ASSESSING THE IMPACTS OF FLOODS ON NON-HOME BASED BUSINESS ACTIVITIES IN BWAISE, KAMPALA.

ALPHONSE KAMUGISHA
ID: 29266
March, 2013

SUPERVISORS:
Dr. Richard Sliuzas
Dr. Dinand Alkema

ASSESSING THE IMPACTS OF FLOODS ON NON-HOME BASED BUSINESS ACTIVITIES IN BWAISE, KAMPALA.
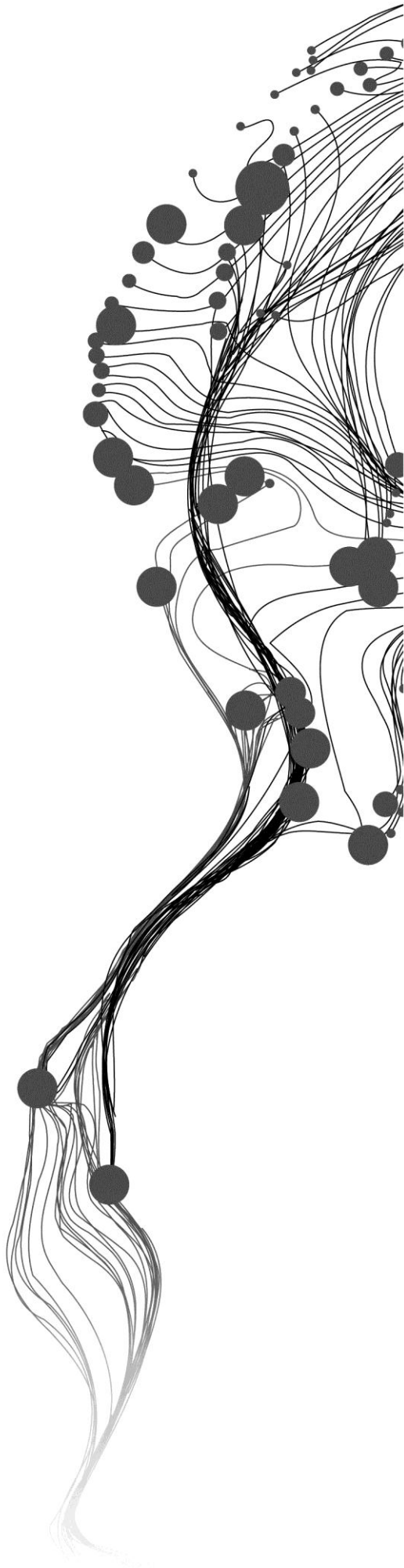
ALPHONSE KAMUGISHA
Enschede, The Netherlands, November, 2012

Thesis submitted to the Faculty of Geo-Information Science and Earth Observation of the University of Twente in partial fulfilment of the requirements for the degree of Master of Science in Geo-information Science and Earth Observation.
Specialization: Urban planning and management

SUPERVISORS:
Dr. R.V. Sliuzas
Dr. Dinand Alkema

THESIS ASSESSMENT BOARD:
Prof. dr. ir. M.F.A.M. van Maarseveen (Chair)
Ms. Ir. Saskia Ruijsink, MSc (External Examiner, IHS)
Dr. R.V. Sliuzas
Dr. Dinand Alkema

ABSTRACT

The main objective of this research was to assess the impacts of floods on non-home based business activities in Bwaise, Kamapala through the identification of business activities in the area, analysis of flood risk perceptions by the local people, assessing the vulnerability of business activities to floods in the area and identification of coping mechanisms employed by local people in dealing with flood related problems.

This research tries to explore the vulnerability to flood of business activities based on local peoples' perceptions of flood risk, experiences and knowledge on flood occurrence in the area. Through the use questionnaires, 90 business operators were interviewed and information provieded were used to analyse the effects of floods on their business activities.

Generally the results show that most of the businesss activities in the area are small scale businesses. The identiffied business activities were classified into five business classes and it was found that the most common business class is small scale shops making up to 56% of the businesses in the area. Information provided on flood occurrence revealed that the area experiences small scale localized floods. Howver it was clear that though of floods in the are not so severe, their effects on business activities are tangible based on local peoples'perceptions.

The existing coping mechanisms employed by both local people and government are discussed in this research. Though local business operators have tried the use of different mechanisms such as cleaning of drainage channels, raising foundations and entrances of the buildings etc, to minimize the effects of floods on their business activities in the area, it was found that government is doing relatively little to help the local people in dealing with floods. It can however be mentioned that the coping mechanisms in the area are not enough to address the flood issues and the cooperation between local community and the government is necesssary for proper and effective coping mechanisms in the the area.

Key words: Flood hazard, flood risk perceptions, vulnerability assessment, business activities, flood impacts, coping mechanisms.

ACKNOWLEDGEMENTS

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

IFM Kampala project: Integrated Flood Management Kampala project

UN-Habitat: The United Nations human settlements programme

CCCI: Cities and Climate Change Initiative

ASEAN: Association of Southeast Asian Nations

UNFPA: United Nations Population Fund

ISDR: International Strategy for Disaster Reduction

UNDP: United Nations Development Programme

GIS: Geographic Information Systems

KCCA: Kampala Capital City Authority

KDMP: Kampala Drainage Master Plan

BCS: Business Classification Scheme

BS: British Standards

ISO: International Standards Organisation

UGSH: Ugandan Shillings

USD: United States Dollar

Boda-Boda: Motorcycle drivers

1.   INTRODUCTION

This section presents a general overview of the flood problems and the use of flood impact assessment as an approach for better understanding of the nature of flood hazard and its adverse impacts on business activities in the affected areas. It also provides an insight into the study area Bwaise, Kampala and explains why the area is susceptible to flooding.

1.1.   Background

Floods are among the natural hazards that cause huge losses in terms of loss to buildings, infrastructure and human lives. The flood damage caused by heavy rainfalls is one of the most common natural disasters and poses a high risk to human life and social-economic development (Wang , Li , Tang, & Zeng, 2011). Flooding is becoming an increasing threat to many people living in urban areas world-wide and the impacts of floods are expected to be more severe in urban areas where people, resources, businesses and infrastructure are concentrated. This will not only affect the urban dwellers but also the social-economic activities in the urban areas (Kandilioti & Makropoulos, 2011). Though floods are a natural phenomenon, the damage and losses from floods are mainly the consequence of human action (ActionAid, 2006). Urbanisation has led to an increase in flooding occurrence through restricting where flood waters can go, covering large parts of the ground with roofs, roads and pavements and obstructing sections of natural waterways(Douglas et al., 2008). As more pervious natural areas are converted to more impervious urban and suburban areas water infiltration into the soil decreases. Due to decreased infiltration capacity, even quite moderate storms may produce high surface water run-off leading to flooding. This has resulted in increased social-economic problems to the urban dwellers and mainly to the urban poor who have less capacity to cope with disasters(Ramin, 2009). The Integrated Flood Management project in Kampala (IFM Kampala) which is part of UN-HABITAT's Cities and Climate Change Initiative (CCCI) seeks to identify strategies and actions to address flood management issues in Kampala (Sliuzas, 2012). In order to better understand the effects of urban flooding on business activities in informal settlement areas of Uganda's capital, and for a deeper understanding of the different vulnerabilities from a business perspective, this thesis has focused on the situation in one part of Kampala to assess the impacts of urban flooding on non-home based business activities. This study considers a major business corridor along Nabweru road which is shared by four parishes of Bwaise I, II, III and Makerere III of Kawempe division, Kampala.

1.2.   Problem statement

Flooding is the major occurrence and a threat to social-economic development worldwide (Zhou, Mikkelsen, Halsnæs, & Arnbjerg-Nielsen, 2012) . Although many consider it a natural and rather random

event human actions have increased the negative impacts of floods on society. Rapid urban development together with the impact of poor urban management systems in Kampala has increased the frequency of flooding(Lwasa, 2010). This is because change in the land use due to rapid urbanization adversely affects the hydrological processes in a catchment, leading to a deteriorating water environment. The problems caused by urban flooding in Bwaise, range from minor ones such as water entering the floor space of houses, to major incidents, where large parts of area are inundated for several days thereby disrupting business activities leading to substantial economic losses or even loss of lives in the area. Despite increasing flood risk awareness, human settlements continue to develop in flood-prone areas due to the need for land (Gupta, 1994). Moreover, the development of the upper catchment area also increases run-off leading to flooding in the lower catchment. This is particularly so for the Bwaise urban poor who may have little option other than to informally occupy public land or purchase affordable land in flood prone-zones.

The problem of flooding in Bwaise is aggravated further by its location. Bwaise being a floodplain and being surrounded by steep hills has made the area more susceptible to floods (Mukwaya, Sengendo, & Lwasa, 2010). Until 1990s, disaster risk assessment were given lower priority than disaster response (rescue and relief) but since then there has been a need for a strategic shift in disaster management practices towards an integrated disaster risk reduction approach, which includes incorporating disaster risk reduction planning in the development process of countries and regions (ASEAN Disaster Risk Management Initiative, 2010).

To understand the economic risk due to flood hazard in the area it is important to understand the impacts of floods on non-home based business activities in Bwaise. This is necessary for proper management and planning of urban development that encourages a shift of the focus from a reactive to a proactive response to flooding i.e. from flood control to flood management. In order to achieve this, there is a need to understand the three main components in any disaster event: the hazard itself, the degree of exposure and the degree of vulnerability (Sliuzas, 2012). This study considers Bwaise, Kampala city as a case study to identify the impacts of flood hazard on non-home based business activities and analyse the vulnerability of different business activities in the area and the coping mechanisms employed by the local population to protect themselves and their properties against the flooding. The developed methods can be used elsewhere in Kampala and other cities and the findings may provide an insight for management measures in Bwaise and Kampala in general.

1.3.   Scope of the study

The study will focus on the assessment of flood impacts on non-home based business activities in Bwaise, Kampala. The major focus will be along the Nabweru road which is a major business corridor that

connects four parishes of Bwaise I, Bwaise II, Bwaise III and Makerere III of Kawempe division, Kampala. See Fig1 below.

STUDY AREA EXTENT
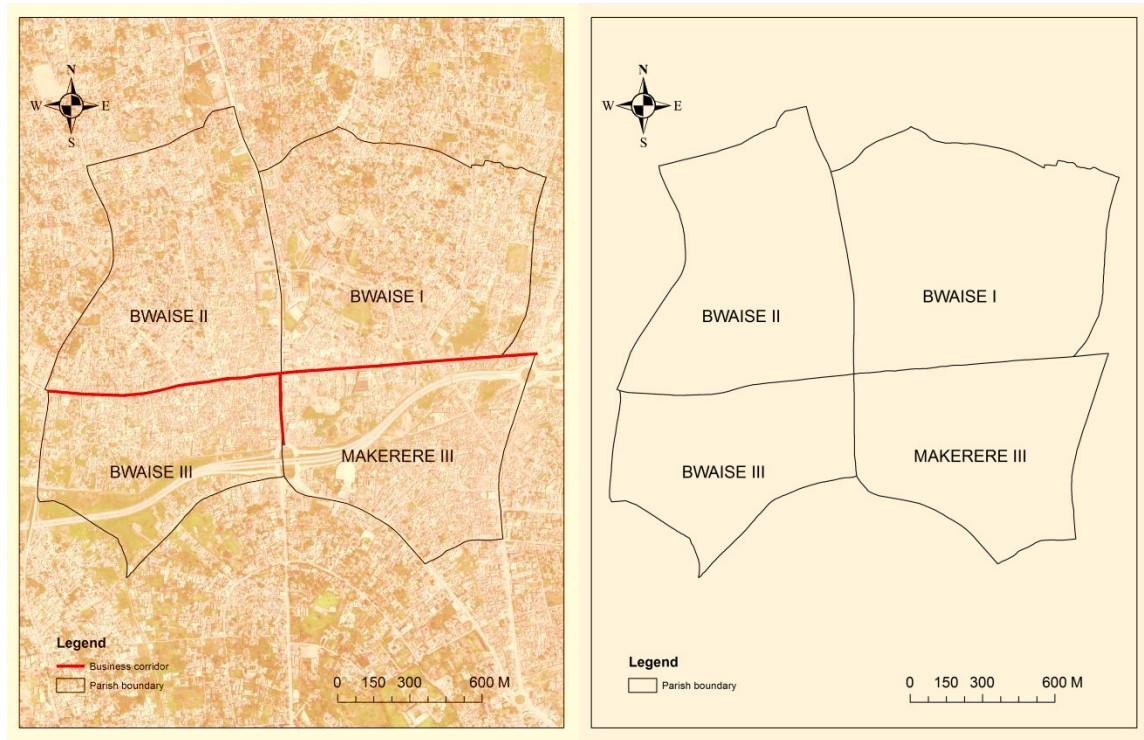
Figure 1: Focus of the study

This research views the impacts of floods on business activities in the study area as the combination of three main factors 1) the flood hazard event, 2) the exposure of business activities, and 3) vulnerability of the businesses. In addition to this, the awareness and coping capacity of the business operators also play a vital role in actual impact of floods on the business activities. The research endeavours to conceptualise all these issues and attempts to incorporate the knowledge of all the actors involved in the assessment process. Additionally, the study intends to find out the interactions and interrelations of the various variables such as flood hazard characteristics, spatial location and type of business and their overall contributions to the negative impacts of floods on business activities in the study area. Figure2 below shows the scope of this research.
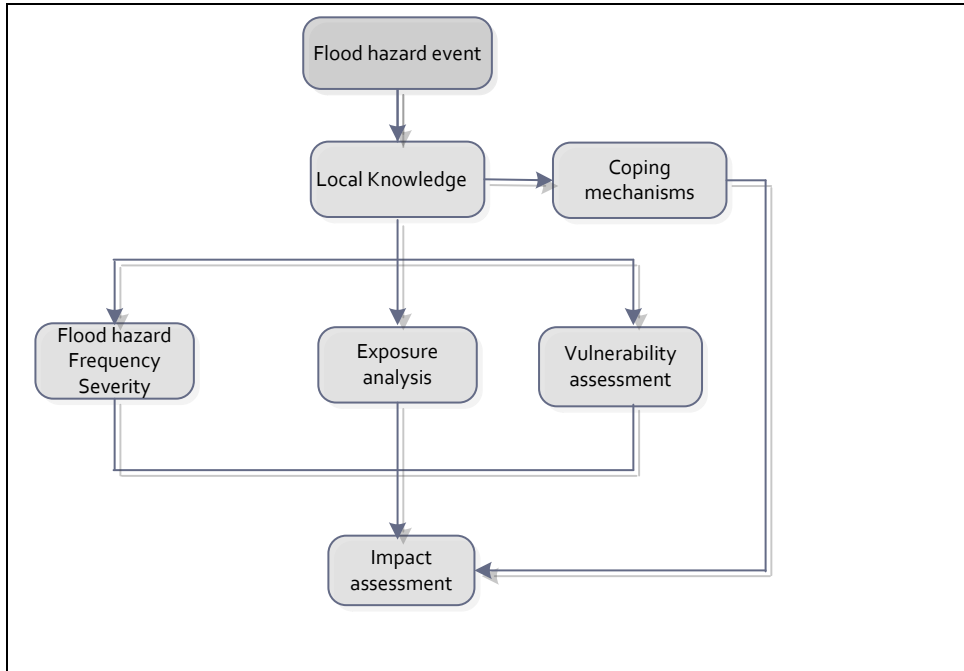
Figure 2: Contextual scope of the study

1.4. Research objectives

In general, disasters seriously disrupt systems of society, and a driving factor in this thesis has been to study the effects of urban floods on business activities in urban areas. Bwaise is currently facing problems with localized urban flooding because the slum is situated on a low lying wetland and surrounded by a number of hills. Generally, slum residents do not have the best preconditions to live a hazard-free life. More than half of the population in Bwaise is living in poverty and the area lacks proper drainage systems that could greatly reduce the occurrence of floods and improve the standard of living. A knowledge-gap on the impacts of floods on business activities and coping strategies from a business perspective in Bwaise has been identified through literature reviews. This thesis aims at contributing to a broader understanding of flooding in Kampala by seeking answers in a theoretical framework that has not yet been applied to the field area. The main objective of this thesis is to explore the coping strategies that business operating individuals have undertaken to mitigate the effects of localized flooding on their business activities and to study the opinions and perceptions that business operators have on flood risk and on improving their situation. This is done by assessing the impacts of floods on non-home based business activities, through the use of the local knowledge related to floods, the identification of non-home based business activities, their vulnerability to flooding and local coping strategies in the study area.

