
	Number	%	Number	%	Number	%	Number	%	Number	%
Yes	57	90.48	26	86.67	21	84.00	28	96.55	15	93.75
No	6	9.52	4	13.33	3	12.00	1	3.45	1	6.25
Did not Specify	0	0.00	0	0.00	1	4.00	0	0.00	0	0.00

Frequency	Balugo		Calindagan		Overall	
	Number	%	Number	%	Number	%
Yes	12	70.59	23	100.00	315	87.26
No	5	29.41	0	0.00	45	12.47
Did not Specify	0	0.00	0	0.00	1	0.28

Presence of Stray Animals in the Neighborhood

Frequency	Tabuc-tubig		Junob		Poblacion 1		Batinguel		Candua-ay	
	Number	%	Number	%	Number	%	Number	%	Number	%
Yes	7	70.00	9	56.25	15	68.18	20	52.63	41	56.94
No	3	30.00	7	43.75	7	31.82	18	47.37	27	37.50
Did not Specify	0	0.00	0	0.00	0	0.00	0	0.00	4	5.56

Frequency	Taclobo		Bagacay		Cadawinonan		Poblacion 8		Barangay 2	
	Number	%	Number	%	Number	%	Number	%	Number	%
Yes	42	66.67	16	53.33	16	64.00	15	51.72	11	68.75
No	21	33.33	14	46.67	7	28.00	12	41.38	5	31.25
Did not Specify	0	0.00	0	0.00	2	8.00	2	6.90	0	0.00

Frequency	Balugo		Calindagan		Overall	
	Number	%	Number	%	Number	%
Yes	5	29.41	14	60.87	211	58.45
No	12	70.59	9	39.13	142	39.34
Did not Specify	0	0.00	0	0.00	8	2.22

Awareness of Programs on Sanitation and Hygiene

Program	Tabuc-tubig		Junob		Poblacion 1		Batinguel		Candua-ay	
	Number	%	Number	%	Number	%	Number	%	Number	%
Water Safety	2	20.00	10	62.50	7	31.82	12	31.58	33	45.83
Environmental Sanitation	1	10.00	9	56.25	16	72.73	16	42.11	44	61.11
Garbage Segregation	7	70.00	15	93.75	11	50.00	21	55.26	48	66.67
Disease Outbreaks	4	40.00	12	75.00	9	40.91	13	34.21	34	47.22
Right Way of Washing Hands	1	10.00	11	68.75	8	36.36	15	39.47	39	54.17
Owning a Latrine	2	20.00	9	56.25	7	31.82	12	31.58	28	38.89
Did not specify	1	10.00	2	12.50	1	4.55	1	2.63	8	11.11

Program	Taclobo		Bagacay		Cadawinonan		Poblacion 8		Barangay 2	
	Number	%	Number	%	Number	%	Number	%	Number	%
Water Safety	17	26.98	15	50.00	7	28.00	19	65.52	5	31.25
Environmental Sanitation	26	41.27	14	46.67	15	60.00	18	62.07	4	25.00
Garbage Segregation	28	44.44	15	50.00	16	64.00	18	62.07	9	56.25
Disease Outbreaks	23	36.51	13	43.33	11	44.00	16	55.17	4	25.00
Right Way of Washing Hands	14	22.22	13	43.33	11	44.00	19	65.52	2	12.50
Owning a Latrine	14	22.22	10	33.33	7	28.00	15	51.72	2	12.50
Did not specify	7	11.11	3	10.00	1	4.00	4	13.79	1	6.25

Awareness of Programs on Sanitation and Hygiene … continued

Program	Balugo		Calindagan		Overall	
	Number	%	Number	%	Number	%
Water Safety	4	23.53	6	26.09	137	37.95
Environmental Sanitation	3	17.65	10	43.48	176	48.75
Garbage Segregation	8	47.06	16	69.57	212	58.73
Disease Outbreaks	3	17.65	10	43.48	152	42.11
Right Way of Washing Hands	2	11.76	10	43.48	145	40.17
Owning a Latrine	3	17.65	8	34.78	117	32.41
Did not specify	4	23.53	1	4.35	34	9.42

Sources of Information About the Sanitation and Hygiene Programs

Source	Tabuc-tubig		Junob		Poblacion 1		Batinguel		Candua-ay	
	Number	%	Number	%	Number	%	Number	%	Number	%
Own Family	0	0.00	2	12.50	4	18.18	4	10.53	8	11.11
Neighbors	0	0.00	1	6.25	1	4.55	2	5.26	9	12.50
NGO Worker	1	10.00	0	0.00	0	0.00	5	13.16	9	12.50
LGUs	0	0.00	4	25.00	1	4.55	10	26.32	11	15.28
Health Center	5	50.00	5	31.25	9	40.91	15	39.47	29	40.28
Barangay Officials	6	60.00	2	12.50	8	36.36	10	26.32	28	38.89
Barangay Health Worker	5	50.00	7	43.75	11	50.00	11	28.95	40	55.56
School/Teacher	3	30.00	5	31.25	9	40.91	8	21.05	23	31.94
Religious Groups	0	0.00	2	12.50	0	0.00	7	18.42	9	12.50
TV	2	20.00	7	43.75	8	36.36	15	39.47	18	25.00
Radio	1	10.00	6	37.50	4	18.18	3	7.89	16	22.22
Newspaper/Magazines	0	0.00	3	18.75	2	9.09	2	5.26	7	9.72
Bill Board	0	0.00	1	6.25	1	4.55	0	0.00	3	4.17
Did not specify	1	10.00	0	0.00	1	4.55	2	5.26	5	6.94

Sources of Information About the Sanitation and Hygiene Programs … continued

Source	Taclobo		Bagacay		Cadawinonan		Poblacion 8		Barangay 2	
	Number	%	Number	%	Number	%	Number	%	Number	%
Own Family	4	6.35	1	3.33	3	12.00	1	3.45	1	6.25
Neighbors	6	9.52	1	3.33	3	12.00	0	0.00	0	0.00
NGO Worker	7	11.11	2	6.67	2	8.00	8	27.59	2	12.50
LGUs	5	7.94	2	6.67	6	24.00	8	27.59	1	6.25
Health Center	22	34.92	9	30.00	10	40.00	12	41.38	4	25.00
Barangay Officials	21	33.33	7	23.33	10	40.00	18	62.07	6	37.50
Barangay Health Worker	20	31.75	19	63.33	9	36.00	17	58.62	6	37.50
School/Teacher	20	31.75	5	16.67	4	16.00	5	17.24	3	18.75
Religious Groups	9	14.29	2	6.67	3	12.00	6	20.69	2	12.50
TV	14	22.22	4	13.33	11	44.00	12	41.38	5	31.25
Radio	10	15.87	3	10.00	6	24.00	10	34.48	1	6.25
Newspaper/Magazines	4	6.35	1	3.33	6	24.00	7	24.14	4	25.00
Bill Board	1	1.59	0	0.00	1	4.00	4	13.79	0	0.00
Did not specify	6	9.52	2	6.67	1	4.00	2	6.90	0	0.00

Sources of Information About the Sanitation and Hygiene Programs … continued

Source	Balugo		Calindagan		Overall	
	Number	%	Number	%	Number	%
Own Family	1	5.88	0	0.00	29	8.03
Neighbors	1	5.88	0	0.00	24	6.65
NGO Worker	2	11.76	1	4.35	39	10.80
LGUs	0	0.00	1	4.35	49	13.57
Health Center	5	29.41	7	30.43	132	36.57
Barangay Officials	2	11.76	10	43.48	128	35.46
Barangay Health Worker	3	17.65	13	56.52	161	44.60
School/Teacher	1	5.88	6	26.09	92	25.48
Religious Groups	1	5.88	1	4.35	42	11.63
TV	4	23.53	8	34.78	108	29.92
Radio	3	17.65	6	26.09	69	19.11
Newspaper/Magazines	0	0.00	1	4.35	37	10.25
Bill Board	0	0.00	0	0.00	11	3.05
Did not specify	4	23.53	1	4.35	25	6.93

SOCIAL ENVIRONMENT

Friends with Neighbors

Frequency	Tabuc-tubig		Junob		Poblacion 1		Batinguel		Candua-ay	
	Number	%	Number	%	Number	%	Number	%	Number	%
Yes	9	90.00	14	87.50	22	100.00	38	100.00	68	94.44
No	1	10.00	2	12.50	0	0.00	0	0.00	4	5.56
Did not Specify	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Frequency	Taclobo		Bagacay		Cadawinonan		Poblacion 8		Barangay 2	
	Number	%	Number	%	Number	%	Number	%	Number	%
Yes	60	95.24	29	96.67	24	96.00	28	96.55	14	87.50
No	3	4.76	1	3.33	1	4.00	1	3.45	2	12.50
Did not Specify	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Frequency	Balugo		Calindagan		Overall	
	Number	%	Number	%	Number	%
Yes	16	94.12	22	95.65	344	95.29
No	1	5.88	1	4.35	17	4.71
Did not Specify	0	0.00	0	0.00	0	0.00

Willingness to Help Neighbors

Frequency	Tabuc-tubig		Junob		Poblacion 1		Batinguel		Candua-ay	
	Number	%	Number	%	Number	%	Number	%	Number	%
Yes	10	100.00	15	93.75	22	100.00	38	100.00	70	97.22
No	0	0.00	1	6.25	0	0.00	0	0.00	2	2.78
Did not Specify	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Frequency	Taclobo		Bagacay		Cadawinonan		Poblacion 8		Barangay 2	
	Number	%	Number	%	Number	%	Number	%	Number	%
Yes	60	95.24	26	86.67	25	100.00	26	89.66	15	93.75
No	3	4.76	2	6.67	0	0.00	3	10.34	1	6.25
Did not Specify	0	0.00	2	6.67	0	0.00	0	0.00	0	0.00

Frequency	Balugo		Calindagan		Overall	
	Number	%	Number	%	Number	%
Yes	16	94.12	23	100.00	346	95.84
No	0	0.00	0	0.00	12	3.32
Did not Specify	1	5.88	0	0.00	3	0.83

Knowledge on the Holding of Health Related Meetings in the Community

Frequency	Tabuc-tubig		Junob		Poblacion 1		Batinguel		Candua-ay	
	Number	%	Number	%	Number	%	Number	%	Number	%
Yes	10	100.00	15	93.75	20	90.91	23	60.53	52	72.22
No	0	0.00	1	6.25	1	4.55	15	39.47	16	22.22
Did not Specify	0	0.00	0	0.00	1	4.55	0	0.00	4	5.56

Frequency	Taclobo		Bagacay		Cadawinonan		Poblacion 8		Barangay 2	
	Number	%	Number	%	Number	%	Number	%	Number	%
Yes	45	71.43	25	83.33	20	80.00	26	89.66	11	68.75
No	17	26.98	4	13.33	3	12.00	0	0.00	4	25.00
Did not Specify	1	1.59	1	3.33	2	8.00	3	10.34	1	6.25

Frequency	Balugo		Calindagan		Overall	
	Number	%	Number	%	Number	%
Yes	10	58.82	22	95.65	279	77.29
No	7	41.18	1	4.35	69	19.11
Did not Specify	0	0.00	0	0.00	13	3.60

Attendance to Held Related Meetings Conducted in the Community

Frequency	Tabuc-tubig		Junob		Poblacion 1		Batinguel		Candua-ay	
	Number	%	Number	%	Number	%	Number	%	Number	%
Yes	8	80.00	11	68.75	14	63.64	15	39.47	39	54.17
No	2	20.00	5	31.25	8	36.36	23	60.53	28	38.89
Did not Specify	0	0.00	0	0.00	0	0.00	0	0.00	5	6.94

Frequency	Taclobo		Bagacay		Cadawinonan		Poblacion 8		Barangay 2	
	Number	%	Number	%	Number	%	Number	%	Number	%
Yes	24	38.10	21	70.00	15	60.00	19	65.52	6	37.50
No	37	58.73	5	16.67	9	36.00	9	31.03	10	62.50
Did not Specify	2	3.17	4	13.33	1	4.00	1	3.45	0	0.00

Frequency	Balugo		Calindagan		Overall	
	Number	%	Number	%	Number	%
Yes	5	29.41	17	73.91	194	53.74
No	11	64.71	5	21.74	152	42.11
Did not Specify	1	5.88	1	4.35	15	4.16

Witnessed Neighbors Assisting Neighbors in Times of Need During Typhoons/Flooding

Frequency	Tabuc-tubig		Junob		Poblacion 1		Batinguel		Candua-ay	
	Number	%	Number	%	Number	%	Number	%	Number	%
Yes	10	100.00	16	100.00	18	81.82	32	84.21	66	91.67
No	0	0.00	0	0.00	4	18.18	6	15.79	5	6.94
Did not Specify	0	0.00	0	0.00	0	0.00	0	0.00	1	1.39

Frequency	Taclobo		Bagacay		Cadawinonan		Poblacion 8		Barangay 2	
	Number	%	Number	%	Number	%	Number	%	Number	%
Yes	60	95.24	27	90.00	22	88.00	25	86.21	15	93.75
No	3	4.76	1	3.33	1	4.00	4	13.79	0	0.00
Did not Specify	0	0.00	2	6.67	2	8.00	0	0.00	1	6.25

Frequency	Balugo		Calindagan		Overall	
	Number	%	Number	%	Number	%
Yes	12	70.59	22	95.65	325	90.03
No	2	11.76	1	4.35	27	7.48
Did not Specify	3	17.65	0	0.00	9	2.49

Knowledge on the Risk Flooding

Frequency	Tabuc-tubig		Junob		Poblacion 1		Batinguel		Candua-ay	
	Number	%	Number	%	Number	%	Number	%	Number	%
Yes	10	100.00	15	93.75	18	81.82	36	94.74	62	86.11
No	0	0.00	1	6.25	4	18.18	2	5.26	9	12.50
Did not Specify	0	0.00	0	0.00	0	0.00	0	0.00	1	1.39

Frequency	Taclobo		Bagacay		Cadawinonan		Poblacion 8		Barangay 2	
	Number	%	Number	%	Number	%	Number	%	Number	%
Yes	59	93.65	27	90.00	21	84.00	27	93.10	16	100.00
No	2	3.17	2	6.67	4	16.00	2	6.90	0	0.00
Did not Specify	2	3.17	1	3.33	0	0.00	0	0.00	0	0.00

Frequency	Balugo		Calindagan		Overall	
	Number	%	Number	%	Number	%
Yes	13	76.47	21	91.30	325	90.03
No	4	23.53	2	8.70	32	8.86
Did not Specify	0	0.00	0	0.00	4	1.11

Willingness to Vacate and be Relocated

Frequency	Tabuc-tubig		Junob		Poblacion 1		Batinguel		Candua-ay	
	Number	%	Number	%	Number	%	Number	%	Number	%
Yes	10	100.00	14	87.50	14	63.64	25	65.79	45	62.50
No	0	0.00	2	12.50	7	31.82	13	34.21	24	33.33
Did not Specify	0	0.00	0	0.00	1	4.55	0	0.00	3	4.17

Frequency	Taclobo		Bagacay		Cadawinonan		Poblacion 8		Barangay 2	
	Number	%	Number	%	Number	%	Number	%	Number	%
Yes	45	71.43	23	76.67	19	76.00	19	65.52	10	62.50
No	13	20.63	4	13.33	5	20.00	9	31.03	6	37.50
Did not Specify	5	7.94	3	10.00	1	4.00	1	3.45	0	0.00

Frequency	Balugo		Calindagan		Overall	
	Number	%	Number	%	Number	%
Yes	15	88.24	19	82.61	258	71.47
No	2	11.76	4	17.39	89	24.65
Did not Specify	0	0.00	0	0.00	14	3.88

Reasons for Acceding to Vacate

Reasons	Tabuc-tubig		Junob		Poblacion 1		Batinguel		Candua-ay	
	Number	%	Number	%	Number	%	Number	%	Number	%
Availability of relocation site	0	0.00	0	0.00	3	13.64	5	13.16	6	8.33
Avoid further losses	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Avoid recurrence of being flooded	0	0.00	1	6.25	2	9.09	0	0.00	0	0.00
High risk area	1	10.00	1	6.25	0	0.00	2	5.26	2	2.78
Property owned by government	1	10.00	0	0.00	0	0.00	0	0.00	0	0.00
Safety of family	5	50.00	7	43.75	5	22.73	16	42.11	28	38.89
Trust in LGU advisory	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Did not Specify	1	10.00	3	18.75	3	13.64	4	10.53	11	15.28

Reasons	Taclobo		Bagacay		Cadawinonan		Poblacion 8		Barangay 2	
	Number	%	Number	%	Number	%	Number	%	Number	%
Availability of relocation site	6	9.52	1	3.33	3	12.00	3	10.34	0	0.00
Avoid further losses	0	0.00	1	3.33	0	0.00	0	0.00	0	0.00
Avoid recurrence of being flooded	1	1.59	1	3.33	3	12.00	1	3.45	1	6.25
High risk area	1	1.59	2	6.67	2	8.00	2	6.90	2	12.50
Property owned by government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Safety of family	29	46.03	10	33.33	11	44.00	11	37.93	7	43.75
Trust in LGU advisory	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Did not Specify	3	4.76	4	13.33	2	8.00	3	10.34	1	6.25

Reasons for Acceding to Vacate … continued

Reasons	Balugo		Calindagan		Overall	
	Number	%	Number	%	Number	%
Availability of relocation site	2	11.76	2	8.70	31	8.59
Avoid further losses	0	0.00	0	0.00	1	0.28
Avoid recurrence of being flooded	0	0.00	0	0.00	10	2.77
High risk area	1	5.88	0	0.00	16	4.43
Property owned by government	0	0.00	0	0.00	1	0.28
Safety of family	9	52.94	13	56.52	151	41.83
Trust in LGU advisory	0	0.00	0	0.00	0	0.00
Did not Specify	2	11.76	2	8.70	39	10.80

Reasons for Not Acceding to Vacate

Reasons	Tabuc-tubig		Junob		Poblacion 1		Batinguel		Candua-ay	
	Number	%	Number	%	Number	%	Number	%	Number	%
Being ready and alert	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Dikes are in place	0	0.00	0	0.00	0	0.00	1	2.63	0	0.00
Dont trust the LGU	0	0.00	0	0.00	1	4.55	0	0.00	1	1.39
No relocation site	0	0.00	0	0.00	2	9.09	5	13.16	8	11.11
No threat	0	0.00	0	0.00	1	4.55	1	2.63	2	2.78
Not ready	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Proximity of source of livelihood	0	0.00	1	6.25	0	0.00	1	2.63	2	2.78
Secure our property	0	0.00	1	6.25	0	0.00	0	0.00	1	1.39
Sentimental reasons	0	0.00	0	0.00	0	0.00	1	2.63	2	2.78
Did not Specify	4	40.00	1	6.25	6	27.27	5	13.16	11	15.28

Reasons	Taclobo		Bagacay		Cadawinonan		Poblacion 8		Barangay 2	
	Number	%	Number	%	Number	%	Number	%	Number	%
Being ready and alert	0	0.00	0	0.00	2	8.00	0	0.00	0	0.00
Dikes are in place	1	1.59	0	0.00	0	0.00	0	0.00	0	0.00
Dont trust the LGU	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
No relocation site	5	7.94	5	16.67	0	0.00	2	6.90	3	18.75
No threat	2	3.17	0	0.00	0	0.00	1	3.45	0	0.00
Not ready	1	1.59	0	0.00	0	0.00	0	0.00	0	0.00
Proximity of source of livelihood	0	0.00	1	3.33	0	0.00	3	10.34	2	12.50
Secure our property	0	0.00	1	3.33	0	0.00	1	3.45	0	0.00
Sentimental reasons	2	3.17	0	0.00	2	8.00	1	3.45	1	6.25
Did not Specify	10	15.87	2	6.67	4	16.00	3	10.34	3	18.75

Reasons for Not Acceding to Vacate … continued

Reasons	Balugo		Calindagan		Overall	
	Number	%	Number	%	Number	%
Being ready and alert	0	0.00	0	0.00	2	0.55
Dikes are in place	0	0.00	0	0.00	2	0.55
Dont trust the LGU	0	0.00	0	0.00	2	0.55
No relocation site	0	0.00	2	8.70	32	8.86
No threat	1	5.88	0	0.00	8	2.22
Not ready	0	0.00	0	0.00	1	0.28
Proximity of source of livelihood	0	0.00	1	4.35	11	3.05
Secure our property	0	0.00	1	4.35	5	1.39
Sentimental reasons	0	0.00	0	0.00	9	2.49
Did not Specify	4	23.53	4	17.39	57	15.79

Appendix 5 Knowledge, Attitude, and Practices (KAP) on Flood Resilience

In this appendix the results from Knowledge, Attitude, and Practices (KAP) on Flood Resilience of the surveyed questionnaires from the household respondents is presented as follows:

A. Flood Resilience
    1. Hazard
    2. Risks
    3. Exposure
    4. Preparedness
    5. Response
    6. Recovery
    7. Coordination
    8. Adaptation Strategies

Flood Resilience: KNOWLEDGE

Item: HAZARD	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
Questions	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
1. Are you aware that your area is a flood hazard zone and you are at high risks?	6	60.00	13	81.25	16	72.73	8	34.78	7	41.18
2. Do you know the nature and capacity of floods?	10	100.00	11	68.75	14	63.64	8	34.78	9	52.94
3. Have you experienced flooding in this area and still continue to live here?	9	90.00	12	75.00	20	90.91	4	17.39	10	58.82
4. Have you seen presence of overloaded drainage infrastructures during heavy rains/typhoons and have seen its potential risks?	8	80.00	11	68.75	20	90.91	5	21.74	10	58.82
5. Have you seen debris from all kinds during and after flooding?	10	100.00	16	100.00	20	90.91	9	39.13	13	76.47
6. Do you know if there are flood hazard maps available for your locality?	3	30.00	6	37.50	7	31.82	1	4.35	2	11.76
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	4.60	1.26	4.50	1.20	4.41	1.37	4.35	1.70	3.00	1.58
Percentage Score	76.67	21.08	71.88	19.92	73.48	22.81	72.46	28.25	50.00	26.35

**F values are frequency of "yes" answers*

Flood Resilience: KNOWLEDGE ***. . . continued***

Item: HAZARD	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
Questions	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
1. Are you aware that your area is a flood hazard zone and you are at high risks?	15	93.75	24	82.76	17	70.83	24	80.00	45	73.77
2. Do you know the nature and capacity of floods?	14	87.50	27	93.10	20	83.33	21	70.00	54	88.52
3. Have you experienced flooding in this area and still continue to live here?	13	81.25	29	100.00	15	62.50	26	86.67	42	68.85
4. Have you seen presence of overloaded drainage infrastructures during heavy rains/typhoons and have seen its potential risks?	14	87.50	29	100.00	21	87.50	22	73.33	52	85.25
5. Have you seen debris from all kinds during and after flooding?	15	93.75	29	100.00	24	100.00	30	100.00	53	86.89
6. Do you know if there are flood hazard maps available for your locality?	9	56.25	15	51.72	11	45.83	2	6.67	19	31.15
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	5.00	1.41	5.28	0.92	4.32	1.38	4.17	0.99	4.21	1.55
Percentage Score	83.33	23.57	87.93	15.36	72.00	22.93	69.44	16.43	70.11	25.78

Flood Resilience: KNOWLEDGE ***. . . continued***

Item: HAZARD	Candau-ay		Batinguel		Overall	
Questions	**F**	**%**	**F**	**%**	**F**	**%**
1. Are you aware that your area is a flood hazard zone and you are at high risks?	58	80.56	32	84.21	265	73.41
2. Do you know the nature and capacity of floods?	57	79.17	31	81.58	276	76.45
3. Have you experienced flooding in this area and still continue to live here?	63	87.50	32	84.21	275	76.18
4. Have you seen presence of overloaded drainage infrastructures during heavy rains/typhoons and have seen its potential risks?	55	76.39	29	76.32	276	76.45
5. Have you seen debris from all kinds during and after flooding?	63	87.50	32	84.21	314	86.98
6. Do you know if there are flood hazard maps available for your locality?	28	38.89	16	42.11	119	32.96
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	4.50	1.56	4.53	1.47	4.40	1.47
Percentage Score	75.00	25.94	75.44	24.43	73.41	24.42

Flood Resilience: KNOWLEDGE ***. . . continued***

Item: RISK	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
Questions	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
1. Are you aware that flooding can occur during and after heavy downpour?	10	100.00	16	100.00	18	81.82	10	43.48	13	76.47
2. Are you aware of the limitation and level of protection of the flood control barriers?	8	80.00	10	62.50	10	45.45	7	30.43	8	47.06
3. Do you know what time of the year flooding can usually occur?	6	60.00	13	81.25	10	45.45	3	13.04	4	23.53
4. Do you think It can also happen at any time and one just needs to be ready all the time?	10	100.00	14	87.50	21	95.45	9	39.13	15	88.24
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	3.40	0.84	3.50	0.79	2.68	0.99	3.04	0.88	2.35	1.22
Percentage Score	85.00	21.08	82.81	19.83	67.05	24.86	76.09	21.95	58.82	30.54

Flood Resilience: KNOWLEDGE ***. . . continued***

Item: RISK	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
Questions	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
1. Are you aware that flooding can occur during and after heavy downpour?	14	87.50	25	86.21	22	91.67	29	96.67	59	96.72
2. Are you aware of the limitation and level of protection of the flood control barriers?	12	75.00	18	62.07	18	75.00	17	56.67	43	70.49
3. Do you know what time of the year flooding can usually occur?	6	37.50	17	58.62	15	62.50	14	46.67	34	55.74
4. Do you think It can also happen at any time and one just needs to be ready all the time?	16	100.00	28	96.55	24	100.00	29	96.67	61	100.00
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	3.00	0.97	3.03	0.98	3.16	1.11	2.97	1.03	3.13	0.91
Percentage Score	75.00	24.15	75.86	24.53	79.00	27.65	74.17	25.83	78.17	22.67

Flood Resilience: KNOWLEDGE ***. . . continued***

Item: RISK	Candau-ay		Batinguel		Overall	
Questions	**F**	**%**	**F**	**%**	**F**	**%**
1. Are you aware that flooding can occur during and after heavy downpour?	63	87.50	36	94.74	315	87.26
2. Are you aware of the limitation and level of protection of the flood control barriers?	63	87.50	28	73.68	242	67.04
3. Do you know what time of the year flooding can usually occur?	39	54.17	24	63.16	185	51.25
4. Do you think It can also happen at any time and one just needs to be ready all the time?	66	91.67	29	76.32	322	89.20
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	3.21	1.64	3.08	0.91	3.06	1.14
Percentage Score	80.21	40.88	76.97	22.80	76.52	28.46

Flood Resilience: KNOWLEDGE ***. . . continued***

Item: EXPOSURE	**Tabuc-tubig**		**Junob**		**Poblacion 1**		**Calindagan**		**Balugo**	
Questions	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
1. Are you aware of the negative impacts of flooding?	10	100.00	16	100.00	22	100.00	10	43.48	13	76.47
2. Have you or anyone in the household have been exposed to flooding before?	6	60.00	12	75.00	20	90.91	6	26.09	9	52.94
3. Have you or anyone in the household have been injured from the previous flooding?	3	30.00	6	37.50	12	54.55	3	13.04	4	23.53
4. Have you or anyone in the household have been sick during or after flooding/rainy season?	5	50.00	7	43.75	9	40.91	3	13.04	4	23.53
5. Have your household have experienced loss of love ones due to flooding and the impacts it has brought such as injury and infection?	3	30.00	5	31.25	2	9.09	0	0.00	2	11.76
6. Have you lost any of your property from the previous flooding?	7	70.00	14	87.50	7	31.82	1	4.35	6	35.29
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	3.40	1.71	3.80	1.18	3.27	1.35	2.04	1.07	2.24	1.86
Percentage Score	56.67	28.54	62.50	19.72	54.55	22.53	34.06	17.75	37.25	30.92

Item: EXPOSURE	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
Questions	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
1. Are you aware of the negative impacts of flooding?	16	100.00	29	100.00	23	95.83	29	96.67	60	98.36
2. Have you or anyone in the household have been exposed to flooding before?	13	81.25	28	96.55	19	79.17	27	90.00	44	72.13
3. Have you or anyone in the household have been injured from the previous flooding?	7	43.75	13	44.83	8	33.33	9	30.00	17	27.87
4. Have you or anyone in the household have been sick during or after flooding/rainy season?	5	31.25	16	55.17	7	29.17	11	36.67	15	24.59
5. Have your household have experienced loss of love ones due to flooding and the impacts it has brought such as injury and infection?	1	6.25	8	27.59	2	8.33	5	16.67	4	6.56
6. Have you lost any of your property from the previous flooding?	12	75.00	20	68.97	8	33.33	20	66.67	27	44.26
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	3.38	1.41	3.93	1.46	2.68	1.38	3.37	1.27	2.65	1.43
Percentage Score	56.25	23.47	65.52	24.37	44.67	22.93	56.11	21.21	44.18	23.79

Item: EXPOSURE	Candau-ay		Batinguel		Overall	
Questions	**F**	**%**	**F**	**%**	**F**	**%**
1. Are you aware of the negative impacts of flooding?	65	90.28	37	97.37	330	91.41
2. Have you or anyone in the household have been exposed to flooding before?	59	81.94	36	94.74	279	77.29
3. Have you or anyone in the household have been injured from the previous flooding?	24	33.33	18	47.37	124	34.35
4. Have you or anyone in the household have been sick during or after flooding/rainy season?	22	30.56	16	42.11	120	33.24
5. Have your household have experienced loss of love ones due to flooding and the impacts it has brought such as injury and infection?	10	13.89	5	13.16	47	13.02
6. Have you lost any of your property from the previous flooding?	39	54.17	33	86.84	194	53.74
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	3.04	1.46	3.82	1.23	3.10	1.48
Percentage Score	50.69	24.30	63.60	20.45	51.62	24.65

Flood Resilience: KNOWLEDGE ***. . . continued***

Item: PREPAREDNESS	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
Questions	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
1. Have you heard about the presence of flood early warning systems in your community?	7	70.00	13	81.25	9	40.91	4	17.39	8	47.06
2. Do you know how to interpret it?	6	60.00	9	56.25	12	54.55	4	17.39	7	41.18
3. Were you aware if there were any lectures on Early Warning Systems in your community?	6	60.00	10	62.50	11	50.00	4	17.39	5	29.41
4. Were you aware if there were any drills on Early Warning Systems in your community?	5	50.00	5	31.25	13	59.09	2	8.70	3	17.65
5. Do you know about the information drive on flood prevention spread around in your community?	10	100.00	11	68.75	20	90.91	5	21.74	9	52.94
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	3.40	1.65	2.50	1.75	2.95	1.81	2.39	1.73	1.88	1.80
Percentage Score	68.00	32.93	60.00	35.02	59.09	36.24	47.83	34.50	37.65	35.97

Flood Resilience: KNOWLEDGE ***. . . continued***

Item: PREPAREDNESS	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
Questions	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
1. Have you heard about the presence of flood early warning systems in your community?	9	56.25	23	79.31	19	79.17	24	80.00	37	60.66
2. Do you know how to interpret it?	8	50.00	20	68.97	15	62.50	17	56.67	44	72.13
3. Were you aware if there were any lectures on Early Warning Systems in your community?	7	43.75	18	62.07	12	50.00	16	53.33	28	45.90
4. Were you aware if there were any drills on Early Warning Systems in your community?	6	37.50	21	72.41	11	45.83	12	40.00	20	32.79
5. Do you know about the information drive on flood prevention spread around in your community?	11	68.75	25	86.21	18	75.00	19	63.33	36	59.02
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	2.56	1.79	3.69	1.69	3.00	1.85	2.93	1.48	2.62	1.61
Percentage Score	51.25	35.75	73.79	33.85	60.00	36.97	58.67	29.68	52.38	32.21

Flood Resilience: KNOWLEDGE ***. . . continued***

Item: PREPAREDNESS	Candau-ay		Batinguel		Overall	
Questions	**F**	**%**	**F**	**%**	**F**	**%**
1. Have you heard about the presence of flood early warning systems in your community?	52	72.22	33	86.84	238	65.93
2. Do you know how to interpret it?	52	72.22	31	81.58	225	62.33
3. Were you aware if there were any lectures on Early Warning Systems in your community?	37	51.39	19	50.00	173	47.92
4. Were you aware if there were any drills on Early Warning Systems in your community?	40	55.56	16	42.11	154	42.66
5. Do you know about the information drive on flood prevention spread around in your community?	50	69.44	28	73.68	242	67.04
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	3.21	1.89	3.34	1.66	2.96	1.76
Percentage Score	64.17	37.82	66.84	33.30	59.17	35.16

Flood Resilience: KNOWLEDGE ***. . . continued***

Source of Preparedness Information	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	F	%	F	%	F	%	F	%	F	%
Own family	0	0.00	2	12.50	1	4.55	0	0.00	0	0.00
Other villagers	1	10.00	1	6.25	1	4.55	0	0.00	1	5.88
NGO worker	0	0.00	1	6.25	0	0.00	0	0.00	0	0.00
LGU's	1	10.00	0	0.00	3	13.64	1	4.35	1	5.88
Health Center	1	10.00	2	12.50	2	9.09	1	4.35	1	5.88
Barangay Officials	5	50.00	6	37.50	10	45.45	7	30.43	4	23.53
Barangay Health Workers	1	10.00	2	12.50	1	4.55	4	17.39	2	11.76
Physicians/Nurses/ Pharmacist	0	0.00	1	6.25	3	13.64	2	8.70	1	5.88
School/Teachers	1	10.00	0	0.00	0	0.00	1	4.35	1	5.88
Religious Groups	3	30.00	4	25.00	9	40.91	8	34.78	3	17.65
TV	1	10.00	6	37.50	8	36.36	5	21.74	4	23.53
Radio	1	10.00	4	25.00	1	4.55	1	4.35	3	17.65
Newspaper/Magazines	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Billboard	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Flood Resilience: KNOWLEDGE ***. . . continued***

Source of Preparedness Information	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	F	%	F	%	F	%	F	%	F	%
Own family	0	0.00	1	3.45	2	8.33	1	3.33	3	4.92
Other villagers	2	12.50	2	6.90	4	16.67	2	6.67	4	6.56
NGO worker	2	12.50	4	13.79	3	12.50	1	3.33	7	11.48
LGU's	0	0.00	4	13.79	6	25.00	3	10.00	0	0.00
Health Center	1	6.25	5	17.24	6	25.00	3	10.00	5	8.20
Barangay Officials	6	37.50	19	65.52	8	33.33	5	16.67	14	22.95
Barangay Health Workers	3	18.75	3	10.34	1	4.17	3	10.00	6	9.84
Physicians/Nurses/ Pharmacist	2	12.50	3	10.34	4	16.67	3	10.00	5	8.20
School/Teachers	1	6.25	0	0.00	1	4.17	3	10.00	4	6.56
Religious Groups	2	12.50	5	17.24	8	33.33	6	20.00	12	19.67
TV	2	12.50	4	13.79	7	29.17	7	23.33	14	22.95
Radio	1	6.25	1	3.45	2	8.33	2	6.67	6	9.84
Newspaper/Magazines	0	0.00	1	3.45	1	4.17	0	0.00	0	0.00
Billboard	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Flood Resilience: KNOWLEDGE ***. . . continued***

Source of Preparedness Information	Candau-ay		Batinguel		Overall	
	F	%	F	%	F	%
Own family	8	11.11	5	13.16	23	6.37
Other villagers	6	8.33	3	7.89	27	7.48
NGO worker	13	18.06	7	18.42	38	10.53
LGU's	11	15.28	4	10.53	34	9.42
Health Center	12	16.67	5	13.16	44	12.19
Barangay Officials	31	43.06	13	34.21	128	35.46
Barangay Health Workers	18	25.00	6	15.79	50	13.85
Physicians/Nurses/ Pharmacist	9	12.50	2	5.26	35	9.70
School/Teachers	9	12.50	1	2.63	22	6.09
Religious Groups	22	30.56	13	34.21	95	26.32
TV	23	31.94	10	26.32	91	25.21
Radio	5	6.94	3	7.89	30	8.31
Newspaper/Magazines	2	2.78	0	0.00	4	1.11
Billboard	0	0.00	0	0.00	0	0.00

Flood Resilience: KNOWLEDGE ***. . . continued***

Item: RESPONSE	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
Questions	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
1. Are you aware that we have a local emergency response group in our community and city?	9	90.00	11	68.75	18	81.82	7	30.43	12	70.59
2. Do you know the locations of the evacuation centers?	10	100.00	13	81.25	16	72.73	5	21.74	7	41.18
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	1.90	0.32	1.30	0.82	1.55	0.67	1.48	0.85	1.12	0.78
Percentage Score	95.00	15.81	75.00	40.82	77.27	33.55	73.91	42.29	55.88	39.06

Item: RESPONSE	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
Questions	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
1. Are you aware that we have a local emergency response group in our community and city?	12	75.00	24	82.76	21	87.50	26	86.67	49	80.33
2. Do you know the locations of the evacuation centers?	12	75.00	25	86.21	20	83.33	21	70.00	46	75.41
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	1.50	0.82	1.69	0.60	1.64	0.70	1.57	0.63	1.51	0.72
Percentage Score	75.00	40.82	84.48	30.19	82.00	35.00	78.33	31.30	75.40	35.78

Flood Resilience: KNOWLEDGE ***. . . continued***

Item: RESPONSE	Candau-ay		Batinguel		Overall	
Questions	**F**	**%**	**F**	**%**	**F**	**%**
1. Are you aware that we have a local emergency response group in our community and city?	51	70.83	29	76.32	269	74.52
2. Do you know the locations of the evacuation centers?	57	79.17	31	81.58	263	72.85
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	1.50	0.79	1.58	0.68	1.53	0.72
Percentage Score	75.00	39.36	78.95	34.15	76.73	36.11

Flood Resilience: KNOWLEDGE ***. . . continued***

Item: RECOVERY	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
Questions	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
1. Do you know how to conduct yourself in the evacuation centers?	10	100.00	12	75.00	16	72.73	4	17.39	12	70.59
2. Are you aware of the different programs of the local government in times of calamities?	10	100.00	9	56.25	16	72.73	5	21.74	10	58.82
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	2.00	0.00	1.10	0.87	1.45	0.74	1.13	0.87	1.29	0.77
Percentage Score	100.00	0.00	65.63	43.66	72.73	36.93	56.52	43.44	64.71	38.59

Item: RECOVERY	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
Questions	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
1. Do you know how to conduct yourself in the evacuation centers?	13	81.25	24	82.76	23	95.83	23	76.67	56	91.80
2. Are you aware of the different programs of the local government in times of calamities?	8	50.00	21	72.41	17	70.83	19	63.33	41	67.21
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	1.31	0.79	1.55	0.78	1.60	0.65	1.40	0.81	1.54	0.64
Percentage Score	65.63	39.66	77.59	39.16	80.00	32.27	70.00	40.68	76.98	32.16

Flood Resilience: KNOWLEDGE ***. . . continued***

Item: RECOVERY	Candau-ay		Batinguel		Overall	
Questions	**F**	**%**	**F**	**%**	**F**	**%**
1. Do you know how to conduct yourself in the evacuation centers?	58	80.56	34	89.47	285	78.95
2. Are you aware of the different programs of the local government in times of calamities?	45	62.50	31	81.58	232	64.27
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	1.43	0.78	1.71	0.52	1.48	0.73
Percentage Score	71.53	39.21	85.53	25.75	73.96	36.71

Flood Resilience: KNOWLEDGE ***. . . continued***

Item: COORDINATION	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
Questions	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
1. Are you aware that the emergency response team and the rest of the units work in a coordinated manner?	9	90.00	11	68.75	16	72.73	5	21.74	12	70.59
2. Do you know the Standard Operating Procedures during response and evacuations events so coordination is facilitated?	8	80.00	10	62.50	16	72.73	5	21.74	7	41.18
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	1.70	0.48	1.10	0.87	1.45	0.74	1.09	0.95	1.12	0.78
Percentage Score	85.00	24.15	65.63	43.66	72.73	36.93	54.35	47.47	55.88	39.06

Flood Resilience: KNOWLEDGE ***. . . continued***

Item: COORDINATION	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
Questions	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
1. Are you aware that the emergency response team and the rest of the units work in a coordinated manner?	11	68.75	21	72.41	20	83.33	19	63.33	43	70.49
2. Do you know the Standard Operating Procedures during response and evacuations events so coordination is facilitated?	11	68.75	20	68.97	18	75.00	16	53.33	41	67.21
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	1.38	0.89	1.41	0.82	1.52	0.71	1.17	0.83	1.33	0.82
Percentage Score	68.75	44.25	70.69	41.23	76.00	35.71	58.33	41.70	66.67	41.15

Flood Resilience: KNOWLEDGE ***. . . continued***

Item: COORDINATION	Candau-ay		Batinguel		Overall	
Questions	**F**	**%**	**F**	**%**	**F**	**%**
1. Are you aware that the emergency response team and the rest of the units work in a coordinated manner?	46	63.89	30	78.95	243	67.31
2. Do you know the Standard Operating Procedures during response and evacuations events so coordination is facilitated?	48	66.67	26	68.42	226	62.60
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	1.31	65.28	1.47	0.76	1.34	0.81
Percentage Score	0.85	42.49	73.68	38.09	67.04	40.75

Flood Resilience: KNOWLEDGE PERCENT SCORE SUMMARY

Items	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Hazard	76.67	21.08	71.88	19.92	73.48	22.81	72.46	28.25	50.00	26.35
Risk	85.00	21.08	82.81	19.83	67.05	24.86	76.09	21.95	58.82	30.54
Exposure	56.67	28.54	62.50	19.72	54.55	22.53	34.06	17.75	37.25	30.92
Preparedness	68.00	32.93	60.00	35.02	59.09	36.24	47.83	34.50	37.65	35.97
Response	95.00	15.81	75.00	40.82	77.27	33.55	73.91	42.29	55.88	39.06
Recovery	100.00	0.00	65.63	43.66	72.73	36.93	56.52	43.44	64.71	38.59
Coordination	85.00	24.15	65.63	43.66	72.73	36.93	54.35	47.47	55.88	39.06
Adaptation Strategies	80.00	42.16	68.75	47.87	45.45	50.96	30.43	47.05	47.06	51.45
Overall	80.79	13.99	69.02	7.38	65.29	11.16	55.71	17.73	50.91	9.86

Items	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Hazard	83.33	23.57	87.93	15.36	72.00	22.93	69.44	16.43	70.11	25.78
Risk	75.00	24.15	75.86	24.53	79.00	27.65	74.17	25.83	78.17	22.67
Exposure	56.25	23.47	65.52	24.37	44.67	22.93	56.11	21.21	44.18	23.79
Preparedness	51.25	35.75	73.79	33.85	60.00	36.97	58.67	29.68	52.38	32.21
Response	75.00	40.82	84.48	30.19	82.00	35.00	78.33	31.30	75.40	35.78
Recovery	65.63	39.66	77.59	39.16	80.00	32.27	70.00	40.68	76.98	32.16
Coordination	68.75	44.25	70.69	41.23	76.00	35.71	58.33	41.70	66.67	41.15
Adaptation Strategies	62.50	50.00	68.97	47.08	72.00	45.83	36.67	49.01	55.56	50.09
Overall	67.21	10.58	75.60	7.63	70.71	12.57	62.72	13.26	64.93	12.74

Items	Candau-ay		Batinguel		Overall	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Hazard	75.00	25.94	75.44	24.43	73.41	24.42
Risk	80.21	40.88	76.97	22.80	76.52	28.46
Exposure	50.69	24.30	63.60	20.45	51.62	24.65
Preparedness	64.17	37.82	66.84	33.30	59.17	35.16
Response	75.00	39.36	78.95	34.15	76.73	36.11
Recovery	71.53	39.21	85.53	25.75	73.96	36.71
Coordination	65.28	42.49	73.68	38.09	67.04	40.75
Adaptation Strategies	51.39	50.33	55.26	50.39	54.29	49.88
Overall	66.66	10.97	72.03	9.62	66.59	10.23

Flood Resilience: ATTITUDE PERCENT SCORE SUMMARY

Items	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Hazard	3.50	0.71	2.75	1.18	3.05	0.84	3.04	0.98	2.94	0.97
Risk	2.60	1.17	3.00	0.97	3.18	0.80	3.04	1.11	3.00	1.00
Exposure	2.40	1.07	2.56	1.15	3.18	0.80	2.74	1.05	2.71	1.16
Preparedness	3.30	0.95	3.25	1.00	3.10	0.89	3.04	1.02	3.06	0.90
Response	3.60	0.52	3.25	0.77	3.41	0.80	3.09	1.04	3.25	0.77
Recovery	3.50	0.71	3.38	0.81	3.27	0.77	3.17	1.03	3.24	0.90
Coordination	3.50	0.53	3.38	0.72	3.36	0.73	2.96	1.02	2.94	1.03
Adaptation Strategies	3.00	1.05	3.19	0.75	3.00	0.82	2.68	0.95	2.71	1.05
Overall										
Mean Score	3.18	0.46	3.09	0.30	3.19	0.15	2.97	0.17	2.98	0.21
Mean Percent Score	79.38	12.94	77.34	12.42	79.40	14.99	73.91	22.94	73.90	18.55

Flood Resilience: ATTITUDE PERCENT SCORE SUMMARY . . . *continued*

Items	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Hazard	3.38	0.81	2.93	1.04	3.20	1.00	2.67	1.15	2.83	1.14
Risk	3.25	0.86	2.75	0.97	3.20	0.91	2.62	1.21	2.81	1.08
Exposure	3.15	1.07	2.85	0.95	3.13	1.12	2.41	1.09	2.81	1.02
Preparedness	3.38	0.62	2.89	1.03	3.32	0.90	2.80	1.13	2.80	0.96
Response	3.50	0.82	3.14	1.01	3.20	1.00	2.87	1.11	3.14	0.95
Recovery	3.38	0.89	3.11	0.96	3.36	0.91	2.70	1.09	3.06	0.95
Coordination	3.06	1.00	3.00	1.02	3.04	1.02	2.77	0.97	2.90	1.01
Adaptation Strategies	3.19	0.75	2.93	1.04	3.08	1.10	2.70	0.95	2.89	1.01
Overall										
Mean Score	3.28	0.15	2.95	0.13	3.19	0.11	2.69	0.14	2.91	0.13
Mean Percent Score	80.27	16.95	70.26	24.94	79.00	21.87	66.77	22.21	72.07	20.22

Flood Resilience: ATTITUDE PERCENT SCORE SUMMARY . . . *continued*

Items	Candau-ay		Batinguel		Overall	
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Hazard	2.92	1.16	3.00	1.14	2.99	0.24
Risk	2.86	1.03	2.76	1.12	2.89	0.24
Exposure	2.58	1.20	2.66	1.02	2.80	0.27
Preparedness	2.91	1.06	2.97	1.08	3.01	0.24
Response	3.09	0.96	3.22	1.11	3.16	0.19
Recovery	3.10	1.07	3.17	1.06	3.12	0.23
Coordination	2.93	1.12	3.00	1.09	2.96	0.10
Adaptation Strategies	2.77	1.13	2.86	0.98	2.92	0.17
Overall						
Mean Score	2.89	0.17	2.95	0.19	2.98	0.12
Mean Percent Score	69.62	24.87	72.62	21.46	72.94	4.96

Flood Resilience: PRACTICE

Item: HAZARD*	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
Questions	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
If you know that your house is in a flood prone area, would you still continue to live there?	5	50.00	14	87.50	6	27.27	15	65.22	12	70.59
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.50	0.53	0.88	0.34	0.27	0.46	0.65	0.49	0.71	0.47
Percentage Score	50.00	50.00	87.50	34.16	27.27	45.58	65.22	48.70	70.59	46.97

**F values are for the "NO" answers (desirable)*

Item: HAZARD	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
Questions	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
If you know that your house is in a flood prone area, would you still continue to live there?	5	31.25	8	27.59	9	37.50	23	76.67	36	59.02
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.31	0.48	0.29	0.46	0.36	0.49	0.77	0.43	0.61	0.49
Percentage Score	31.25	47.87	28.57	46.00	36.00	48.99	76.67	43.02	61.02	49.19

Flood Resilience: PRACTICE . . . *continued*

Item: HAZARD	Candau-ay		Batinguel		Overall	
Questions	**F**	**%**	**F**	**%**	**F**	**%**
If you know that your house is in a flood prone area, would you still continue to live there?	21	29.17	13	34.21	172	47.65
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.30	0.46	0.34	0.48	0.47	0.50
Percentage Score	29.58	45.96	34.21	48.08	47.04	49.98

Reasons for not relocating

Reasons	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
1. No safer place to transfer	3	30.00	3	18.75	9	40.91	6	26.09	5	29.41
2. Like the current place	2	20.00	0	0.00	0	0.00	0	0.00	0	0.00
3. Have been here for long and used to flooding	0	0.00	1	6.25	1	4.55	1	4.35	0	0.00
4. Hard to build a new home	0	0.00	0	0.00	2	9.09	0	0.00	0	0.00
5. Tolerable flooding/not frequent	0	0.00	0	0.00	2	9.09	1	4.35	1	5.88
6. Relocation site is far from livelihood/school	0	0.00	0	0.00	0	0.00	1	4.35	0	0.00
7. Dike is in place	0	0.00	0	0.00	0	0.00	0	0.00	1	5.88
8. Location is elevated/far from river banks	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Flood Resilience: PRACTICE . . . *continued*

Reasons for not relocating

Reasons	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	F	%	F	%	F	%	F	%	F	%
1. No safer place to transfer	7	43.75	9	31.03	6	25.00	9	30.00	18	29.51
2. Like the current place	0	0.00	1	3.45	1	4.17	0	0.00	0	0.00
3. Have been here for long and used to flooding	0	0.00	5	17.24	1	4.17	0	0.00	0	0.00
4. Hard to build a new home	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
5. Tolerable flooding/not frequent	0	0.00	1	3.45	0	0.00	0	0.00	2	3.28
6. Relocation site is far from livelihood/school	2	12.50	2	6.90	0	0.00	1	3.33	2	3.28
7. Dike is in place	0	0.00	0	0.00	1	4.17	0	0.00	0	0.00
8. Location is elevated/far from river banks	1	6.25	0	0.00	1	4.17	0	0.00	1	1.64

Flood Resilience: PRACTICE . . . *continued*

Reasons for not relocating

Reasons	Candau-ay		Batinguel		Overall	
	F	%	F	%	F	%
1. No safer place to transfer	31	43.06	20	52.63	126	34.90
2. Like the current place	0	0.00	0	0.00	4	1.11
3. Have been here for long and used to flooding	5	6.94	1	2.63	15	4.16
4. Hard to build a new home	0	0.00	0	0.00	2	0.55
5. Tolerable flooding/not frequent	2	2.78	0	0.00	9	2.49
6. Relocation site is far from livelihood/school	2	2.78	1	2.63	11	3.05
7. Dike is in place	2	2.78	1	2.63	5	1.39
8. Location is elevated/far from river banks	5	6.94	0	0.00	8	2.22

Flood Resilience: PRACTICE . . . *continued*

Reasons for opting to relocate

Reasons	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	F	%	F	%	F	%	F	%	F	%
1. Safety	1	10.00	4	25.00	3	13.64	8	34.78	7	41.18
2. Bad previous experience with flooding	0	0.00	3	18.75	0	0.00	0	0.00	0	0.00
3. Risk/uncertainly of flooding	0	0.00	1	6.25	0	0.00	0	0.00	0	0.00

Reasons	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	F	%	F	%	F	%	F	%	F	%
1. Safety	5	31.25	7	24.14	5	20.83	11	36.67	11	18.03
2. Bad previous experience with flooding	0	0.00	0	0.00	0	0.00	2	6.67	3	4.92
3. Risk/uncertainly of flooding	0	0.00	0	0.00	0	0.00	1	3.33	6	9.84

Reasons	Candau-ay		Batinguel		Overall	
	F	%	F	%	F	%
1. Safety	6	8.33	5	13.16	73	20.22
2. Bad previous experience with flooding	2	2.78	1	2.63	11	3.05
3. Risk/uncertainly of flooding	1	1.39	1	2.63	10	2.77

Flood Resilience: PRACTICE . . . *continued*

Item: RISK	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
Questions	F	%	F	%	F	%	F	%	F	%
1. Do you consider or give importance to the hazards involved in flooding?	10	100.00	13	81.25	18	81.82	20	86.96	16	94.12
2. Do you consider or give importance to the risks involved in flooding?	10	100.00	11	68.75	16	72.73	19	82.61	11	64.71
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	2.00	0.00	1.50	0.82	1.55	0.80	1.70	0.56	1.59	0.62
Percentage Score	100.00	0.00	75.00	40.82	77.27	40.02	84.78	27.94	79.41	30.92

Item: RISK	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
Questions	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
1. Do you consider or give importance to the hazards involved in flooding?	15	93.75	24	82.76	24	100.00	21	70.00	53	86.89
2. Do you consider or give importance to the risks involved in flooding?	14	87.50	24	82.76	22	91.67	15	50.00	47	77.05
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	1.81	0.40	1.66	0.72	1.84	0.37	1.20	0.85	1.59	0.75
Percentage Score	90.63	20.16	82.76	36.05	92.00	18.71	60.00	42.35	79.37	37.71

Flood Resilience: PRACTICE . . . *continued*

Item: RISK	Candau-ay		Batinguel		Overall	
Questions	**F**	**%**	**F**	**%**	**F**	**%**
1. Do you consider or give importance to the hazards involved in flooding?	61	84.72	31	81.58	316	87.53
2. Do you consider or give importance to the risks involved in flooding?	51	70.83	31	81.58	281	77.84
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	1.56	0.75	1.63	0.71	1.60	0.71
Percentage Score	77.78	37.42	81.58	35.68	79.92	35.43

Flood Resilience: PRACTICE . . . *continued*

Item: EXPOSURE	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
Questions	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
1. Do you wear protective clothing (raincoat) and sturdy shoes(boots) during typhoons and flooding?	5	50.00	8	50.00	13	59.09	12	52.17	10	58.82
2. Would you immediately evacuate to designated areas when a flood warning announcement is given by those in authority?	10	100.00	13	81.25	19	86.36	23	100.00	16	94.12
3. Would you tend to watch and stay near the flowing water while flooding?	2	20.00	5	31.25	7	31.82	4	17.39	4	23.53
4. Would you tend to pick up floating and stocked debris during flooding?	0	0.00	1	6.25	6	27.27	1	4.35	1	5.88
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	1.70	0.82	1.69	0.79	2.05	0.84	1.74	0.69	1.82	0.64
Percentage Score	42.50	20.58	42.19	19.83	51.14	21.10	43.48	17.22	45.59	15.90

Flood Resilience: PRACTICE . . . *continued*

Item: EXPOSURE	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
Questions	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
1. Do you wear protective clothing (raincoat) and sturdy shoes(boots) during typhoons and flooding?	7	43.75	9	31.03	17	70.83	13	43.33	41	67.21
2. Would you immediately evacuate to designated areas when a flood warning announcement is given by those in authority?	16	100.00	28	96.55	25	104.17	30	100.00	59	96.72
3. Would you tend to watch and stay near the flowing water while flooding?	1	6.25	6	20.69	4	16.67	6	20.00	10	16.39
4. Would you tend to pick up floating and stocked debris during flooding?	1	6.25	5	17.24	4	16.67	1	3.33	3	4.92
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	1.56	0.63	1.66	0.72	2.00	0.71	1.67	0.71	1.79	0.79
Percentage Score	39.06	15.73	41.38	18.02	50.00	17.68	41.67	17.78	44.84	19.65

Flood Resilience: PRACTICE . . . *continued*

Item: EXPOSURE	Candau-ay		Batinguel		Overall	
Questions	**F**	**%**	**F**	**%**	**F**	**%**
1. Do you wear protective clothing (raincoat) and sturdy shoes(boots) during typhoons and flooding?	42	58.33	20	52.63	202	55.96
2. Would you immediately evacuate to designated areas when a flood warning announcement is given by those in authority?	60	83.33	35	92.11	344	95.29
3. Would you tend to watch and stay near the flowing water while flooding?	12	16.67	11	28.95	74	20.50
4. Would you tend to pick up floating and stocked debris during flooding?	7	9.72	7	18.42	37	10.25
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	1.68	0.77	1.92	0.82	1.77	0.76
Percentage Score	42.01	19.15	48.03	20.45	44.32	18.88

Flood Resilience: PRACTICE . . . *continued*

Item: PREPAREDNESS	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
Questions	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
1. Do you prepare matches, lighters, candles, traditional lamp and chargeable lamp and other things ready and safe during heavy rains or expected flooding?	10	100.00	14	87.50	20	90.91	21	91.30	16	94.12
2. Do you unplug all appliances including the main switch when heavy rain and typhoon is coming?	10	100.00	12	75.00	19	86.36	21	91.30	15	88.24
3. If you do not have any transportation, do you make arrangements with relatives, friends, or the local government?	6	60.00	9	56.25	15	68.18	18	78.26	13	76.47
4. Do you gather water, food, clothing, and emergency supplies before any typhoon and flooding occurs?	8	80.00	13	81.25	16	72.73	21	91.30	15	88.24

Flood Resilience: PRACTICE . . . *continued*

Item: PREPAREDNESS	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
Questions	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
5. Do you secure your house by boarding or placing shutter on all windows/doors and all loose items such as garbage can lids, empty drums, gardening tools, and any other material that could become airborne during high winds?	7	70.00	15	93.75	20	90.91	21	91.30	14	82.35
6. Do you fuel your motorbikes, tricycles or car prior to the typhoon and flooding?	7	70	14	87.5	17	77.27	16	69.57	12	70.59
7. Did you participate in an Early Warning System lectures in your community?	8	80	9	56.25	7	31.82	8	34.78	3	17.65
8. Did you participate in drills related to evacuation and response?	7	70	9	56.25	7	31.82	9	39.13	4	23.53
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	6.30	2.06	5.94	1.77	5.50	1.92	5.87	1.69	5.41	1.54
Percentage Score	78.75	25.72	74.22	22.11	68.75	24.01	73.37	21.09	67.65	19.29

Flood Resilience: PRACTICE . . . *continued*

Item: PREPAREDNESS	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
Questions	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
1. Do you prepare matches, lighters, candles, traditional lamp and chargeable lamp and other things ready and safe during heavy rains or expected flooding?	15	93.75	28	96.55	24	100.00	30	100.00	57	93.44
2. Do you unplug all appliances including the main switch when heavy rain and typhoon is coming?	15	93.75	26	89.66	21	87.50	28	93.33	55	90.16
3. If you do not have any transportation, do you make arrangements with relatives, friends, or the local government?	9	56.25	21	72.41	17	70.83	18	60.00	49	80.33
4. Do you gather water, food, clothing, and emergency supplies before any typhoon and flooding occurs?	14	87.50	23	79.31	22	91.67	21	70.00	56	91.80

Flood Resilience: PRACTICE . . . *continued*

Item: PREPAREDNESS	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
Questions	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
5. Do you secure your house by boarding or placing shutter on all windows/doors and all loose items such as garbage can lids, empty drums, gardening tools, and any other material that could become airborne during high winds?	14	87.50	22	75.86	19	79.17	23	76.67	52	85.25
6. Do you fuel your motorbikes, tricycles or car prior to the typhoon and flooding?	10	62.5	18	62.07	20	83.33	23	76.67	50	81.97
7. Did you participate in an Early Warning System lectures in your community?	5	31.25	18	62.07	13	54.17	12	40.00	29	47.54
8. Did you participate in drills related to evacuation and response?	4	25	19	65.52	12	50.00	8	26.67	21	34.43
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	5.38	2.19	6.03	2.21	5.92	2.22	5.43	1.81	5.86	1.63
Percentage Score	67.19	27.34	75.43	27.65	74.00	27.70	67.92	22.67	73.21	20.44

Flood Resilience: PRACTICE . . . *continued*

Item: PREPAREDNESS	Candau-ay		Batinguel		Overall	
Questions	**F**	**%**	**F**	**%**	**F**	**%**
1. Do you prepare matches, lighters, candles, traditional lamp and chargeable lamp and other things ready and safe during heavy rains or expected flooding?	65	90.28	34	89.47	344	95.29
2. Do you unplug all appliances including the main switch when heavy rain and typhoon is coming?	60	83.33	33	86.84	325	90.03
3. If you do not have any transportation, do you make arrangements with relatives, friends, or the local government?	54	75.00	28	73.68	263	72.85
4. Do you gather water, food, clothing, and emergency supplies before any typhoon and flooding occurs?	60	83.33	36	94.74	313	86.70

Flood Resilience: PRACTICE . . . *continued*

Item: PREPAREDNESS	Candau-ay		Batinguel		Overall	
Questions	**F**	**%**	**F**	**%**	**F**	**%**
5. Do you secure your house by boarding or placing shutter on all windows/doors and all loose items such as garbage can lids, empty drums, gardening tools, and any other material that could become airborne during high winds?	54	75.00	34	89.47	302	83.66
6. Do you fuel your motorbikes, tricycles or car prior to the typhoon and flooding?	57	79.17	30	78.95	281	77.84
7. Did you participate in an Early Warning System lectures in your community?	33	45.83	18	47.37	171	47.37
8. Did you participate in drills related to evacuation and response?	35	48.61	19	50.00	161	44.60
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	5.81	2.42	6.11	1.72	5.81	1.97
Percentage Score	72.57	30.30	76.32	21.51	72.61	24.63

Flood Resilience: PRACTICE . . . *continued*

Item: RESPONSE	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
Questions	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
1. Are you always alert all the time for possible flooding especially if it rains hard for several hours?	10	100.00	15	93.75	18	81.82	23	100.00	15	88.24
2. Do you listen to the radio, watch the TV, read the newspaper, keep track online updates and mobile text messages and call authorities for further information and warning during heavy rains, typhoons and flooding events?	10	100.00	16	100.00	19	86.36	21	91.30	16	94.12
3. Do you have neighborhood associations or support members in times of need during flooding?	8	80.00	13	81.25	14	63.64	15	65.22	13	76.47
4. Do you check from time to time the water levels of the river near you whenever there is a heavy rain?	8	80.00	14	87.50	16	72.73	19	82.61	12	70.59
5. Do you have contacts from people further up to your area (Balugo or Valencia) so you will know the water levels there?	7	70.00	5	31.25	13	59.09	9	39.13	12	70.59

Flood Resilience: PRACTICE . . . *continued*

Item: RESPONSE	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
Questions	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
6. Would you be ready to cooperate if local officials and rescue operations directing evacuation routes?	10	100	15	93.75	20	90.91	22	95.65	17	100.00
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	5.30	0.82	4.88	0.89	4.55	1.44	4.74	1.10	5.00	1.00
Percentage Score	88.33	13.72	81.25	14.75	75.76	23.97	78.99	18.27	83.33	16.67

Flood Resilience: PRACTICE . . . *continued*

Item: RESPONSE	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
Questions	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
1. Are you always alert all the time for possible flooding especially if it rains hard for several hours?	15	93.75	28	96.55	21	87.50	28	93.33	54	88.52
2. Do you listen to the radio, watch the TV, read the newspaper, keep track online updates and mobile text messages and call authorities for further information and warning during heavy rains, typhoons and flooding events?	16	100.00	26	89.66	21	87.50	28	93.33	58	95.08
3. Do you have neighborhood associations or support members in times of need during flooding?	12	75.00	26	89.66	19	79.17	17	56.67	38	62.30
4. Do you check from time to time the water levels of the river near you whenever there is a heavy rain?	13	81.25	23	79.31	20	83.33	26	86.67	56	91.80
5. Do you have contacts from people further up to your area (Balugo or Valencia) so you will know the water levels there?	9	56.25	21	72.41	16	66.67	8	26.67	34	55.74