1.4.1. Specific objectives and research questions

Based on the general objective of the research, the following research objectives and corresponding research questions were formulated.

RESEARCH OBJECTIVES	RESEARCH QUESTIONS
Objective 1: To identify and classify different non-home based business activities which would be affected by floods in the study area.	1. What are non-home based business activities in area?
	2. How to classify non-home based business activities in the study area?
Objective 2: To identify the local business operators' perceptions and actual experiences about the floods.	1. What are the perceptions of people about the flood risk in the study area?
	2. What is their knowledge on flood characteristics in the area? E.g frequency and severity?
Objective 3: To identify the current coping strategies employed by both local people and local government in the area.	1. What are people's current strategies to reduce the impacts of flooding on their business activities in the area?
	2. What are current strategies deployed by local government to protect the non-home based business activities in the area?
Objective 4: To assess the exposure of non-home based business activities to floods in the study area.	1. What is the degree of exposure of different non-home based businesses based on 100 years return period flood extent in in the study area?
	2. What is the degree of exposure of different non-home based businesses based on 25th June 2012 flood event historic data in in the study area?
Objective 5: To assess the impacts of floods on non-home based business activities.	1. What are indirect impacts of floods on businesses in Bwaise?
	2. What are the direct impacts of floods on businesses in Bwaise?

Table 1: Research objectives and questions

1.5.   Research Design and Thesis outline

This research is designed to be carried out in six main steps. 1) The first step is determining the local business operators perceptions of flood risk in the study area; 2) The second step is the identification of the non-home business activities (elements at risk) in the study area based on data collected during fieldwork; 3) The third step is to analyse the exposure to floods of the identified business activities in the study area; 4) The fourth step is a vulnerability assessment of the different business activities in the study area; 5) The fifth step is to identify the existing coping strategies (coping mechanisms) applied by local business operators to reduce the impact of floods on their business activities; and 6) Lastly, the sixth step is to assess the flood impact on business activities in the study area. Figure 3 below shows the research design.
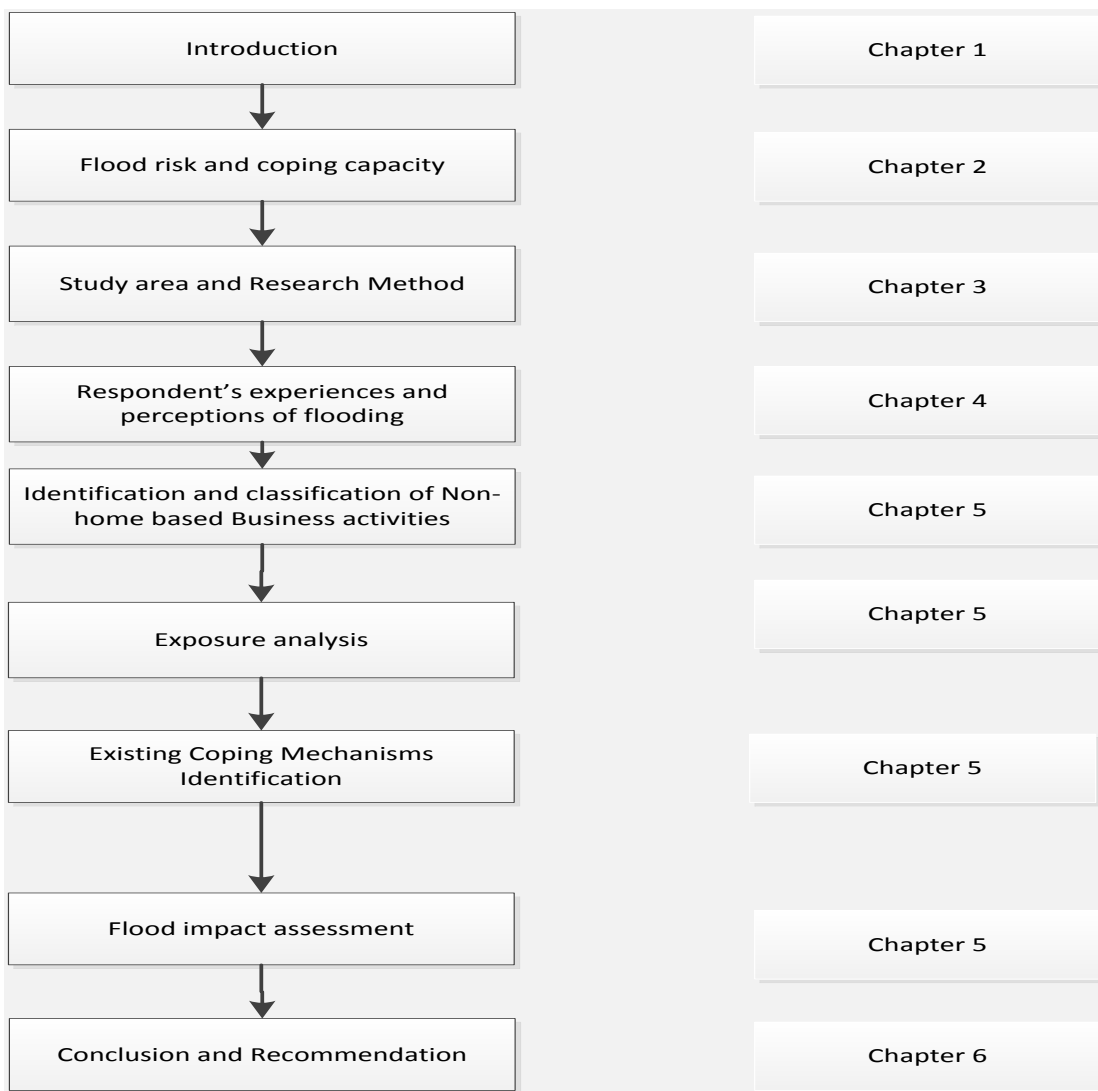
Figure 3: Research design

Table 2 below shows the research questions and the proposed research methods that will be used in this research.

Research Questions and Proposed research methods

Research objectives	Research Questions	Proposed research Methods
1	1. What are non-home based business activities in area? 2. How to classify non-home based business activities in the study area?	❖ Field observation ❖ Structured interviews using questionnaires ❖ Image interpretation ❖ Literature review
2	1. What are the perceptions of people about the flood risk in the study area? 2. What is their knowledge on flood characteristics in the area? E.g frequency and severity.	❖ Structured interviews using questionnaires ❖ Focus group discussions ❖ Data analysis using water depth and duration information from fieldwork.
3	1. What are peoples' current strategies to reduce the impacts of flooding on their business activities in the area? 2. What are current strategies employed by local government to protect the non-home based business activities in the area?	❖ Field observation ❖ Focus group discussions ❖ Field survey using questionnaires ❖ Interview with contact person (City physical planner)
4	1. What is the degree of exposure of different non-home based businesses based on 100 years return period flood extent in in the study area? 2. What is the degree of exposure of different non-home based businesses based on 25th June 2012 flood event historic data in in the study area?	❖ Interview on business activities that get affected during flood (using questionnaires) ❖ Business activities classification ❖ Data analysis based on business spatial location and flood characteristics ❖ Make vulnerability map
5	1. What are indirect impacts of floods on businesses in the study area? 2. What are the direct impacts of floods on businesses in the study area?	❖ Interview using questionnaires ❖ Focus group discussions ❖ Literature and results from previous steps.

Table 2: Research questions and methods

This research consists of six chapters and each chapter is briefly described in the following section.

Chapter 1- Introduction: This chapter aims at providing the general idea of the research, from background, scope and context followed by the research problem, objectives, and questions on which this research is based. It also explains the research design and research methods to be used in this research.

Chapter 2-Flood risk and Coping capacity: This chapter provides an insight into different available literatures related to this research.

Chapter 3- Study Area and Research Methods: This chapter gives a brief description of the study area, factors exacerbating the flooding problems in the area, sampling method and research methodology. This research has been divided into three major phases and these are: pre-fieldwork, fieldwork and post-fieldwork and each phase is discussed in full depth.

Chapter 4 - Respondent's experiences and perceptions of flooding: This section looks at different ways in which respondents perceive the flood risk in the study area considering location of business activities, flood depth, frequency and duration in order to determine the vulnerabilities of the business activities carried out in the area.

Chapter 5- Flood impact assessment for business activities: This chapter aims at assessing the impacts of flooding on business activities in the area based on data gathered from the field, exposure analysis of businesses based on spatial location of business activities and flood characteristics (flood depth and duration). This section also includes the identification of coping mechanisms employed by both the local business operators and local government to mitigate the impacts of floods on business activities.

Chapter 6 – Conclusion and Recommendation: This chapter provides conclusions drawn from the results of the research and provides suggestion for areas that would require further research for a better understanding of the problem at hand.

2. FLOOD RISK AND COPING CAPACITY

This section includes the related literatures used to support this research. It describes the definitions of key terms used which include flood hazard, exposure, elements at risk and vulnerability. It also discusses the contributions of urbanization to flooding problems, causes of floods in general, flood hazard estimation methods, exposure analysis methods, hazard impact assessment methods, vulnerability assessment methods and coping mechanisms used against floods in general. This chapter aims at giving an overview of flooding problems from global perspective and ways in which different communities have been trying to deal with these issues.

2.1.   Urbanization and Floods

Urbanization during the nineteenth and twentieth century in Europe was accompanied by the industrial revolution and economic growth (Dyson, 2009), in contrast, an important factor in the present-day urbanization in many developing countries is that it is associated with poverty (Ramin, 2009) and consequently poverty is increasing in urban areas of developing countries (Medal & Boyer, 2010). Although urbanization has led to socio-economic improvements of many people's lives through the creation of job opportunities (Patel & Burke, 2009) and better access to education and health care services (Vestbro, 2011), the urbanization today is occurring in a disorganized way and many people are still in high poverty (Patel & Burke, 2009).

Unplanned settlements known as slums are mushrooming in and around growing cities (World Bank, 2010). The causes behind the expansion of the slums are many, for example rapid urban migration of rural people, lack of adequate city planning, land tenure problems, not enough housing and the concentration of poverty in unplanned urban areas (Medal & Boyer, 2010). According to United Nations (UN) Habitat, a slum household is defined as "a group of individuals living under the same roof in an urban area who lack one or more of the following: durable housing, sufficient living area, access to improved water, access to sanitation and secure tenure" (UNFPA, 2007). A significant part of the development of urban areas occurs without the provision of basic infrastructure and service such as proper water and sanitation services, drainage systems, waste management systems and durable quality housing are often lacking (Medal & Boyer, 2010) and this in turn exacerbates the vulnerability of slum dwellers to disasters such as urban flooding. It is estimated that approximately 72 percent of urban residents in Sub-Saharan Africa live in slums (Vestbro, 2011). By some, unplanned urban development has been referred to as an emerging humanitarian disaster because of informal settlements and the related hazards such as diseases, floods, high crime rates which are found in slum settings (Patel & Burke, 2009). There is a relationship between poor urban management of services and infrastructure and the accumulation of hazards that could potentially cause great damage in urban environment (Bull-Kamanga et al., 2003). According to the

Tampere Convention from 1998; a disaster is an event that seriously disrupts the functioning of a society and poses threats to human life, health, property or the environment. Disasters can appear suddenly or have slow and complex onsets and can be caused accidentally, by nature or as a result of human action (International Federation of Red Cross and Red Crescent Societies, 2007).

The criteria that can be used to judge if an event is a disaster may include the number of deaths and seriously injured (Bull-Kamanga et al., 2003)or that external humanitarian assistance is needed because local capacity has been overpowered. However, this thesis focuses on small-scale disasters, which may not even lead to deaths or require external humanitarian assistance but which has an influence on the daily lives of the people and their business activities. There are many small events that disrupt people lives and their income generating activities, but not to the extent that they are labelled as disasters. However, they may very well end up creating impacts on people's lives directly or indirectly in ways that are worse than the impacts from large scale disasters (Bull-Kamanga et al., 2003). Small-scale disasters may not always be defined as disasters but they may be disastrous for individuals. Declined health after a small-scale disaster can affect a person's ability to ensure their livelihood (Olorunfemi, 2011) and the loss of a livelihood source can have a great impact on the affected household (Bull-Kamanga et al., 2003) or community at large. An increasing disastrous phenomenon that is occurring in slums is urban flooding (Douglas et al., 2008). Small-scale urban flooding can lead to a number of losses for the individual such as loss of possessions, damage to houses, disturbances to transport, disturbance to business activities, power and communication systems and financial stress for the affected persons and an increased risk to suffer from infectious waterborne diseases (Olorunfemi, 2011). There are different factors that contribute to incidences of flooding and most of them are connected to how areas develop and how the land is used and managed (Ramin, 2009). Rainfall intensity and duration, poor drainage systems, increased impermeable surfaces through the construction of buildings, roofs and roads that restrict the natural pathways of rainwater can affect and change natural rainwater drainage patterns (World Bank, 2010). Urban flooding is therefore not only dependent on heavy rainfall but also on the changing environment of urban setting (World Bank, 2010).

2.2. Flood hazard

According to (Pistrika & Tsakiris, 2007), a hazard is defined as the "source of potential harm or a threat that may cause loss of life or any failure to the natural, modified or human systems". Hazards are classified as of natural or man-made origin. A flood hazard is of natural origin and is defined as possible flood conditions with the potential of causing adverse consequences (Faber, 2006). However although flood hazards are of natural origin, human activities have an influence on both the flood scale and its impacts (ActionAid, 2006). In order to study the destructive nature of floods as a natural phenomenon, it is important to capture the frequency of flood events and their corresponding magnitudes (Alexander, 1991) so that damages can be predicted. This process of flood hazard estimation involves hazard identification

and estimation. For both hazard identification and hazard estimation, two approaches can be used according to (ISDR, 2004) and these are:

a.   **Traditional deterministic approach**: This approach assumes that the future occurrence and the behaviour of a given hazard is fully determined by its initial conditions with no random elements involved. This approach can be used for the estimation of the potential adverse consequences if the hazard occurs and it is the most suitable for estimating man-induced and /or technological hazards such as forest fire hazard that cannot be captured by a probability distribution.

b.   **Probabilistic approach:** this approach is based on the theory of probability and considers hazard estimation as the estimation of the probability of occurrence of a particular natural event such as flood with an estimated frequency within a given period of time. This approach is most suitable for the hazards of natural origin. The probabilistic approach assumes that events in the future are predictable based on the experience of the past.