Flood Resilience: PRACTICE . . . *continued*

Item: RESPONSE	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
Questions	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
6. Would you be ready to cooperate if local officials and rescue operations directing evacuation routes?	16	100	27	93.10	23	95.83	29	96.67	57	93.44
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	5.06	0.93	5.21	1.45	4.80	1.85	4.53	1.31	4.71	1.21
Percentage Score	84.38	15.48	86.78	24.14	80.00	30.81	75.56	21.77	78.57	20.18

Flood Resilience: PRACTICE . . . *continued*

Item: RESPONSE	Candau-ay		Batinguel		Overall	
Questions	**F**	**%**	**F**	**%**	**F**	**%**
1. Are you always alert all the time for possible flooding especially if it rains hard for several hours?	62	86.11	36	94.74	335	92.80
2. Do you listen to the radio, watch the TV, read the newspaper, keep track online updates and mobile text messages and call authorities for further information and warning during heavy rains, typhoons and flooding events?	59	81.94	32	84.21	332	91.97
3. Do you have neighborhood associations or support members in times of need during flooding?	48	66.67	18	47.37	249	68.98
4. Do you check from time to time the water levels of the river near you whenever there is a heavy rain?	55	76.39	33	86.84	303	83.93
5. Do you have contacts from people further up to your area (Balugo or Valencia) so you will know the water levels there?	39	54.17	17	44.74	197	54.57

Flood Resilience: PRACTICE . . . *continued*

Item: RESPONSE	Candau-ay		Batinguel		Overall	
Questions	**F**	**%**	**F**	**%**	**F**	**%**
6. Would you be ready to cooperate if local officials and rescue operations directing evacuation routes?	60	83.33	34	89.47	340	94.18
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	4.49	1.89	4.47	1.35	4.72	1.43
Percentage Score	74.77	31.52	74.56	22.51	78.62	23.91

Flood Resilience: PRACTICE . . . *continued*

Item: RECOVERY	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
Questions	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
1. Do you remain in the evacuation center, until informed by local authorities that it is safe to leave?	10	100.00	16	100.00	20	90.91	21	91.30	16	94.12
2. Do you stay away from disaster areas?	7	70.00	11	68.75	16	72.73	20	86.96	13	76.47
3. Do you avoid loose or dangling power wires, broken sewer or water mains and report them immediately to local officials?	8	80.00	15	93.75	22	100.00	20	86.96	12	70.59
4. Do you check food for spoilage and other food supply including water that is safe to eat and DRINK?	10	100.00	16	100.00	22	100.00	21	91.30	15	88.24
5. Do you stay away from river banks until all potential flooding has passed?	8	80.00	13	81.25	17	77.27	19	82.61	16	94.12
6. Would you be willing to stay and cooperate to whatever programs and procedures (health, sanitation practices) that they will facilitate in the evacuation center during flooding calamity?	8	80	16	100	21	95.45	21	91.30	16	94.12

Flood Resilience: PRACTICE . . . *continued*

Item: RECOVERY	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
Questions	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
7. Do you immediately clean up your house after a flooding event?	10	100	14	87.5	19	86.36	21	91.30	17	100.00
8. Do you immediately repair whatever damage to your property after a flooding event?	10	100	11	68.75	20	90.91	19	82.61	16	94.12
9. Do you immediately go for a medical check-up if one is sick from diarrhea in your family especially during or after a typhoon or flooding events?	10	100	14	87.5	22	100.00	18	78.26	14	82.35
10. Have you been given or have you attended some debriefing session of the past flooding event?	5	50	10	62.5	10	45.45	6	26.09	3	17.65
11. Have you attended to some discussions of lessons learned from the past flooding event?	7	70	13	81.25	10	45.45	8	34.78	6	35.29
12. Do you usually do a survey by yourself of the scope of the damaged the past flooding has brought?	10	100	14	87.5	14	63.64	19	82.61	13	76.47

Flood Resilience: PRACTICE . . . *continued*

Item: RECOVERY	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
Questions	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
13. Do you find ways to cope from the last flooding incident?	7	70	14	87.5	17	77.27	13	56.52	6	35.29
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	11.00	1.70	11.06	1.39	10.45	2.09	9.83	2.93	9.59	2.12
Percentage Score	84.62	13.07	85.10	10.68	80.42	16.05	75.59	22.56	73.76	16.33

Flood Resilience: PRACTICE . . . *continued*

Item: RECOVERY	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
Questions	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
1. Do you remain in the evacuation center, until informed by local authorities that it is safe to leave?	15	93.75	28	96.55	23	95.83	29	96.67	54	88.52
2. Do you stay away from disaster areas?	13	81.25	24	82.76	21	87.50	22	73.33	47	77.05
3. Do you avoid loose or dangling power wires, broken sewer or water mains and report them immediately to local officials?	16	100.00	25	86.21	20	83.33	28	93.33	54	88.52
4. Do you check food for spoilage and other food supply including water that is safe to eat and DRINK?	16	100.00	28	96.55	24	100.00	29	96.67	62	101.64
5. Do you stay away from river banks until all potential flooding has passed?	13	81.25	24	82.76	20	83.33	23	76.67	51	83.61
6. Would you be willing to stay and cooperate to whatever programs and procedures (health, sanitation practices) that they will facilitate in the evacuation center during flooding calamity?	15	93.75	27	93.10	24	100.00	30	100.00	60	98.36

Flood Resilience: PRACTICE . . . *continued*

Item: RECOVERY	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
Questions	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
7. Do you immediately clean up your house after a flooding event?	16	100	39	134.48	23	95.83	27	90.00	62	101.64
8. Do you immediately repair whatever damage to your property after a flooding event?	16	100	24	82.76	21	87.50	26	86.67	55	90.16
9. Do you immediately go for a medical check-up if one is sick from diarrhea in your family especially during or after a typhoon or flooding events?	16	100	25	86.21	19	79.17	29	96.67	64	104.92
10. Have you been given or have you attended some debriefing session of the past flooding event?	6	37.5	16	55.17	12	50.00	5	16.67	22	36.07
11. Have you attended to some discussions of lessons learned from the past flooding event?	6	37.5	23	79.31	13	54.17	21	70.00	25	40.98
12. Do you usually do a survey by yourself of the scope of the damaged the past flooding has brought?	15	93.75	27	93.10	19	79.17	26	86.67	52	85.25

Flood Resilience: PRACTICE . . . *continued*

Item: RECOVERY	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
Questions	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
13. Do you find ways to cope from the last flooding incident?	13	81.25	26	89.66	23	95.83	16	53.33	41	67.21
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	11.00	1.32	11.59	3.06	10.48	2.43	10.37	2.01	10.30	2.53
Percentage Score	84.62	10.13	89.12	23.58	80.62	18.73	79.74	15.45	79.24	19.47

Flood Resilience: PRACTICE . . . *continued*

Item: RECOVERY	Candau-ay		Batinguel		Overall	
Questions	**F**	**%**	**F**	**%**	**F**	**%**
1. Do you remain in the evacuation center, until informed by local authorities that it is safe to leave?	66	91.67	36	94.74	344	95.29
2. Do you stay away from disaster areas?	63	87.50	34	89.47	298	82.55
3. Do you avoid loose or dangling power wires, broken sewer or water mains and report them immediately to local officials?	60	83.33	33	86.84	321	88.92
4. Do you check food for spoilage and other food supply including water that is safe to eat and DRINK?	70	97.22	36	94.74	359	99.45
5. Do you stay away from river banks until all potential flooding has passed?	58	80.56	30	78.95	300	83.10
6. Would you be willing to stay and cooperate to whatever programs and procedures (health, sanitation practices) that they will facilitate in the evacuation center during flooding calamity?	62	86.11	35	92.11	343	95.01

Flood Resilience: PRACTICE . . . *continued*

Item: RECOVERY	Candau-ay		Batinguel		Overall	
Questions	**F**	**%**	**F**	**%**	**F**	**%**
7. Do you immediately clean up your house after a flooding event?	64	88.89	37	97.37	359	99.45
8. Do you immediately repair whatever damage to your property after a flooding event?	59	81.94	30	78.95	317	87.81
9. Do you immediately go for a medical check-up if one is sick from diarrhea in your family especially during or after a typhoon or flooding events?	67	93.06	45	118.42	353	97.78
10. Have you been given or have you attended some debriefing session of the past flooding event?	28	38.89	23	60.53	151	41.83
11. Have you attended to some discussions of lessons learned from the past flooding event?	39	54.17	30	78.95	208	57.62
12. Do you usually do a survey by yourself of the scope of the damaged the past flooding has brought?	60	83.33	32	84.21	311	86.15

Flood Resilience: PRACTICE . . . *continued*

Item: RECOVERY	Candau-ay		Batinguel		Overall	
Questions	**F**	**%**	**F**	**%**	**F**	**%**
13. Do you find ways to cope from the last flooding incident?	56	77.78	29	76.32	268	74.24
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	10.44	3.31	11.32	2.91	10.59	2.66
Percentage Score	80.34	25.49	87.04	22.42	81.44	20.45

Flood Resilience: PRACTICE . . . *continued*

Coping Mechanisms

Coping Mechanism	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	F	%	F	%	F	%	F	%	F	%
1. Counseling	1	10.00	0	0.00	0	0.00	0	0.00	0	0.00
2. Not mentioning/forgetting the unfortunate event	1	10.00	0	0.00	0	0.00	0	0.00	0	0.00
3. Staying Calm	1	10.00	0	0.00	2	9.09	3	13.04	1	5.88
4. Prayers/attending church	0	0.00	3	18.75	1	4.55	1	4.35	0	0.00
5. Evacuating/relocating	0	0.00	2	12.50	0	0.00	1	4.35	0	0.00
6. Work harder	0	0.00	1	6.25	0	0.00	0	0.00	0	0.00
7. Accepting reality	0	0.00	0	0.00	1	4.55	0	0.00	0	0.00
8. Soliciting help from health center	0	0.00	0	0.00	1	4.55	0	0.00	0	0.00
9. Listening to advice of others	0	0.00	0	0.00	1	4.55	0	0.00	0	0.00
10. Family bond	0	0.00	0	0.00	2	9.09	0	0.00	0	0.00
11. Being alert/ready	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
12. Listening to radio/tv	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Flood Resilience: PRACTICE . . . *continued*

Coping Mechanism	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	F	%	F	%	F	%	F	%	F	%
1. Counseling	1	6.25	0	0.00	0	0.00	0	0.00	0	0.00
2. Not mentioning/forgetting the unfortunate event	1	6.25	1	3.45	2	8.33	0	0.00	0	0.00
3. Staying Calm	0	0.00	3	10.34	1	4.17	0	0.00	0	0.00
4. Prayers/attending church	1	6.25	0	0.00	3	12.50	0	0.00	1	1.64
5. Evacuating/relocating	0	0.00	1	3.45	0	0.00	0	0.00	0	0.00
6. Work harder	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
7. Accepting reality	1	6.25	0	0.00	0	0.00	0	0.00	0	0.00
8. Soliciting help from health center	0	0.00	0	0.00	2	8.33	0	0.00	1	1.64
9. Listenting to advice of others	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
10. Family bond	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
11. Being alert/ready	0	0.00	2	6.90	0	0.00	0	0.00	0	0.00
12. Listening to radio/tv	0	0.00	0	0.00	0	0.00	0	0.00	1	1.64

Flood Resilience: PRACTICE . . . *continued*

Coping Mechanism	Candau-ay		Batinguel		Overall	
	F	%	F	%	F	%
1. Counseling	0	0.00	0	0.00	2	0.55
2. Not mentioning/forgetting the unfortunate event	1	1.39	2	5.26	8	2.22
3. Staying Calm	3	4.17	2	5.26	16	4.43
4. Prayers/attending church	5	6.94	1	2.63	16	4.43
5. Evacuating/relocating	1	1.39	1	2.63	6	1.66
6. Work harder	0	0.00	0	0.00	1	0.28
7. Accepting reality	1	1.39	0	0.00	3	0.83
8. Soliciting help from health center	0	0.00	0	0.00	4	1.11
9. Listenting to advice of others	0	0.00	0	0.00	1	0.28
10. Family bond	0	0.00	1	2.63	3	0.83
11. Being alert/ready	1	1.39	0	0.00	3	0.83
12. Listening to radio/tv	0	0.00	0	0.00	1	0.28

Flood Resilience: PRACTICE . . . *continued*

Item: COORDINATION	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
Questions	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
1. Do you cooperate with the coordination procedures of the local government for the resilience program in your community?	8	80.00	14	87.50	17	77.27	16	69.57	12	70.59
2. Would you share your information to your neighbors about your knowledge of an issued flood warning?	10	100.00	16	100.00	21	95.45	19	82.61	15	88.24
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	1.80	0.42	1.88	0.34	1.73	0.46	1.52	0.73	1.59	0.71
Percentage Score	90.00	21.08	93.75	17.08	86.36	22.79	76.09	36.52	79.41	35.61

Flood Resilience: PRACTICE . . . *continued*

Item: COORDINATION	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
Questions	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
1. Do you cooperate with the coordination procedures of the local government for the resilience program in your community?	14	87.50	26	89.66	16	66.67	26	86.67	47	77.05
2. Would you share your information to your neighbors about your knowledge of an issued flood warning?	16	100.00	27	93.10	22	91.67	30	100.00	58	95.08
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	1.88	0.34	1.83	0.54	1.52	0.71	1.87	0.35	1.67	0.60
Percentage Score	93.75	17.08	91.38	26.96	76.00	35.71	93.33	17.29	83.33	29.78

Flood Resilience: PRACTICE . . . *continued*

Item: COORDINATION	Candau-ay		Batinguel		Overall	
Questions	**F**	**%**	**F**	**%**	**F**	**%**
1. Do you cooperate with the coordination procedures of the local government for the resilience program in your community?	50	69.44	30	78.95	284	78.67
2. Would you share your information to your neighbors about your knowledge of an issued flood warning?	58	80.56	34	89.47	336	93.07
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	1.50	0.80	1.68	0.62	1.67	0.63
Percentage Score	75.00	40.25	84.21	30.99	83.38	31.41

Flood Resilience: PRACTICE . . . *continued*

Item: ADAPTATION STRATEGIES	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
Questions	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
1. Are you in favor of whatever adaptation strategies the local government is implementing or planned?	10	100.00	16	100.00	19	86.36	20	86.96	15	88.24
2. Have you participated to any adaptation strategies facilitated by the LGU's?	5	50.00	14	87.50	11	50.00	5	21.74	4	23.53
3. Have you applied what you have learned from the adaptation strategies?	6	60	10	62.5	15	68.18	9	39.13	6	35.29
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	2.10	0.99	2.50	0.73	2.05	1.05	1.48	0.99	1.47	1.01
Percentage Score	70.00	33.15	83.33	24.34	68.18	34.85	49.28	33.14	49.02	33.58

Flood Resilience: PRACTICE . . . *continued*

Item: ADAPTATION STRATEGIES	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
Questions	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
1. Are you in favor of whatever adaptation strategies the local government is implementing or in planned?	14	87.50	22	75.86	20	83.33	25	83.33	54	88.52
2. Have you participated to any adaptation strategies facilitated by the LGU's?	6	37.50	19	65.52	11	45.83	13	43.33	25	40.98
3. Have you applied what you have learned from the adaptation strategies?	12	75.00	22	75.86	15	62.50	17	56.67	31	50.82
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	2.00	0.82	2.17	1.20	1.84	1.21	1.83	1.09	1.75	1.06
Percentage Score	66.67	27.22	72.41	39.91	61.33	40.46	61.11	36.18	58.20	35.40

Flood Resilience: PRACTICE . . . *continued*

Item: ADAPTATION STRATEGIES	Candau-ay		Batinguel		Overall	
Questions	**F**	**%**	**F**	**%**	**F**	**%**
1. Are you in favor of whatever adaptation strategies the local government is implementing or in planned?	57	79.17	35	92.11	317	87.81
2. Have you participated to any adaptation strategies facilitated by the LGU's?	31	43.06	25	65.79	174	48.20
3. Have you applied what you have learned from the adaptation strategies?	43	59.72	27	71.05	219	60.66
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	1.82	1.19	2.29	1.01	1.91	1.09
Percentage Score	60.65	39.69	76.32	33.70	63.62	36.43

Flood Resilience: PRACTICE PERCENT SCORE SUMMARY

Items	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Hazard	50.00	50.00	87.50	34.16	27.27	45.58	65.22	48.70	70.59	46.97
Risk	100.00	0.00	75.00	40.82	77.27	40.02	84.78	27.94	79.41	30.92
Exposure	42.50	20.58	42.19	19.83	51.14	21.10	43.48	17.22	45.59	15.90
Preparedness	78.75	25.72	74.22	22.11	68.75	24.01	73.37	21.09	67.65	19.29
Response	88.33	13.72	81.25	14.75	75.76	23.97	78.99	18.27	83.33	16.67
Recovery	84.62	13.07	85.10	10.68	80.42	16.05	75.59	22.56	73.76	16.33
Coordination	90.00	21.08	93.75	17.08	86.36	22.79	76.09	36.52	79.41	35.61
Adaptation Strategies	70.00	33.15	83.33	24.34	68.18	34.85	49.28	33.14	49.02	33.58
Overall	75.52	20.14	77.79	15.74	66.89	19.17	68.35	14.70	68.59	14.12

Items	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Hazard	31.25	47.87	28.57	46.00	36.00	48.99	76.67	43.02	61.02	49.19
Risk	90.63	20.16	82.76	36.05	92.00	18.71	60.00	42.35	79.37	37.71
Exposure	39.06	15.73	41.38	18.02	50.00	17.68	41.67	17.78	44.84	19.65
Preparedness	67.19	27.34	75.43	27.65	74.00	27.70	67.92	22.67	73.21	20.44
Response	84.38	15.48	86.78	24.14	80.00	30.81	75.56	21.77	78.57	20.18
Recovery	84.62	10.13	89.12	23.58	80.62	18.73	79.74	15.45	79.24	19.47
Coordination	93.75	17.08	91.38	26.96	76.00	35.71	93.33	17.29	83.33	29.78
Adaptation Strategies	66.67	27.22	72.41	39.91	61.33	40.46	61.11	36.18	58.20	35.40
Overall	69.69	23.56	70.98	23.39	68.74	18.39	69.50	15.58	69.72	13.56

Flood Resilience: PRACTICE PERCENT SCORE SUMMARY . . . *continued*

Items	Candau-ay		Batinguel		Overall	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Hazard	29.58	45.96	34.21	48.08	47.04	49.98
Risk	77.78	37.42	81.58	35.68	79.92	35.43
Exposure	42.01	19.15	48.03	20.45	44.32	18.88
Preparedness	72.57	30.30	76.32	21.51	72.61	24.63
Response	74.77	31.52	74.56	22.51	78.62	23.91
Recovery	80.34	25.49	87.04	22.42	81.44	20.45
Coordination	75.00	40.25	84.21	30.99	83.38	31.41
Adaptation Strategies	60.65	39.69	76.32	33.70	63.62	36.43
Overall	64.09	18.70	70.28	18.86	68.87	15.61

APPENDIX 6 Knowledge, Attitude, and Practices (KAP) on Environmental Microbial Health Risks

In this appendix the results from Knowledge, Attitude, and Practices (KAP) on Environmental Microbial Health Risks of the surveyed questionnaires from the household respondents is presented as follows:

A. Environmental Microbial Health Risks
   1. Nature of E.coli, Leptospirosis, and Dengue Fever moaquito
   2. Mode of transmission
   3. Prevention
   4. Signs and Symptoms
   5. It is fatal
   6. Treatment
   7. Financial Cost of Treatment

Environmental Microbial Health Risks: KNOWLEDGE

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
1. Have you heard about the following bacteria and virus:	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
Escherichia coli or *E. coli*?	8	80.00	13	81.25	16	72.73	18	78.26	13	76.47
Leptospira spp. ?	6	60.00	12	75.00	18	81.82	19	82.61	15	88.24
Dengue Fever causing mosquito?	8	80.00	14	87.50	22	100.00	22	95.65	15	88.24
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	2.20	0.79	2.44	0.96	2.55	0.67	2.57	0.79	2.53	0.62
Percentage Score	73.33	26.29	81.25	32.13	84.85	22.37	85.51	26.26	84.31	20.81

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
1. Have you heard about the following bacteria and virus:	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
Escherichia coli or *E. coli*?	14	87.50	25	86.21	16	64.00	23	76.67	48	78.69
Leptospira spp. ?	16	100.00	24	82.76	22	88.00	21	70.00	48	78.69
Dengue Fever causing mosquito?	16	100.00	27	93.10	25	100.00	27	90.00	55	90.16
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	2.88	0.34	2.62	0.78	2.52	0.65	2.37	0.89	2.40	0.79
Percentage Score	95.83	11.39	87.36	25.84	84.00	21.77	78.89	29.66	79.89	26.46

Environmental Microbial Health Risks: KNOWLEDGE . . . *continued*

Questions	Candau-ay		Batinguel		Overall	
1. Have you heard about the following bacteria and virus:	**F**	**%**	**F**	**%**	**F**	**%**
Escherichia coli or *E. coli*?	56	77.78	28	73.68	278	77.01
Leptospira spp. ?	61	84.72	35	92.11	297	82.27
Dengue Fever causing mosquito?	66	91.67	36	94.74	333	92.24
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	2.54	0.79	2.61	0.79	2.52	0.16
Percentage Score	84.72	26.20	86.84	26.33	83.90	5.45

Environmental Microbial Health Risks: KNOWLEDGE . . . *continued*

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	F	%	F	%	F	%	F	%	F	%
2. Have you heard about that there are bad and dangerous bacteria in water?	10	100.00	15	93.75	21	95.45	23	100.00	16	94.12
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	1.00	0.00	0.94	0.25	0.95	0.21	1.00	0.00	0.94	0.24
Percentage Score	100.00	0.00	93.75	25.00	95.45	21.32	100.00	0.00	94.12	24.25

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	F	%	F	%	F	%	F	%	F	%
2. Have you heard about that there are bad and dangerous bacteria in water?	16	100.00	26	89.66	23	92.00	26	86.67	61	100.00
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	1.00	0.00	0.90	0.31	0.92	0.28	0.87	0.35	0.97	0.18
Percentage Score	100.00	0.00	89.66	30.99	30.67	9.23	86.67	34.57	96.83	17.67

Environmental Microbial Health Risks: KNOWLEDGE . . . *continued*

Questions	Candau-ay		Batinguel		Overall	
	F	%	F	%	F	%
2. Have you heard about that there are bad and dangerous bacteria in water?	68	94.44	35	92.11	340	94.18
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.94	0.23	0.92	0.27	0.95	0.04
Percentage Score	94.44	23.07	92.11	27.33	89.47	18.97

Environmental Microbial Health Risks: KNOWLEDGE . . . *continued*

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	F	%	F	%	F	%	F	%	F	%
3. Are you aware that *E. coli*, *Leptospira* spp. & Dengue Fever mosquito can be deadly?	9	90.00	14	87.50	21	95.45	23	100.00	16	94.12
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.90	0.32	0.88	0.34	0.95	0.21	1.00	0.00	0.94	0.24
Percentage Score	90.00	31.62	87.50	34.16	95.45	21.32	100.00	0.00	94.12	24.25

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	F	%	F	%	F	%	F	%	F	%
3. Are you aware that *E. coli*, *Leptospira* spp. & Dengue Fever mosquito can be deadly?	15	93.75	27	93.10	24	96.00	26	86.67	59	96.72
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.94	0.25	0.93	0.26	0.96	0.20	0.87	0.35	0.94	0.25
Percentage Score	93.75	25.00	93.10	25.79	96.00	20.00	86.67	34.57	93.65	24.58

Questions	Candau-ay		Batinguel		Overall	
	F	%	F	%	F	%
3. Are you aware that *E. coli*, *Leptospira* spp. & Dengue Fever mosquito can be deadly?	71	98.61	36	94.74	341	94.46
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.99	0.12	0.95	0.23	0.94	0.04
Percentage Score	98.61	11.79	94.74	22.63	93.63	3.99

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
4. Do you know how the following bacteria and virus can be transmitted?	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
E. coli										
failure to wash hands thoroughly with soap and water following contact with animals or animal waste	6	60.00	6	37.50	14	63.64	11	47.83	8	47.06
drinking contaminated water	6	60.00	10	62.50	19	86.36	19	82.61	14	82.35
swimming in water even with very low levels of sewage contamination	7	70.00	5	31.25	11	50.00	11	47.83	8	47.06
accidental ingestion of contaminated water	7	70.00	11	68.75	12	54.55	12	52.17	9	52.94
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	2.60	1.71	2.00	1.41	2.55	1.63	2.30	1.52	2.29	1.69
Percentage Score	65.00	42.82	50.00	35.36	63.64	40.63	57.61	38.02	57.35	42.17

Environmental Microbial Health Risks: KNOWLEDGE . . . *continued*

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
4. Do you know how the following bacteria and virus can be transmitted?	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
Leptospira spp.										
walking barefoot in flood waters; contacts of mucous membranes or broken skin with water (swimming or immersion) contaminated with the urine of infected animals	6	60.00	12	75.00	17	77.27	19	82.61	14	82.35
swimming in water	7	70.00	7	43.75	9	40.91	10	43.48	9	52.94
wading in flood waters	7	70.00	9	56.25	10	45.45	9	39.13	8	47.06
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	2.00	1.33	1.75	1.24	1.64	1.22	1.65	1.11	1.82	1.07
Percentage Score	66.67	44.44	58.33	41.28	54.55	40.56	55.07	37.08	60.78	35.81
	F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
Dengue Fever causing mosquito										
mosquito bite infected from *Aedes* spp.	7	70	15	93.75	19	86.36	23	100	16	94.12
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.70	0.48	0.94	0.25	0.86	0.35	1.00	0.00	0.94	0.24
Percentage Score	70.00	48.30	93.75	25.00	86.36	35.13	100.00	0.00	94.12	24.25
Overall Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	5.30	3.43	4.69	2.52	5.05	2.70	4.96	2.38	5.06	2.66
Percentage Score	66.25	42.92	58.59	31.53	63.07	33.74	61.96	29.79	63.24	33.21

Environmental Microbial Health Risks: KNOWLEDGE . . . *continued*

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
4. Do you know how the following bacteria and virus can be transmitted?	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
E. coli										
failure to wash hands thoroughly with soap and water following contact with animals or animal waste	10	62.50	15	51.72	15	60.00	16	53.33	28	45.90
drinking contaminated water	15	93.75	24	82.76	19	76.00	19	63.33	44	72.13
swimming in water even with very low levels of sewage contamination	11	68.75	11	37.93	12	48.00	16	53.33	25	40.98
accidental ingestion of contaminated water	11	68.75	12	41.38	12	48.00	14	46.67	33	54.10
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	2.94	1.44	2.14	1.43	2.32	1.55	2.17	1.68	2.06	1.51
Percentage Score	73.44	35.90	53.45	35.81	58.00	38.68	54.17	42.08	51.59	37.80

Environmental Microbial Health Risks: KNOWLEDGE . . . *continued*

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
4. Do you know how the following bacteria and virus can be transmitted?	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
Leptospira spp.										
walking barefoot in flood waters; contacts of mucous membranes or broken skin with water (swimming or immersion) contaminated with the urine of infected animals	13	81.25	26	89.66	19	76.00	21	70.00	50	81.97
swimming in water	8	50.00	9	31.03	12	48.00	10	33.33	26	42.62
wading in flood waters	9	56.25	12	41.38	14	56.00	14	46.67	25	40.98
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	1.88	1.15	1.62	1.01	1.80	0.96	1.50	1.07	1.60	1.11
Percentage Score	62.50	38.25	54.02	33.82	60.00	31.91	50.00	35.83	53.44	37.17
	F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
Dengue Fever causing mosquito										
mosquito bite infected from *Aedes* spp.	12	75.00	28	96.55	20	80.00	25	83.33	58	95.08
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.75	0.45	0.97	0.19	0.80	0.41	0.83	0.38	0.92	0.27
Percentage Score	75.00	44.72	96.55	18.57	80.00	40.82	83.33	37.90	92.06	27.25
Overall Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	5.56	2.63	4.72	2.22	4.92	2.63	4.50	2.79	4.59	2.56
Percentage Score	69.53	32.90	59.05	27.73	61.50	32.86	56.25	34.86	57.34	32.04

Environmental Microbial Health Risks: KNOWLEDGE . . . *continued*

Questions	Candau-ay		Batinguel		Overall	
4. Do you know how the following bacteria and virus can be transmitted?	**F**	**%**	**F**	**%**	**F**	**%**
E. coli						
failure to wash hands thoroughly with soap and water following contact with animals or animal waste	47	65.28	18	47.37	194	53.74
drinking contaminated water	51	70.83	27	71.05	267	73.96
swimming in water even with very low levels of sewage contamination	47	65.28	15	39.47	179	49.58
accidental ingestion of contaminated water	43	59.72	16	42.11	192	53.19
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	2.61	1.60	2.00	1.51	2.33	0.29
Percentage Score	65.28	39.93	50.00	37.67	58.29	7.24

Environmental Microbial Health Risks: KNOWLEDGE . . . *continued*

Questions	Candau-ay		Batinguel		Overall	
4. Do you know how the following bacteria and virus can be transmitted?	**F**	**%**	**F**	**%**	**F**	**%**
Leptospira spp.						
walking barefoot in flood waters; contacts of mucous membranes or broken skin with water (swimming or immersion) contaminated with the urine of infected animals	57	79.17	30	78.95	284	78.67
swimming in water	41	56.94	15	39.47	163	45.15
wading in flood waters	46	63.89	15	39.47	178	49.31
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	2.00	1.14	1.58	1.03	1.74	0.16
Percentage Score	66.67	37.94	52.63	34.34	57.89	5.49
	F	**%**	**F**	**%**	**F**	**%**
Dengue Fever causing mosquito						
mosquito bite infected from *Aedes* spp.	66	91.67	30	78.95	319	88.37
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.92	0.28	0.79	0.41	0.87	0.09
Percentage Score	91.67	27.83	78.95	41.32	86.82	9.36
Overall Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	5.53	2.63	4.37	2.51	4.94	0.39
Percentage Score	69.10	32.90	54.61	31.36	61.71	4.83

Environmental Microbial Health Risks: KNOWLEDGE . . . *continued*

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
5. Have you heard that infections brought about by these bacteria and virus can be prevented?	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
E. coli										
washing of hands thoroughly with soap and water	7	70.00	12	75.00	17	77.27	16	69.57	12	70.59
boiling of water at 100 degrees celcius for 10 minutes	6	60.00	10	62.50	13	59.09	15	65.22	11	64.71
prohibiting animals near bodies of water	7	70.00	7	43.75	13	59.09	11	47.83	8	47.06
treating water with chlorine	6	60.00	9	56.25	10	45.45	9	39.13	9	52.94
avoid swimming in fecally contaminated waters	6	60	12	75	12	54.55	14	60.87	9	52.94
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	3.20	2.10	3.13	1.86	2.95	1.79	2.83	1.83	2.88	2.06
Percentage Score	64.00	41.95	62.50	37.15	59.09	35.71	56.52	36.51	57.65	41.16

Environmental Microbial Health Risks: KNOWLEDGE . . . *continued*

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
5. Have you heard that infections brought about by these bacteria and virus can be prevented?	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
Leptospira spp.										
avoid contact with flood waters by swimming or immersion with an open wound	8	80.00	13	81.25	17	77.27	13	56.52	13	76.47
use of sturdy boots during heavy rains and flooding	7	70.00	12	75.00	15	68.18	17	73.91	12	70.59
avoid walking barefoot	6	60.00	12	75.00	14	63.64	17	73.91	11	64.71
securing the environment free from its reservoir and fecal contamination	7	70.00	8	50.00	15	68.18	12	52.17	9	52.94
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	2.80	1.75	2.81	1.47	2.77	1.54	2.57	1.59	2.65	1.50
Percentage Score	70.00	43.78	70.31	36.76	69.32	38.52	64.13	39.76	66.18	37.44