Since flood hazard is a natural phenomenon, it can be estimated using a probabilistic approach. The starting point in analysing potential flood hazard losses is the quantification of the flood hazard (Scawthorn et al., 2006). The process of flood hazard estimation is based on the flood characteristics such as flood velocity, flood depth and flood impulse (Alkema, Nieuwenhuis, & de Jong, 2007). The impacts of the flood hazard can be characterised by a number of factors such as effect on human beings, to physical infrastructures, to environment and to the economy (Vojinovic & Abbott, 2012). The relationship between flood characteristics and its adverse consequences can be assessed using for example stage-damage curves. Hazard categories can be identified based on the depth, duration and the velocities of flood water.

2.3.   Exposure

The hazard assessment results in a spatial distribution of the hazard's expected intensity or severity throughout the study area (UNDP, 2011)). The works under the exposure analysis are to determine how much and where (geographical location) the at-risk elements are exposed to the various intensities of flood hazard. Flood exposure is the extent to which properties, houses, economic activities and infrastructure are geographically situated in flood -prone areas (Barroca, Bernardara, Mouchel, & Hubert, 2006). Exposure relates the flood plain, peoples' location and proximity to the area of inundation, and housing/property characteristics to one another. The relationship between flood risk, exposure and vulnerability of exposed elements is directly proportional; as exposure increases or vulnerability increases, flood risk also increases(Goosby, Chiesa, Mielbrecht, & Bosse, 2005). Accordingly, there is no flood risk where there is no flood or where no elements are exposed.

2.4. Elements at risk and vulnerability

According to (Van Westen, Van Asch, & Soeters, 2005), elements at risk are the key component for vulnerability analysis and is one of the major layers required for total impacts quantification. Elements at risk can be defined as the degree of exposure with reference to physical infrastructure, population, economic activities, public services and utilities which can be affected by the hazard (Nott, 2006). The quantification of the vulnerability depends heavily on the degree of damage to a given element at risk for a given flood hazard (UNDP, 1994). Vulnerability can be defined as a set of conditions and processes resulting from physical, social, environmental and economic factors, which increase the susceptibility of a community to the impacts of the hazards (ISDR, 2004). This study will only focus on economic vulnerability due to flood hazard and the elements at risk to be considered are non-home based business activities consisting of Wholesale and retail shops, food and accommodation services, workshops, financial and personal services, street vendors, transport businesses and other services.

2.5. Coping strategies

In order for survival, human beings like all other living organisms need to be able to sense and avoid harmful situations. People make choices everyday on how to avoid risks (World Bank, 2010). The acceptance or rejection of a risk is not an isolated matter; it is also dependent on the consequences of not engaging in the risk (Fischhoff, 1994). Risks and trade-offs have to be considered together with expected benefits, for example, the economic benefits from living in a city outweigh most hazard risks for individuals due to opportunities that are available in the urban setting. People's choices to accept different levels of risks can depend on different factors such as the probability and severity of the risk, knowledge about the risk, if the risk has been unwillingly imposed, if individuals will be compensated for being exposed to the risk and what advantages exposure to the risk may bring (Fischhoff, 1994). Individuals make choices based upon the existence of acceptable balance between risks and benefits (Fischhoff, 1994). However for the Urban Poor, they are often preoccupied with dealing with more acute demands related to survival and are because of that, less able to take action on decreasing their exposure to environmental hazards (Pelling, 2003). Studying people's perception of the risks that they are exposed to can help policy makers in mitigation schemes and risk prevention. In some communities, flooding is so common that people accept it as normality and are therefore reluctant of reducing the risks. Prevention is not the only informed decision that people can undertake to avoid risks; people can also insure themselves as this can offer both protection and compensation if a disaster strikes (World Bank, 2010). However, when neither prevention nor insurance is enough or affordable individuals must develop coping strategies to lessen the consequences of flooding on their lives and the damages it can inflict on their properties or business activities.

Coping is the manner in which people act within the limits of existing resources and range of expectations to achieve various ends (Wisner, Blaikie, Cannon, & Davis, 2003). In general this involves no more than 'managing resources', but usually it means how it is done in unusual, abnormal and adverse situations. Thus coping can include defence mechanisms, active ways of solving problems and methods for handling stress. Coping strategies include temporal migration, intensification or expansion of household labour, drawing on stocks of social capital such as credit, food, charity or begging, reducing household expenditure and/or utilizing human and physical capital (World Bank, 2010). The poor usually create informal arrangements as a response to disasters especially if no market institutions or other support mechanisms are in place. For small localized disasters, loaning money from friends and relatives is effective. Coping strategies from a local perspective is a way to look at people's strengths and the resilience they have built upon their own, as opposed to a sole focus on their vulnerabilities (Dekens, 2007). It is crucial to know the coping strategies that vulnerable people have developed in disaster management so that external interventions can stem from local practice.

2.6. Classification of business activities

The business needs of the organisation, the benefits which it expects to gain from a move to electronic working environment and other relevant external requirements on the organisation are the general determinants of the way in which records should be organised, and the means by which they may be accessed (The National Archives, 2003). A business classification scheme (BCS) is required by BS ISO 15489 and, together with the folders and records it contains, comprises what in the paper environment was called a "Fileplan" (The National Archives, 2003). A BCS is thus a full representation of the business of an organisation. As such, it is a useful method of organising information for purposes such as: retrieval, storage and more involved processes of (records) management, such as disposal scheduling (The National Archives, 2003). In this regard, creating and maintaining BCS for the purposes of managing electronic records is very important.

2.7. Flood impacts

Disasters can disrupt or destroy many different sorts of functions and institutions all at once. Disaster impacts in urban systems can be described as direct or systematic (Pelling, 2003; Pelling, Özerdem, & Barakat, 2002). Direct impacts of floods are the consequences of the initial flood disaster event and are felt immediately as physical damage especially to the housing, property, physical infrastructure and loss of life or injury. Direct impacts of flood hazard interrupt the flows of goods, services and information in and around the urban areas and are the root cause of the systematic impacts which are felt as instabilities in the economy of the urban areas (Pelling, 2003). There are two types of systematic loss and economists have classified them as indirect losses and secondary effects. Indirect losses are goods that will not be produced and services that will not be offered because of the disaster (Robinson, 2010). Indirect losses include the

losses of personal income in the case of total or partial loss of the means of production or livelihood (Zapata-Marti, 1997). The secondary impact of the flood disaster is impact on the overall performance of the economy, as measured through the most significant macro-economic variables. Relevant variables may include overall and sectoral gross domestic product, the balance of trade and balance of payments, levels of indebtedness and monetary reserves, the state of public finances and gross capital investment and this may have huge impact on the long-term development of the affected area (Carter, 1991). But since the study is more at the local level, the analysis of the secondary impacts of floods will not be covered. This study will only focus on the direct and indirect impacts of the flood hazard on business activities in the study area.

3. STUDY AREA AND RESEARCH METHODS

This section gives a brief presentation of urbanization in Uganda, the risks and challenges that are posed upon some of the residents in Bwaise and neighbouring parishes which is the major focus of the study. There are a number of studies about Bwaise and other slum areas in Kampala that have dealt with water, sanitation, housing and climate change impacts including flooding problems that were reviewed prior to starting this study and the outcomes of the studies has provided an insight into problems related to flooding in the study area.

3.1.   General background

Uganda is one of the least urbanized countries in Africa with most of the urban population residing in the capital city, Kampala (Mukwaya et al., 2010). Kampala's topography is hilly where the city was initially located on seven hills of Lubaga, Namirembe, Makerere, Kololo, Kibuli, Kampala (old Kampala) and Mulago. However currently the city has expanded far beyond to include even more hills and surrounding the hills are wet valleys of papyrus swamps which were supposed to be the natural drainage system. The way Kampala has been developing has been referred to as altitudinal stratification whereby the rich live on the top of the hills and the poor live on the bottom of the hills (Mukwaya et al., 2010). On the top of the hills important institutions are found, the slopes are used for residences and offices and the wet valleys are where the slums are found (Matagi, 2002) and this has led to unplanned developments in wetlands making the city more vulnerable to floods. Urban growth in Uganda is increasing by 6.4 percent annually due to natural increase of the population and high rural to urban migration (Nyakaana, Sengendo, & Lwasa, 2007). In year 2002, 41 percent of Uganda's urban population lived in Kampala but the number of urban dwellers in the whole country is expected to triple by 2025 (Mukwaya et al., 2010).

The slum areas in Kampala cover about 10 percent of the city area (Birabi, 2007). Informal settlements are popping up in geographically low-lying areas that have high water-tables and these areas are expanding over natural wetlands such as Bwaise that are prone to localized flooding (Lwasa, 2010). Some of the recognized informal settlements are Katanga, Nakulabye, Kalerwe, Kamwokya, Katwe, Mulago Nsooba, Kiswa, Kinawataka, Banda, Kivulu, Kisenyi, Ndeeba, Wabigalo and Bwaise (Kulabako, 2010). The slums in Kampala are home to 60 percent of the population in Kampala (Birabi, 2007). The provision of services such as garbage collection, drainage installation and road maintenance in Uganda is decentralized and the mandate falls upon the local councils (Lwasa, 2010), but the residents are not offered adequate basic services such as water provision, electricity, garbage collection facilities, sewage disposal and sanitation systems (Kulabako, 2010). Kampala is divided into five divisions in which Kawempe Division is the poorest (Golooba-Mutebi, 2003). The figure 4 below shows Kampala and its wetlands and how these wetlands have been encroached on since 1994 to 2010.

Map Showing Kampala and Its Wetlands
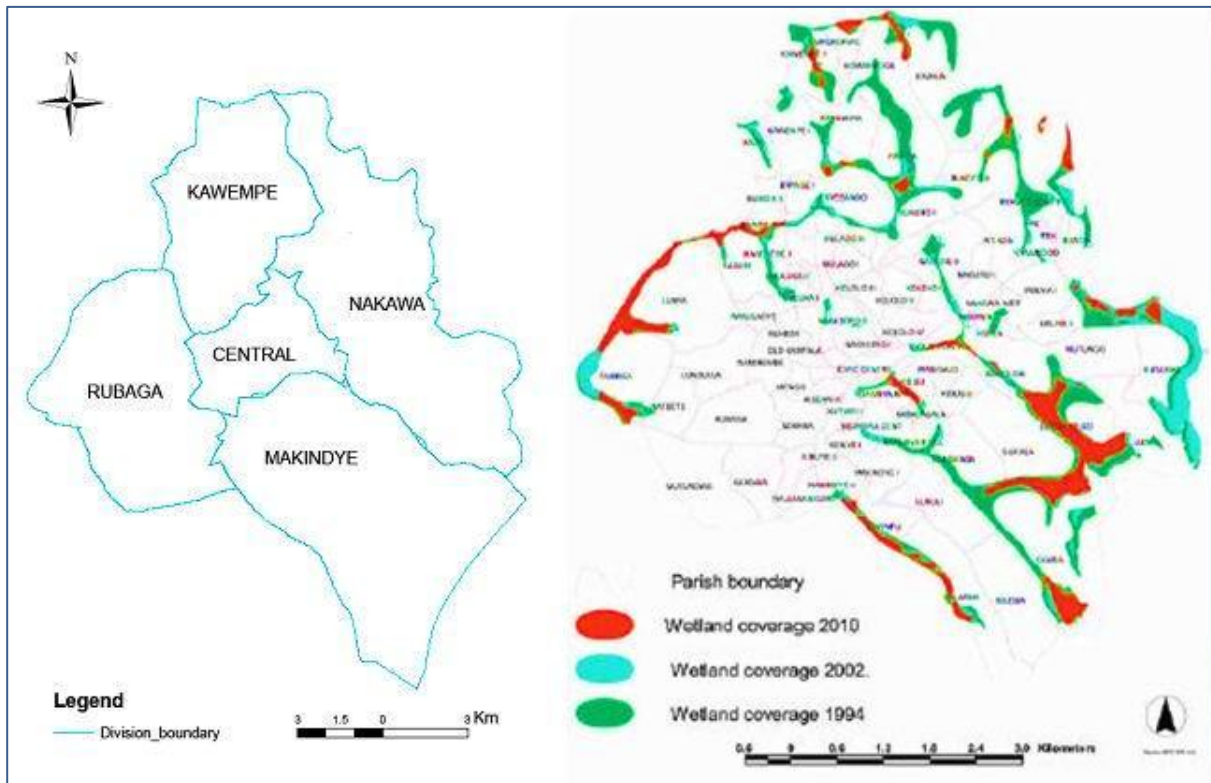
Figure 4: Changes in Kampala wetlands

Source: (Mukwaya, Sengendo, & Lwasa, 2012): An Assessment of Flood Management and Planning Regimes in Kampala City, Uganda.

The focus of the study is on effects of floods on business activities in Kawempe division and specifically along the major business corridor which is shared by four parishes of Bwaise I, II, III and Makerere III of Kawempe division. In vulnerability assessments, it has been found that the urban poor in Kampala are at high risk of flooding because they often live on low-lying lands where there is high population density and where roughly 60 percent of garbage remains uncollected (Lwasa, 2010). Around 1500 tons of solid waste is produced in Kampala every day (Kulabako, 2010) and collection and disposal of garbage in the city not properly arranged leading to disposing of these wastes in drainage channels and as a result drains become blocked with garbage and quickly fill up with water in case it rains leading to flooding problems. In an earlier study from Bwaise Parish III a resident linked the population growth in the area and the accumulation of garbage in the drainages to the increased incidences of flooding. The drain which used to be two metres deep had become clogged with garbage and silt and was now only 30 centimetres deep. Every small rainfall seemed to lead to flooding. As the population increases in the area, more waste is produced and since no garbage management system has been put in place, this has in turn exacerbated the problem of flooding in the area (Douglas et al., 2008).

Lack of proper sanitation and water, combined with flooding, can worsen health situations. During flooding, when storm water runoff is mixed with excreta people are put at an increased risk of infectious water-borne diseases (Olorunfemi, 2011) and this turn affects the livelihood of the people in the area.

3.2. Flooding in Kampala

Frequency of flooding in Kampala has increased over past decades and this is mainly attributed to the effect of climate change and high rate of urbanisation (Lwasa, 2010). Flooding in Kampala is a result of high intensity rainfall in combination with poor waste management and poor drainage systems (Mukwaya et al., 2010) . However in low lying areas such as Bwaise, flooding can be attributed to heavy rainfall and inadequate drainage systems elsewhere in the built up hillsides-areas around the area. Bwaise is surrounded by steep hills such as Makerere university hill and Nansana among others. Figure 5 below is the hillshade map of the study area showing the location of the business corridor which is shared by four parishes of Kawempe division that were considered in the study.
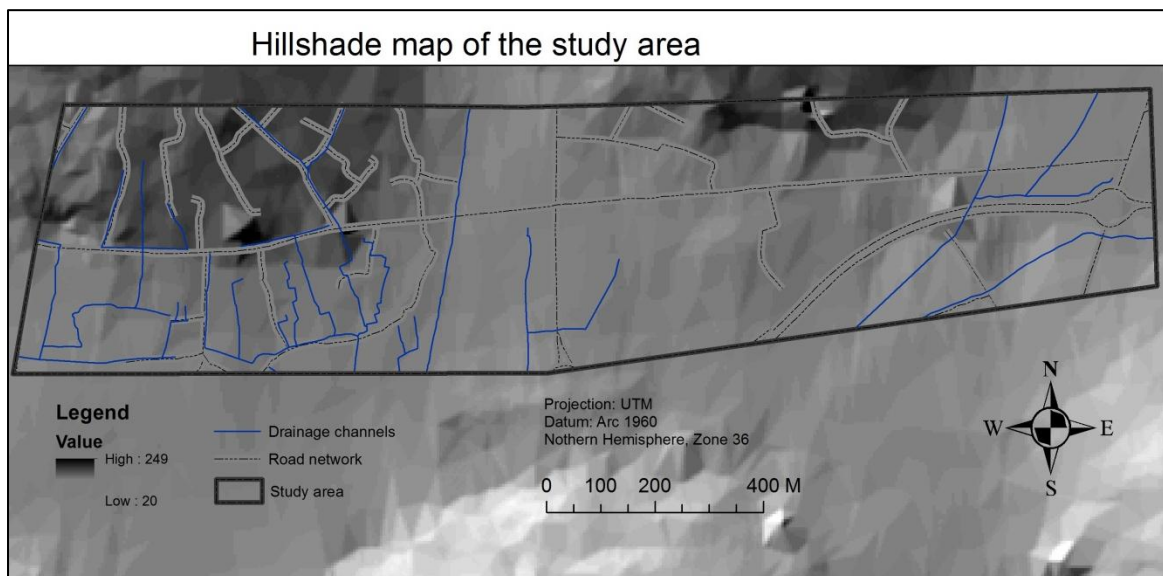
Figure 5: Hillshade of the study area

In addition to threatening residential properties and their occupants, flooding is also a big threat to the business activities and therefore may cause substantial economic losses. Urban floods are a great and regular disturbance to all aspects of daily life in Bwaise but the impact of floods on business activities are as yet under researched.

3.3. Research process

This research is aimed at determining the respondents' perceptions of floods from a business perspective, identifying and classifying business activities in the study area that would be affected by floods, exposure of business activities to floods analysis, vulnerability assessment for different business activities identified

in the study area and flood impacts on business activities assessment. The research process consists of three major stages: pre-fieldwork, fieldwork and post-fieldwork (Figure 6).

3.3.1.   Pre-fieldwork

The pre-fieldwork stage started with the intensive literature review through previous related studies (reflected in chapter 2) and reports to gain more knowledge and information about the data requirements and methodologies to be used during the fieldwork and post-fieldwork stages. The main concept of this research is the use of local knowledge as an additional source of data to analyse the impacts of floods on business activities. From the review of different literatures related to the research and through the site observation using satellite image of the study area and the use of available data such as flood extent information and digital elevation model of the area, the researcher designed a sampling strategy and formulated the questionnaire.

The designed questionnaire was made of five major sections and this was done with an aim of capturing the required information from the fieldwork in order to be able to answer the research questions (see appendix 1). The first section of the questionnaire contains the general information including business type, number of employees, work days and type of goods on the premises. The second part is concerned with flood information (depth, duration, frequency, causes, etc). Part three of the questionnaire was concerned with the business respondent's perception of flood severity in the area from both business and location perspective. The fourth section focused on flood awareness and coping mechanisms applied by both business operators and government in the area. The last part of the questionnaire focused on impacts of flood on business activities in the area. The figure 6 below shows the research process outline.
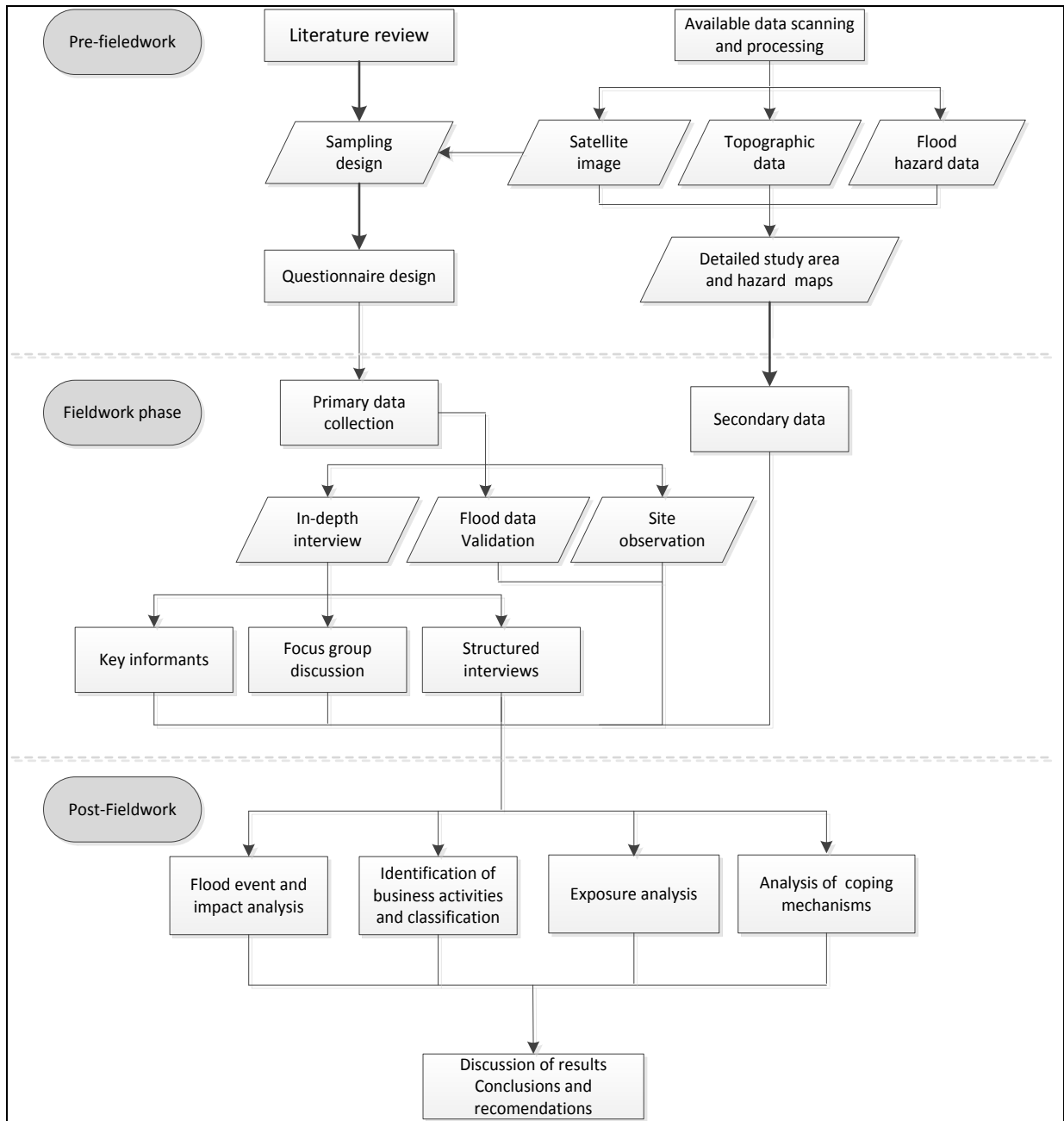
Figure 6: Research process outline

Apart from literature reviews, another important component of pre-fieldwork stage is data inventory and the data available for the research is shown in the table 3 below. As shown in the table below some of the data required were provided before the fieldwork and the main source was IFM Kampala project and KDMP, 2002. However most of the data required for the research was collected during fieldwork stage as these data were not available. The sequence of activities that were carried out during this research, data requirement and data source are shown in the table 3 below.

No	Research Activities	Data required	Source
1	Sampling design	▪ Satellite image: Geoeye 2010 (Resolution 0.5m) ▪ Digital elevation model ▪ Flood extent map (100 years return period) ▪ Administrative boundary map	IFM Kampala KDMP, 2002
2	Identification and classification of business activities	▪ Business types ▪ Type of goods ▪ Size of business	Fieldwork
3	Flood risk perception analysis	Flood depth, duration and flood threat on business based on local people's perception.	Fieldwork and data analysis
3	Exposure analysis	▪ Spatial location of businesses ▪ Flood hazard map	IFM Kampala KDMP, 2002 Fieldwork
6	Coping mechanisms	Business operators coping mechanisms	Fieldwork
7	Flood impact assessment	Flood depth and duration, location elevation and damage relationship.	Fieldwork Data analysis from vulnerability assessment.

Table 3: Data requirement and respective source

3.3.2. Fieldwork

The aim of this stage was to collect data on business activities in the study area (type of business, location and type of goods on the premises), flood data (flood depth, frequency and duration), flood risk perception from business perspective, coping mechanisms and flood impacts on business. The fieldwork was conducted from 15th October 2012 until 7th November 2012, in Bwaise (Kampala) where most of the business activities are located in flood prone zones and are faced with flood problems quite often.

    a. Data collection techniques

Different data collection techniques were used in order to systematically collect relevant data for this research. For each technique used, care was taken to avoid data bias through careful planning of data collection methods and ensuring that the instruments are well calibrated and users given relevant training on how to use them beforehand. A combination of both qualitative and quantitative data collection techniques is deemed to be important for this study in order to explore diverse insights on all spatial and non-spatial variables such as opinion, attitudes, perceptions, and understandings of the nature, causes of flood hazard and its effects on business activities in Bwaise.

b. Literature reviews

Prior to departing for fieldwork, secondary sources of information and literature were explored. This helped to get an in-depth understanding beforehand about the study area and problem under investigation. The secondary data were gathered from the published literatures like journals, books, and articles. This was intended to compliment primary data and fill in the knowledge data gaps that primary data collection methods were not able to address during the actual field work process. The primary data collection in Kampala, Uganda applied different approaches in order to collect both spatial and non-spatial data required for the research. In this regard three main approaches were used;

i.   Field observation to identify different types of business activities and their spatial distribution in the study area.

ii.   GIS based approaches to elicit spatial location of business activities in the study area, flood depth and extent based on local knowledge through engagement of local communities.

iii.   Administering of questionnaires and focused group discussions in order to collect non spatial data on business activities, flooding issues and coping mechanisms employed in the area.

To facilitate rapid interpretation and recording of various features, direct observations were made aided by aerial photographs, sketch mapping and height measuring tools.

c. Sampling method

The study population for this research involved all local business operators (owners and employees), government and non-governmental organisation officials working in the field of disaster management or related fields. Business activities were classified into two broad classes of fixed and mobile businesses. Due considerations were taken in order to draw a sample from this population in a representative way and this was achieved through site visit in order to identify the distribution pattern of different business activities in the area. As the study used a number of techniques and methods to collect data, different sampling methods were used for each technique as deemed appropriate. As this research was mostly conducted within the realms of qualitative studies, purposeful sampling was used in order to focus on most important informant that poses in-depth information and insight into the issues under investigation. Key informants were strategically selected using snowballing sampling. This helped me to easily and quickly get key contacts persons from both government officers (Physical planning department) and local communities (community opinion leaders) who provided in-depth knowledge and insight about flood related issues in the study area. For the fixed business activities survey, the samples were selected using a systematic survey

based on the business location. "Fixed business activities in the context of this research refer to business activities having specific spatial locations", fixed businesses outside flood prone zones, samples were selected every 60 m on either side of the road for questionnaire administration. For the businesses within flood prone zones, samples were selected in every 30m range. The figure 7 below shows the spatial distribution of respondents in the study area. The sample points shown below are for the fixed business activities.
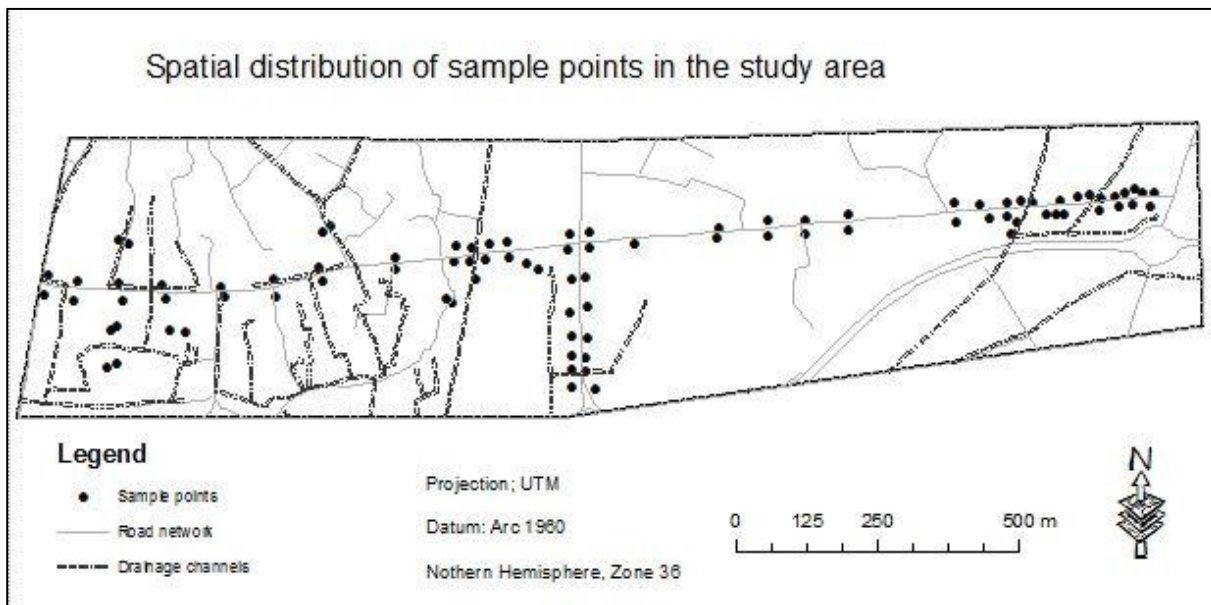
Figure 7: Spatial distribution of respondents in the study area

For the different focus group discussions that were held, the study selected a homogenous group aimed at allowing free interaction and discussions among participants. The study administered 90 questionnaires for fixed businesses and 2 group discussion sessions for different types of mobile businesses. The first group of 6 people was composed of people in transport business specifically taxi drivers and motorcycle drivers (Boda-boda) and the second group were composed of 6 street vendors operating in the study area.

d. Business inventory and flood information

Business inventory aimed at gaining information on type of business and flood information for database. This was achieved through the use of questionnaire approach, focused group discussions and key informants interviews. The information collected included: type of business, type of goods on the premises, flood information which included causes of floods in the area, frequency of floods, water depth and duration, effects of floods on business, flood risk perceptions, awareness and coping mechanisms applied in the area. During the field survey, fixed business identification, flood information and interviews were done at the same time using questionnaire approach, printed high resolution image base map information for plotting the location of businesses and a tape for measuring flood water depth. For mobile business activities, focus group discussions were conducted and recorded using an audio recorder.