Environmental Microbial Health Risks: KNOWLEDGE . . . *continued*

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
5. Have you heard that infections brought about by these bacteria and virus can be prevented?	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
Dengue Fever causing mosquito										
mosquito control (eradicate mosquitoes as possible)	14	56.00	11	68.75	13	59.09	14	60.87	10	58.82
solid waste management (proper disposal of waste)	13	52.00	8	50.00	12	54.55	11	47.83	7	41.18
chemical control	14	56.00	8	50.00	10	45.45	13	56.52	11	64.71
improvement of water supply and storage (putting all unused containers upside down)	16	64.00	13	81.25	19	86.36	15	65.22	12	70.59
modification of man-made larval habitats (discourage presence of water-logged areas)	15	60.00	10	62.50	14	63.64	13	56.52	10	58.82
biological control (use of larvivoparous fish)	11	44.00	8	50.00	7	31.82	11	47.83	8	47.06
personal protection (use of insect repellent and appropriate clothing)	16	64.00	12	75.00	12	54.55	15	65.22	10	58.82
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	3.96	2.88	4.38	2.68	3.95	2.52	4.00	2.80	4.00	2.65
Percentage Score	56.57	41.13	62.50	38.29	56.49	35.95	57.14	39.94	57.14	37.80

Environmental Microbial Health Risks: KNOWLEDGE . . . *continued*

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
5. Have you heard that infections brought about by these bacteria and virus can be prevented?										
Overall Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	9.24	6.19	10.31	5.70	9.68	5.43	9.39	6.03	9.53	5.98
Percentage Score	57.75	38.67	64.45	35.63	60.51	33.93	58.70	37.68	59.56	37.38

Environmental Microbial Health Risks: KNOWLEDGE . . . *continued*

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
5. Have you heard that infections brought about by these bacteria and virus can be prevented?	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
E. coli										
washing of hands thoroughly with soap and water	12	75.00	21	72.41	17	68.00	19	63.33	41	67.21
boiling of water at 100 degrees celcius for 10 minutes	15	93.75	20	68.97	18	72.00	20	66.67	45	73.77
prohibiting animals near bodies of water	11	68.75	15	51.72	11	44.00	16	53.33	23	37.70
treating water with chlorine	11	68.75	11	37.93	13	52.00	16	53.33	29	47.54
avoid swimming in fecally contaminated waters	11	68.75	15	51.72	14	56	17	56.67	28	45.90
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	3.75	1.88	2.83	1.97	2.92	1.91	2.93	2.07	2.63	1.91
Percentage Score	75.00	37.59	56.55	39.30	58.40	38.26	58.67	41.33	52.70	38.24

Environmental Microbial Health Risks: KNOWLEDGE . . . *continued*

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
5. Have you heard that infections brought about by these bacteria and virus can be prevented?	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
Leptospira spp.										
avoid contact with flood waters by swimming or immersion with an open wound	13	81.25	20	68.97	18	72.00	20	66.67	44	72.13
use of sturdy boots during heavy rains and flooding	12	75.00	18	62.07	14	56.00	15	50.00	36	59.02
avoid walking barefoot	13	81.25	16	55.17	13	52.00	15	50.00	33	54.10
securing the environment free from its reservoir and fecal contamination	10	62.5	11	37.93	14	56.00	15	50.00	33	54.10
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	3.00	1.46	2.24	1.60	2.36	1.63	2.17	1.72	2.32	1.57
Percentage Score	75.00	36.51	56.03	39.90	59.00	40.75	54.17	43.09	57.94	39.36

Environmental Microbial Health Risks: KNOWLEDGE . . . *continued*

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
5. Have you heard that infections brought about by these bacteria and virus can be prevented?	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
Dengue Fever causing mosquito										
mosquito control (eradicate mosquitoes as possible)	10	62.50	15	51.72	14	56.00	15	50.00	41	67.21
solid waste management (proper disposal of waste)	9	56.25	13	44.83	13	52.00	16	53.33	28	45.90
chemical control	11	68.75	14	48.28	14	56.00	17	56.67	29	47.54
improvement of water supply and storage (putting all unused containers upside down)	14	87.50	23	79.31	16	64.00	21	70.00	48	78.69
modification of man-made larval habitats (discourage presence of water-logged areas)	10	62.50	16	55.17	15	60.00	18	60.00	36	59.02
biological control (use of larvivoparous fish)	9	56.25	13	44.83	11	44.00	14	46.67	29	47.54
personal protection (use of insect repellent and appropriate clothing)	10	62.50	15	51.72	16	64.00	18	60.00	37	60.66

Environmental Microbial Health Risks: KNOWLEDGE . . . *continued*

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
5. Have you heard that infections brought about by these bacteria and virus can be prevented?										
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	4.56	2.94	3.76	2.85	3.96	2.88	3.97	2.94	3.94	3.22
Percentage Score	65.18	42.05	53.69	40.70	56.57	41.13	56.67	42.03	56.24	46.03
Overall Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	11.31	70.70	8.83	6.19	9.24	6.19	9.07	6.57	8.89	6.39
Percentage Score	5.97	37.34	55.17	38.71	57.75	38.67	56.67	41.06	55.56	39.94

Environmental Microbial Health Risks: KNOWLEDGE . . . *continued*

Questions	Candau-ay		Batinguel		Overall	
5. Have you heard that infections brought about by these bacteria and virus can be prevented?	**F**	**%**	**F**	**%**	**F**	**%**
E. coli						
washing of hands thoroughly with soap and water	49	68.06	23	60.53	246	68.14
boiling of water at 100 degrees celcius for 10 minutes	48	66.67	27	71.05	248	68.70
prohibiting animals near bodies of water	45	62.50	15	39.47	182	50.42
treating water with chlorine	44	61.11	21	55.26	188	52.08
avoid swimming in fecally contaminated waters	48	66.67	21	55.26	207	57.34
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	3.25	2.03	2.82	2.01	3.01	0.29
Percentage Score	65.00	40.66	56.32	40.23	60.20	5.83

Environmental Microbial Health Risks: KNOWLEDGE . . . *continued*

Questions	Candau-ay		Batinguel		Overall	
5. Have you heard that infections brought about by these bacteria and virus can be prevented?	**F**	**%**	**F**	**%**	**F**	**%**
Leptospira spp.						
avoid contact with flood waters by swimming or immersion with an open wound	51	70.83	24	63.16	254	70.36
use of sturdy boots during heavy rains and flooding	48	66.67	24	63.16	230	63.71
avoid walking barefoot	49	68.06	22	57.89	221	61.22
securing the environment free from its reservoir and fecal contamination	43	59.72	20	52.63	197	54.57
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	2.65	1.70	2.37	1.63	2.56	0.26
Percentage Score	66.32	42.41	59.21	40.86	63.97	6.61

Environmental Microbial Health Risks: KNOWLEDGE . . . *continued*

Questions	Candau-ay		Batinguel		Overall	
5. Have you heard that infections brought about by these bacteria and virus can be prevented?	**F**	**%**	**F**	**%**	**F**	**%**
Dengue Fever causing mosquito						
mosquito control (eradicate mosquitoes as possible)	48	66.67	18	47.37	215	59.56
solid waste management (proper disposal of waste)	41	56.94	17	44.74	182	50.42
chemical control	40	55.56	16	42.11	189	52.35
improvement of water supply and storage (putting all unused containers upside down)	54	75.00	25	65.79	267	73.96
modification of man-made larval habitats (discourage presence of water-logged areas)	46	63.89	24	63.16	219	60.66
biological control (use of larvivoparous fish)	35	48.61	17	44.74	169	46.81
personal protection (use of insect repellent and appropriate clothing)	46	63.89	24	63.16	220	60.94
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	4.31	2.85	3.71	2.89	4.09	0.28
Percentage Score	61.51	40.66	53.01	41.34	58.37	4.00

Environmental Microbial Health Risks: KNOWLEDGE . . . *continued*

Questions	Candau-ay		Batinguel		Overall	
5. Have you heard that infections brought about by these bacteria and virus can be prevented?						
Overall Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	10.21	6.32	8.89	6.39	9.65	0.78
Percentage Score	63.80	39.50	55.59	39.92	60.34	4.86

Environmental Microbial Health Risks: KNOWLEDGE . . . *continued*

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
6. Do you know the signs and symptoms of infection of :	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
E. coli										
severe abdominal cramps	7	70.00	11	68.75	17	77.27	14	60.87	10	58.82
watery diarrhea	6	60.00	8	50.00	13	59.09	17	73.91	10	58.82
vomiting	5	50.00	8	50.00	11	50.00	13	56.52	8	47.06
fever	6	60.00	7	43.75	11	50.00	10	43.48	7	41.18
severe neurological complications	3	30.00	6	37.50	3	13.64	6	26.09	4	23.53
sometimes bloody diarrhea	4	40.00	8	50.00	6	27.27	8	34.78	6	35.29
HUS (acute visceral failure, hemolytic anemia)	3	30.00	5	31.25	3	13.64	6	26.09	3	17.65
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	3.40	2.32	3.31	2.18	2.91	2.33	3.22	2.59	2.82	2.53
Percentage Score	48.57	33.13	47.32	31.18	41.56	33.26	45.96	37.04	40.34	36.15
	F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
Leptospira spp.										
nausea	5	50.00	8	50.00	11	50.00	8	34.78	7	41.18
vomiting	5	50.00	9	56.25	8	36.36	9	39.13	5	29.41
abdominal pain	5	50.00	8	50.00	7	31.82	7	30.43	7	41.18
diarrhea	6	60.00	9	56.25	8	36.36	12	52.17	7	41.18
arthralgia	5	50.00	12	75.00	11	50.00	7	30.43	5	29.41
headache	6	60.00	11	68.75	8	36.36	10	43.48	5	29.41
prostration	5	50.00	10	62.50	11	50.00	7	30.43	7	41.18
myalgia (particularly calf muscles)	6	60.00	9	56.25	10	45.45	8	34.78	5	29.41

Environmental Microbial Health Risks: KNOWLEDGE . . . *continued*

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
6. Do you know the signs and symptoms of infection of :										
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	4.30	3.80	4.75	3.13	3.36	3.39	2.96	3.27	2.82	3.41
Percentage Score	53.75	47.53	59.38	39.13	42.05	42.35	36.96	40.85	35.29	42.67
	F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
Dengue Fever causing mosquito										
high fever of acute onset	6	60.00	13	81.25	17	77.27	20	86.96	13	76.47
hemorrhagic manifestations (presence of spots on the body)	5	50.00	10	62.50	12	54.55	10	43.48	9	52.94
hepatomegally	3	30.00	2	12.50	6	27.27	6	26.09	4	23.53
bleeding	2	20.00	5	31.25	9	40.91	6	26.09	4	23.53
shock	1	10.00	2	12.50	4	18.18	5	21.74	2	11.76
myalgia and arthralgia (severe joint and muscle pain)	4	40.00	8	50.00	9	40.91	10	43.48	6	35.29
lymphadenopathy	6	60.00	4	25.00	6	27.27	6	26.09	3	17.65
nausea and vomiting	7	70.00	9	56.25	10	45.45	12	52.17	6	35.29
pain in eyeballs	6	60.00	6	37.50	8	36.36	7	30.43	5	29.41
pain in back, body and joints	4	40.00	5	31.25	11	50.00	13	56.52	6	35.29
severe headache										
colds and flu										

Environmental Microbial Health Risks: KNOWLEDGE . . . *continued*

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
6. Do you know the signs and symptoms of infection of :										
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	4.40	3.37	4.00	2.76	4.18	3.63	4.13	3.38	3.41	3.00
Percentage Score	44.00	33.73	40.00	27.57	41.82	36.34	41.30	33.75	34.12	30.01
Overall Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	12.10	9.00	12.06	7.58	10.45	8.97	10.30	8.56	9.06	8.30
Percentage Score	48.40	36.00	48.25	30.30	41.82	35.88	41.22	34.23	36.24	33.18

Environmental Microbial Health Risks: KNOWLEDGE . . . *continued*

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
6. Do you know the signs and symptoms of infection of :	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
E. coli										
severe abdominal cramps	11	68.75	16	55.17	17	68.00	22	73.33	40	65.57
watery diarrhea	12	75.00	14	48.28	18	72.00	17	56.67	39	63.93
vomiting	18	112.50	13	44.83	14	56.00	16	53.33	30	49.18
fever	8	50.00	14	48.28	13	52.00	14	46.67	31	50.82
severe neurological complications	8	50.00	9	31.03	7	28.00	10	33.33	19	31.15
sometimes bloody diarrhea	9	56.25	11	37.93	11	44.00	13	43.33	25	40.98
HUS (acute visceral failure, hemolytic anemia)	7	43.75	9	31.03	10	40.00	7	23.33	16	26.23
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	4.56	4.00	2.97	2.88	3.60	2.77	3.30	2.76	3.17	2.66
Percentage Score	65.18	57.14	42.36	41.21	51.43	39.56	47.14	39.37	45.35	37.93
	F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
Leptospira spp.										
nausea	8	50.00	13	44.83	8	32.00	11	36.67	24	39.34
vomiting	7	43.75	13	44.83	9	36.00	12	40.00	29	47.54
abdominal pain	8	50.00	12	41.38	9	36.00	13	43.33	25	40.98
diarrhea	8	50.00	14	48.28	20	80.00	14	46.67	23	37.70
arthralgia	12	75.00	14	48.28	10	40.00	13	43.33	26	42.62
headache	8	50.00	16	55.17	21	84.00	13	43.33	26	42.62
prostration	10	62.50	14	48.28	11	44.00	13	43.33	26	42.62
myalgia (particularly calf muscles)	9	56.25	13	44.83	10	40.00	13	43.33	23	37.70

Environmental Microbial Health Risks: KNOWLEDGE . . . *continued*

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
6. Do you know the signs and symptoms of infection of :										
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	4.38	3.40	3.76	3.73	3.92	4.48	3.40	3.55	3.21	3.41
Percentage Score	54.69	42.54	46.98	46.61	49.00	56.01	42.50	44.36	40.08	42.61
	F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
Dengue Fever causing mosquito										
high fever of acute onset	13	81.25	25	86.21	20	80.00	26	86.67	56	91.80
hemorrhagic manifestations (presence of spots on the body)	11	68.75	12	41.38	13	52.00	20	66.67	30	49.18
hepatomegally	4	25.00	5	17.24	6	24.00	11	36.67	16	26.23
bleeding	5	31.25	11	37.93	9	36.00	13	43.33	20	32.79
shock	5	31.25	5	17.24	5	20.00	10	33.33	14	22.95
myalgia and arthralgia (severe joint and muscle pain)	8	50.00	13	44.83	7	28.00	13	43.33	27	44.26
lymphadenopathy	7	43.75	6	20.69	4	16.00	12	40.00	21	34.43
nausea and vomiting	6	37.50	13	44.83	8	32.00	14	46.67	27	44.26
pain in eyeballs	7	43.75	9	31.03	8	32.00	12	40.00	26	42.62
pain in back, body and joints	10	62.50	11	37.93	9	36.00	14	46.67	23	37.70
severe headache										
colds and flu										

Environmental Microbial Health Risks: KNOWLEDGE . . . *continued*

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
6. Do you know the signs and symptoms of infection of :										
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	4.75	3.28	3.79	3.44	3.56	3.22	4.83	3.96	4.13	3.62
Percentage Score	47.50	32.76	37.93	34.37	35.60	32.16	48.33	39.57	41.27	36.17
Overall Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	13.69	9.05	10.52	9.71	11.08	9.26	11.53	9.37	10.51	8.97
Percentage Score	54.75	36.21	42.07	38.83	44.32	37.04	46.13	37.49	42.03	35.86

Environmental Microbial Health Risks: KNOWLEDGE . . . *continued*

Questions	Candau-ay		Batinguel		Overall	
6. Do you know the signs and symptoms of infection of :	**F**	**%**	**F**	**%**	**F**	**%**
E. coli						
severe abdominal cramps	48	66.67	27	71.05	240	66.48
watery diarrhea	46	63.89	21	55.26	221	61.22
vomiting	41	56.94	18	47.37	195	54.02
fever	43	59.72	19	50.00	183	50.69
severe neurological complications	29	40.28	10	26.32	114	31.58
sometimes bloody diarrhea	31	43.06	15	39.47	147	40.72
HUS (acute visceral failure, hemolytic anemia)	27	37.5	12	31.58	108	29.9169
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	3.68	2.86	3.21	2.70	3.35	0.46
Percentage Score	52.58	40.82	45.86	38.61	47.81	6.58
	F	**%**	**F**	**%**	**F**	**%**
Leptospira spp.						
nausea	28	38.89	14	36.84	145	40.17
vomiting	30	41.67	13	34.21	149	41.27
abdominal pain	32	44.44	15	39.47	148	41.00
diarrhea	31	43.06	20	52.63	172	47.65
arthralgia	31	43.06	13	34.21	159	44.04
headache	35	48.61	11	28.95	170	47.09
prostration	32	44.44	13	34.21	159	44.04
myalgia (particularly calf muscles)	31	43.06	10	26.32	147	40.72

Environmental Microbial Health Risks: KNOWLEDGE . . . *continued*

Questions	Candau-ay		Batinguel		Overall	
6. Do you know the signs and symptoms of infection of :						
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	3.47	3.44	2.87	3.18	3.60	0.63
Percentage Score	43.40	43.04	35.86	39.76	44.99	7.87
	F	**%**	**F**	**%**	**F**	**%**
Dengue Fever causing mosquito						
high fever of acute onset	62	86.11	29	76.32	300	83.10
hemorrhagic manifestations (presence of spots on the body)	38	52.78	18	47.37	188	52.08
hepatomegally	19	26.39	8	21.05	90	24.93
bleeding	25	34.72	15	39.47	124	34.35
shock	13	18.06	4	10.53	70	19.39
myalgia and arthralgia (severe joint and muscle pain)	26	36.11	12	31.58	143	39.61
lymphadenopathy	17	23.61	7	18.42	99	27.42
nausea and vomiting	28	38.89	10	26.32	150	41.55
pain in eyeballs	30	41.67	13	34.21	137	37.95
pain in back, body and joints	34	47.22	13	34.21	153	42.38
severe headache						
colds and flu						

Environmental Microbial Health Risks: KNOWLEDGE . . . *continued*

Questions	Candau-ay		Batinguel		Overall	
6. Do you know the signs and symptoms of infection of :						
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	4.06	3.44	3.39	3.17	4.05	0.47
Percentage Score	40.56	34.35	33.95	31.67	40.53	4.67
Overall Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	11.21	9.00	9.47	8.35	11.00	1.25
Percentage Score	44.83	35.98	37.89	33.41	44.00	5.01

Environmental Microbial Health Risks: KNOWLEDGE . . . *continued*

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
7. Do you know how E. coli infection, Liptospira spp. and Dengue Fever infection can be fatal?	9	90.00	16	100.00	18	81.82	23	100.00	17	100.00
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.90	0.32	1.00	0.00	0.82	0.39	1.00	0.00	1.00	0.00
Percentage Score	90.00	31.62	100.00	0.00	81.82	39.48	100.00	0.00	100.00	0.00

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	F	%	F	%	F	%	F	%	F	%
7. Do you know how E. coli infection, Liptospira spp. and Dengue Fever infection can be fatal?	15	93.75	28	96.55	20	80.00	27	90.00	55	90.16
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.94	0.25	0.97	0.19	0.80	0.41	0.90	0.31	0.87	0.34
Percentage Score	93.75	25.00	96.55	18.57	80.00	40.82	90.00	30.51	87.30	33.56

Environmental Microbial Health Risks: KNOWLEDGE . . . *continued*

Questions	Candau-ay		Batinguel		Overall	
	F	%	F	%	F	%
7. Do you know how E. coli infection, Liptospira spp. and Dengue Fever infection can be fatal?	71	98.61	35	92.11	334	92.52
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.99	0.12	0.92	0.27	0.93	0.07
Percentage Score	98.61	11.79	92.11	27.33	92.51	6.97

Environmental Microbial Health Risks: KNOWLEDGE . . . *continued*

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	F	%	F	%	F	%	F	%	F	%
8. Do you know that E. coli, Leptospira spp. & Dengue Fever mosquito can also be treated?	8	80.00	11	68.75	18	81.82	23	100.00	15	88.24
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.80	0.42	0.69	0.48	0.82	0.39	1.00	0.00	0.88	0.33
Percentage Score	80.00	42.16	68.75	47.87	81.82	39.48	100.00	0.00	88.24	33.21

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	F	%	F	%	F	%	F	%	F	%
8. Do you know that E. coli, Leptospira spp. & Dengue Fever mosquito can also be treated?	15	93.75	29	100.00	21	84.00	25	83.33	59	96.72
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.94	0.25	1.00	0.00	0.84	0.37	0.83	0.38	0.94	0.25
Percentage Score	93.75	25.00	100.00	0.00	84.00	37.42	83.33	37.90	93.65	24.58

Questions	Candau-ay		Batinguel		Overall	
	F	%	F	%	F	%
8. Do you know that E. coli, Leptospira spp. & Dengue Fever mosquito can also be treated?	67	93.06	35	92.11	326	90.30
Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.93	93.06	0.92	0.27	0.88	0.09
Percentage Score	0.26	25.60	92.11	27.33	88.22	9.07

9. Where did you get your sources of information on E. coli infection, Liptospira spp. and Dengue Fever infection?

Source	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	F	%	F	%	F	%	F	%	F	%
TV	8	80.00	15	93.75	13	59.09	18	78.26	14	82.35
radio programs	2	20.00	9	56.25	8	36.36	9	39.13	9	52.94
newspapers	3	30.00	5	31.25	8	36.36	6	26.09	5	29.41
books	3	30.00	3	18.75	6	27.27	3	13.04	2	11.76
school discussions	3	30.00	8	50.00	9	40.91	9	39.13	6	35.29
Family	2	20.00	1	6.25	9	40.91	4	17.39	3	17.65
Brgy. Discussions	2	20.00	6	37.50	7	31.82	9	39.13	3	17.65
health care personal	3	30.00	8	50.00	10	45.45	14	60.87	7	41.18
internet/online post	0	0.00	1	6.25	7	31.82	5	21.74	4	23.53
mobile messages	1	10.00	1	6.25	2	9.09	1	4.35	13	76.47
Brgy. Officials	1	10.00	5	31.25	7	31.82	6	26.09	2	11.76
Personal experience	2	20.00	4	25.00	5	22.73	2	8.70	2	11.76

9. Where did you get your sources of information on E. coli infection, Liptospira spp. and Dengue Fever infection? . . . continued

Source	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	F	%	F	%	F	%	F	%	F	%
TV	14	87.50	27	93.10	21	84.00	20	66.67	50	81.97
radio programs	4	25.00	15	51.72	12	48.00	11	36.67	29	47.54
newspapers	5	31.25	8	27.59	9	36.00	4	13.33	20	32.79
books	4	25.00	6	20.69	3	12.00	4	13.33	18	29.51
school discussions	4	25.00	10	34.48	6	24.00	8	26.67	21	34.43
Family	2	12.50	6	20.69	3	12.00	4	13.33	15	24.59
Brgy. Discussions	4	25.00	15	51.72	5	20.00	7	23.33	14	22.95
health care personal	5	31.25	15	51.72	10	40.00	18	60.00	25	40.98
internet/online post	5	31.25	6	20.69	4	16.00	3	10.00	16	26.23
mobile messages	1	6.25	4	13.79	3	12.00	2	6.67	8	13.11
Brgy. Officials	1	6.25	11	37.93	5	20.00	3	10.00	10	16.39
Personal experience	3	18.75	4	13.79	5	20.00	1	3.33	6	9.84

9. Where did you get your sources of information on E. coli infection, Liptospira spp. and Dengue Fever infection? . . . continued

Source	Candau-ay		Batinguel		Overall	
	F	%	F	%	F	%
TV	60	83.33	33	86.84	293	81.16
radio programs	41	56.94	14	36.84	163	45.15
newspapers	24	33.33	9	23.68	106	29.36
books	17	23.61	9	23.68	78	21.61
school discussions	25	34.72	13	34.21	122	33.80
Family	22	30.56	6	15.79	77	21.33
Brgy. Discussions	16	22.22	6	15.79	94	26.04
health care personal	32	44.44	13	34.21	160	44.32
internet/online post	16	22.22	5	13.16	72	19.94
mobile messages	11	15.28	3	7.89	50	13.85
Brgy. Officials	17	23.61	6	15.79	74	20.50
Personal experience	11	15.28	7	18.42	52	14.40

Environmental Microbial Health Risks: KNOWLEDGE PERCENT SCORE SUMMARY

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
1. Have you heard about the following bacteria and virus: E. coli, Leptospira spp., Dengue Fever Mosquito?	73.33	26.29	81.25	32.13	84.85	22.37	85.51	26.26	84.31	20.81
2. Have you heard about that there are bad and dangerous bacteria in water?	100.00	0.00	93.75	25.00	95.45	21.32	100.00	0.00	94.12	24.25
3. Are you aware that E. coli, Leptospira spp. & Dengue Fever mosquito can be deadly?	90.00	31.62	87.50	34.16	95.45	21.32	100.00	0.00	94.12	24.25
4. Do you know how the following bacteria and virus (E. coli, Leptospira spp., Dengue Fever Mosquito) can be transmitted?	66.25	42.92	58.59	31.53	63.07	33.74	61.96	29.79	63.24	33.21
5. Have you heard that infections brought about by these bacteria and virus (E. coli, Leptospira spp., Dengue Fever Mosquito) can be prevented?	57.75	38.67	64.45	35.63	60.51	33.93	58.70	37.68	59.56	37.38
6. Do you know the signs and symptoms of infection of E. coli, Leptospira spp., Dengue Fever Mosquito?	48.40	36.00	48.25	30.30	41.82	35.88	41.22	34.23	36.24	33.18

Environmental Microbial Health Risks: KNOWLEDGE PERCENT SCORE SUMMARY . . . *continued*

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
7. Do you know how E. coli infection, Liptospira spp. and Dengue Fever infection can be fatal?	90.00	31.62	100.00	0.00	81.82	39.48	100.00	0.00	100.00	0.00
8. Do you know that E. coli, Leptospira spp. & Dengue Fever mosquito can also be treated?	80.00	42.16	68.75	47.87	81.82	39.48	100.00	0.00	88.24	33.21
Overall	**75.72**	**17.65**	**75.32**	**18.15**	**75.60**	**18.81**	**80.92**	**23.63**	**77.48**	**22.20**

Environmental Microbial Health Risks: KNOWLEDGE PERCENT SCORE SUMMARY . . . *continued*

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
1. Have you heard about the following bacteria and virus: E. coli, Leptospira spp., Dengue Fever Mosquito?	95.83	11.39	87.36	25.84	84.00	21.77	78.89	29.66	79.89	26.46
2. Have you heard about that there are bad and dangerous bacteria in water?	100.00	0.00	89.66	30.99	30.67	9.23	86.67	34.57	96.83	17.67
3. Are you aware that E. coli, Leptospira spp. & Dengue Fever mosquito can be deadly?	93.75	25.00	93.10	25.79	96.00	20.00	86.67	34.57	93.65	24.58
4. Do you know how the following bacteria and virus (E. coli, Leptospira spp., Dengue Fever Mosquito) can be transmitted?	69.53	32.90	59.05	27.73	61.50	32.86	56.25	34.86	57.34	32.04
5. Have you heard that infections brought about by these bacteria and virus (E. coli, Leptospira spp., Dengue Fever Mosquito) can be prevented?	5.97	37.34	55.17	38.71	57.75	38.67	56.67	41.06	55.56	39.94
6. Do you know the signs and symptoms of infection of E. coli, Leptospira spp., Dengue Fever Mosquito?	54.75	36.21	42.07	38.83	44.32	37.04	46.13	37.49	42.03	35.86

Environmental Microbial Health Risks: KNOWLEDGE PERCENT SCORE SUMMARY . . . *continued*

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
7. Do you know how E. coli infection, Liptospira spp. and Dengue Fever infection can be fatal?	93.75	25.00	96.55	18.57	80.00	40.82	90.00	30.51	87.30	33.56
8. Do you know that E. coli, Leptospira spp. & Dengue Fever mosquito can also be treated?	93.75	25.00	100.00	0.00	84.00	37.42	83.33	37.90	93.65	24.58
Overall	**75.92**	**32.32**	**77.87**	**22.20**	**67.28**	**22.48**	**73.08**	**17.21**	**75.78**	**21.11**

Environmental Microbial Health Risks: KNOWLEDGE PERCENT SCORE SUMMARY . . . *continued*

Questions	Candau-ay		Batinguel		Overall	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
1. Have you heard about the following bacteria and virus: E. coli, Leptospira spp., Dengue Fever Mosquito?	84.72	26.20	86.84	26.33	83.90	5.45
2. Have you heard about that there are bad and dangerous bacteria in water?	94.44	23.07	92.11	27.33	89.47	18.97
3. Are you aware that E. coli, Leptospira spp. & Dengue Fever mosquito can be deadly?	98.61	11.79	94.74	22.63	93.63	3.99
4. Do you know how the following bacteria and virus (E. coli, Leptospira spp., Dengue Fever Mosquito) can be transmitted?	69.10	32.90	54.61	31.36	61.71	4.83
5. Have you heard that infections brought about by these bacteria and virus (E. coli, Leptospira spp., Dengue Fever Mosquito) can be prevented?	63.80	39.50	55.59	39.92	60.34	4.86
6. Do you know the signs and symptoms of infection of E. coli, Leptospira spp., Dengue Fever Mosquito?	43.40	43.04	35.86	39.76	44.99	7.87

Environmental Microbial Health Risks: KNOWLEDGE PERCENT SCORE SUMMARY . . . *continued*

Questions	Candau-ay		Batinguel		Overall	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
7. Do you know how E. coli infection, Liptospira spp. and Dengue Fever infection can be fatal?	98.61	11.79	92.11	27.33	92.51	6.97
8. Do you know that E. coli, Leptospira spp. & Dengue Fever mosquito can also be treated?	0.26	25.60	92.11	27.33	88.22	9.07
Overall	**69.12**	**33.92**	**75.49**	**23.09**	**76.85**	**18.45**

Health Risk: *E. coli* ATTITUDE PERCENT SCORE SUMMARY

Items	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
The nature of *E.coli*	3.00	1.25	3.38	1.09	3.18	0.85	3.04	0.98	3.06	1.20
Mode of transmission	3.50	0.71	3.50	1.03	3.09	1.02	3.09	0.97	3.18	1.13
Prevention	2.90	1.37	3.38	1.02	3.38	1.02	3.17	0.98	3.12	1.22
Signs and symptoms	3.10	0.99	3.25	1.18	3.41	0.67	3.04	0.93	3.35	0.93
It is fatal	3.70	0.48	3.56	1.03	3.50	0.86	3.32	0.95	3.41	1.00
Treatment	3.50	0.85	3.38	1.02	3.27	0.94	3.17	0.94	3.29	1.10
Financial cost of treatment	3.30	0.95	3.69	0.79	3.14	0.99	3.30	0.88	3.35	0.93
The infection itself	3.40	1.26	3.63	0.81	3.48	0.68	3.17	0.94	3.24	1.03
Information drive	3.80	0.63	3.38	1.02	3.32	0.89	3.04	1.07	3.24	1.09
Overall										
Mean Score	3.36	0.70	3.46	0.81	3.27	0.74	3.12	0.86	3.25	0.88
Mean Percent Score	83.89	17.51	86.46	20.18	81.82	18.52	78.02	21.40	81.21	21.88