Finally a digital camera was also used to capture the pictures of relevant visual facts that were observed during the field-survey.

i.   Questionnaire approach

As mentioned above, data collection entailed carrying out interviews in order to get first-hand information from local business operators and local authorities on floods and business activities in the area. During the fieldwork, data was collected with the aid of a questionnaire. Due to limited time, language barrier and the fact that the researcher was not familiar with the local people's customs and traditions, three field assistants were used for collecting data. For the first day of fieldwork, the field-assistants were trained on how data was to be collected and this aimed at creating the platform for the same understanding and interpretation of the questions to be asked during the fieldwork and techniques for data collection. All the questions in the questionnaire were discussed and techniques to be applied were explained. The questionnaire approach was applied to collect data on fixed businesses and related flood information. However it should be noted that during this survey, flood depth information measurements were taken inside the workplace for each business activity identified. All business activities identified were marked on the printed copy of the high resolution image provided to each field assistant. All the points marked were later digitized to create a shape file layer to show the spatial location of business activities identified during the fieldwork.

ii.   Focus group discussion

In addition to questionnaire approach mentioned above, focus group discussions with different groups of mobile business operators were conducted to discuss how floods affect their daily business activities and how they cope with such problems in the area. During this survey, two focus group discussions were conducted each group composed of six mobile business operators. The first group was composed of six street vendors and second group was composed of six individuals in transport business both taxi-drivers and motorcycle drivers (Boda-boda). Both groups were conducted with the help of one field assistant for translation as most of the members in both groups were not fluent in English and had to use their local language. The discussions mainly focused on challenges faced by their business activities with regard to flood problem, awareness of floods in the area, effects of floods on their businesses and coping strategies. A meeting with government officials from physical planning department was conducted for the discussion of government contribution to improve the coping capacity of people in the study area. To ensure inclusion of all the business activities, the interviews covered a wide range of stakeholders, including all sorts of formal and informal business operators.

3.3.3.   Post-fieldwork

The final stage of this research is post-fieldwork and this is mainly concerned with data analysis part. However further reviews of literature was done for better understanding on analysis methods and clear interpretation of the results. Data collected from the fieldwork were first converted from hardcopy format to digital format. The process of data entry was done in two parts. First the business inventory data were entered into the personal computer using excel software and then the digitization of sample points was achieved through the use of ArcGIS software where all the business activities that were marked on a printed high resolution image during the fieldwork were digitized to create a shape file layer of business location information. The digitization process is illustrated in figure 8 below.
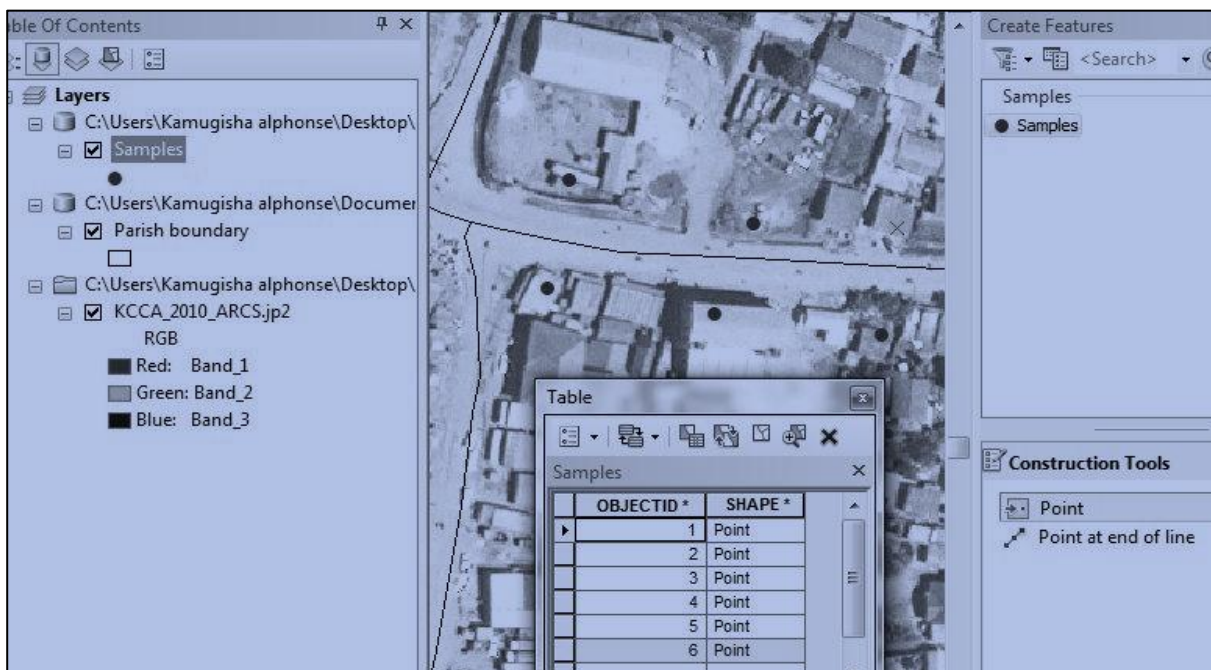
Figure 8: Illustration of digitization process for sample points

After the data conversion from hardcopy to digital format process, then the data were processed spatially and statistically using ArcGIS and SPSS software. The details on data analysis process are explained in chapters four and five of this thesis.

4. RESPONDENTS' EXPERIENCES AND PERCEPTIONS OF FLOODING

The perceptions and experiences of respondents on flood causes and occurrences in the study area are based on information from primary sources, which included interviews, field-observation and focus group discussions with business operating respondents in the area, researchers and the KCCA physical planner. During the fieldwork, the challenges were discussed and some were observed. Flooding was described as a major threat to businesses in the study area but irrespective of the awareness of this problem people are still willing to do business in the area due to a number of reasons that will be discussed later in this section. Topics such as urban planning, drainage systems and waste management were identified as relevant topics because they were both identified as either direct or indirect causes of flooding in the study area. The respondents were able to give accounts of how their businesses are affected by flooding as well how they themselves and others are coping.

Because it did not rain heavily in Kampala during the course of this field study, the flooding was not witnessed by the author, however due to small rain that happened during fieldwork the author was able to observe some problems in the study area where one section of the road was partially covered by rain water and mud thereby disrupting the free movement of road users see figure 9 below.

Figure 9: Partially flooded section of the road in the study area

4.1 Causes of flooding in the study area

Using the questionnaire, the respondents were asked to give and rank the causes of flooding in the study area and the following causes were mentioned; Poor garbage disposal, narrow drainage channels, topography of the area and unplanned construction of buildings were said to be the major causes of flooding in the area. However other factors such as climate change, heavy rainfall, soil type, road condition, population pressure, type of the soil, construction of northern bypass and landfilling were as well mentioned as contributing to flooding problems in the area see table 4 below.

Causes	Number of respondents	Percentage
Poor waste management	16	17.80%
Narrow drainage channels	20	22.20%
Topography of the area	19	21.10%
Informal development	21	23.30%
Other factors	14	15.60%

Table 4: Summary of causes of floods in the study area

4.1.1.   Poor garbage disposal and narrow drainage channels

A personal observation of the study area was that the environment was dirty due to poorly disposed garbage in the area (fig. 10). Few trash cans and disposal sites were seen and therefore, it was interesting to learn how the people in the area managed their waste. It was also noted that the garbage problems in the study area did not only stem from poor management in Bwaise but also garbage from other upstream areas could accumulate in Bwaise and Makerere III Parishes. When it rained, floods could bring garbage from other places in upper catchment and deposit them in Bwaise and Makerere III Parishes.

Figure 10: Poorly disposed garbage blocking flow of water in the area.

Individuals in the study area usually collected and stored their garbage on their compounds. Some types of garbage (biodegradable) could be made useful by making compost out of it, but according to one respondent from the area there were some difficulties in storing garbage during the rainy season because it would wash away by rain water. Collected garbage was supposed to be picked up by Kampala Capital City Authority (KCCA) trucks once a week but most of the time the trucks do not turn up.

When complaints were made to the KCCA, they would respond that they could not afford to pay for fuel. One respondent explained that when the pick-up trucks did not come, he would burn his garbage or when he had 1000 UGSH ($ 0.40) to spare, he would give the garbage to people that moved around with wheelbarrows collecting garbage to be taken to disposal sites. "The fact that it costs money to dispose garbage is a problem to us but also we are not sure whether garbage is really properly disposed by these people who use wheelbarrows to collect garbage, or if they just dump it in some hidden places in the area one respondent said".

In some parts of the study area mainly in the western part of Bwaise III however, the problem was that people did not have access to the roads and the trucks that would pick up garbage could not access the households because there were no roads. While conducting the research it was found that the respondents were aware of the causes of the challenges that they were facing and it was agreed during the focus group discussion that when people just threw their garbage anywhere, it ended up blocking the drainage system thereby blocking flow of water and when drains are blocked and it rains, the area would flood. This fact of awareness was confirmed by some of the activities of cleaning the drainage channels carried out by the local community that was observed during the fieldwork.

4.1.2.   Informal development and topography of the area

One respondent explained that Bwaise was a natural wetland located in a big water catchment of Lubigi and that the water table was high. Ideally people should not live in Bwaise and Makerere III areas but there have been a lot informal developments in the area due to the fact that the enforcement of laws was weak and it was complicated to evict people. This is further exacerbated by the fact that the issuance of building plan approval documents is based on condition of having a land tittle (Source: Physical Planning Department of KCCA). Many land owners in Kampala don't have such land tittles due to complicated land tenure system in Kampala city. However because of this fact and weak laws people tend to construct houses regardless of laws and this has led to informal developments in the area. Due to these informal developments water ways have been blocked and natural drainage system has been affected in the study area and this has increased to occurrence of floods. Figure11 below shows some settlements constructed in the wetland in Bwaise III.

Figure 11: Informal settlements in a wetland

Because Bwaise and Makerere III parishes are located in a low-lying area, it did not even have to rain in the area for the inhabitants to get affected by floods. "It rains elsewhere and Bwaise floods" is a common slogan used in the area to emphasize the influence of floods on people and their properties in the area. Though the area is informally developed, people in the area are aware of the fact that the area is a flood hot spot and they are trying to cope with floods through the use of different coping mechanisms. However some coping mechanisms such as landfilling end-up causing more problems as they are deployed without proper planning. They may block waterways thus increase the possibility of flooding in the area. One respondent showed concern for people living near the northern bypass because she was aware that they were facing the worst problems of floods and this happened after the construction of the road.

4.1.3. Heavy rainfall and Climate change

There have been typically two wet seasons in Uganda: One between March and May and one September and November. However in Kampala these two seasons were said to be hard to distinguish these days due to the fact that during the past year, occasional heavy rains in Kampala have occurred even during the dry seasons. January and February of 2011 were described as dry months, but since then it had been raining throughout the year and every time it had rained water had entered some of the houses of people living in Bwaise and Makerere III Parishes. People perceived this as the result of climate change.

The effect of climate change was mentioned during the fieldwork focus group discussions and interviews where the respondents pointed out that the seasons have changed and that it has become more and more difficult to predict when it will rain. These abrupt changes in the seasons have made businesses in the area more vulnerable to floods. One street vendor involved in food selling business said; "These days it is difficult to know when it will rain and most of the time it rains when we are not prepared and we end up losing some of our goods". It should be noted that no systematic early warning systems were found in the study area except the local peoples' knowledge on seasons.

4.2. Business location flood information

Business location information related to flooding in the study was gathered from interviews using questionnaire approach. During this fieldwork, 90 respondents were interviewed using questionnaire and out of 90 interviewed respondents, 71.1% were business owners and 28.9% were employees as shown in the table 5 below. As some questions were specifically directed to business owners, in the analysis of the data concerning business owners, the responses from employees were not considered to avoid bias in the data.

Business Operator status

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Employees	26	28.9	28.9	28.9
	Owners	64	71.1	71.1	100.0
	Total	90	100.0	100.0	

Table 5: Status of business operators

The information from questionnaire interviews was analysed using SPSS software. The flood event that was considered during this fieldwork is the event that happened on 25th of June 2012. This event was chosen based on rainfall data that was obtained from Makerere University. See the figure12 below. It should be noted that the flood event on 25th June 2012 happened outside the traditional wet season and this would contribute to the peoples' perceptions that seasons are changing.
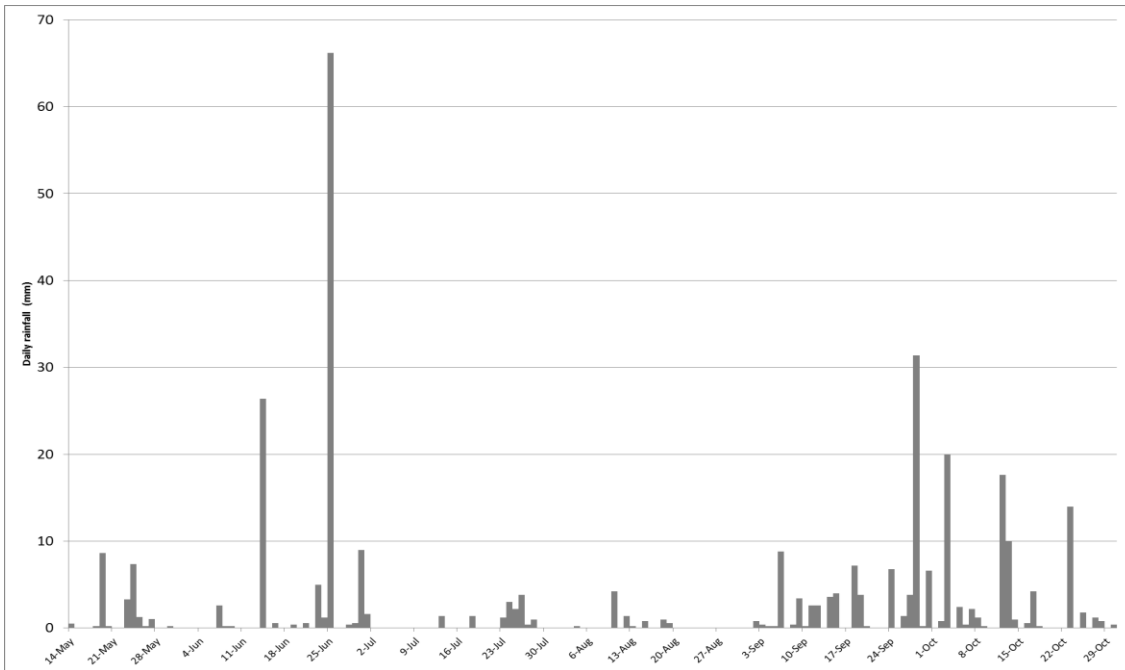
Figure 12: Rainfall data

Based on the records above the event on 25th of June 2012 was selected and from fieldwork it was confirmed that there was flood event on this specific date in the most parts of the study area, however some respondents could not remember exactly the date of the event due to the high frequency of floods in the study area. Through the use of questionnaires, the flood information on depth and duration of flood water of the event on 25th of June were collected. When asked if they experienced a flood on 25th of June 2012, a number of responses were given see figure 13 below.
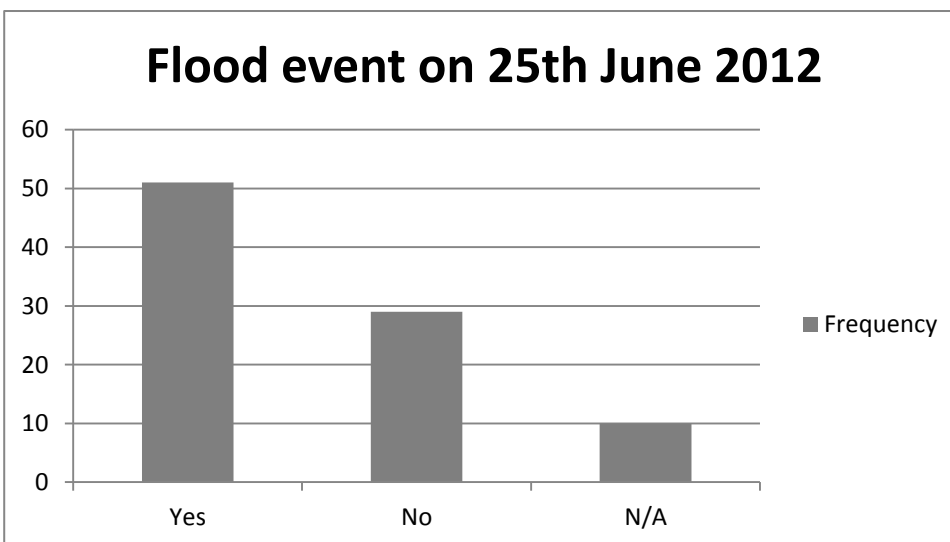
Figure 13: Number of response to the question if their business was affected by the flood event on 25th June 2012.