Health Risk: *E. coli* ATTITUDE PERCENT SCORE SUMMARY . . . *continued*

Items	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
The nature of *E.coli*	3.00	1.10	2.86	0.99	2.83	1.17	2.66	1.14	2.94	1.20
Mode of transmission	3.06	1.06	3.00	1.04	3.00	1.18	2.80	1.10	3.02	1.17
Prevention	3.44	0.96	3.17	1.04	2.96	1.16	2.97	1.16	3.19	1.20
Signs and symptoms	3.25	0.86	3.10	1.05	3.08	1.06	2.77	1.17	3.08	1.20
It is fatal	3.69	0.60	3.25	1.00	3.33	0.92	2.97	1.16	3.11	1.17
Treatment	3.50	0.89	3.21	0.99	2.96	1.12	2.90	1.12	3.17	1.13
Financial cost of treatment	3.31	0.95	3.10	0.98	3.00	1.06	2.90	1.12	3.11	1.14
The infection itself	3.38	1.09	3.24	0.99	3.04	1.20	2.90	1.12	3.14	1.15
Information drive	3.06	1.06	2.93	1.03	2.92	1.14	2.87	1.20	3.02	1.17
Overall										
Mean Score	3.30	0.75	3.07	0.94	2.89	1.16	2.85	1.05	3.09	1.09
Mean Percent Score	82.47	18.80	76.82	23.48	72.33	28.90	71.20	26.16	77.16	27.15

Health Risk: *E. coli* ATTITUDE PERCENT SCORE SUMMARY . . . *continued*

Items	Candau-ay		Batinguel		Overall	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
The nature of *E.coli*	2.71	1.34	3.11	1.16	2.98	0.20
Mode of transmission	2.68	1.32	3.11	1.11	3.09	0.24
Prevention	2.71	1.36	3.16	1.15	3.13	0.22
Signs and symptoms	2.82	1.25	3.24	1.05	3.12	0.19
It is fatal	2.94	1.25	3.29	1.04	3.34	0.25
Treatment	2.90	1.18	3.32	0.96	3.22	0.21
Financial cost of treatment	2.72	1.20	3.21	0.91	3.18	0.25
The infection itself	2.79	1.23	3.18	0.98	3.22	0.24
Information drive	2.52	1.32	3.03	1.08	3.09	0.32
Overall						
Mean Score	2.75	1.17	3.18	0.95	3.13	0.22
Mean Percent Score	68.67	29.27	79.53	23.85	78.30	5.39

Health Risk: Liptospirosis ATTITUDE PERCENT SCORE SUMMARY

Items	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
The nature of Liptospirosis	3.60	0.52	3.44	1.03	3.36	0.90	3.30	0.93	3.41	0.71
Mode of transmission	3.50	0.85	3.50	1.03	3.41	0.73	3.22	1.04	2.94	1.14
Prevention	3.80	0.42	3.25	1.18	3.62	0.59	3.36	1.05	3.18	1.07
Signs and symptoms	3.40	0.97	3.44	1.03	3.23	0.75	3.39	0.99	3.06	1.14
It is fatal	3.50	0.85	3.44	1.21	3.43	0.87	3.57	0.84	3.29	1.05
Treatment	3.60	0.84	3.25	1.18	3.32	0.89	3.48	0.85	3.41	0.80
Financial cost of treatment	3.40	0.97	3.25	1.18	3.33	0.97	3.43	0.79	3.47	0.62
The infection itself	3.60	0.84	3.56	1.03	3.36	0.85	3.41	0.91	3.00	0.79
Information drive	3.50	0.85	3.38	1.02	3.36	0.90	3.22	1.09	3.29	0.92
Overall										
Mean Score	3.54	0.57	3.39	0.98	3.33	0.72	3.34	0.84	3.23	0.71
Mean Percent Score	88.61	14.37	84.72	24.55	83.21	18.03	83.57	21.09	80.72	17.69

Health Risk: Liptospirosis ATTITUDE PERCENT SCORE SUMMARY . . . *continued*

Items	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
The nature of Liptospirosis	3.69	0.60	2.93	1.07	2.92	1.35	2.73	1.20	3.00	1.22
Mode of transmission	3.69	0.60	3.07	1.13	2.83	1.34	2.67	1.24	3.08	1.17
Prevention	3.69	0.79	3.10	1.11	2.79	1.38	2.83	1.21	3.14	1.22
Signs and symptoms	3.44	0.89	3.07	1.07	2.88	1.26	2.80	1.16	3.11	1.19
It is fatal	3.80	0.56	3.28	0.96	2.92	1.28	2.83	1.23	3.11	1.23
Treatment	3.75	0.58	3.21	0.96	2.88	1.26	2.83	1.18	3.06	1.22
Financial cost of treatment	3.53	0.74	3.14	0.92	2.92	1.28	2.90	1.24	2.95	1.22
The infection itself	3.80	0.41	3.29	0.98	2.96	1.27	2.87	1.14	3.15	1.19
Information drive	3.63	0.72	3.17	1.04	3.00	1.29	2.70	1.18	3.00	1.23
Overall										
Mean Score	3.59	0.60	3.11	0.95	2.78	1.34	2.80	1.12	3.06	1.14
Mean Percent Score	89.76	15.10	77.87	23.81	69.56	33.56	69.91	27.90	76.41	28.39

Health Risk: Liptospirosis ATTITUDE PERCENT SCORE SUMMARY . . . *continued*

Items	Candau-ay		Batinguel		Overall	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
The nature of Liptospirosis	2.57	1.32	3.26	1.18	3.18	0.35
Mode of transmission	2.69	1.32	3.24	1.20	3.15	0.33
Prevention	2.67	1.34	3.21	1.14	3.22	0.36
Signs and symptoms	2.79	1.30	3.11	1.16	3.14	0.24
It is fatal	2.88	1.24	3.21	1.12	3.27	0.30
Treatment	2.83	1.24	3.21	1.12	3.24	0.30
Financial cost of treatment	2.79	1.22	3.08	1.10	3.18	0.25
The infection itself	2.82	1.25	3.21	1.09	3.25	0.31
Information drive	2.51	1.34	3.18	1.18	3.16	0.32
Overall						
Mean Score	2.72	1.21	3.19	1.09	3.17	0.29
Mean Percent Score	68.09	30.27	79.75	27.28	79.35	7.26

Health Risk: Dengue Fever ATTITUDE PERCENT SCORE SUMMARY

Items	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
The nature of Dengue Fever	3.70	0.67	3.75	0.77	3.45	0.86	3.83	0.39	3.65	0.61
Mode of transmission	4.00	0.00	3.75	0.77	3.41	0.80	3.61	0.50	3.47	0.62
Prevention	3.60	0.70	3.50	1.03	3.57	0.81	3.70	0.56	3.41	0.71
Signs and symptoms	3.60	0.70	3.50	0.89	3.41	0.80	3.74	0.45	3.56	0.51
It is fatal	4.00	0.00	3.63	0.89	3.50	0.86	3.87	0.34	3.41	1.00
Treatment	3.60	0.84	3.44	0.89	3.55	0.80	3.74	0.45	3.00	1.17
Financial cost of treatment	3.80	0.63	3.38	1.02	3.36	1.00	3.65	0.49	3.53	0.51
The infection itself	3.90	0.32	3.75	0.77	3.64	0.73	3.74	0.45	3.47	0.62
Information drive	3.90	0.32	3.56	0.81	3.32	1.09	3.57	0.66	3.47	0.72
Overall										
Mean Score	3.79	0.37	3.58	0.76	3.45	0.79	3.71	0.37	3.42	0.49
Mean Percent Score	94.72	9.21	89.58	18.96	86.24	19.65	92.87	9.17	85.46	12.21

Health Risk: Dengue Fever ATTITUDE PERCENT SCORE SUMMARY . . . *continued*

Items	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
The nature of Dengue Fever	3.94	0.25	3.62	0.56	3.52	0.82	3.10	0.92	3.48	0.86
Mode of transmission	3.81	0.40	3.66	0.48	3.40	0.82	3.10	0.82	3.42	0.84
Prevention	3.75	0.58	3.62	0.49	3.28	0.98	3.23	0.86	3.49	0.80
Signs and symptoms	3.56	0.63	3.66	0.48	3.32	0.85	3.13	0.68	3.49	0.76
It is fatal	3.81	0.40	3.72	0.45	3.52	0.92	3.27	0.78	3.54	0.80
Treatment	3.75	0.45	3.59	0.57	3.32	0.95	3.13	0.78	3.38	0.85
Financial cost of treatment	3.53	0.83	3.52	0.57	3.44	0.82	3.23	0.63	3.37	0.92
The infection itself	3.75	0.45	3.66	0.55	3.40	1.00	3.30	0.60	3.49	0.84
Information drive	3.63	0.72	3.45	0.69	3.42	1.02	3.00	0.83	3.32	0.93
Overall										
Mean Score	3.70	0.45	3.61	0.44	3.39	0.78	3.16	0.63	3.44	0.76
Mean Percent Score	92.53	11.37	90.23	10.90	84.67	19.51	78.89	15.71	85.89	19.03

Health Risk: Dengue Fever ATTITUDE PERCENT SCORE SUMMARY . . . *continued*

Items	Candau-ay		Batinguel		Overall	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
The nature of Dengue Fever	3.44	0.86	3.65	0.63	3.59	0.22
Mode of transmission	3.41	0.81	3.66	0.53	3.56	0.24
Prevention	3.32	0.87	3.66	0.53	3.51	0.17
Signs and symptoms	3.44	0.89	3.63	0.54	3.50	0.16
It is fatal	3.44	0.84	3.76	0.43	3.62	0.21
Treatment	3.35	0.86	3.55	0.50	3.45	0.23
Financial cost of treatment	3.21	0.88	3.53	0.51	3.46	0.17
The infection itself	3.37	0.91	3.58	0.50	3.59	0.18
Information drive	3.06	1.05	3.47	0.60	3.43	0.24
Overall						
Mean Score	3.29	0.88	3.60	0.42	3.51	0.19
Mean Percent Score	82.14	22.01	89.99	10.48	87.77	4.70

Health Risk: ATTITUDE PERCENT SCORE SUMMARY

Item	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
E.coli	83.89	17.51	86.46	20.18	81.82	18.52	78.02	21.40	81.21	21.88
Liptospirosis	88.61	14.37	84.72	24.55	83.21	18.03	83.57	21.09	80.72	17.69
Dengue Fever	94.72	9.21	89.58	18.96	86.24	19.65	92.87	9.17	85.46	12.21
Overall Mean Percent Score	89.07	5.43	86.92	2.46	83.75	2.26	84.82	7.51	82.46	2.61

Items	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
E.coli	82.47	18.80	76.82	23.48	72.33	28.90	71.20	26.16	77.16	27.15
Liptospirosis	89.76	15.10	77.87	23.81	69.56	33.56	69.91	27.90	76.41	28.39
Dengue Fever	92.53	11.37	90.23	10.90	84.67	19.51	78.89	15.71	85.89	19.03
Overall Mean Percent Score	88.25	5.20	81.64	7.46	75.52	8.04	73.33	4.85	79.82	5.27

Items	Candau-ay		Batinguel		Overall	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
E.coli	68.67	29.27	79.53	23.85	78.30	5.39
Liptospirosis	68.09	30.27	79.75	27.28	79.35	7.26
Dengue Fever	82.14	22.01	89.99	10.48	87.77	4.70
Overall Mean Percent Score	72.97	7.95	83.09	5.97	81.80	5.19

Health Risk: *E. coli* Practice

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	F	%	F	%	F	%	F	%	F	%
1a. Do you or other members in the family go swimming or bathing in the river?	6	60.00	6	37.50	19	86.36	19	82.61	8	47.06
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.60	0.52	0.38	0.50	0.86	0.35	0.83	0.39	0.47	0.51
Percentage Score	60.00	51.64	37.50	50.00	86.36	35.13	82.61	38.76	47.06	51.45
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Frequency of swimming										
Mean Score	5.40	1.58	3.57	2.34	5.60	1.14	5.78	0.52	3.47	2.50
Percentage Score	90.00	26.29	52.08	41.67	93.33	19.04	96.38	8.64	57.84	41.72
	F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
1b. Were there any chances that you have accidentally swallowed the water from the river?	9	90.00	10	62.5	18	81.82	20	86.96	11	64.71
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.90	0.32	0.63	0.50	0.86	0.36	0.87	0.34	0.65	0.49
Percentage Score	90.00	31.62	62.50	50.00	85.71	35.86	86.96	34.44	64.71	49.26
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Estimated amount of water swallowed										
Mean Score	5.60	1.26	5.13	1.36	5.50	1.37	5.74	1.05	5.41	0.94
Percentage Score	93.33	21.08	85.42	22.67	91.67	22.86	95.65	17.56	90.20	15.66
Q1 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Percentage Score	83.33	15.63	59.38	20.16	89.27	3.80	90.40	6.73	64.95	18.33

Health Risk: *E. coli* Practice . . . *continued*

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	F	%	F	%	F	%	F	%	F	%
1a. Do you or other members in the family go swimming or bathing in the river?	11	68.75	17	58.62	17	68.00	15	50.00	42	68.85
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Mean Score	0.69	0.48	0.59	0.50	0.68	0.48	0.50	0.51	0.73	0.45
Percentage Score	68.75	47.87	58.62	50.12	68.00	47.61	50.00	50.85	73.02	44.74
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Frequency of swimming										
Mean Score	5.31	1.40	4.83	1.81	5.64	0.57	5.13	1.41	5.30	1.44
Percentage Score	88.54	23.35	80.46	30.23	94.00	9.48	85.56	23.46	88.36	24.07
	F	%	F	%	F	%	F	%	F	%
1b. Were there any chances that you have accidentally swallowed the water from the river?	11	68.75	19	65.52	17	68.00	22	73.33	44	72.13
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Mean Score	0.79	0.43	0.66	0.48	0.68	0.48	0.73	0.45	0.76	0.43
Percentage Score	78.57	42.58	65.52	48.37	68.00	47.61	73.33	44.98	76.19	42.93
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Estimated amount of water swallowed										
Mean Score	5.69	0.70	5.03	1.55	4.96	1.70	5.40	90.00	5.38	1.35
Percentage Score	94.79	11.74	83.91	25.77	82.67	28.25	1.22	20.34	89.68	22.49
Q1 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Percentage Score	82.66	11.43	72.13	12.03	78.17	12.62	52.53	37.25	81.81	8.44

Health Risk: *E. coli* Practice . . . *continued*

Questions	Candau-ay		Batinguel		Overall	
	F	%	F	%	F	%
1a. Do you or other members in the family go swimming or bathing in the river?	47	65.28	16	42.11	223	61.77
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.65	0.48	0.42	0.50	0.62	0.15
Percentage Score	65.28	47.94	42.11	50.04	61.61	15.40
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Frequency of swimming						
Mean Score	5.15	1.59	4.21	2.12	4.95	0.78
Percentage Score	85.88	26.49	70.18	35.34	69.07	34.45
	F	**%**	**F**	**%**	**F**	**%**
1b. Were there any chances that you have accidentally swallowed the water from the river?	60	83.33	24	63.16	265	73.41
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.83	0.38	0.63	0.49	0.75	0.10
Percentage Score	83.33	37.53	63.16	48.89	74.83	10.05
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Estimated amount of water swallowed						
Mean Score	5.56	1.12	5.26	1.18	5.39	0.25
Percentage Score	92.59	18.74	87.72	19.64	89.80	4.18
Q1 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Percentage Score	81.77	11.67	65.79	18.87	73.83	11.95

Health Risk: *E. coli* Practice . . . *continued*

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	F	%	F	%	F	%	F	%	F	%
2a. Do you immerse yourself other members in the family into the river?	7	70.00	5	31.25	17	77.27	18	78.26	8	47.06
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.70	0.48	0.31	0.48	0.77	0.43	0.82	0.39	0.47	0.51
Percentage Score	70.00	48.30	31.25	47.87	77.27	42.89	81.82	39.48	47.06	51.45
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Frequency of immersion										
Mean Score	5.30	1.57	3.13	2.22	5.55	1.15	5.83	0.39	4.35	2.15
Percentage Score	88.33	26.12	52.08	36.96	92.50	19.10	97.10	6.46	72.55	35.81
	F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
2b. Were there any chances that you have accidentally swallowed the water from the river?	10	100.00	5	31.25	17	77.27	21	91.30	12	70.59
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	1.00	0.00	0.31	0.48	0.85	0.37	0.91	0.29	0.71	0.47
Percentage Score	100.00	0.00	31.25	47.87	85.00	36.63	91.30	28.81	70.59	46.97
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Estimated amount of water swallowed										
Mean Score	6.00	0.00	4.94	1.44	5.55	1.34	5.74	1.05	5.53	0.87
Percentage Score	100.00	0.00	3.13	2.22	92.42	22.26	95.65	17.56	92.16	14.57
Q2 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Percentage Score	89.58	14.17	29.43	20.10	86.80	7.26	91.47	6.89	70.59	18.46

Health Risk: *E. coli* Practice . . . *continued*

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	F	%	F	%	F	%	F	%	F	%
2a. Do you immerse yourself other members in the family into the river?	13	81.25	17	58.62	15	60.00	6	20.00	32	52.46
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.81	0.40	0.61	0.50	0.60	0.50	0.21	0.41	0.56	0.50
Percentage Score	81.25	40.31	60.71	49.73	60.00	50.00	20.69	41.23	55.56	50.09
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Frequency of immersion										
Mean Score	5.56	1.26	5.07	1.53	5.64	0.57	4.66	1.54	5.05	1.63
Percentage Score	92.71	21.05	84.48	25.56	94.00	9.48	77.59	25.70	84.13	27.18
	F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
2b. Were there any chances that you have accidentally swallowed the water from the river?	13	81.25	21	72.41	20	80.00	23	76.67	47	77.05
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.87	0.35	0.72	0.45	0.80	0.41	0.79	0.41	0.84	0.37
Percentage Score	86.67	35.19	72.41	45.49	80.00	40.82	79.31	41.23	84.13	36.84
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Estimated amount of water swallowed										
Mean Score	5.81	0.54	5.45	1.15	5.44	1.42	5.53	1.14	5.63	1.07
Percentage Score	96.88	9.07	90.80	19.20	90.67	23.61	92.22	18.94	93.92	17.79
Q2 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Percentage Score	89.38	6.85	77.10	13.33	81.17	15.32	67.45	31.85	79.43	16.57

Health Risk: *E. coli* Practice . . . *continued*

Questions	Candau-ay		Batinguel		Overall	
	F	**%**	**F**	**%**	**F**	**%**
2a. Do you immerse yourself other members in the family into the river?	33	45.83	16	42.11	187	51.80
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.46	0.50	0.42	0.50	0.56	0.20
Percentage Score	45.83	50.18	42.11	50.04	56.13	19.60
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Frequency of immersion						
Mean Score	4.89	1.57	4.26	2.18	4.94	0.76
Percentage Score	80.32	27.74	71.05	36.28	82.24	12.70
	F	**%**	**F**	**%**	**F**	**%**
2b. Were there any chances that you have accidentally swallowed the water from the river?	62	86.11	28	73.68	274	75.90
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.86	0.35	0.74	0.45	0.83	0.09
Percentage Score	86.11	34.83	73.68	44.63	82.66	8.72
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Estimated amount of water swallowed						
Mean Score	5.67	1.01	5.53	0.80	5.63	0.17
Percentage Score	94.44	16.78	92.11	13.28	93.75	2.84
Q2 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Percentage Score	76.68	21.36	69.74	20.67	78.69	15.96

Health Risk: *E. coli* Practice . . . *continued*

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	F	%	F	%	F	%	F	%	F	%
3a. Do you wash your clothes in the river?	8	80.00	10	62.50	21	95.45	23	100.00	4	23.53
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.80	0.42	0.63	0.50	0.95	0.21	1.00	0.00	0.24	0.44
Percentage Score	80.00	42.16	62.50	50.00	95.45	21.32	100.00	0.00	23.53	43.72
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Frequency of washing										
Mean Score	5.30	1.16	3.00	1.71	5.56	1.04	5.96	0.21	3.82	1.94
Percentage Score	88.33	19.33	50.00	28.50	92.59	17.36	99.28	3.48	63.73	32.40
	F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
3b. Were there any chances that you have accidentally swallowed the water from the river?	10	100.00	6	37.5	19	86.36	22	95.65	9	52.94
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	1.00	0.00	0.38	0.50	0.90	0.30	0.96	0.21	0.53	0.51
Percentage Score	100.00	0.00	37.50	50.00	90.48	30.08	95.65	20.85	52.94	51.45
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Estimated amount of water swallowed										
Mean Score	6.00	0.00	5.31	1.25	5.59	1.33	5.96	0.21	5.29	0.92
Percentage Score	100.00	0.00	88.54	20.83	93.18	22.22	99.28	3.48	88.24	15.33
Q3 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Percentage Score	92.08	9.75	59.64	21.81	92.93	2.05	98.55	1.96	57.11	26.82

Health Risk: *E. coli* Practice . . . *continued*

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	F	%	F	%	F	%	F	%	F	%
3a. Do you wash your clothes in the river?	16	100.00	21	72.41	17	68.00	18	60.00	40	65.57
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Mean Score	1.00	0.00	0.72	0.45	0.68	0.48	0.60	0.50	0.70	0.46
Percentage Score	100.00	0.00	72.41	45.49	68.00	47.61	60.00	49.83	69.84	46.26
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Frequency of washing										
Mean Score	6.00	0.00	4.96	1.58	5.40	1.12	5.27	1.17	5.25	1.37
Percentage Score	100.00	0.00	77.01	33.16	90.00	18.63	87.78	19.54	87.57	22.79
	F	%	F	%	F	%	F	%	F	%
3b. Were there any chances that you have accidentally swallowed the water from the river?	13	81.25	23	79.31	21	84.00	25	83.33	49	80.33
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Mean Score	0.93	0.27	0.79	0.41	0.84	0.37	0.83	0.38	0.86	0.35
Percentage Score	92.86	26.73	79.31	41.23	84.00	37.42	83.33	37.90	85.71	35.27
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Estimated amount of water swallowed										
Mean Score	5.94	0.25	5.55	0.99	5.67	0.92	5.60	1.10	5.63	1.08
Percentage Score	98.96	4.17	92.53	16.42	90.67	24.09	93.33	18.36	93.92	18.04
Q3 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Percentage Score	97.95	3.43	80.32	8.63	83.17	10.55	81.11	14.66	84.26	10.23

Health Risk: *E. coli* Practice . . . *continued*

Questions	Candau-ay		Batinguel		Overall	
	F	%	F	%	F	%
3a. Do you wash your clothes in the river?	42	58.33	12	31.58	222	61.50
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.58	0.50	0.32	0.47	0.69	0.25
Percentage Score	58.33	49.65	31.58	47.11	69.01	25.34
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Frequency of washing						
Mean Score	5.07	1.44	4.16	1.87	5.16	0.67
Percentage Score	84.49	23.95	69.30	31.13	85.46	11.39
	F	**%**	**F**	**%**	**F**	**%**
3b. Were there any chances that you have accidentally swallowed the water from the river?	62	86.11	27	71.05	280	77.56
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.86	0.35	0.71	0.46	0.84	0.13
Percentage Score	86.11	34.83	71.05	45.96	83.77	12.94
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Estimated amount of water swallowed						
Mean Score	5.64	1.05	5.34	1.19	5.66	0.23
Percentage Score	93.98	17.54	89.04	19.86	93.92	4.01
Q3 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Percentage Score	80.73	15.50	65.24	24.15	83.04	10.35

Health Risk: *E. coli* Practice . . . *continued*

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	F	%	F	%	F	%	F	%	F	%
4a. Do you use water from the river/deep well to wet your ground, flush your toilet, and water your plants?	7	70.00	11	68.75	19	86.36	22	95.65	6	35.29
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.70	0.48	0.38	0.50	0.86	0.35	0.96	0.21	0.35	0.49
Percentage Score	70.00	48.30	37.50	50.00	86.36	35.13	95.65	20.85	35.29	49.26
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Frequency of use of water from river										
Mean Score	4.90	1.91	5.31	1.25	5.55	1.34	5.96	0.21	3.18	2.43
Percentage Score	81.67	31.87	88.54	20.83	92.42	22.26	99.28	3.48	52.94	40.50
	F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
4b. Were there any chances that you have accidentally swallowed the water from the river?	10	100.00	11	68.75	20	90.91	23	100.00	10	58.82
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	1.00	0.00	0.69	0.48	0.91	0.29	1.00	0.00	0.59	0.51
Percentage Score	100.00	0.00	68.75	47.87	90.91	29.42	100.00	0.00	58.82	50.73
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Estimated amount of water swallowed										
Mean Score	6.00	0.00	5.25	1.39	5.68	1.13	6.00	0.00	5.29	0.92
Percentage Score	100.00	0.00	87.50	23.17	94.70	18.82	100.00	0.00	88.24	15.33
Q4 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Percentage Score	87.92	14.74	70.57	23.85	91.10	3.52	98.73	2.08	58.82	22.01

Health Risk: *E. coli* Practice . . . *continued*

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	F	%	F	%	F	%	F	%	F	%
4a. Do you use water from the river/deep well to wet your ground, flush your toilet, and water your plants?	12	75.00	21	72.41	24	96.00	19	63.33	41	67.21
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.75	0.45	0.72	0.45	0.96	0.20	0.63	0.49	0.71	0.46
Percentage Score	75.00	44.72	72.41	45.49	96.00	20.00	63.33	49.01	71.43	45.54
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Frequency of use of water from river										
Mean Score	5.63	1.02	4.97	1.84	5.96	0.20	4.70	2.05	5.03	1.89
Percentage Score	93.75	17.08	82.76	30.69	99.33	3.33	78.33	34.23	83.86	31.53
	F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
4b. Were there any chances that you have accidentally swallowed the water from the river?	15	93.75	25	86.21	25	100.00	26	86.67	49	80.33
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.94	0.25	0.89	0.31	1.00	0.00	0.87	0.35	0.86	0.35
Percentage Score	93.75	25.00	89.29	31.50	100.00	0.00	86.67	34.57	85.71	35.27
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Estimated amount of water swallowed										
Mean Score	5.88	0.34	5.66	1.04	6.00	0.00	5.83	0.59	5.60	1.20
Percentage Score	97.92	5.69	94.25	17.41	100.00	0.00	97.22	9.87	93.39	19.98
Q4 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Percentage Score	90.10	10.26	84.68	9.43	98.83	1.91	81.39	14.30	83.60	9.10

Health Risk: *E. coli* Practice . . . *continued*

Questions	Candau-ay		Batinguel		Overall	
	F	%	F	%	F	%
4a. Do you use water from the river/deep well to wet your ground, flush your toilet, and water your plants?	54	75.00	21	55.26	246	68.14
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.75	0.44	0.55	0.50	0.72	0.18
Percentage Score	75.00	43.61	55.26	50.39	72.34	17.51
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Frequency of use of water from river						
Mean Score	5.19	1.70	4.16	2.21	5.02	0.82
Percentage Score	86.57	28.34	69.30	36.87	83.66	13.64
	F	**%**	**F**	**%**	**F**	**%**
4b. Were there any chances that you have accidentally swallowed the water from the river?	65	90.28	27	71.05	295	81.72
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.90	0.30	0.71	0.46	0.88	0.13
Percentage Score	90.28	29.83	71.05	45.96	87.86	12.75
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Estimated amount of water swallowed						
Mean Score	5.71	1.01	5.37	1.17	5.73	0.24
Percentage Score	95.14	16.89	89.47	19.54	95.48	4.07
Q4 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Percentage Score	86.75	8.58	71.27	14.04	84.84	9.66

Health Risk: *E. coli* Practice . . . *continued*

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	F	%	F	%	F	%	F	%	F	%
5. Do you wash your hands with soap and water thoroughly after contact with domesticated animals?	10	100.00	16	100.00	20	90.91	19	82.61	14	82.35
Q5 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	1.00	0.00	1.00	0.00	0.91	0.29	0.83	0.39	0.82	0.39
Percentage Score	100.00	0.00	100.00	0.00	90.91	29.42	82.61	38.76	82.35	39.30

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	F	%	F	%	F	%	F	%	F	%
5. Do you wash your hands with soap and water thoroughly after contact with domesticated animals?	14	87.50	22	75.86	19	76.00	23	76.67	47	77.05
Q5 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.88	0.34	0.76	0.44	0.76	0.44	0.77	0.43	0.87	0.34
Percentage Score	87.50	34.16	75.86	43.55	76.00	43.59	76.67	43.02	86.89	34.04

Health Risk: *E. coli* Practice . . . *continued*

Questions	Candau-ay		Batinguel		Overall	
	F	%	F	%	F	%
5. Do you wash your hands with soap and water thoroughly after contact with domesticated animals?	50	69.44	33	86.84	271	75.07
Q5 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.69	0.46	0.87	0.34	0.83	0.09
Percentage Score	69.44	46.39	86.84	34.26	83.19	8.52

Health Risk: *E. coli* Practice . . . *continued*

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	F	%	F	%	F	%	F	%	F	%
6. Do you boil your water for 10 minutes during unusual events such as during typhoons & flooding?	8	80.00	14	87.50	18	81.82	13	56.52	12	70.59
Q6 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.80	0.42	0.88	0.34	0.86	0.36	0.57	0.51	0.71	0.47
Percentage Score	80.00	42.16	87.50	34.16	85.71	35.86	56.52	50.69	70.59	46.97

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	F	%	F	%	F	%	F	%	F	%
6. Do you boil your water for 10 minutes during unusual events such as during typhoons & flooding?	10	62.50	19	65.52	18	72.00	18	60.00	42	68.85
Q6 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.63	0.50	0.66	0.48	0.72	0.46	0.60	0.50	0.74	0.44
Percentage Score	62.50	50.00	65.52	48.37	72.00	45.83	60.00	49.83	74.19	44.11

Health Risk: *E. coli* Practice . . . *continued*

Questions	Candau-ay		Batinguel		Overall	
	F	%	F	%	F	%
6. Do you boil your water for 10 minutes during unusual events such as during typhoons & flooding?	40	55.56	30	78.95	228	63.16
Q6 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.56	0.50	0.79	0.41	0.69	0.10
Percentage Score	55.56	50.04	78.95	41.32	69.23	10.05

Health Risk: *E. coli* Practice . . . *continued*

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	F	%	F	%	F	%	F	%	F	%
7. Do you keep your animals away from bodies of water?	6	60.00	8	80.00	8	80.00	15	65.22	10	58.82
Q7 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.60	0.52	0.80	0.42	0.89	0.33	0.71	0.46	0.59	0.51
Percentage Score	60.00	51.64	80.00	42.16	88.89	33.33	71.43	46.29	58.82	50.73

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	F	%	F	%	F	%	F	%	F	%
7. Do you keep your animals away from bodies of water?	10	62.50	15	51.72	13	52.00	20	66.67	41	67.21
Q7 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.63	0.50	0.52	0.51	0.54	0.51	0.69	0.47	0.74	0.44
Percentage Score	62.50	50.00	51.72	50.85	54.17	50.90	68.97	47.08	74.19	44.11

Questions	Candau-ay		Batinguel		Overall	
	F	%	F	%	F	%
7. Do you keep your animals away from bodies of water?	45	62.50	25	65.79	208	57.62
Q7 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.64	0.48	0.66	0.48	0.66	0.10
Percentage Score	64.29	48.26	65.79	48.08	65.52	10.36

Health Risk: *E. coli* Practice . . . *continued*

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	F	%	F	%	F	%	F	%	F	%
8. If one is sick from severe diarrhea in the family, do you immediately sick for medical help?	10	100.00	7	70.00	9	90.00	19	82.61	14	82.35
Q8 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	1.00	0.00	0.70	0.48	0.90	0.32	0.83	0.39	0.82	0.39
Percentage Score	100.00	0.00	70.00	48.30	90.00	31.62	82.61	38.76	82.35	39.30