From 90 respondents, 51 respondents experienced flood on this date, 29 respondents did not experience flood and 10 respondents could not remember the flood event on 25th June (N/A) and as a result they

were excluded in the flood information analysis. The presentation of 80 responses regarding flood event on 25th June 2012 are shown below. The distribution of flood water depth and duration in the study area is shown in the two maps below. Figure 14 below shows the spatial distribution of flood water depth in the study area.
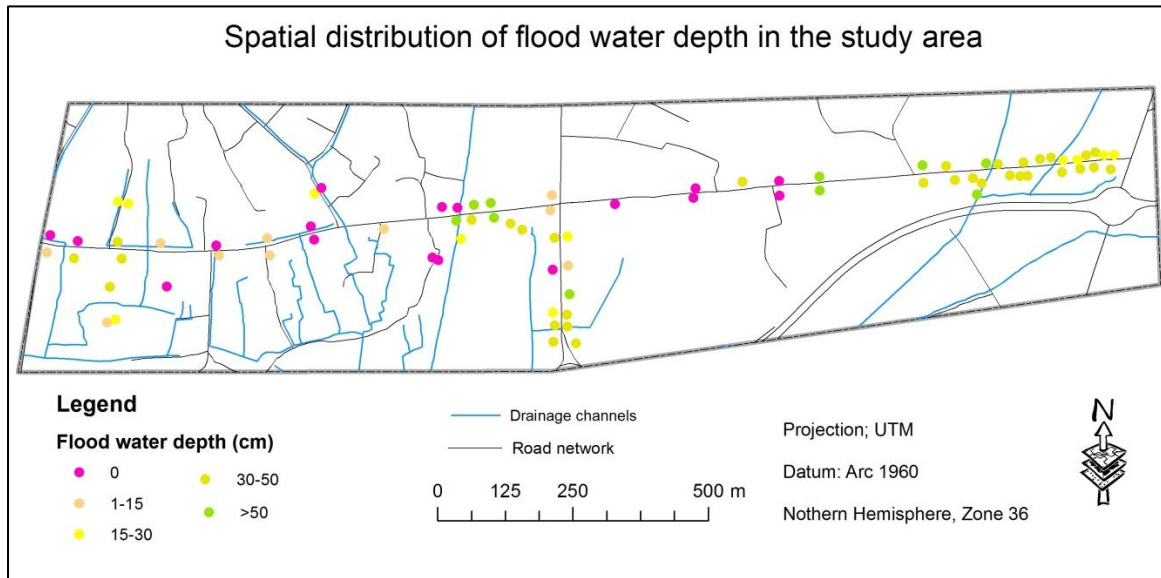
Figure 14: Spatial distribution of flood depth in the study

From figure 14 above, it is clear that the in the eastern part of the study area along the border of Makerere III and Bwaise I and the area along the border of Bwaise III and Makerere III towards northern bypass are the areas with business activities most affected by the floods. Towards the western part of the study area some business activities mainly on the side of Bwaise III are also affected but the value of flood water depth is relatively small (less than 30cm).

Figure 15 below illustrates the spatial distribution of flood water duration in the study area based on information provided by local business operators in the area. From figure 15 below it is clear that the eastern part of the study area is the most affected however across the study area, most of the business activities show a relatively short flood water duration (less than 6 hours) and with a major trend decreasing from west to east and around area towards northern bypass except for the few observed cases probably due to the nature of the terrain across the study area and inaccuracies in data provided by the business operators. It therefore be concluded that though some business activities show relatively high flood water depth values but flood water duration is relatively short for the most of the business activities in the area.
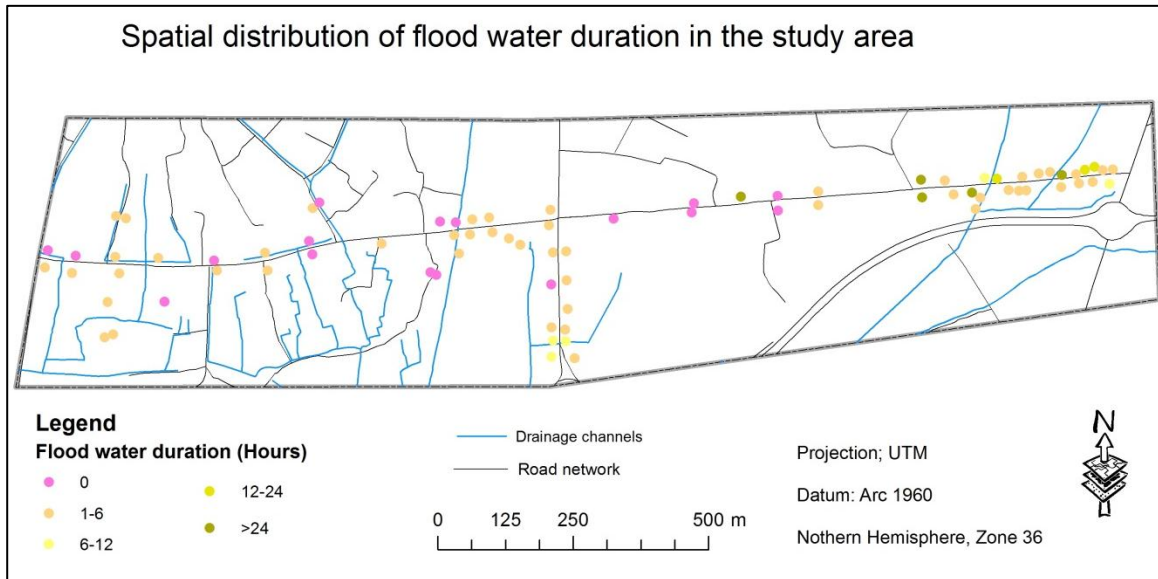
Figure 15: Spatial distribution of flood water duration in the study area

4.2.1. Flood occurrence in the study area

Based on interviews, most of the interviewed business operators in the study area have at least experienced one or more flood events since May 2012. Most of these floods are distributed in two wet seasons in the area as explained during fieldwork. Generally most respondents considered flood as a normal event however due to increase in frequency of floods and severity of the flood events and their occurrence outside "normal" wet seasons in the study area people are beginning to realise that floods are serious disturbances to their lives and their businesses. They have started some programmes to help them cope or prevent floods from happening. For example during one day workshop organised by IFM Kampala project in Kampala on 1st November 2012, it was mentioned that local people in Kampala get involved in cleaning of the city once every month under the programme called "Burungi Bwansi" where local community get together and clean their environment and this helps in keeping the city environment clean. Specifically in the study area the programme focuses on cleaning of drainage channels thereby helping in opening waterways and unblocking culverts and this has helped in fighting against flooding in the area.

4.2.2. Reasons for initiating business and flood awareness in the area

It was found out during fieldwork that out of 90 interviewed business operators, 41 respondents having business activities in the area were aware of the flood problems in the area before starting their businesses, 23 did not know about flood issues before starting their business activities while 26 respondents were employees and could not answer if their employers knew about the flood issues or not before starting their businesses in the area. The figure 16 below shows the level of awareness in the study area.
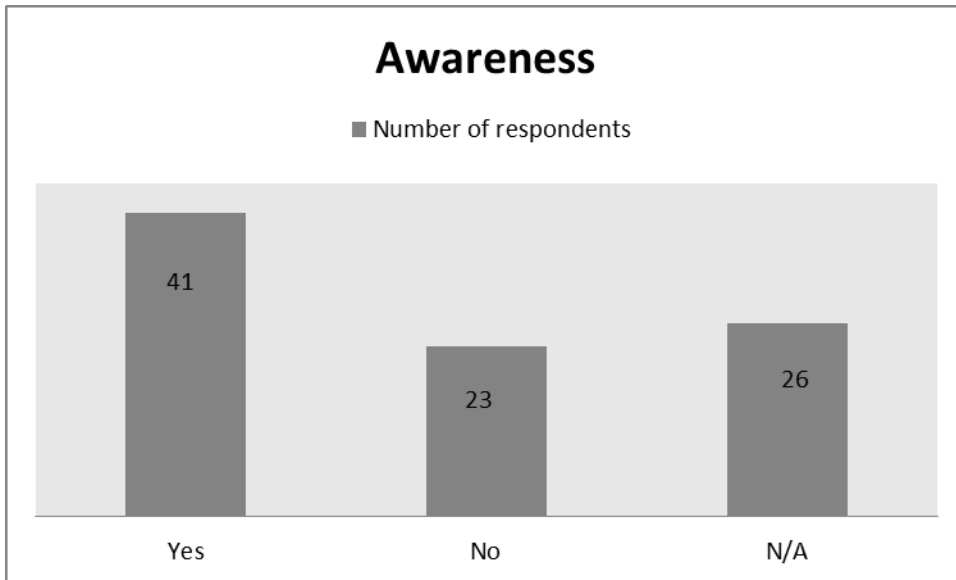
Figure 16: flood awareness in the area

During this research, out of 90 business operators interviewed during fieldwork 64 were business owners as shown in table 6 above and out of which 41 business owners new about flood problems in the study area before starting their businesses in the area see table 5 above. However this did not stop them from opening their businesses in the area irrespective of the flood challenges. When asked why they still have their business activities in a flood prone zone, a number of reasons were given. Figure16 below shows reasons for initiating in the area given by 64 business owners interviewed during the fieldwork.
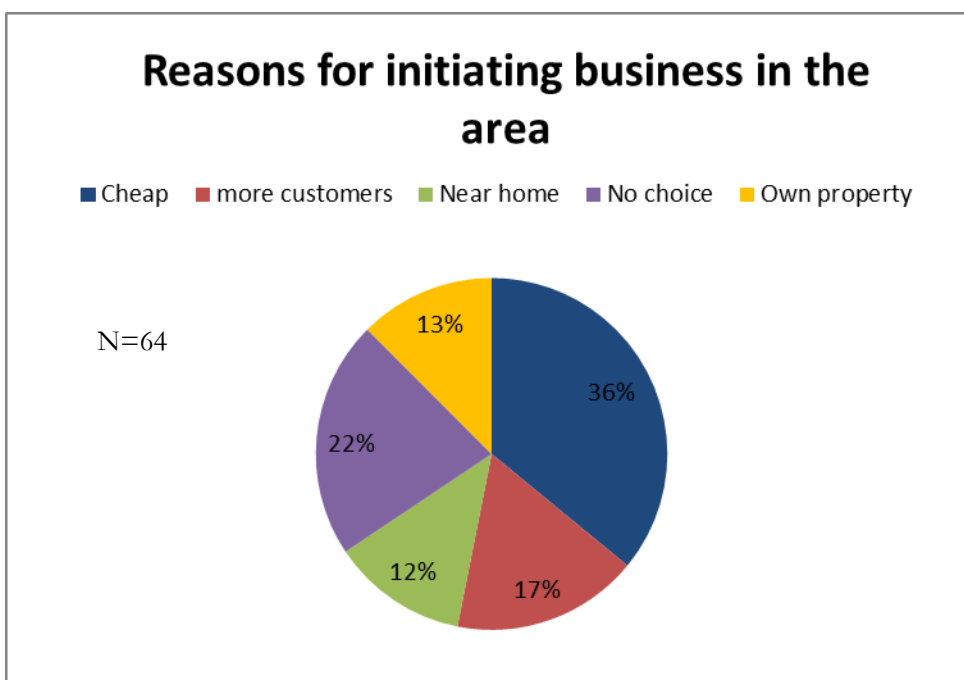
Figure 17: Reasons for initiating business in the area

i.   Cheap rent: One of the major reasons why people still have business activities in this flood prone zone is that the cost for renting is cheap. This makes it possible for small business owners who could not manage to rent a place in other parts of the city due to high rent to carry out their business activities irrespective of challenges due to floods. The results from fieldwork show that 36% of business owners in the area prefer the place because of cheap rent. They could move but won't.

ii.   No choice: Though rent is relatively cheap in the area, 22% of business owners would prefer to shift from the area but they have no choice due to the fact that they own small businesses and they can't afford rent in other places in the city as they are relatively expensive. They can't move.

iii. More customers: Another reason why people have business activities in the area is the number of customers in the area, 17% of the interviewed business owners consider this as their main motivation to initiate business and not to shift to other places. When asked how this is possible one of the respondents said that the area has more customers because of what they refer to as "night population". The area has a big number of people who come to stay from nearby areas during night and this provides more market to business owners.

iv.   Own property: Another reason for staying in the area is that some business owners (13%) in the area own property on which they carry their business activities and this makes it necessary for them to stay in the area though there is a flood problem but it is their home.

v.   Near home: 12% of the business operators interviewed in the area said that they have their business activities in the area because the area is close to their homes and thus there are no transport costs. This could therefore be an indication that there is a trade-off between risk and travel costs in which affordability plays a role. It can therefore be concluded that these small-scale business owners have relatively low profits.

4.3.   Flood risk perception

This section will explore the flood risk perception based on the local business operators' perceptions. The knowledge of local people and their experiences with flood and how it affects the business activities is the basis of determining the risk in the area due to flooding. During interviews, business operators were asked to determine the risk level of their businesses and area in which businesses are located. Flood risk was categorized into four classes which include:

i.   Not in danger at all "1": This means that there no threat of floods on business activities in the area according to local people.

ii.   Less in danger "2": This means that local business operators agree that there is a flood problem in the area but it's manageable.

iii.   In danger "3": This means that local business operators agree that there is a serious flood problem in the area and risk for carrying out business in the area. However they can still somehow manage through the use of simple coping mechanisms.

iv.   Much in danger "4": This means local business operators agree that there is high risk for carrying out business in the area and flood issue is not manageable at all.

The interview questions on flood risk perception had two components, one asking about how people perceive the flood risk on individual business activities and the second part aimed at understanding how people perceive the flood risk in the area (environment) where their daily business transactions are carried out. The risk perception levels according to local business operators in the study area are presented in the figure 18 below. The results from the analysis show the area is considered to be more in danger than individual business activities as shown by the figure18 below which shows that 45 respondents agree that their business activities are not in danger at all whereas only 28 respondents believe that the area is not in danger at all, 19 respondents believe that their businesses are less in danger and 21 consider the area to be less in danger. Only 16 respondents considered their businesses to be in danger as compared to 26 who believe that area is in danger, 10 respondents believe that their businesses are much in danger while 15 respondents believe that the area is much in danger. While asked why they believe that the area is much more in danger than individual business activities, one respondent answered that during rainy seasons the area experiences frequent floods which might not necessarily affect the individual business activities directly but indirectly businesses in the area are affected due to disturbances in transport system and general hygienic conditions of the area. This means that the area as a whole may experience more challenges in general as compared to the individual business activities.
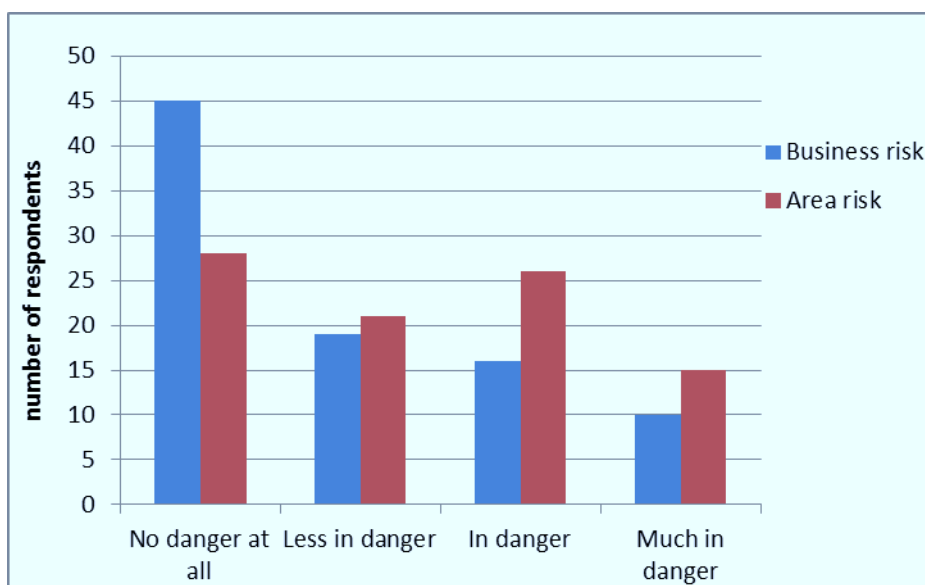
Figure 18: Business flood risk perception in relation to environment flood risk

In an attempt to understand why business operators perceive flood risk as shown in figure 18 above, statistical analysis was carried out in order to determine the factors on which flood risk perception depended. Using bivariate correlation function in SPSS software, the results show that the way people perceive flood risk is related to three major factors: 1) flood water depth, 2) flood water duration and 3) elevation of business activities' location in the area. The results are explained in section 4.3.1 below.

4.3.1.   Factors affecting flood risk perception

A number of factors have been identified as the key factors affecting the flood risk perception in the study area. The output of correlation analysis in SPSS is shown in the appendix 2. The identified factors include:

i.   Water depth: based on the results of the survey it has been observed that respondents who experienced high water depth when it floods are the ones with high flood risk perceptions. A bivariate correlation analysis in SPSS shows a significant positive correlation at 99% confidence interval between business risk perceptions with a Pearson coefficient of 0.723. Thus it can be concluded the higher the flood water depth, the higher the business operators perceive flood risk.

ii.   Water duration: another factor to consider is flood water duration which refers to the time the flood water stays on the premises. This has an effect on how people perceive flood risk due to the fact that if water stays longer, then their business transactions are more affected thereby inducing high risk perception to people. From data collected during fieldwork, the risk perceptions and flood water duration are positively correlated with a Pearson correlation coefficient of 0.422 at 99% confidence interval. This further shows that the longer the flood water stays on the premises the more the people consider their business activities to be at a higher risk.

iii.   Elevation: the location factor is based on the elevation of the area in which the interviewed business activities are located. The elevation information for each business activity was extracted from the digital elevation model of the study area. The results were then transferred to SPSS for correlation analysis which resulted in a significant negative correlation between flood risk perceptions and elevation at 99% confidence interval with a Pearson correlation coefficient of -0.304. This shows that the people with business activities located in relatively flat areas show a high flood risk perception as compared to those whose business activities are located in relatively steep areas. Thus elevation of the area in which business activities are located is another important factor to explain the risk perception of individual business operators in the area.

It should however be noted that during fieldwork another factor of proximity to drainage channels was mentioned by some of the local business operators who said that having a business located close to a drainage channel is risky as some of the drains are very small and in most cases they fail to drain water when it rains leading to water overflowing that results in flooding their workplaces. Therefore for each business activity, the proximity to the nearest drainage channel was obtained. Only primary and secondary channels were considered as the information on tertiary drainage channels was not sufficient. Using statistical techniques for correlation analysis the two variables of risk perceptions and proximity to drainage channels were analysed. The results however show that there is no significant relationship between the two variables. Hence it can be concluded that though some businesses close to drainage channels are sometimes flooded due to the failure to drain the rain water by drainage channels but this factor is not strongly affecting the flood risk perceptions across in the study area.

5. FLOOD RISK ASSESSMENT FOR BUSINESS ACTIVITIES

5.1. Identification and classification of business activities

The overall purpose of creating, using and managing business records is to support the easy access to the required business information. A number of considerations were applied during classification of business activities in the study area. Below are the steps that were considered for the classification of business activities.
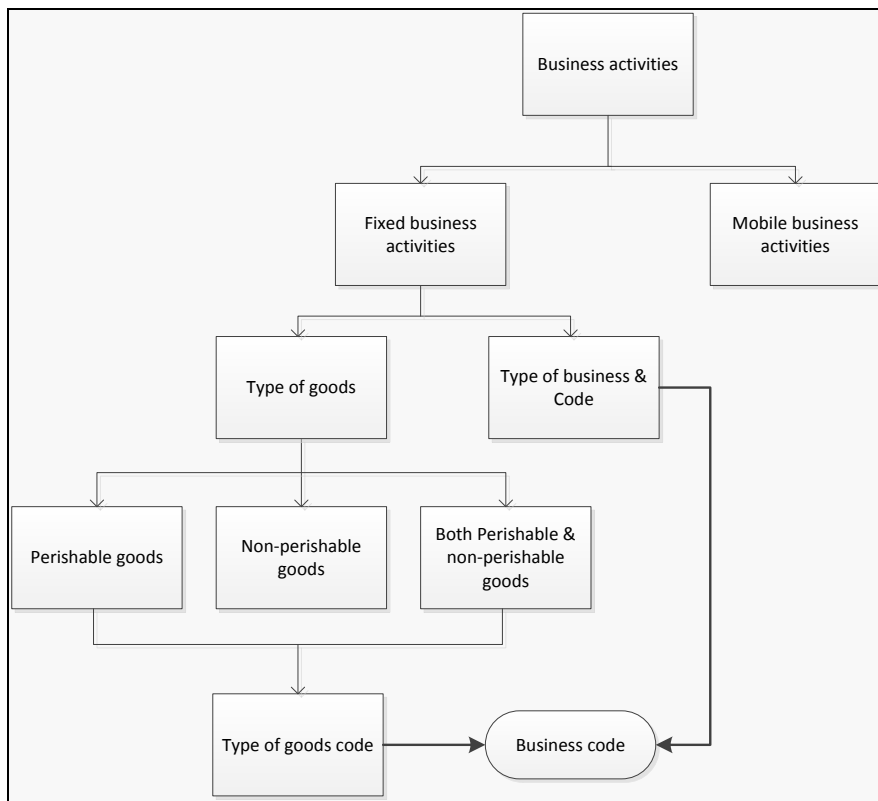
Figure 19: Classification of business activities

Firstly the business activities in the study area were identified as fixed or mobile businesses. For fixed business activities, two further steps were taken. Identifying the type of goods on the premises and this was based on whether goods are perishable, non-perishable or if the business has both perishable and non-perishable goods after which each type of goods was given a unique code as shown below.

Type of goods	Type of goods code
Perishable goods	11
Non-perishable goods	12
Both	13

Table 6: Type of goods code

 The next step was to identify and group business activities having similarities and then each group of business was given a code. The final stage of classifying business activities was combining the code given to the business class (table 8) and code of type of goods (table 6) on the premises to get the final business code for each group of similar business activities. Twenty groups of business activities were identified in the study area and a four digit coding system was designed.

These business activities were then aggregated into five major business classes based on similarities among the identified business activities in the study area. These classes are shown in the table 7. The business code for each business type is therefore generated based on combination of type of goods code shown in table 6 and business class code shown in table 7.

BUSINESS CLASS CODE	DESCRIPTION	FREQUENCY
21	Financial services	3
22	Food and accomodation	11
23	Personal services	8
24	Shops	51
25	Workshops	17

Table 7: Classified business activities

The majority of the business activities in the area are shops 51 identified business activities. The results from combining business class code and type of goods code is a four digit code for each business activity an example of the coding process is shown in figure 20.

Business type	No. Employees	Operator's status	Goods code	Business Class	Business code
Dairy	2	Owner	11	22	1122
Garrage	7	Owner	12	25	1225
Retail shop	1	Owner	13	24	1324
Saloon	4	Employee	12	23	1223
Retail shop	1	Owner	13	24	1324
Boutique	3	Employee	12	24	1224
Restaurant	4	Owner	11	24	1122
Retail shop	1	Owner	13	24	1324
Clinic	1	Owner	13	23	1323
Restaurant	2	Owner	11	22	1122
Saloon	2	Owner	12	23	1223
Retail shop	1	Employee	13	24	1324
Furniture Wksp	3	Owner	12	25	1225
Sport betting	3	Employee	12	21	1221
Retail shop	1	Owner	13	24	1324
Phone repair	1	Owner	12	24	1224
Hotel	10	Employee	13	22	1322
Hardware shop	3	Owner	12	24	1224
Mobile money agent	1	Owner	12	21	1221
Supermarket	4	Employee	13	24	1324
Mini-Supermarket	3	Owner	13	24	1324
Mobile money agent	1	Owner	12	21	1221
Clinic	3	Employee	12	23	1223

Figure 20: An example of classification of business activities

5.2. Exposure analysis

The flood exposure analysis of business activities in the study area was done based on two approaches. First the exposure of business activities was done by overlaying the business activities in the study area on the flood extent map based on the 100 years return period flood map extent that was provided by KDMP, 2002. The second approach to assess flood exposure of business activities was based on historic evidence collected from the business operators as explained in section 4.2. The output of the analysis for both approaches is shown in figure 21 below.
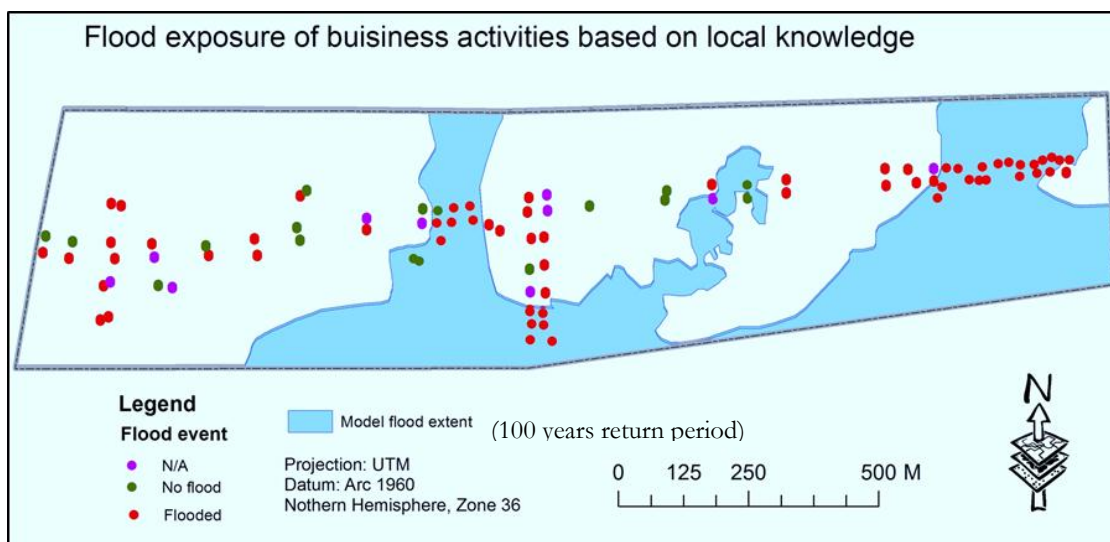
Figure 21: Flood exposure for business activities

It should be noted that the results shown in figure 21 above are based on the flood water depth information provided by the respondents during the fieldwork and the information is based on the flood event on 25th June 2012 which was an event of 2years return period. The flood extent map used is derived from a 100 years return period flood lines from Kampala drainage master plan 2002. Though the flood event considered is a 2 years return period event and the flood extent map used is for 100 years return period flood event, results from the analysis show that some business activities outside the flood zones mainly in the western part of the study area along the border of Bwaise II and III, flooded on 25th of June 2012 (see figure 21) whereas some other business activities inside the flood zones did not experience flood. This can be explained by a number of reasons; the flood extent map used was made in 2002(10 years) and more development has happened in the area, the quality of the digital elevation model used to produce this flood extent is not of good quality, there is a problem of drainage channels that overflow before water is drained to the main drainage channel. However it could also be that some business operators provided the information that is not accurate. It can therefore be concluded that combination of both methods can lead to a better understanding on the exposure of business activities however a further investigation is necessary for a better results.

5.3.   Assessment of the coping mechanisms

A flooded work place was described as inevitable when it rains in the study area. The respondents from Bwaise and Makerere III in this field study had similar courses of action to mitigate the effects of floods on their business activities. They would move goods up on tables, shelves or on top of other furniture. Some people had raised the entrance of their working places, raised foundations and used sand bags to stop water from entering houses. When the rain tubs, basins and buckets were used to move water out of the houses. Use of absorbent materials such as saw dust was also used to absorb rain water and keep floors dry. The coping mechanisms in the study area cost money and this affects the business operators' profits. However in most cases it was mentioned that for some of the coping mechanisms such as cleaning of workplace, covering the floor with saw-dust and moving items to a safer place were carried out by employees as part of their job and hence no extra payment. When asked how much money they spend on coping mechanisms, some business operators responded that they don't pay money because family members do the work and hence no payment required.