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	F	%	F	%	F	%	F	%	F	%
8. If one is sick from severe diarrhea in the family, do you immediately sick for medical help?	13	81.25	22	75.86	17	68.00	22	73.33	43	70.49
Q8 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.81	0.40	0.76	0.44	0.68	0.48	0.73	0.45	0.81	0.40
Percentage Score	81.25	40.31	75.86	43.55	68.00	47.61	73.33	44.98	80.65	39.83

Questions	Candau-ay		Batinguel		Overall	
	F	%	F	%	F	%
8. If one is sick from severe diarrhea in the family, do you immediately sick for medical help?	49	68.06	34	89.47	252	69.81
Q8 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.68	0.47	0.89	0.31	0.81	0.10
Percentage Score	68.06	46.95	89.47	31.10	81.05	9.70

Health Risk: *E. coli* Practice . . . *continued*

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	F	%	F	%	F	%	F	%	F	%
9. Do you self-medicate?	6	60.00	8	50.00	10	45.45	14	60.87	11	64.71
Q9 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.60	0.52	0.50	0.52	0.45	0.51	0.61	0.50	0.69	0.48
Percentage Score	60.00	51.64	50.00	51.64	45.45	50.96	60.87	49.90	68.75	47.87

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	F	%	F	%	F	%	F	%	F	%
9. Do you self-medicate?	8	50.00	18	62.07	11	44.00	9	30.00	27	44.26
Q9 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.50	0.52	0.62	0.49	0.44	0.51	0.30	0.47	0.46	0.50
Percentage Score	50.00	51.64	62.07	49.38	44.00	50.66	30.00	46.61	45.90	50.25

Questions	Candau-ay		Batinguel		Overall	
	F	%	F	%	F	%
9. Do you self-medicate?	28	38.89	13	34.21	155	42.94
Q9 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.40	0.49	0.34	0.48	0.49	0.12
Percentage Score	40.00	49.34	34.21	48.08	49.21	12.37

Health Risk: *E. coli* Practice . . . *continued*

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	F	%	F	%	F	%	F	%	F	%
10. Do you follow the prescription given?	10	100.00	13	81.25	20	90.91	18	78.26	15	88.24
Q10 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	1.00	0.00	0.81	0.40	0.91	0.29	0.78	0.42	0.88	0.33
Percentage Score	100.00	0.00	81.25	40.31	90.91	29.42	78.26	42.17	88.24	33.21

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	F	%	F	%	F	%	F	%	F	%
10. Do you follow the prescription given?	14	87.50	21	72.41	18	72.00	25	83.33	48	78.69
Q10 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.88	0.34	0.75	0.44	0.72	0.46	0.83	0.38	0.90	0.30
Percentage Score	87.50	34.16	75.00	44.10	72.00	45.83	83.33	37.90	90.16	30.03

Questions	Candau-ay		Batinguel		Overall	
	F	%	F	%	F	%
10. Do you follow the prescription given?	50	69.44	31	81.58	270	74.79
Q10 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.69	0.46	0.82	0.39	0.83	0.09
Percentage Score	69.44	46.39	81.58	39.29	83.31	9.18

Health Risk: *E. coli* Practice . . . *continued*

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	F	%	F	%	F	%	F	%	F	%
11. Do you go for a regular health check up?	9	90.00	9	56.25	15	68.18	13	56.52	12	70.59
Q11 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.90	0.32	0.56	0.51	0.68	0.48	0.57	0.51	0.71	0.47
Percentage Score	90.00	31.62	56.25	51.23	68.18	47.67	56.52	50.69	76.47	43.72

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	F	%	F	%	F	%	F	%	F	%
11. Do you go for a regular health check up?	8	50.00	15	51.72	14	56.00	17	56.67	37	60.66
Q11 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.50	0.52	0.54	0.51	0.56	0.51	0.59	0.50	0.67	0.47
Percentage Score	50.00	51.64	53.57	50.79	56.00	50.66	58.62	50.12	67.21	47.33

Questions	Candau-ay		Batinguel		Overall	
	F	%	F	%	F	%
11. Do you go for a regular health check-up?	29	40.28	23	60.53	192	53.19
Q11 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.40	0.49	0.61	0.50	0.61	0.13
Percentage Score	40.28	49.39	60.53	49.54	61.58	13.50

Health Risk: E. coli Practice SUMMARY

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
1. Do you or other members in the family go swimming or bathing in the river?	83.33	15.63	59.38	20.16	89.27	3.80	90.40	6.73	64.95	18.33
2. Do you immerse yourself other members in the family into the river?	89.58	14.17	29.43	20.10	86.80	7.26	91.47	6.89	70.59	18.46
3. Do you wash your clothes in the river?	92.08	9.75	59.64	21.81	92.93	2.05	98.55	1.96	57.11	26.82
4. Do you use water from the river/deep well to wet your ground, flush your toilet, and water your plants?	87.92	14.74	70.57	23.85	91.10	3.52	98.73	2.08	58.82	22.01
5. Do you wash your hands with soap and water thoroughly after contact with domesticated animals?	100.00	0.00	100.00	0.00	90.91	29.42	82.61	38.76	82.35	39.30
6. Do you boil your water for 10 minutes during unusual events such as during typhoons & flooding?	80.00	42.16	87.50	34.16	85.71	35.86	56.52	50.69	70.59	46.97
7. Do you keep your animals away from bodies of water?	60.00	51.64	80.00	42.16	88.89	33.33	71.43	46.29	58.82	50.73
8. If one is sick from severe diarrhea in the family, do you immediately sick for medical help?	100.00	0.00	70.00	48.30	90.00	31.62	82.61	38.76	82.35	39.30

Health Risk: E. coli Practice SUMMARY . . . continued

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
9. Do you self-medicate?	60.00	51.64	50.00	51.64	45.45	50.96	60.87	49.90	68.75	47.87
10. Do you follow the prescription given?	100.00	0.00	81.25	40.31	90.91	29.42	78.26	42.17	88.24	33.21
11. Do you go for a regular health check-up?	90.00	31.62	56.25	51.23	68.18	47.67	56.52	50.69	76.47	43.72
Overall Summary	**85.72**	**14.32**	**67.64**	**19.56**	**83.65**	**14.35**	**78.91**	**15.75**	**70.82**	**10.56**

Health Risk: E. coli Practice SUMMARY . . . continued

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
1. Do you or other members in the family go swimming or bathing in the river?	82.66	11.43	72.13	12.03	78.17	12.62	52.53	37.25	81.81	8.44
2. Do you immerse yourself other members in the family into the river?	89.38	6.85	77.10	13.33	81.17	15.32	67.45	31.85	79.43	16.57
3. Do you wash your clothes in the river?	97.95	3.43	80.32	8.63	83.17	10.55	81.11	14.66	84.26	10.23
4. Do you use water from the river/deep well to wet your ground, flush your toilet, and water your plants?	90.10	10.26	84.68	9.43	98.83	1.91	81.39	14.30	83.60	9.10
5. Do you wash your hands with soap and water thoroughly after contact with domesticated animals?	87.50	34.16	75.86	43.55	76.00	43.59	76.67	43.02	86.89	34.04
6. Do you boil your water for 10 minutes during unusual events such as during typhoons & flooding?	62.50	50.00	65.52	48.37	72.00	45.83	60.00	49.83	74.19	44.11
7. Do you keep your animals away from bodies of water?	62.50	50.00	51.72	50.85	54.17	50.90	68.97	47.08	74.19	44.11
8. If one is sick from severe diarrhea in the family, do you immediately sick for medical help?	81.25	40.31	75.86	43.55	68.00	47.61	73.33	44.98	80.65	39.83

Health Risk: E. coli Practice SUMMARY . . . continued

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
9. Do you self-medicate?	50.00	51.64	62.07	49.38	44.00	50.66	30.00	46.61	45.90	50.25
10. Do you follow the prescription given?	87.50	34.16	75.00	44.10	72.00	45.83	83.33	37.90	90.16	30.03
11. Do you go for a regular health check up?	50.00	51.64	53.57	50.79	56.00	50.66	58.62	50.12	67.21	47.33
Overall Summary	**76.49**	**17.06**	**70.35**	**10.75**	**71.23**	**15.33**	**66.67**	**15.83**	**77.12**	**12.20**

Health Risk: E. coli Practice SUMMARY . . . continued

Questions	Candau-ay		Batinguel		Overall	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
1. Do you or other members in the family go swimming or bathing in the river?	81.77	11.67	65.79	18.87	73.83	11.95
2. Do you immerse yourself other members in the family into the river?	76.68	21.36	69.74	20.67	78.69	15.96
3. Do you wash your clothes in the river?	80.73	15.50	65.24	24.15	83.04	10.35
4. Do you use water from the river/deep well to wet your ground, flush your toilet, and water your plants?	86.75	8.58	71.27	14.04	84.84	9.66
5. Do you wash your hands with soap and water thoroughly after contact with domesticated animals?	69.44	46.39	86.84	34.26	83.19	8.52
6. Do you boil your water for 10 minutes during unusual events such as during typhoons & flooding?	55.56	50.04	78.95	41.32	69.23	10.05
7. Do you keep your animals away from bodies of water?	64.29	48.26	65.79	48.08	65.52	10.36
8. If one is sick from severe diarrhea in the family, do you immediately sick for medical help?	68.06	46.95	89.47	31.10	81.05	9.70

Health Risk: E. coli Practice SUMMARY . . . continued

Questions	Candau-ay		Batinguel		Overall	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
9. Do you self-medicate?	40.00	49.34	34.21	48.08	49.21	12.37
10. Do you follow the prescription given?	69.44	46.39	81.58	39.29	83.31	9.18
11. Do you go for a regular health check up?	40.28	49.39	60.53	49.54	61.58	13.50
Overall Summary	**66.64**	**15.76**	**69.95**	**15.19**	**73.95**	**11.43**

Health Risk: Leptospirosis Practice

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	F	%	F	%	F	%	F	%	F	%
1. If one is sick from severe fever in the family, do you immediately sick for medical help?	9	90.00	9	56.25	17	77.27	16	69.57	13	76.47
Q1 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.90	0.32	0.56	0.51	0.77	0.43	0.70	0.47	0.76	0.44
Percentage Score	90.00	31.62	56.25	51.23	77.27	42.89	69.57	47.05	76.47	43.72

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	F	%	F	%	F	%	F	%	F	%
1. If one is sick from severe fever in the family, do you immediately sick for medical help?	12	75.00	17	58.62	15	60.00	22	73.33	40	65.57
Q1 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.75	0.45	0.59	0.50	0.60	0.50	0.73	0.45	0.74	0.44
Percentage Score	75.00	44.72	58.62	50.12	60.00	50.00	73.33	44.98	74.19	44.11

Health Risk: Leptospirosis Practice . . . *continued*

Questions	Candau-ay		Batinguel		Overall	
	F	%	F	%	F	%
1. If one is sick from severe fever in the family, do you immediately sick for medical help?	42	58.33	29	76.32	232	64.27
Q1 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.58	0.50	0.76	0.43	0.72	0.10
Percentage Score	58.33	49.65	76.32	43.09	71.74	9.60

Health Risk: Leptospirosis Practice . . . *continued*

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	F	%	F	%	F	%	F	%	F	%
2. Do you use rubber boots during heavy rains, typhoons or flooding?	4	40.00	6	37.50	7	31.82	7	30.43	8	47.06
Q2 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.40	0.52	0.38	0.50	0.32	0.48	0.30	0.47	0.47	0.51
Percentage Score	40.00	51.64	37.50	50.00	31.82	47.67	30.43	47.05	47.06	51.45

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	F	%	F	%	F	%	F	%	F	%
2. Do you use rubber boots during heavy rains, typhoons or flooding?	9	56.25	8	27.59	8	32.00	4	13.33	21	34.43
Q2 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.56	0.51	0.28	0.45	0.32	0.48	0.13	0.35	0.37	0.49
Percentage Score	56.25	51.23	27.59	45.49	32.00	47.61	13.33	34.57	37.10	48.70

Health Risk: Leptospirosis Practice . . . *continued*

Questions	Candau-ay		Batinguel		Overall	
	F	%	F	%	F	%
2. Do you use rubber boots during heavy rains, typhoons or flooding?	22	30.56	12	31.58	110	30.47
Q3 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.31	0.46	0.32	0.47	0.34	0.11
Percentage Score	30.56	46.39	31.58	47.11	34.34	11.03

Health Risk: Leptospirosis Practice . . . *continued*

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	F	%	F	%	F	%	F	%	F	%
3. Do you take Doxycyline antibiotics as prevention during rainy or flooding season?	4	40.00	3	18.75	1	4.55	4	17.39	3	17.65
Mean Score	0.40	0.52	0.19	0.40	0.05	0.21	0.17	0.39	0.18	0.39
Percentage Score	40.00	51.64	18.75	40.31	4.55	21.32	17.39	38.76	17.65	39.30

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	F	%	F	%	F	%	F	%	F	%
3. Do you take Doxycyline antibiotics as prevention during rainy or flooding season?	3	18.75	5	17.24	4	16.00	0	0.00	20	32.79
Q10 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.19	0.40	0.17	0.38	0.16	0.37	0	0.00	0.34	0.48
Percentage Score	18.75	40.31	17.24	38.44	16.00	37.42	0	0.00	33.87	47.71

Health Risk: Leptospirosis Practice . . . *continued*

Questions	Candau-ay		Batinguel		Overall	
	F	%	F	%	F	%
3. Do you take Doxycyline antibiotics as prevention during rainy or flooding season?	15	20.83	12	31.58	71	19.67
Q10 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.21	0.41	0.32	0.47	0.20	0.12
Percentage Score	20.83	40.90	31.58	47.11	19.81	11.85

Health Risk: Leptospirosis Practice SUMMARY

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
From *E coli* questions	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
1. Do you or other members in the family go swimming or bathing in the river?	83.33	15.63	59.38	20.16	89.27	3.80	90.40	6.73	64.95	18.33
2. Do you immerse yourself other members in the family into the river?	89.58	14.17	29.43	20.10	86.80	7.26	91.47	6.89	70.59	18.46
3. Do you wash your clothes in the river?	92.08	9.75	59.64	21.81	92.93	2.05	98.55	1.96	57.11	26.82
4. Do you use water from the river/deep well to wet your ground, flush your toilet, and water your plants?	87.92	14.74	70.57	23.85	91.10	3.52	98.73	2.08	58.82	22.01
Leptospirosis questions										
1. If one is sick from severe fever in the family, do you immediately sick for medical help?	90.00	31.62	56.25	51.23	77.27	42.89	69.57	47.05	76.47	43.72
2. Do you use rubber boots during heavy rains, typhoons or flooding?	40.00	51.64	37.50	50.00	31.82	47.67	30.43	47.05	47.06	51.45
3. Do you take Doxycyline antibiotics as prevention during rainy or flooding season?	40.00	51.64	18.75	40.31	4.55	21.32	17.39	38.76	17.65	39.30
Overall Summary	**74.70**	**23.86**	**47.36**	**18.93**	**67.68**	**35.07**	**70.93**	**33.78**	**56.09**	**19.46**

Health Risk: Leptospirosis Practice SUMMARY . . . *continued*

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
From *E coli* questions	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
1. Do you or other members in the family go swimming or bathing in the river?	82.66	11.43	72.13	12.03	78.17	12.62	52.53	37.25	81.81	8.44
2. Do you immerse yourself other members in the family into the river?	89.38	6.85	77.10	13.33	81.17	15.32	67.45	31.85	79.43	16.57
3. Do you wash your clothes in the river?	97.95	3.43	80.32	8.63	83.17	10.55	81.11	14.66	84.26	10.23
4. Do you use water from the river/deep well to wet your ground, flush your toilet, and water your plants?	90.10	10.26	84.68	9.43	98.83	1.91	81.39	14.30	83.60	9.10
Leptospirosis questions										
1. If one is sick from severe fever in the family, do you immediately sick for medical help?	75.00	44.72	58.62	50.12	60.00	50.00	73.33	44.98	74.19	44.11
2. Do you use rubber boots during heavy rains, typhoons or flooding?	56.25	51.23	27.59	45.49	32.00	47.61	13.33	34.57	37.10	48.70
3. Do you take Doxycyline antibiotics as prevention during rainy or flooding season?	18.75	40.31	17.24	38.44	16.00	37.42	0	0.00	33.87	47.71
Overall Summary	**72.87**	**27.40**	**59.67**	**26.90**	**64.19**	**30.06**	**52.74**	**33.17**	**67.75**	**22.31**

Health Risk: Leptospirosis Practice SUMMARY . . . *continued*

Questions	Candau-ay		Batinguel		Overall	
From *E coli* questions	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
1. Do you or other members in the family go swimming or bathing in the river?	81.77	11.67	65.79	18.87	73.83	11.95
2. Do you immerse yourself other members in the family into the river?	76.68	21.36	69.74	20.67	78.69	15.96
3. Do you wash your clothes in the river?	80.73	15.50	65.24	24.15	83.04	10.35
4. Do you use water from the river/deep well to wet your ground, flush your toilet, and water your plants?	86.75	8.58	71.27	14.04	84.84	9.66
Leptospirosis questions						
1. If one is sick from severe fever in the family, do you immediately sick for medical help?	58.33	49.65	76.32	43.09	71.74	9.60
2. Do you use rubber boots during heavy rains, typhoons or flooding?	30.56	46.39	31.58	47.11	34.34	11.03
3. Do you take Doxycyline antibiotics as prevention during rainy or flooding season?	20.83	40.90	31.58	47.11	19.81	11.85
Overall Summary	**62.24**	**26.66**	**58.79**	**18.95**	**63.75**	**25.83**

Health Risk: Dengue Practice

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	F	%	F	%	F	%	F	%	F	%
1. Do you clean your immediate surroundings and empty from the following usual mosquito breeding sites?	9	90.00	9	56.25	20	90.91	21	91.30	14	82.35
Q1 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.90	0.32	0.56	0.51	0.91	0.29	0.91	0.29	0.82	0.39
Percentage Score	90.00	31.62	56.25	51.23	90.91	29.42	91.30	28.81	82.35	39.30

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	F	%	F	%	F	%	F	%	F	%
1. Do you clean your immediate surroundings and empty from the following usual mosquito breeding sites?	15	93.75	26	89.66	22	88.00	27	90.00	50	81.97
Q1 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.94	0.25	0.90	0.31	0.88	0.33	0.90	0.31	0.92	0.27
Percentage Score	93.75	25.00	89.66	30.99	88.00	33.17	90.00	30.51	91.94	27.45

Questions	Candau-ay		Batinguel		Overall	
	F	%	F	%	F	%
1. Do you clean your immediate surroundings and empty from the following usual mosquito breeding sites?	56	77.78	37	97.37	301	83.38
Q1 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.78	0.42	0.97	0.16	3.58	7.14
Percentage Score	77.78	41.87	97.37	16.22	82.25	25.16

Mosquito breeding sites being cleaned

Breeding Sites	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	F	%	F	%	F	%	F	%	F	%
flower pot	7	70.00	9	56.25	17	77.27	15	65.22	10	58.82
hardened soil of potted plants	4	40.00	6	37.50	7	31.82	5	21.74	2	11.76
collar of toilet bowl	5	50.00	5	31.25	8	36.36	6	26.09	3	17.65
gully trap	5	50.00	4	25.00	3	13.64	11	47.83	5	29.41
roof gutter	6	60.00	7	43.75	9	40.91	12	52.17	5	29.41
flower pot plat	3	30.00	4	25.00	4	18.18	5	21.74	2	11.76
road side drain	8	80.00	6	37.50	12	54.55	10	43.48	5	29.41
scupper drain	3	30.00	2	12.50	6	27.27	7	30.43	4	23.53
abandoned water tank	7	70.00	4	25.00	9	40.91	9	39.13	3	17.65

Mosquito breeding sites being cleaned . . . continued

Breeding Sites	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	F	%	F	%	F	%	F	%	F	%
flower pot	12	75.00	18	62.07	16	64.00	18	60.00	34	55.74
hardened soil of potted plants	5	31.25	12	41.38	8	32.00	10	33.33	17	27.87
collar of toilet bowl	4	25.00	12	41.38	8	32.00	11	36.67	22	36.07
gully trap	4	25.00	7	24.14	7	28.00	8	26.67	22	36.07
roof gutter	7	43.75	17	58.62	11	44.00	14	46.67	25	40.98
flower pot plat	6	37.50	9	31.03	5	20.00	9	30.00	23	37.70
road side drain	8	50.00	13	44.83	12	48.00	13	43.33	24	39.34
scupper drain	2	12.50	10	34.48	6	24.00	9	30.00	15	24.59
abandoned water tank	6	37.50	11	37.93	7	28.00	7	23.33	21	34.43

Breeding Sites	Candau-ay		Batinguel		Overall	
	F	%	F	%	F	%
flower pot	44	61.11	23	60.53	223	61.77
hardened soil of potted plants	18	25.00	10	26.32	104	28.81
collar of toilet bowl	28	38.89	10	26.32	122	33.80
gully trap	21	29.17	13	34.21	110	30.47
roof gutter	35	48.61	16	42.11	164	45.43
flower pot plat	25	34.72	9	23.68	104	28.81
road side drain	36	50.00	15	39.47	162	44.88
scupper drain	23	31.94	9	23.68	96	26.59
abandoned water tank	26	36.11	9	23.68	119	32.96

Health Risk: Dengue Practice . . . *continued*

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	F	%	F	%	F	%	F	%	F	%
2. Do you clean your immediate surroundings and empty from the following unusual/uncommon mosquito breeding Sites?	8	80.00	13	81.25	19	86.36	20	86.96	16	94.12
Q2 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.80	0.42	0.81	0.40	0.90	0.30	0.87	0.34	0.94	0.24
Percentage Score	80.00	42.16	81.25	40.31	90.48	30.08	86.96	34.44	94.12	24.25

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	F	%	F	%	F	%	F	%	F	%
2. Do you clean your immediate surroundings and empty from the following unusual/uncommon mosquito breeding Sites?	13	81.25	25	86.21	23	92.00	25	83.33	48	78.69
Q2 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.81	0.40	0.89	0.31	0.92	0.28	0.83	0.38	0.87	0.34
Percentage Score	81.25	40.31	89.29	31.50	92.00	27.69	83.33	37.90	87.10	33.80

Health Risk: Dengue Practice . . . *continued*

Questions	Candau-ay		Batinguel		Overall	
	F	%	F	%	F	%
2. Do you clean your immediate surroundings and empty from the following unusual/uncommon mosquito breeding Sites?	55	76.39	32	84.21	284	78.67
Q2 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.76	0.43	0.84	0.37	0.86	0.05
Percentage Score	76.39	42.77	84.21	36.95	85.92	5.44

Unusual/uncommon mosquito breeding sites

Breeding Sites	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	F	%	F	%	F	%	F	%	F	%
tree hole	4	40.00	5	31.25	10	45.45	11	47.83	7	41.18
plant axil	7	70.00	16	100.00	16	72.73	16	69.57	10	58.82
aircon tray	3	30.00	1	6.25	2	9.09	4	17.39	3	17.65
BBQ pit	4	40.00	1	6.25	3	13.64	4	17.39	2	11.76
canvass sheet	3	30.00	2	12.50	3	13.64	3	13.04	2	11.76
discarded receptacles such as:										
tire	10	100.00	7	43.75	11	50.00	12	52.17	6	35.29
plastic cap	9	90.00	5	31.25	9	40.91	12	52.17	5	29.41
coconut shells	3	30.00	7	43.75	10	45.45	11	47.83	7	41.18
empty bottles	9	90.00	9	56.25	11	50.00	16	69.57	10	58.82
cans	6	60.00	10	62.50	12	54.55	17	73.91	9	52.94
buckets	5	50.00	8	50.00	8	36.36	12	52.17	4	23.53
jars	4	40.00	8	50.00	7	31.82	11	47.83	4	23.53
blocked roof gutters	4	40.00	8	50.00	6	27.27	9	39.13	2	11.76
tarps	4	40.00	2	12.50	3	13.64	7	30.43	2	11.76
drums	4	40.00	4	25.00	8	36.36	9	39.13	3	17.65

Unusual/uncommon mosquito breeding sites . . . *continued*

Breeding Sites	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	F	%	F	%	F	%	F	%	F	%
tree hole	8	50.00	15	51.72	11	44.00	11	36.67	25	40.98
plant axil	9	56.25	16	55.17	19	76.00	24	80.00	39	63.93
aircon tray	0	0.00	2	6.90	3	12.00	7	23.33	15	24.59
BBQ pit	1	6.25	2	6.90	3	12.00	6	20.00	10	16.39
canvass sheet	2	12.50	6	20.69	2	8.00	6	20.00	8	13.11
discarded receptacles such as:										
tire	6	37.50	11	37.93	9	36.00	15	50.00	27	44.26
plastic cap	6	37.50	12	41.38	9	36.00	16	53.33	27	44.26
coconut shells	8	50.00	10	34.48	11	44.00	16	53.33	23	37.70
empty bottles	14	87.50	19	65.52	14	56.00	35	116.67	34	55.74
cans	13	81.25	20	68.97	14	56.00	21	70.00	32	52.46
buckets	5	31.25	11	37.93	8	32.00	12	40.00	26	42.62
jars	4	25.00	8	27.59	7	28.00	7	23.33	20	32.79
blocked roof gutters	1	6.25	8	27.59	6	24.00	8	26.67	16	26.23
tarps	2	12.50	7	24.14	5	20.00	5	16.67	12	19.67
drums	2	12.50	7	24.14	4	16.00	7	23.33	16	26.23

Unusual/uncommon mosquito breeding sites . . . *continued*

Breeding Sites	Candau-ay		Batinguel		Overall	
	F	%	F	%	F	%
tree hole	33	45.83	17	44.74	157	43.49
plant axil	49	68.06	28	73.68	249	68.98
aircon tray	11	15.28	4	10.53	55	15.24
BBQ pit	11	15.28	3	7.89	50	13.85
canvass sheet	10	13.89	5	13.16	52	14.40
discarded receptacles such as:						
tire	33	45.83	21	55.26	168	46.54
plastic cap	32	44.44	19	50.00	161	44.60
coconut shells	28	38.89	19	50.00	153	42.38
empty bottles	47	65.28	38	100.00	256	70.91
cans	45	62.50	26	68.42	225	62.33
buckets	30	41.67	13	34.21	142	39.34
jars	25	34.72	11	28.95	116	32.13
blocked roof gutters	19	26.39	10	26.32	97	26.87
tarps	21	29.17	9	23.68	79	21.88
drums	25	34.72	12	31.58	101	27.98

Health Risk: Dengue Practice . . . *continued*

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	F	%	F	%	F	%	F	%	F	%
3. Do you make sure that your home is airy, bright, and safe from moisture?	10	100.00	14	87.50	22	100.00	20	86.96	15	88.24
Q3 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	1.00	0.00	0.88	0.34	1.00	0.00	0.87	0.34	0.94	0.25
Percentage Score	100.00	0.00	87.50	34.16	100.00	0.00	86.96	34.44	93.75	25.00

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	F	%	F	%	F	%	F	%	F	%
3. Do you make sure that your home is airy, bright, and safe from moisture?	16	100.00	19	65.52	18	72.00	21	70	48	78.69
Q3 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	1.00	0.63	0.70	0.47	0.72	0.46	0.70	70.00	0.85	0.36
Percentage Score	100.00	63.25	70.37	46.53	72.00	45.83	0.47	46.61	85.48	35.51

Health Risk: Dengue Practice . . . *continued*

Questions	Candau-ay		Batinguel		Overall	
	F	%	F	%	F	%
3. Do you make sure that your home is airy, bright, and safe from moisture?	47	65.28	31	81.58	267	73.96
Q3 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.66	0.48	0.82	0.39	0.84	0.13
Percentage Score	66.20	47.64	81.58	39.29	84.21	13.12

Health Risk: Dengue Practice . . . *continued*

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	F	%	F	%	F	%	F	%	F	%
4. Do you have fixed net on doors and windows?	0	0.00	0	0.00	7	31.82	1	4.35	2	11.76
Q4 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.00	0.00	0.00	0.00	0.32	0.48	0.04	0.21	0.13	0.34
Percentage Score	0.00	0.00	0.00	0.00	31.82	47.67	4.35	20.85	12.50	34.16

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	F	%	F	%	F	%	F	%	F	%
4. Do you have fixed net on doors and windows?	1	6.25	4	13.79	1	4.00	4	13.33	14	22.95
Q4 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.06	0.25	0.14	0.36	0.04	0.20	0.13	0.35	0.25	0.43
Percentage Score	6.25	25.00	14.29	35.63	4.00	20.00	13.33	34.57	24.59	43.42

Questions	Candau-ay		Batinguel		Overall	
	F	%	F	%	F	%
4. Do you have fixed net on doors and windows?	4	5.56	7	18.42	45	12.47
Q4 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.06	0.23	0.18	0.39	0.12	0.10
Percentage Score	5.63	23.22	18.42	39.29	12.29	9.69

Health Risk: Dengue Practice . . . *continued*

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	F	%	F	%	F	%	F	%	F	%
5. Do you close the overhead tanks after using?	10	100.00	11	68.75	16	72.73	16	69.57	8	47.06
Q5 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	1.00	0.00	0.69	0.48	0.73	0.46	0.73	0.46	0.47	0.51
Percentage Score	100.00	0.00	68.75	47.87	72.73	45.58	72.73	45.58	47.06	51.45

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	F	%	F	%	F	%	F	%	F	%
5. Do you close the overhead tanks after using?	11	68.75	15	51.72	18	72.00	19	63.33	40	65.57
Q5 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.69	0.48	0.52	0.51	0.72	0.46	0.63	0.49	0.68	0.47
Percentage Score	68.75	47.87	51.72	50.85	72.00	45.83	63.33	49.01	67.74	47.13

Questions	Candau-ay		Batinguel		Overall	
	F	%	F	%	F	%
5. Do you close the overhead tanks after using?	42	58.33	29	76.32	224	62.05
Q5 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.58	0.50	0.76	0.43	0.68	0.14
Percentage Score	58.33	49.65	76.32	43.09	68.25	14.04

Health Risk: Dengue Practice . . . *continued*

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	F	%	F	%	F	%	F	%	F	%
6. Do you keep your water in water containers for a week?	7	70.00	13	81.25	18	81.82	22	95.65	14	82.35
Q6 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.70	0.48	0.81	0.40	0.82	0.39	0.96	0.21	0.82	0.39
Percentage Score	70.00	48.30	81.25	40.31	81.82	39.48	95.65	20.85	82.35	39.30

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	F	%	F	%	F	%	F	%	F	%
6. Do you keep your water in water containers for a week?	4	25.00	26	89.66	22	88.00	27	90.00	47	77.05
Q6 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.88	0.34	0.90	0.31	0.88	0.33	0.90	0.31	0.85	0.36
Percentage Score	87.50	34.16	89.66	30.99	88.00	33.17	90.00	30.51	85.48	35.51

Questions	Candau-ay		Batinguel		Overall	
	F	%	F	%	F	%
6. Do you keep your water in water containers for a week?	69	95.83	36	94.74	292	80.89
Q6 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.96	0.20	0.95	0.23	0.87	0.08
Percentage Score	95.83	20.12	94.74	22.63	87.37	7.54

Health Risk: Dengue Practice . . . *continued*

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	F	%	F	%	F	%	F	%	F	%
7. Do you let water to accumulate inside and outside your home?	10	100.00	15	93.75	18	81.82	18	78.26	11	64.71
Q7 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	1.00	0.00	0.94	0.25	0.82	0.39	0.78	0.42	0.65	0.49
Percentage Score	100.00	0.00	93.75	25.00	81.82	39.48	78.26	42.17	64.71	49.26

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	F	%	F	%	F	%	F	%	F	%
7. Do you let water to accumulate inside and outside your home?	4	25.00	25	86.21	22	88.00	29	96.67	47	77.05
Q7 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.88	0.34	0.86	0.35	0.88	0.33	0.96	0.20	0.85	0.36
Percentage Score	87.50	34.16	86.21	35.09	88.00	33.17	96.00	20.00	85.48	35.51

Health Risk: Dengue Practice . . . *continued*

Questions	Candau-ay		Batinguel		Overall	
	F	%	F	%	F	%
7. Do you let water to accumulate inside and outside your home?	67	93.06	34	89.47	283	78.39
Q7 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.93	0.26	0.89	0.31	0.85	0.08
Percentage Score	93.06	25.60	89.47	31.10	84.59	8.45

Health Risk: Dengue Practice . . . *continued*

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	F	%	F	%	F	%	F	%	F	%
8. Do you let water to stay in the flower pots or vases for a week?	10	100.00	15	93.75	21	95.45	19	82.61	15	88.24
Q8 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	1.00	0.00	0.94	0.25	0.95	0.21	0.86	0.35	0.88	0.33
Percentage Score	100.00	0.00	93.75	25.00	95.45	21.32	86.36	35.13	88.24	33.21

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	F	%	F	%	F	%	F	%	F	%
8. Do you let water to stay in the flower pots or vases for a week?	5	31.25	26	89.66	23	92.00	28	93.33	47	77.05
Q8 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.81	0.40	0.90	0.31	0.92	0.28	0.92	0.28	0.85	0.36
Percentage Score	81.25	40.31	89.66	30.99	92.00	27.69	92.00	27.69	85.48	35.51

Health Risk: Dengue Practice . . . *continued*

Questions	Candau-ay		Batinguel		Overall	
	F	%	F	%	F	%
8. Do you let water to stay in the flower pots or vases for a week?	72	100.00	37	97.37	303	83.93
Q8 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	1.00	0.00	0.97	0.16	0.92	0.06
Percentage Score	100.00	0.00	97.37	16.22	91.62	6.14

Health Risk: Dengue Practice . . . *continued*

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	F	%	F	%	F	%	F	%	F	%
9. Have you had fogging activities in your home or community?	7	70.00	7	43.75	9	40.91	5	21.74	6	35.29
Q9 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.70	0.48	0.44	0.51	0.41	0.50	0.22	0.42	0.35	0.49
Percentage Score	70.00	48.30	43.75	51.23	40.91	50.32	21.74	42.17	35.29	49.26

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	F	%	F	%	F	%	F	%	F	%
9. Have you had fogging activities in your home or community?	5	31.25	11	37.93	9	36.00	9	36.00	20	32.79
Q9 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.31	0.48	0.38	0.49	0.36	0.49	0.36	0.49	0.38	0.49
Percentage Score	31.25	47.87	37.93	49.38	36.00	48.99	36.00	48.99	37.70	48.87

Health Risk: Dengue Practice . . . *continued*

Questions	Candau-ay		Batinguel		Overall	
	F	%	F	%	F	%
9. Have you had fogging activities in your home or community?	19	26.39	15	39.47	115	31.86
Q9 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.26	0.44	0.39	0.50	0.38	0.12
Percentage Score	26.39	44.38	39.47	49.54	37.52	12.22

Health Risk: Dengue Practice . . . *continued*

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	F	%	F	%	F	%	F	%	F	%
10. Have you had apply chemical control against larval stages of dengue mosquitoes?	6	60.00	3	18.75	6	27.27	6	26.09	4	23.53
Q10 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.60	0.52	0.19	0.40	0.27	0.46	0.26	0.45	0.24	0.44
Percentage Score	60.00	51.64	18.75	40.31	27.27	45.58	26.09	44.90	23.53	43.72

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	F	%	F	%	F	%	F	%	F	%
10. Have you had apply chemical control against larval stages of dengue mosquitoes?	4	25.00	5	17.24	8	32.00	7	28.00	19	31.15
Q10 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.25	0.45	0.17	0.38	0.32	0.48	0.28	0.46	0.34	0.48
Percentage Score	25.00	44.72	17.24	38.44	32.00	47.61	28.00	45.83	33.87	47.71

Health Risk: Dengue Practice . . . *continued*

Questions	Candau-ay		Batinguel		Overall	
	F	%	F	%	F	%
10. Have you had apply chemical control against larval stages of dengue mosquitoes?	11	15.28	11	28.95	87	24.10
Q10 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.15	0.36	0.29	0.46	0.29	0.12
Percentage Score	15.28	36.23	28.95	45.96	28.84	11.74

Health Risk: Dengue Practice . . . *continued*

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	F	%	F	%	F	%	F	%	F	%
11. Have you had apply biological control against larval stages of dengue mosquitoes?	3	30.00	2	12.50	4	18.18	0	0.00	3	17.65
Q11 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.30	0.48	0.13	0.34	0.18	0.39	0.00	0.00	0.18	0.39
Percentage Score	30.00	48.30	12.50	34.16	18.18	39.48	0.00	0.00	17.65	39.30

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	F	%	F	%	F	%	F	%	F	%
11. Have you had apply biological control against larval stages of dengue mosquitoes?	3	18.75	7	24.14	9	36.00	2	8.00	13	21.31
Q11 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.19	0.40	0.24	0.44	0.36	0.49	0.08	0.28	0.24	0.43
Percentage Score	18.75	40.31	24.14	43.55	36.00	48.99	8.33	28.23	24.19	43.18

Health Risk: Dengue Practice . . . *continued*

Questions	Candau-ay		Batinguel		Overall	
	F	%	F	%	F	%
11. Have you had apply biological control against larval stages of dengue mosquitoes?	11	15.28	4	10.53	59	16.34
Q11 Item Summary	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Mean Score	0.15	0.36	0.11	0.31	0.18	0.10
Percentage Score	15.28	36.23	10.53	31.10	18.46	10.12

Health Risk: Dengue Practice SUMMARY

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
1. Do you clean your immediate surroundings and empty from the following usual mosquito breeding sites?	90.00	31.62	56.25	51.23	90.91	29.42	91.30	28.81	82.35	39.30
2. Do you clean your immediate surroundings and empty from the following unusual/uncommon mosquito breeding Sites?	80.00	42.16	81.25	40.31	90.48	30.08	86.96	34.44	94.12	24.25
3. Do you make sure that your home is airy, bright, and safe from moisture?	100.00	0.00	87.50	34.16	100.00	0.00	86.96	34.44	93.75	25.00
4. Do you have fixed net on doors and windows?	0.00	0.00	0.00	0.00	31.82	47.67	4.35	20.85	12.50	34.16
5. Do you close the overhead tanks after using?	100.00	0.00	68.75	47.87	72.73	45.58	72.73	45.58	47.06	51.45
6. Do you keep your water in water containers for a week?	70.00	48.30	81.25	40.31	81.82	39.48	95.65	20.85	82.35	39.30
7. Do you let water to accumulate inside and outside your home?	100.00	0.00	93.75	25.00	81.82	39.48	78.26	42.17	64.71	49.26

8. Do you let water to stay in the flower pots or vases for a week?	100.00	0.00	93.75	25.00	95.45	21.32	86.36	35.13	88.24	33.21
9. Have you had fogging activities in your home or community?	70.00	48.30	43.75	51.23	40.91	50.32	21.74	42.17	35.29	49.26

Health Risk: Dengue Practice SUMMARY . . . *continued*

Questions	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
10. Have you had apply chemical control against larval stages of dengue mosquitoes?	60.00	51.64	18.75	40.31	27.27	45.58	26.09	44.90	23.53	43.72
11. Have you had apply biological control against larval stages of dengue mosquitoes?	30.00	48.30	12.50	34.16	18.18	39.48	0.00	0.00	17.65	39.30
Overall Summary	**72.73**	**32.59**	**57.95**	**34.36**	**66.49**	**30.61**	**59.13**	**37.68**	**58.32**	**32.01**

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
1. Do you clean your immediate surroundings and empty from the following usual mosquito breeding sites?	93.75	25.00	89.66	30.99	88.00	33.17	90.00	30.51	91.94	27.45
2. Do you clean your immediate surroundings and empty from the following unusual/uncommon mosquito breeding Sites?	81.25	40.31	89.29	31.50	92.00	27.69	83.33	37.90	87.10	33.80
3. Do you make sure that your home is airy, bright, and safe from moisture?	100.00	63.25	70.37	46.53	72.00	45.83	0.47	46.61	85.48	35.51
4. Do you have fixed net on doors and windows?	6.25	25.00	14.29	35.63	4.00	20.00	13.33	34.57	24.59	43.42

Health Risk: Dengue Practice SUMMARY . . . *continued*

Questions	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
5. Do you close the overhead tanks after using?	68.75	47.87	51.72	50.85	72.00	45.83	63.33	49.01	67.74	47.13
6. Do you keep your water in water containers for a week?	87.50	34.16	89.66	30.99	88.00	33.17	90.00	30.51	85.48	35.51
7. Do you let water to accumulate inside and outside your home?	87.50	34.16	86.21	35.09	88.00	33.17	96.00	20.00	85.48	35.51
8. Do you let water to stay in the flower pots or vases for a week?	81.25	40.31	89.66	30.99	92.00	27.69	92.00	27.69	85.48	35.51
9. Have you had fogging activities in your home or community?	31.25	47.87	37.93	49.38	36.00	48.99	36.00	48.99	37.70	48.87
10. Have you had apply chemical control against larval stages of dengue mosquitoes?	25.00	44.72	17.24	38.44	32.00	47.61	28.00	45.83	33.87	47.71
11. Have you had apply biological control against larval stages of dengue mosquitoes?	18.75	40.31	24.14	43.55	36.00	48.99	8.33	28.23	24.19	43.18
Overall Summary	**61.93**	**34.40**	**60.01**	**31.70**	**63.64**	**31.01**	**54.62**	**37.88**	**64.46**	**28.12**

Health Risk: Dengue Practice SUMMARY . . . *continued*

Questions	Candau-ay		Batinguel		Overall	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
1. Do you clean your immediate surroundings and empty from the following usual mosquito breeding sites?	77.78	41.87	97.37	16.22	82.25	25.16
2. Do you clean your immediate surroundings and empty from the following unusual/uncommon mosquito breeding Sites?	76.39	42.77	84.21	36.95	85.92	5.44
3. Do you make sure that your home is airy, bright, and safe from moisture?	66.20	47.64	81.58	39.29	84.21	13.12
4. Do you have fixed net on doors and windows?	5.63	23.22	18.42	39.29	12.29	9.69
5. Do you close the overhead tanks after using?	58.33	49.65	76.32	43.09	68.25	14.04
6. Do you keep your water in water containers for a week?	95.83	20.12	94.74	22.63	87.37	7.54
7. Do you let water to accumulate inside and outside your home?	93.06	25.60	89.47	31.10	84.59	8.45
8. Do you let water to stay in the flower pots or vases for a week?	100.00	0.00	97.37	16.22	91.62	6.14
9. Have you had fogging activities in your home or community?	26.39	44.38	39.47	49.54	37.52	12.22

Questions	Candau-ay		Batinguel		Overall	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
10. Have you had apply chemical control against larval stages of dengue mosquitoes?	15.28	36.23	28.95	45.96	28.84	11.74
11. Have you had apply biological control against larval stages of dengue mosquitoes?	15.28	36.23	10.53	31.10	18.46	10.12
Overall Summary	**57.29**	**35.51**	**65.31**	**33.82**	**61.94**	**31.00**

Appendix 7 LOCAL GOVERNMENT UNITS and NON-GOVERNMENTAL ORGANIZATION MATRIX (SUMMARY)

In this appendix the results of the survey from the Local Government Units (LGU's) and Non-governmental Organizations (NGO's) in terms of the following is presented as follows:

1. Governance
2. Sustainable Community Livelihood
3. The River's Natural Resources and Natural Features Management
4. Land Use Management and Structural Design
5. Post-Risk Assessment and Integration
6. Warning and Evacuation
7. Emergency Response
8. Disaster Recovery

LOCAL GOVERNMENT UNITS and NON-GOVERNMENTAL ORGANIZATION MATRIX (SUMMARY)

Local Government Unit/NGO	BENCHMARK									
	A. Governance		B. Society and Economy		C. The River's Natural Resource and Natural Features' Management		D. Land Use and Management and Structural Design		E. Risk Knowledge	
	Average	Percent	Average	Percent	Average	Percent	Average	Percent	Average	Percent
Poblacion 1 (Tinago)	3.23	64.67	2.88	57.50	3.13	62.50	3.09	62.34	3.41	63.33
Poblacion 2 (Lukewright)	2.30	46.00	2.00	40.00	2.38	47.50	2.69	54.69	2.56	48.67
Poblacion 8	3.00	60.00	2.38	47.50	2.13	42.50	2.66	56.41	2.97	51.31
Tabuc-tubig	2.58	51.67	1.88	37.50	1.50	30.00	1.85	38.75	2.13	45.63
Calindagan	4.33	86.67	4.00	80.00	4.25	85.00	4.31	87.81	4.44	90.25
Taclobo	3.25	65.00	2.88	57.50	2.88	57.50	2.45	46.25	2.88	58.31
Bagacay	3.65	73.00	3.38	67.50	3.50	70.00	2.95	56.25	3.91	66.91
Junob	3.85	77.00	3.13	62.50	3.38	67.50	3.56	71.56	3.56	71.40
Batinguel	3.12	62.33	3.25	65.00	3.13	62.50	3.08	61.88	3.38	65.67
Cadawinonan	3.57	71.33	3.13	62.50	3.63	72.50	3.03	58.28	3.09	63.06
Balugo	2.85	57.00	2.38	47.50	2.38	47.50	2.04	38.44	2.13	46.64
Candau-ay	3.48	69.67	3.25	65.00	3.63	72.50	3.43	68.13	3.59	69.13
PDRRMC	4.00	80.00	3.75	75.00	3.00	60.00	3.11	62.81	4.00	73.32
DRRMC	3.50	70.00	3.25	65.00	4.00	80.00	4.10	82.50	3.00	70.71
NGO	2.70	54.00	3.00	60.00	2.38	47.50	2.69	53.57	2.34	53.46
OVERALL	**3.29**	**65.89**	**2.97**	**59.33**	**3.02**	**60.33**	**3.00**	**59.98**	**3.16**	**62.52**

LOCAL GOVERNMENT UNITS and NON-GOVERNMENTAL ORGANIZATION MATRIX (SUMMARY) … continued

Local Government Unit/NGO	BENCHMARK						OVERALL	
	F. Warning and Evacuation		G. Emergency Response		H. Disaster Recovery			
	Average	Percent	Average	Percent	Average	Percent	Average	Percent
Poblacion 1 (Tinago)	3.50	70.00	3.25	65.00	2.85	45.00	3.17	63.33
Poblacion 2 (Lukewright)	3.00	60.00	2.63	52.50	1.92	30.33	2.43	48.67
Poblacion 8	2.30	46.00	2.75	55.00	2.35	37.00	2.57	51.31
Tabuc-tubig	2.90	58.00	2.75	55.00	2.67	43.33	2.28	45.63
Calindagan	5.00	100.00	5.00	100.00	4.77	75.33	4.51	90.25
Taclobo	3.00	60.00	3.00	60.00	3.00	48.00	2.92	58.31
Bagacay	3.60	72.00	3.25	65.00	2.53	40.67	3.35	66.91
Junob	3.60	72.00	3.75	75.00	3.73	60.67	3.57	71.40
Batinguel	3.50	70.00	3.38	67.50	3.45	55.00	3.28	65.67
Cadawinonan	3.10	62.00	3.25	65.00	2.43	36.67	3.15	63.06
Balugo	1.90	38.00	2.63	52.50	2.37	37.33	2.33	46.64
Candau-ay	3.80	76.00	4.13	82.50	2.35	31.00	3.46	69.13
PDRRMC	3.80	76.00	4.00	80.00	3.67	61.33	3.67	73.32
DRRMC	3.40	68.00	4.00	80.00	3.03	48.67	3.54	70.71
NGO	2.70	54.00	3.06	61.25	2.51	39.17	2.67	53.46
OVERALL	**3.27**	**65.47**	**3.39**	**67.75**	**2.91**	**45.97**	**3.13**	**62.52**

LOCAL GOVERNMENT UNITS and NON-GOVERNMENTAL ORGANIZATION MATRIX

Benchmarks	LOCAL GOVERNMENT UNIT			
	Poblacion 1 (Tinago)	Poblacion 2 (Lukewright)	Poblacion 8	Tabuc-tubig
A. Governance	**3.23**	**2.30**	**3.00**	**2.58**
A1. How well are the community development policies, plans, and programs implemented and monitored?	3.00	2.50	3.00	3.00
A2. How accessible are the basic services to all sectors of society?	3.67	2.50	3.50	3.42
A2a. Water	3.50	3.00	4.00	3.50
A2b. Transportation	3.50	2.00	3.50	3.00
A2c. Communication	4.00	3.00	4.00	3.50
A2d. Security	3.50	2.50	3.00	3.50
A2e. Health services	3.50	2.00	3.50	3.50
A2f. Evacuation centers	4.00	2.50	3.00	3.50
A3. How well are the participatory collaboration mechanisms among different sectors and various levels of government used to manage for resilience?	3.50	2.50	3.00	2.50
A4. transparent, accountable, and available are the technical and financial support mechanisms to support planned	3.00	2.00	2.50	2.00
A.5 How good are we with our risk reduction efforts?	3.00	2.00	3.00	2.00
Percent Score	**64.67**	**46.00**	**60.00**	**51.67**
B. Society and Economy	**2.88**	**2.00**	**2.38**	**1.88**
B1. How well is our development policies and plans in building social capital and skills for economic diversity and self-reliance?	3.00	2.00	2.50	2.00
B2. How is the availability of diverse and environmentally sustainable livelihood in the community?	2.50	1.00	2.00	1.50

LOCAL GOVERNMENT UNITS and NON-GOVERNMENTAL ORGANIZATION MATRIX … continued

Benchmarks	LOCAL GOVERNMENT UNIT			
	Poblacion 1 (Tinago)	Poblacion 2 (Lukewright)	Poblacion 8	Tabuc-tubig
B3. How well is our technical and financial resources in promoting self-reliant communities so it would have the capacity to provide support to disaster-stricken areas?	3.00	2.50	2.50	2.00
B4. How well is our technical and financial resources in promoting stable and robust economies, reduce vulnerability to hazards, and aid in disaster recovery?	3.00	2.50	2.50	2.00
Percent Score	**57.50**	**40.00**	**47.50**	**37.50**
C. The River's Natural Resource and Natural Features' Management	**3.13**	**2.38**	**2.13**	**1.50**
C1. How well are our policies and plans implemented and monitored to effectively manage our communities along the river?	3.50	2.50	2.50	2.50
C2. How well are the protecting and maintaining our river and its natural features to reduce risk from flood hazards?	3.00	2.50	2.00	0.50
C3. How actively engaged are our communities in planning and and implementing river resource management activities?	3.00	2.00	2.00	1.00
C4. How well are our communities and local governments value and invest in management and conservation to sustain our river's natural resources and natural features?	3.00	2.50	2.00	2.00
Percent Score	**62.50**	**47.50**	**42.50**	**30.00**

LOCAL GOVERNMENT UNITS and NON-GOVERNMENTAL ORGANIZATION MATRIX … continued

Benchmarks	LOCAL GOVERNMENT UNIT			
	Poblacion 1 (Tinago)	Poblacion 2 (Lukewright)	Poblacion 8	Tabuc-tubig
D. Land Use and Management and Structural Design	**3.09**	**2.69**	**2.66**	**1.85**
D1. How well are the land use policies and building Standards that incorporate measures to reduce risks from hazards and protect sensitive habitats are established, monitored and enforced?	3.00	2.50	2.00	1.50
D2. How well are the critical infrastructures constructed to address risks from priority hazards?	3.38	2.75	3.13	3.00
D2a. Increasing capacity of our drainage system	4.00	2.50	3.50	3.00
D2b. Good runoff volume control on open retention basin, in-line basins, off-site basins, on site storage, dry ponds	1.50	1.00	3.00	1.00
D2c. Very efficient dike safety system	4.00	3.50	3.00	4.00
D2d. Very efficient bridge system	4.00	4.00	3.00	4.00
D3. How well are developers and communities incorporate risk reduction into the location and design of structures?	3.00	2.50	2.50	1.90
D3a. Existing spatial planning	3.00	3.00	3.00	3.00
D3b. Flood risk adaptive to land use	3.00	1.50	2.50	2.00
D3c. Building regulations	3.00	2.50	2.50	2.00
D3d. Building codes	3.00	2.50	2.50	1.50
D3e. Zoning ordinances	3.00	3.00	2.00	1.00
D4. How established is our education, outreach, and training programs to improve compliance with land use policies and building standards?	3.00	3.00	3.00	1.00
Percent Score	**62.34**	**54.69**	**56.41**	**38.75**

LOCAL GOVERNMENT UNITS and NON-GOVERNMENTAL ORGANIZATION MATRIX … continued

Benchmarks	LOCAL GOVERNMENT UNIT			
	Poblacion 1 (Tinago)	Poblacion 2 (Lukewright)	Poblacion 8	Tabuc-tubig
E. Risk Knowledge	**3.41**	**2.56**	**2.97**	**2.13**
E1. How well are the flood hazard risk assessments completed and routinely updated?	3.50	2.50	3.00	1.50
E2. How comprehensive is our flood hazard risk assessments to incorporate risks to all elements of resilience?	3.50	2.50	3.00	1.50
E3. How well our community participates in the hazard risk assessment process?	3.00	2.50	3.00	2.50
E4. How well are our information from risk assessment is accessible and utilized by the community and government?	3.63	2.75	2.88	3.00
E4a. Information drive-brochures	3.50	3.00	2.50	2.50
E4b. Understanding the early warning systems	3.50	3.00	2.50	3.50
E4c. Flood hazard maps	3.50	2.00	2.50	2.50
E4d. Evacuation centers	4.00	3.00	4.00	3.50
Percent Score	**68.13**	**51.25**	**59.38**	**42.50**
F. Warning and Evacuation	**3.50**	**3.00**	**2.30**	**2.90**
F1. How well is our community warning and evacuation systems, policies, plans, and procedures are in place and capable of alerting vulnerable populations in a timely manner?	4.00	3.00	2.50	2.00
F2. How well is our community flood warning system in place and maintained?	3.50	3.00	2.00	3.50
F3. How well is our community evacuation infrastructure in place and maintained?	4.00	3.00	2.50	3.00

LOCAL GOVERNMENT UNITS and NON-GOVERNMENTAL ORGANIZATION MATRIX … continued

Benchmarks	LOCAL GOVERNMENT UNIT			
	Poblacion 1 (Tinago)	Poblacion 2 (Lukewright)	Poblacion 8	Tabuc-tubig
F4. How prepared is the community to respond to hazard warnings with appropriate actions?	3.00	3.00	2.00	3.50
F5. How is the availability of our technical (services offered) and financial resources in maintaining and improving warning and evacuation systems?	3.00	3.00	2.50	2.50
Percent Score	**70.00**	**60.00**	**46.00**	**58.00**
G. Emergency Response	**3.25**	**2.63**	**2.75**	**2.75**
G1. How established are our pre-defined roles and responsibilities for immediate action at all levels.	3.50	3.00	3.00	2.50
G2. How is the availability of the basic emergency and relief services?	3.50	3.00	3.00	3.00
G3. How well are our preparedness activities (drills and simulations) are ongoing to train and educate responders?	3.00	2.00	2.00	2.50
G4. How well are the organizations and volunteers are in placed with technical (services offered) and financial resources to support emergency response activities?	3.00	2.50	3.00	3.00
Percent Score	**65.00**	**52.50**	**55.00**	**55.00**
H. Disaster Recovery	**2.85**	**1.92**	**2.35**	**2.67**
H1. How well is our disaster recovery plan pre-established that addresses economic, environmental, and social concerns of the community?	3.00	2.50	2.50	3.00
H2. How well is our disaster recovery process is monitored, and improved at periodic intervals?	3.00	2.00	2.50	3.00

LOCAL GOVERNMENT UNITS and NON-GOVERNMENTAL ORGANIZATION MATRIX … continued

Benchmarks	LOCAL GOVERNMENT UNIT			
	Poblacion 1 (Tinago)	Poblacion 2 (Lukewright)	Poblacion 8	Tabuc-tubig
H3. How well is coordination mechanisms at international, national, and local levels are pre-established for disaster recovery?	3.00	2.00	2.50	2.50
H4. How is the availability of our technical (services offered) and financial resources to support the recovery process?	2.75	2.08	2.25	2.33
H4a. Insurance scheme	1.50	2.00	1.50	3.00
H4b. Damage assessment facilitating claim procession	3.00	2.50	2.50	2.00
H4c. Reconstruction	3.00	2.00	2.00	2.00
H4d. Charitable funds	3.00	2.00	2.50	2.00
H4e. Social therapeutic measures	3.00	2.00	2.50	2.00
H4f. Rescue equipment and tools	3.00	2.00	2.50	3.00
H5. How good are we in conducting traumatic/or psychological stress debriefings?	2.50	1.00	2.00	2.50
Percent Score	**45.00**	**30.33**	**37.00**	**43.33**
AVERAGE RATING (RAW)	**3.17**	**2.43**	**2.57**	**2.28**
OVERALL ALL PERCENT SCORE	**63.33**	**48.67**	**51.31**	**45.63**

LOCAL GOVERNMENT UNITS and NON-GOVERNMENTAL ORGANIZATION MATRIX … continued

Benchmarks	LOCAL GOVERNMENT UNIT			
	Calindagan	Taclobo	Bagacay	Junob
A. Governance	**4.33**	**3.25**	**3.65**	**3.85**
A1. How well are the community development policies, plans, and programs implemented and monitored?	4.00	3.50	2.50	3.50
A2. How accessible are the basic services to all sectors of society?	4.67	3.75	3.25	3.75
A2a. Water	4.00	4.00	3.00	3.50
A2b. Transportation	4.00	4.00	4.00	4.00
A2c. Communication	5.00	4.00	3.00	4.00
A2d. Security	5.00	3.50	3.00	3.50
A2e. Health services	5.00	3.50	4.00	4.00
A2f. Evacuation centers	5.00	3.50	2.50	3.50
A3. How well are the participatory collaboration mechanisms among different sectors and various levels of government used to manage for resilience?	4.00	3.00	3.50	4.00
A4. transparent, accountable, and available are the technical and financial support mechanisms to support planned	4.00	3.00	4.00	4.00
A.5 How good are we with our risk reduction efforts?	5.00	3.00	5.00	4.00
Percent Score	**86.67**	**65.00**	**73.00**	**77.00**
B. Society and Economy	**4.00**	**2.88**	**3.38**	**3.13**
B1. How well is our development policies and plans in building social capital and skills for economic diversity and self-reliance?	4.00	3.00	3.00	3.00
B2. How is the availability of diverse and environmentally sustainable livelihood in the community?	4.00	2.50	3.00	3.00

LOCAL GOVERNMENT UNITS and NON-GOVERNMENTAL ORGANIZATION MATRIX … continued

Benchmarks	LOCAL GOVERNMENT UNIT			
	Calindagan	Taclobo	Bagacay	Junob
B3. How well is our technical and financial resources in promoting self-reliant communities so it would have the capacity to provide support to disaster-stricken areas?	4.00	3.00	4.00	3.00
B4. How well is our technical and financial resources in promoting stable and robust economies, reduce vulnerability to hazards, and aid in disaster recovery?	4.00	3.00	3.50	3.50
Percent Score	**80.00**	**57.50**	**67.50**	**62.50**
C. The River's Natural Resource and Natural Features' Management	**4.25**	**2.88**	**3.50**	**3.38**
C1. How well are our policies and plans implemented and monitored to effectively manage our communities along the river?	5.00	2.50	4.00	3.50
C2. How well are the protecting and maintaining our river and its natural features to reduce risk from flood hazards?	4.00	3.00	3.50	3.00
C3. How actively engaged are our communities in planning and and implementing river resource management activities?	4.00	3.00	3.50	3.50
C4. How well are our communities and local governments value and invest in management and conservation to sustain our river's natural resources and natural features?	4.00	3.00	3.00	3.50
Percent Score	**85.00**	**57.50**	**70.00**	**67.50**

LOCAL GOVERNMENT UNITS and NON-GOVERNMENTAL ORGANIZATION MATRIX … continued

Benchmarks	LOCAL GOVERNMENT UNIT			
	Calindagan	Taclobo	Bagacay	Junob
D. Land Use and Management and Structural Design	**4.31**	**2.45**	**2.95**	**3.56**
D1. How well are the land use policies and building Standards that incorporate measures to reduce risks from hazards and protect sensitive habitats are established, monitored and enforced?	4.00	3.00	3.50	3.50
D2. How well are the critical infrastructures constructed to address risks from priority hazards?	4.25	2.50	2.50	3.75
D2a. Increasing capacity of our drainage system	4.00	3.00	2.50	4.00
D2b. Good runoff volume control on open retention basin, in-line basins, off-site basins, on site storage, dry ponds	4.00	3.00	2.50	3.50
D2c. Very efficient dike safety system	4.00	2.00	3.00	4.00
D2d. Very efficient bridge system	5.00	2.00	2.00	3.50
D3. How well are developers and communities incorporate risk reduction into the location and design of structures?	4.00	2.80	2.80	3.50
D3a. Existing spatial planning	4.00	3.00	3.50	4.00
D3b. Flood risk adaptive to land use	4.00	2.50	3.00	3.50
D3c. Building regulations	4.00	3.50	3.00	3.00
D3d. Building codes	4.00	2.50	2.50	3.00
D3e. Zoning ordinances	4.00	2.50	2.00	4.00
D4. How established is our education, outreach, and training programs to improve compliance with land use policies and building standards?	5.00	1.50	3.00	3.50
Percent Score	**87.81**	**46.25**	**56.25**	**71.56**

LOCAL GOVERNMENT UNITS and NON-GOVERNMENTAL ORGANIZATION MATRIX … continued

Benchmarks	LOCAL GOVERNMENT UNIT			
	Calindagan	Taclobo	Bagacay	Junob
E. Risk Knowledge	**4.44**	**2.88**	**3.91**	**3.56**
E1. How well are the flood hazard risk assessments completed and routinely updated?	5.00	3.00	4.00	3.50
E2. How comprehensive is our flood hazard risk assessments to incorporate risks to all elements of resilience?	4.00	3.00	3.50	3.50
E3. How well our community participates in the hazard risk assessment process?	4.00	3.00	4.50	3.50
E4. How well are our information from risk assessment is accessible and utilized by the community and government?	4.75	2.50	3.63	3.75
E4a. Information drive-brochures	5.00	0.00	3.50	3.50
E4b. Understanding the early warning systems	5.00	3.00	4.00	4.00
E4c. Flood hazard maps	4.00	3.50	4.50	4.00
E4d. Evacuation centers	5.00	3.50	2.50	3.50
Percent Score	**88.75**	**57.50**	**78.13**	**71.25**
F. Warning and Evacuation	**5.00**	**3.00**	**3.60**	**3.60**
F1. How well is our community warning and evacuation systems, policies, plans, and procedures are in place and capable of alerting vulnerable populations in a timely manner?	5.00	3.00	3.50	4.00
F2. How well is our community flood warning system in place and maintained?	5.00	3.00	3.50	3.50
F3. How well is our community evacuation infrastructure in place and maintained?	5.00	3.00	3.50	3.00

LOCAL GOVERNMENT UNITS and NON-GOVERNMENTAL ORGANIZATION MATRIX … continued

Benchmarks	LOCAL GOVERNMENT UNIT			
	Calindagan	Taclobo	Bagacay	Junob
F4. How prepared is the community to respond to hazard warnings with appropriate actions?	5.00	3.00	4.00	4.00
F5. How is the availability of our technical (services offered) and financial resources in maintaining and improving warning and evacuation systems?	5.00	3.00	3.50	3.50
Percent Score	**100.00**	**60.00**	**72.00**	**72.00**
G. Emergency Response	**5.00**	**3.00**	**3.25**	**3.75**
G1. How established are our pre-defined roles and responsibilities for immediate action at all levels.	5.00	3.00	3.00	4.00
G2. How is the availability of the basic emergency and relief services?	5.00	3.00	3.50	3.50
G3. How well are our preparedness activities (drills and simulations) are ongoing to train and educate responders?	5.00	3.00	4.00	4.00
G4. How well are the organizations and volunteers are in placed with technical (services offered) and financial resources to support emergency response activities?	5.00	3.00	2.50	3.50
Percent Score	**100.00**	**60.00**	**65.00**	**75.00**
H. Disaster Recovery	**4.77**	**3.00**	**2.53**	**3.73**
H1. How well is our disaster recovery plan pre-established that addresses economic, environmental, and social concerns of the community?	5.00	3.00	2.50	3.50
H2. How well is our disaster recovery process is monitored, and improved at periodic intervals?	5.00	3.00	2.50	4.00

LOCAL GOVERNMENT UNITS and NON-GOVERNMENTAL ORGANIZATION MATRIX … continued

Benchmarks	LOCAL GOVERNMENT UNIT			
	Calindagan	Taclobo	Bagacay	Junob
H3. How well is coordination mechanisms at international, national, and local levels are pre-established for disaster recovery?	5.00	3.00	2.50	3.50
H4. How is the availability of our technical (services offered) and financial resources to support the recovery process?	4.83	3.00	2.67	3.67
H4a. Insurance scheme	5.00	3.00	2.50	2.00
H4b. Damage assessment facilitating claim procession	5.00	3.00	2.50	4.00
H4c. Reconstruction	4.00	3.00	2.50	4.00
H4d. Charitable funds	5.00	3.00	2.50	4.00
H4e. Social therapeutic measures	5.00	3.00	3.00	4.00
H4f. Rescue equipment and tools	5.00	3.00	3.00	4.00
H5. How good are we in conducting traumatic/or psychological stress debriefings?	4.00	3.00	2.50	4.00
Percent Score	**75.33**	**48.00**	**40.67**	**60.67**
AVERAGE RATING (RAW)	**4.51**	**2.92**	**3.35**	**3.57**
OVERALL ALL PERCENT SCORE	**90.25**	**58.31**	**66.91**	**71.40**

LOCAL GOVERNMENT UNITS and NON-GOVERNMENTAL ORGANIZATION MATRIX … continued

Benchmarks	LOCAL GOVERNMENT UNIT			
	Batinguel	Cadawinonan	Balugo	Candau-ay
A. Governance	**3.12**	**3.57**	**2.85**	**3.48**
A1. How well are the community development policies, plans, and programs implemented and monitored?	3.00	3.50	3.50	3.50
A2. How accessible are the basic services to all sectors of society?	3.58	3.83	3.25	3.92
A2a. Water	4.00	4.00	3.50	3.50
A2b. Transportation	4.00	4.00	3.50	4.50
A2c. Communication	3.50	4.00	3.50	4.50
A2d. Security	3.00	3.50	3.00	3.50
A2e. Health services	3.50	3.50	3.50	4.00
A2f. Evacuation centers	3.50	4.00	2.50	3.50
A3. How well are the participatory collaboration mechanisms among different sectors and various levels of government used to manage for resilience?	3.00	3.50	3.00	3.50
A4. transparent, accountable, and available are the technical and financial support mechanisms to support planned	3.00	3.50	2.00	3.00
A.5 How good are we with our risk reduction efforts?	3.00	3.50	2.50	3.50
Percent Score	**62.33**	**71.33**	**57.00**	**69.67**
B. Society and Economy	**3.25**	**3.13**	**2.38**	**3.25**
B1. How well is our development policies and plans in building social capital and skills for economic diversity and self-reliance?	3.00	3.50	2.50	3.00
B2. How is the availability of diverse and environmentally sustainable livelihood in the community?	3.00	2.50	2.50	3.50

LOCAL GOVERNMENT UNITS and NON-GOVERNMENTAL ORGANIZATION MATRIX … continued

Benchmarks	LOCAL GOVERNMENT UNIT			
	Batinguel	Cadawinonan	Balugo	Candau-ay
B3. How well is our technical and financial resources in promoting self-reliant communities so it would have the capacity to provide support to disaster-stricken areas?	3.50	3.50	2.00	3.00
B4. How well is our technical and financial resources in promoting stable and robust economies, reduce vulnerability to hazards, and aid in disaster recovery?	3.50	3.00	2.50	3.50
Percent Score	**65.00**	**62.50**	**47.50**	**65.00**
C. The River's Natural Resource and Natural Features' Management	**3.13**	**3.63**	**2.38**	**3.63**
C1. How well are our policies and plans implemented and monitored to effectively manage our communities along the river?	3.50	3.50	3.00	4.00
C2. How well are the protecting and maintaining our river and its natural features to reduce risk from flood hazards?	3.00	3.50	3.00	3.50
C3. How actively engaged are our communities in planning and and implementing river resource management activities?	3.00	4.00	1.50	3.50
C4. How well are our communities and local governments value and invest in management and conservation to sustain our river's natural resources and natural features?	3.00	3.50	2.00	3.50
Percent Score	**62.50**	**72.50**	**47.50**	**72.50**

LOCAL GOVERNMENT UNITS and NON-GOVERNMENTAL ORGANIZATION MATRIX … continued

Benchmarks	LOCAL GOVERNMENT UNIT			
	Batinguel	Cadawinonan	Balugo	Candau-ay
D. Land Use and Management and Structural Design	**3.08**	**3.03**	**2.04**	**3.43**
D1. How well are the land use policies and building Standards that incorporate measures to reduce risks from hazards and protect sensitive habitats are established, monitored and enforced?	3.00	3.50	2.50	3.50
D2. How well are the critical infrastructures constructed to address risks from priority hazards?	3.00	2.63	2.25	3.00
D2a. Increasing capacity of our drainage system	3.50	3.00	3.00	4.00
D2b. Good runoff volume control on open retention basin, in-line basins, off-site basins, on site storage, dry ponds	2.50	3.00	0.00	2.00
D2c. Very efficient dike safety system	3.00	2.00	3.00	3.00
D2d. Very efficient bridge system	3.00	2.50	3.00	3.00
D3. How well are developers and communities incorporate risk reduction into the location and design of structures?	3.30	3.00	1.40	3.20
D3a. Existing spatial planning	3.00	3.00	2.00	3.00
D3b. Flood risk adaptive to land use	3.00	2.50	2.00	3.50
D3c. Building regulations	3.50	3.00	1.00	3.50
D3d. Building codes	3.50	3.00	1.00	3.00
D3e. Zoning ordinances	3.50	3.50	1.00	3.00
D4. How established is our education, outreach, and training programs to improve compliance with land use policies and building standards?	3.00	3.00	2.00	4.00
Percent Score	**61.88**	**58.28**	**38.44**	**68.13**

LOCAL GOVERNMENT UNITS and NON-GOVERNMENTAL ORGANIZATION MATRIX … continued

Benchmarks	LOCAL GOVERNMENT UNIT			
	Batinguel	Cadawinonan	Balugo	Candau-ay
E. Risk Knowledge	**3.38**	**3.09**	**2.13**	**3.59**
E1. How well are the flood hazard risk assessments completed and routinely updated?	3.50	3.00	2.00	3.50
E2. How comprehensive is our flood hazard risk assessments to incorporate risks to all elements of resilience?	3.00	3.00	2.00	3.00
E3. How well our community participates in the hazard risk assessment process?	3.50	3.00	2.00	4.50
E4. How well are our information from risk assessment is accessible and utilized by the community and government?	3.50	3.38	2.50	3.38
E4a. Information drive-brochures	4.00	3.50	2.50	3.00
E4b. Understanding the early warning systems	3.50	3.00	2.50	3.50
E4c. Flood hazard maps	3.00	3.00	3.00	3.50
E4d. Evacuation centers	3.50	4.00	2.00	3.50
Percent Score	**67.50**	**61.88**	**42.50**	**71.88**
F. Warning and Evacuation	**3.50**	**3.10**	**1.90**	**3.80**
F1. How well is our community warning and evacuation systems, policies, plans, and procedures are in place and capable of alerting vulnerable populations in a timely manner?	3.50	3.00	3.00	4.50
F2. How well is our community flood warning system in place and maintained?	3.50	2.50	1.50	4.00
F3. How well is our community evacuation infrastructure in place and maintained?	4.00	3.50	2.00	3.50

LOCAL GOVERNMENT UNITS and NON-GOVERNMENTAL ORGANIZATION MATRIX … continued

Benchmarks	LOCAL GOVERNMENT UNIT			
	Batinguel	Cadawinonan	Balugo	Candau-ay
F4. How prepared is the community to respond to hazard warnings with appropriate actions?	3.50	3.50	1.50	3.50
F5. How is the availability of our technical (services offered) and financial resources in maintaining and improving warning and evacuation systems?	3.00	3.00	1.50	3.50
Percent Score	**70.00**	**62.00**	**38.00**	**76.00**
G. Emergency Response	**3.38**	**3.25**	**2.63**	**4.13**
G1. How established are our pre-defined roles and responsibilities for immediate action at all levels.	3.00	3.50	2.50	4.00
G2. How is the availability of the basic emergency and relief services?	3.50	3.50	3.00	4.00
G3. How well are our preparedness activities (drills and simulations) are ongoing to train and educate responders?	3.50	2.50	2.50	4.50
G4. How well are the organizations and volunteers are in placed with technical (services offered) and financial resources to support emergency response activities?	3.50	3.50	2.50	4.00
Percent Score	**67.50**	**65.00**	**52.50**	**82.50**
H. Disaster Recovery	**3.45**	**2.43**	**2.37**	**2.35**
H1. How well is our disaster recovery plan pre-established that addresses economic, environmental, and social concerns of the community?	3.50	2.50	2.50	3.50
H2. How well is our disaster recovery process is monitored, and improved at periodic intervals?	3.00	2.50	2.00	3.50

LOCAL GOVERNMENT UNITS and NON-GOVERNMENTAL ORGANIZATION MATRIX … continued

Benchmarks	LOCAL GOVERNMENT UNIT			
	Batinguel	Cadawinonan	Balugo	Candau-ay
H3. How well is coordination mechanisms at international, national, and local levels are pre-established for disaster recovery?	3.50	3.00	2.50	4.00
H4. How is the availability of our technical (services offered) and financial resources to support the recovery process?	3.75	2.17	2.33	0.75
H4a. Insurance scheme	3.50	1.00	2.50	0.00
H4b. Damage assessment facilitating claim procession	3.50	1.50	2.50	0.00
H4c. Reconstruction	4.00	2.50	2.00	0.00
H4d. Charitable funds	4.00	3.00	2.50	0.00
H4e. Social therapeutic measures	3.50	2.50	2.00	1.50
H4f. Rescue equipment and tools	4.00	2.50	2.50	3.00
H5. How good are we in conducting traumatic/or psychological stress debriefings?	3.50	2.00	2.50	0.00
Percent Score	**55.00**	**36.67**	**37.33**	**31.00**
AVERAGE RATING (RAW)	**3.28**	**3.15**	**2.33**	**3.46**
OVERALL ALL PERCENT SCORE	**65.67**	**63.06**	**46.64**	**69.13**

LOCAL GOVERNMENT UNITS and NON-GOVERNMENTAL ORGANIZATION MATRIX … continued

Benchmarks	LGU/NON-GOVERNMENTAL ORGANIZATION			Overall
	PDRRMC	DRRMC	NGO	
A. Governance	**4.00**	**3.50**	**2.70**	**3.29**
A1. How well are the community development policies, plans, and programs implemented and monitored?	4.00	3.00	2.50	3.20
A2. How accessible are the basic services to all sectors of society?	4.00	3.50	3.00	3.57
A2a. Water	4.00	4.00	3.33	3.66
A2b. Transportation	4.00	3.00	3.50	3.63
A2c. Communication	4.00	4.00	3.25	3.82
A2d. Security	4.00	3.00	2.67	3.34
A2e. Health services	4.00	3.00	3.00	3.57
A2f. Evacuation centers	4.00	4.00	2.25	3.42
A3. How well are the participatory collaboration mechanisms among different sectors and various levels of government used to manage for resilience?	4.00	3.00	2.50	3.23
A4. transparent, accountable, and available are the technical and financial support mechanisms to support planned	4.00	4.00	2.75	3.12
A.5 How good are we with our risk reduction efforts?	4.00	4.00	2.75	3.35
Percent Score	**80.00**	**70.00**	**54.00**	**65.89**
B. Society and Economy	**3.75**	**3.25**	**3.00**	**2.97**
B1. How well is our development policies and plans in building social capital and skills for economic diversity and self-reliance?	4.00	3.00	3.33	2.99
B2. How is the availability of diverse and environmentally sustainable livelihood in the community?	3.00	3.00	3.00	2.67

LOCAL GOVERNMENT UNITS and NON-GOVERNMENTAL ORGANIZATION MATRIX … continued

Benchmarks	LGU/NON-GOVERNMENTAL ORGANIZATION			Overall
	PDRRMC	DRRMC	NGO	
B3. How well is our technical and financial resources in promoting self-reliant communities so it would have the capacity to provide support to disaster-stricken areas?	4.00	4.00	3.00	3.13
B4. How well is our technical and financial resources in promoting stable and robust economies, reduce vulnerability to hazards, and aid in disaster recovery?	4.00	3.00	2.67	3.08
Percent Score	**75.00**	**65.00**	**60.00**	**59.33**
C. The River's Natural Resource and Natural Features' Management	**3.00**	**4.00**	**2.38**	**3.02**
C1. How well are our policies and plans implemented and monitored to effectively manage our communities along the river?	3.00	4.00	2.25	3.28
C2. How well are the protecting and maintaining our river and its natural features to reduce risk from flood hazards?	3.00	4.00	2.25	2.92
C3. How actively engaged are our communities in planning and and implementing river resource management activities?	3.00	4.00	2.50	2.90
C4. How well are our communities and local governments value and invest in management and conservation to sustain our river's natural resources and natural features?	3.00	4.00	2.50	2.97
Percent Score	**60.00**	**80.00**	**47.50**	**60.33**

LOCAL GOVERNMENT UNITS and NON-GOVERNMENTAL ORGANIZATION MATRIX … continued

Benchmarks	LGU/NON-GOVERNMENTAL ORGANIZATION			Overall
	PDRRMC	DRRMC	NGO	
D. Land Use and Management and Structural Design	**3.11**	**4.10**	**2.69**	**3.00**
D1. How well are the land use policies and building Standards that incorporate measures to reduce risks from hazards and protect sensitive habitats are established, monitored and enforced?	3.00	4.00	2.75	3.02
D2. How well are the critical infrastructures constructed to address risks from priority hazards?	3.25	4.00	2.44	3.05
D2a. Increasing capacity of our drainage system	4.00	4.00	2.50	3.37
D2b. Good runoff volume control on open retention basin, in-line basins, off-site basins, on site storage, dry ponds	3.00	3.00	2.25	2.35
D2c. Very efficient dike safety system	3.00	4.00	2.50	3.20
D2d. Very efficient bridge system	3.00	5.00	2.50	3.30
D3. How well are developers and communities incorporate risk reduction into the location and design of structures?	3.20	4.40	2.58	2.94
D3a. Existing spatial planning	4.00	4.00	2.33	3.19
D3b. Flood risk adaptive to land use	3.00	4.00	2.25	2.82
D3c. Building regulations	3.00	4.00	2.33	2.92
D3d. Building codes	3.00	5.00	3.00	2.87
D3e. Zoning ordinances	3.00	5.00	3.00	2.90
D4. How established is our education, outreach, and training programs to improve compliance with land use policies and building standards?	3.00	4.00	3.00	3.00
Percent Score	**62.81**	**82.50**	**53.57**	**59.98**

LOCAL GOVERNMENT UNITS and NON-GOVERNMENTAL ORGANIZATION MATRIX … continued

Benchmarks	LGU/NON-GOVERNMENTAL ORGANIZATION			Overall
	PDRRMC	DRRMC	NGO	
E. Risk Knowledge	**4.00**	**3.00**	**2.34**	**3.16**
E1. How well are the flood hazard risk assessments completed and routinely updated?	4.00	3.00	2.25	3.15
E2. How comprehensive is our flood hazard risk assessments to incorporate risks to all elements of resilience?	4.00	3.00	2.75	3.02
E3. How well our community participates in the hazard risk assessment process?	4.00	3.00	2.25	3.22
E4. How well are our information from risk assessment is accessible and utilized by the community and government?	4.00	3.00	2.13	3.25
E4a. Information drive-brochures	4.00	3.00	2.50	3.07
E4b. Understanding the early warning systems	4.00	3.00	1.25	3.28
E4c. Flood hazard maps	4.00	3.00	2.25	3.22
E4d. Evacuation centers	4.00	3.00	2.50	3.43
Percent Score	**80.00**	**60.00**	**46.88**	**63.17**
F. Warning and Evacuation	**3.80**	**3.40**	**2.70**	**3.27**
F1. How well is our community warning and evacuation systems, policies, plans, and procedures are in place and capable of alerting vulnerable populations in a timely manner?	4.00	4.00	2.75	3.45
F2. How well is our community flood warning system in place and maintained?	4.00	3.00	1.75	3.15
F3. How well is our community evacuation infrastructure in place and maintained?	3.00	3.00	2.50	3.23

LOCAL GOVERNMENT UNITS and NON-GOVERNMENTAL ORGANIZATION MATRIX … continued

Benchmarks	LGU/NON-GOVERNMENTAL ORGANIZATION			Overall
	PDRRMC	DRRMC	NGO	
F4. How prepared is the community to respond to hazard warnings with appropriate actions?	4.00	4.00	3.00	3.37
F5. How is the availability of our technical (services offered) and financial resources in maintaining and improving warning and evacuation systems?	4.00	3.00	3.50	3.17
Percent Score	**76.00**	**68.00**	**54.00**	**65.47**
G. Emergency Response	**4.00**	**4.00**	**3.06**	**3.39**
G1. How established are our pre-defined roles and responsibilities for immediate action at all levels.	4.00	4.00	2.50	3.37
G2. How is the availability of the basic emergency and relief services?	4.00	4.00	3.00	3.50
G3. How well are our preparedness activities (drills and simulations) are ongoing to train and educate responders?	4.00	4.00	3.25	3.32
G4. How well are the organizations and volunteers are in placed with technical (services offered) and financial resources to support emergency response activities?	4.00	4.00	3.50	3.37
Percent Score	**80.00**	**80.00**	**61.25**	**67.75**
H. Disaster Recovery	**3.67**	**3.03**	**2.51**	**2.91**
H1. How well is our disaster recovery plan pre-established that addresses economic, environmental, and social concerns of the community?	4.00	3.00	2.25	3.08
H2. How well is our disaster recovery process is monitored, and improved at periodic intervals?	4.00	3.00	2.25	3.02

LOCAL GOVERNMENT UNITS and NON-GOVERNMENTAL ORGANIZATION MATRIX … continued

Benchmarks	LGU/NON-GOVERNMENTAL ORGANIZATION			Overall
	PDRRMC	DRRMC	NGO	
H3. How well is coordination mechanisms at international, national, and local levels are pre-established for disaster recovery?	3.00	3.00	2.75	3.05
H4. How is the availability of our technical (services offered) and financial resources to support the recovery process?	3.33	3.17	2.79	2.79
H4a. Insurance scheme	3.00	3.00	2.00	2.37
H4b. Damage assessment facilitating claim procession	3.00	3.00	2.50	2.70
H4c. Reconstruction	4.00	4.00	3.25	2.82
H4d. Charitable funds	3.00	3.00	3.25	2.85
H4e. Social therapeutic measures	3.00	3.00	2.75	2.85
H4f. Rescue equipment and tools	4.00	3.00	3.00	3.17
H5. How good are we in conducting traumatic/or psychological stress debriefings?	4.00	3.00	2.50	2.60
Percent Score	**61.33**	**48.67**	**39.17**	**45.97**
AVERAGE RATING (RAW)	**3.67**	**3.54**	**2.67**	**3.13**
OVERALL ALL PERCENT SCORE	**73.32**	**70.71**	**53.46**	**62.52**

APPENDIX 8 Assessment on Flood Resilience and Health Program the Local Government Units and NGO's

The appendix presents the results from the household respondents on the assessment on flood resilience and health programs administered and facilitated by the LGU's and NGO's.

Assessment on Flood Resilience and Health Program the Local Government Units and NGO's

Items	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
1. The implementation and monitoring of the policies, plans, and programs for the different natural calamities particularly typhoon and flooding events.	4.40	0.70	3.50	1.32	3.77	1.02	3.65	1.40	3.65	1.22
2. The transparency and trustworthiness of the LGU in terms of the facilitation and distribution of the budget and donations for the affected population in the community.	4.60	0.84	3.13	1.50	3.45	1.30	3.00	1.45	2.65	1.46
3. For the livelihood or financial aid for the community people to recover again from such calamity.	3.80	1.23	3.06	1.44	3.45	1.18	2.91	1.68	2.31	1.58
4. For the programs and policies in saving and protecting the BANICA River.	3.70	1.25	3.06	1.57	3.55	1.18	3.23	1.48	2.41	1.12
5. The cooperation of the community people including you in protecting the Banica river.	4.30	0.82	3.50	1.32	3.76	0.94	3.57	1.27	3.35	0.86
6. The drainage systems	3.20	1.62	2.44	1.50	3.55	1.34	3.26	1.42	2.59	1.62
7. The dike systems	3.10	1.37	3.19	1.38	3.73	1.03	3.41	1.37	3.24	1.48
8. The bridge systems	4.20	1.14	3.31	1.25	4.05	1.00	3.48	1.27	3.07	1.22
9. The flood hazard maps	3.50	1.43	3.00	1.26	3.57	1.16	3.35	1.19	3.24	1.03

Assessment on Flood Resilience and Health Program the Local Government Units and NGO's . . . continued

Items	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
10. The use of backhoe in cleaning the Banica river especially when the normal flow is blocked.	3.90	1.20	2.88	1.54	3.05	1.25	3.09	1.31	2.94	1.68
11. The distribution of donations, goods and relief.	4.40	0.70	3.25	1.34	3.41	1.40	2.78	1.51	2.81	1.87
12. The distribution of brochures and the information drive that would increase knowledge on the negative impacts from typhoon and flooding events for the purposes of prevention and recovery.	4.10	1.20	3.38	1.45	3.50	1.14	3.43	1.38	3.24	1.15
13. Flood early warning systems	4.10	0.88	3.25	1.44	3.55	1.22	3.52	1.16	3.53	1.18
14. Preparedness and drill to increase resilience from typhoons and floods.	4.20	0.92	3.25	1.39	3.38	1.43	3.30	1.15	2.94	1.34
15. The response and preparedness of the DRRMC, PDRRMC and other NGO volunteers during rescue events.	4.00	0.82	3.75	1.24	3.62	1.16	3.87	1.06	4.06	1.14

Assessment on Flood Resilience and Health Program the Local Government Units and NGO's . . . continued

Items	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
16. The basic emergency and relief services such as food, water, sanitation, transportation, communication, medical help, provisional repairs of damaged properties.	4.10	0.99	3.06	1.53	3.68	1.21	3.57	1.20	3.88	1.17
17. The operation clean-up affected places, giving of insurances, claims, financial aids, traumatic and psychological stress debriefings.	4.50	0.71	3.25	1.48	3.64	1.22	3.13	1.52	3.24	1.56
18. The relocation sites provided by the LGU's to those who were affected from the last flooding and to those who live in the flood prone area.	4.30	0.95	3.19	1.56	3.68	1.25	3.43	1.24	3.82	1.01
19. The health programs for diarrhea and Liptospirosis such as medical help, information drive and among others so outbreaks can be prevented.	4.30	0.95	3.31	1.30	3.55	1.26	3.35	1.19	3.18	1.19

Assessment on Flood Resilience and Health Program the Local Government Units and NGO's . . . continued

Items	Tabuc-tubig		Junob		Poblacion 1		Calindagan		Balugo	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
20. The different prevention and control programs for Dengue Fever infection such as fogging, chemical/biological control, information drive brochures, lectures, clean-up and other similar means at the community level.	4.40	0.84	3.63	1.36	3.64	1.14	3.43	1.44	3.47	1.07
Overall										
Mean Score	81.10	13.79	64.38	23.92	70.91	20.59	66.48	21.97	62.94	19.92
Mean Percent Score	81.10	13.79	64.38	23.92	70.91	20.59	66.48	21.97	62.94	19.92

Assessment on Flood Resilience and Health Program the Local Government Units and NGO's . . . continued

Items	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
1. The implementation and monitoring of the policies, plans, and programs for the different natural calamities particularly typhoon and flooding events.	3.81	1.05	3.45	1.18	3.64	1.11	3.77	1.19	3.59	1.13
2. The transparency and trustworthiness of the LGU in terms of the facilitation and distribution of the budget and donations for the affected population in the community.	2.88	1.26	3.10	1.23	3.44	1.39	3.10	1.37	3.33	1.19
3. For the livelihood or financial aid for the community people to recover again from such calamity.	2.81	1.42	3.28	1.36	3.13	1.39	3.20	1.32	3.08	1.17
4. For the programs and policies in saving and protecting the BANICA River.	3.00	1.36	3.46	1.23	3.50	1.35	3.37	1.45	3.29	1.21
5. The cooperation of the community people including you in protecting the Banica river.	3.44	1.21	3.52	1.09	3.64	1.11	3.43	1.14	3.56	1.07
6. The drainage systems	3.19	1.33	3.28	1.36	3.24	1.42	3.28	1.13	3.17	1.16
7. The dike systems	3.25	1.13	3.32	1.22	3.52	1.33	3.57	1.17	3.16	1.02
8. The bridge systems	3.38	1.20	3.61	1.07	3.52	1.23	3.50	0.94	3.16	1.00

Assessment on Flood Resilience and Health Program the Local Government Units and NGO's . . . continued

Items	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
9. The flood hazard maps	3.25	1.18	3.48	1.12	3.52	1.16	3.24	0.99	3.08	1.06
10. The use of backhoe in cleaning the Banica river especially when the normal flow is blocked.	2.63	1.31	3.17	1.39	3.16	1.40	3.24	1.38	2.98	1.16
11. The distribution of donations, goods and relief.	3.00	1.26	3.41	1.40	3.44	1.47	3.17	1.21	3.24	1.25
12. The distribution of brochures and the information drive that would increase knowledge on the negative impacts from typhoon and flooding events for the purposes of prevention and recovery.	3.00	1.37	3.66	1.04	3.50	1.32	3.37	1.13	3.41	1.17
13. Flood early warning systems	3.44	1.15	3.66	1.14	3.79	1.06	3.23	1.28	3.27	1.12
14. Preparedness and drill to increase resilience from typhoons and floods.	3.25	1.39	3.41	1.38	3.54	1.50	3.30	1.39	3.16	1.19
15. The response and preparedness of the DRRMC, PDRRMC and other NGO volunteers during rescue events.	3.86	0.86	4.04	0.84	3.78	1.20	4.21	0.74	3.79	1.00

Assessment on Flood Resilience and Health Program the Local Government Units and NGO's . . . continued

Items	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
16. The basic emergency and relief services such as food, water, sanitation, transportation, communication, medical help, provisional repairs of damaged properties.	3.60	1.24	3.97	0.87	3.84	0.90	3.77	0.86	3.63	1.00
17. The operation clean-up affected places, giving of insurances, claims, financial aids, traumatic and psychological stress debriefings.	3.19	1.28	3.69	1.14	3.60	1.00	3.33	1.06	3.43	1.07
18. The relocation sites provided by the LGU's to those who were affected from the last flooding and to those who live in the flood prone area.	3.31	1.40	3.72	0.96	3.84	1.03	2.72	1.19	3.41	1.01
19. The health programs for diarrhea and Liptospirosis such as medical help, information drive and among others so outbreaks can be prevented.	3.31	1.25	3.56	1.01	3.92	0.86	3.53	1.01	3.40	1.01

Assessment on Flood Resilience and Health Program the Local Government Units and NGO's . . . continued

Items	Barangay 2		Poblacion 8		Cadawinonan		Bagacay		Taclobo	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
20. The different prevention and control programs for Dengue Fever infection such as fogging, chemical/biological control, information drive brochures, lectures, clean-up and other similar means at the community level.	3.31	1.25	3.79	1.08	3.92	0.91	3.90	0.80	3.75	1.03
Overall										
Mean Score	64.00	20.99	69.83	19.98	70.48	19.61	67.53	15.74	66.75	17.14
Mean Percent Score	64.00	20.99	69.83	19.98	70.48	19.61	67.53	15.74	66.75	17.14

Assessment on Flood Resilience and Health Program the Local Government Units and NGO's . . . continued

Items	Candau-ay		Batinguel		Overall	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
1. The implementation and monitoring of the policies, plans, and programs for the different natural calamities particularly typhoon and flooding events.	3.54	1.24	3.82	1.35	3.72	0.25
2. The transparency and trustworthiness of the LGU in terms of the facilitation and distribution of the budget and donations for the affected population in the community.	3.03	1.26	3.03	1.40	3.23	0.49
3. For the livelihood or financial aid for the community people to recover again from such calamity.	3.04	1.24	2.97	1.35	3.09	0.36
4. For the programs and policies in saving and protecting the BANICA River.	3.15	1.21	3.53	1.43	3.27	0.34
5. The cooperation of the community people including you in protecting the Banica river.	3.51	1.11	3.79	1.17	3.61	0.25
6. The drainage systems	2.90	1.25	3.13	1.19	3.10	0.31
7. The dike systems	3.11	1.24	3.42	1.22	3.33	0.20
8. The bridge systems	3.10	1.24	3.34	1.07	3.48	0.35
9. The flood hazard maps	2.87	1.34	3.00	1.36	3.26	0.23

Assessment on Flood Resilience and Health Program the Local Government Units and NGO's . . . continued

Items	Candau-ay		Batinguel		Overall	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
10. The use of backhoe in cleaning the Banica river especially when the normal flow is blocked.	2.94	1.46	2.71	1.37	3.06	0.32
11. The distribution of donations, goods and relief.	3.11	1.33	2.89	1.52	3.24	0.43
12. The distribution of brochures and the information drive that would increase knowledge on the negative impacts from typhoon and flooding events for the purposes of prevention and recovery.	3.32	1.11	3.26	1.35	3.43	0.27
13. Flood early warning systems	3.25	1.35	3.22	1.42	3.48	0.27
14. Preparedness and drill to increase resilience from typhoons and floods.	3.19	1.32	2.95	1.41	3.32	0.33
15. The response and preparedness of the DRRMC, PDRRMC and other NGO volunteers during rescue events.	3.86	1.04	3.71	1.29	3.88	0.17

Assessment on Flood Resilience and Health Program the Local Government Units and NGO's . . . continued

Items	Candau-ay		Batinguel		Overall	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
16. The basic emergency and relief services such as food, water, sanitation, transportation, communication, medical help, provisional repairs of damaged properties.	3.75	0.99	3.47	1.20	3.69	0.27
17. The operation clean-up affected places, giving of insurances, claims, financial aids, traumatic and psychological stress debriefings.	3.49	1.01	3.16	1.31	3.47	0.38
18. The relocation sites provided by the LGU's to those who were affected from the last flooding and to those who live in the flood prone area.	3.28	1.06	3.08	1.40	3.48	0.42
19. The health programs for diarrhea and Liptospirosis such as medical help, information drive and among others so outbreaks can be prevented.	3.31	1.02	3.24	1.26	3.50	0.32

Assessment on Flood Resilience and Health Program the Local Government Units and NGO's . . . continued

Items	Candau-ay		Batinguel		Overall	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
20. The different prevention and control programs for Dengue Fever infection such as fogging, chemical/biological control, information drive brochures, lectures, clean-up and other similar means at the community level.	3.67	1.01	3.13	1.40	3.67	0.33
Overall						
Mean Score	65.31	18.03	64.76	20.97	67.87	4.92
Mean Percent Score	65.31	18.03	64.76	20.97	67.87	4.92