5.3.1.   Local business operators' flood coping mechanisms

Coping mechanisms applied in the area are based on the knowledge and experience of local business operators on flooding. Business operators in the area made efforts to reduce the effect of flood on their business activities based on their knowledge and capacity. They learned flood behaviour and characteristics such as flood water depth and water duration and then tried to implement structural and non-structural mechanisms to minimize the damage due to flooding.

Since the area is a flood prone zone business operators are familiar with annual floods and they have practically trained themselves to make some actions within their own capacity to protect themselves and their business activities against the damage and loss caused by floods. Based on the interview carried out and site observation during the field-survey, several coping mechanisms were identified as being employed by the business operators to deal with floods in the study area. During the interview, business operators were asked using open-ended questions about their coping strategies: before, during, and after flooding (see appendix 1). The following coping mechanisms were identified.

i.   Do nothing

A flooded work place was described as inevitable during a rainy season in the study area. A business operator from Bwaise during fieldwork said that whatever they do still their work place will be flooded and hence no need of using coping measures. However it was found out that this mechanism is only applied before flooding where business operators wait until the rain stops raining and then clean their workplaces after the flooding by removing the mud and flood water.

ii.   Cleaning of drainage channels

The most common coping strategy applied in the area before and after flooding is the cleaning of the drainage channels. The drainage channels in the study area are usually full of garbage due to poor waste management in the area (see section 4.1.1) and this disrupts the free movement of water in the drainage channels leading to floods. It should be noted that this coping mechanism is more practiced at the community level rather than individual basis. The cleaning of the drainage channels is organised by the community local leaders.

Figure 22: Cleaning of drainage channels

Figure 24 above shows the local people cleaning the drainage channel before it rains to avoid the possibility of flooding due to blockage of waterway in the drainage channel. Picture 1 at the left shows a KCCA truck picking the garbage collected from the drainage channels and in picture 2 to the right is the garbage collected out of the drainage channel.

iii.   Raising foundation and entrance of houses
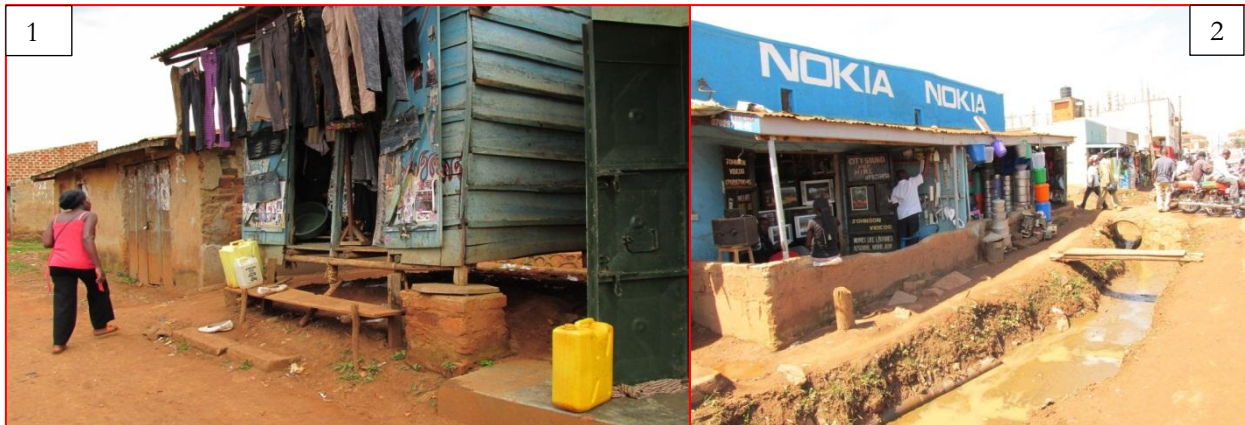
Figure 23: Raised foundation and Entrance of building

One of the common structural measures against flooding with the area is the raising of the foundation and entrances of the buildings to stop flood water from entering their work places. However some described this strategy as more problematic when water level raises beyond the entrance level of the houses because it becomes more difficult to deal with flood water since the floor level is always lower than the entrance. This results in water being trapped inside the building making the house a pool of water. Figure 25 (left), shows a small shop with a raised foundation and figure 25 (right) shows another shop with a raised entrance to stop flood water from entering the house when it floods. It can be observed that the shop is located next to a small drainage channel.

iv.   Removing the flood water from work place

After flooding, flood water is usually removed from the work place by either using buckets or mopping the floor to make sure that water is removed from the area so that customers can be welcome in a water free environment. This one of the common coping mechanisms applied in the study area due to the fact that in most of the workplaces, the floor of houses are lower than the surroundings and when water enters the building, it can only be removed mechanically.

v.   Cleaning of the work place and painting

Flood water usually brings mud and trash; hence it is necessary to clean the work place after flooding by removing mud and trash brought along by flood water. However because of the mud in the flood water

sometimes it is necessary to repaint the walls of the building in order to keep it clean. Another important issue that was raised during fieldwork is that sometimes people in the area empty their toilets in the flood water so in most cases flood water contains high levels of human excreta and a proper cleaning is hence necessary for the healthy working environment.

vi.   Borrowing money from friends, relatives or sometimes from the bank

Another coping strategy employed by business operators in the study area is borrowing money from friends, relatives and banks. One respondent during a focus group discussion mentioned that he had to borrow money from the bank to revive his business that had been seriously affected by flooding where he had lost all of his goods during a severe flood in the study area. Some respondents also mentioned that they owe money to their relatives because of the similar circumstances. This has in general affected their business career as they have to pay back the loan which is sometimes not possible and may result in disputes with-in the community.

vii.   Use of sand bags to stop water from entering houses

It was observed during the fieldwork that people use sand bags at the entrance and around their workplaces to stop flood water from entering their work places.

viii.   Covering the floor with saw-dust to absorb flood water

Mainly workshop business operators mentioned that they use the saw-dust to cover the floor of their work places during rainy seasons and this helps in absorbing the flood water on the floor thereby protecting their furniture from flood water. This method helps them to keep the floor dry however, when there is too much water this technique helps less and adds more work during cleaning process.

ix.   Moving items that can be affected by floods to a higher level

It was observed that in the most of the shops in the area, the items (goods) are kept on raised shelves. Though the primary purpose of this technique was found out to be space management, but it was also mentioned that it is one of the mechanisms to protect goods against flood water when there is flooding. In brief, coping mechanisms employed by local business operators in the study area can be summarized in the table 10 below.

Before flooding	During flooding	After flooding
Non-structural ❖ Do nothing ❖ Cleaning of drainage Channels. ❖ Covering the floor with saw-dust.	**Non-structural** ❖ Moving items to safer places, use of tables and chairs to secure items from flood water.	**Non-structural** ❖ Cleaning of drainage channels. ❖ Removing of flood water from work places. ❖ Cleaning of work places and painting. ❖ Borrowing money from friends, relatives or from the bank.
Structural ❖ Raising the foundation and entrance of houses. ❖ Use of sand bags to protect work places from flood water.		

Table 8: Summarized community coping mechanisms

5.3.2. Coping mechanisms employed by government

In the interviews during fieldwork, it was explained that local government is trying to help the community in coping with flood issues within the study area. The respondents explained that government provides trucks to pick-up the garbage collected from drainage channels. However the process of cleaning is done by the local community. Another government help is on expansion of drainage channels. As mentioned in section 4.1.1, one of the causes of floods in the area is the insufficient capacity of the drainage channels and in this regard the local government through KCCA is expanding one of the main drainage channels in the area. See figure26.

Figure 24: Expansion of Lubigi drainage channel

5.4.   Flood Impact Assessment

The impact of floods on business activities in this research refers to the degree of damage that business activities suffer in terms of loss of stock and decrease in sales or any other loss resulting from effects of flood on business activities. Flood impact is characterized by the flood characteristics flood water depth, duration and velocity. However some other factors such as spatial location of business activities, social-economic characteristics of the community dealing with floods, awareness, early warning systems, existence of coping mechanisms etc can play a vital role in determining the degree of impact for any given business activity. In this research the flood impact was assessed based on flood water depth, flood water duration and elevation at the location of business activities. Elevation information was derived from digital elevation model. An excel sheet containing flood water depth and duration information was transferred to ArcGIS and then flood information for all business activities was extracted with help of join and relates function. The values for the three identified indicators for each business activity were standardized using maxi-min standardization method. An impact index was generated based on the weighted scores of the business activities on the three above mentioned indicators. For standardization process, the relationship between the indicators and the impact index were first identified as a positive or negative relationship and the following formulas were applied.

Positive relationship: (value-lowest value) / (highest value-lowest value)

Negative relationship: 1- [(value-lowest value)/ (highest value-lowest value)]

With this standardisation method, the values were normalised with a linear function between absolute lowest score and the highest score. For the positively correlated indicators, the absolute highest impact score is indicated with a 1 and the absolute lowest with a 0. For indicators with negative correlation, it is the other way round. The table below shows the summary of process for the impact index generation.

Indicator	Sign of the relationship	Indicator value per business activity	Indicator standardized value	Weight of indicator	Weighted value per indicator
Flood water depth	+			0.4	
Flood water duration	+			0.3	
Spatial location (slope)	-			03	

Table 9: Methodology for impact index generation

Impact index: $\sum$ (Indicator standardized value* weight).

Based on the author's observation, flood water depth indicator is given a slightly higher weight as compared to the other two indicators in the impact analysis. Figure 23 below shows the impact to different business activities based on the three indicators described above.
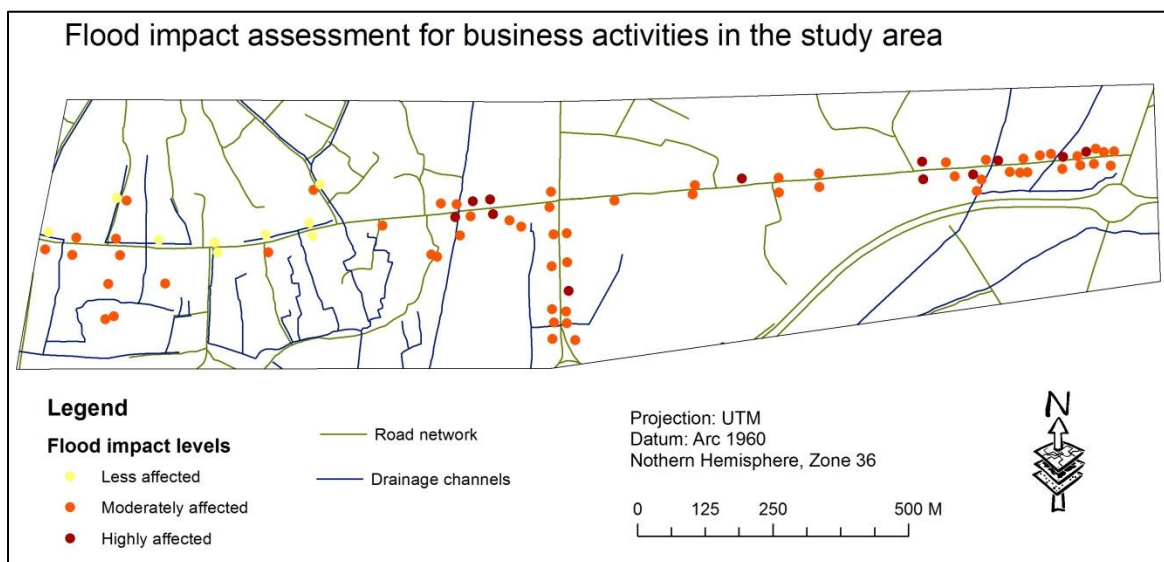
Figure 25: Impact levels for business activities

5.5.   Classification and analysis of flood impacts in the study area

Floods have the potential to exact a huge impact on the transactions of business activities. The direct losses in business due to floods can be seen as the end point of a series of events, whereby a flood event

that leads to damages and disturbances in business activities. The flood impacts on business activities can be assessed by considering individual business activities affected by floods, in proximity to floods, or subject to flood risk. As mentioned in section 2.6, flood impacts can either be direct or indirect therefore the impacts of flood on business activities are discussed in this context. Though it has been discussed that flood effects on business activities are mostly negative, it should however be noted that the consequences of flooding are by no means solely negative.

5.5.1.   Size of business activities in the study area

Based on the researchers' observation during the fieldwork, most of the business activities identified in the study area are small scale businesses. This is further explained by the number of employees per business

activity identified. Most of the businesses are operated by owners or family members but no employees whereas others have one to two employees to help. Figure 27 shows the histogram of number of employees per business activity in the study area.
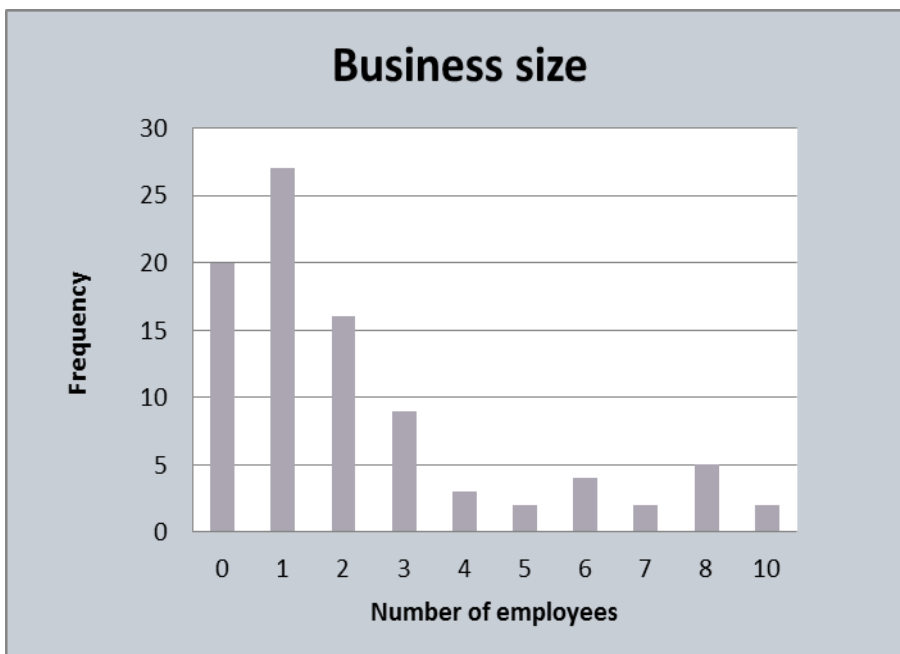
Figure 26: Size of business by number of employees

From the figure 27 above, it is clearly shown that out of 90 business activities identified in the study area, 70% of the business activities identified have employed not more than two employees. This further shows that business activities in the area are mall scale businesses. To be noted zero employee means that the business is operated by the owner. However as shown from figure27 above there are some business activities with high number of employees and these were found to be garages, hotels, petrol stations and restaurants.

In the market area along the main road in Bwaise (Nabweru road) towards eastern part of the study area there were a lot of traders selling items off the ground. The field assistant explained that when it rained and flooded, these people could not work. Some of the shops and other business activities had to close for a number of hours or even the whole day sometimes. This is due to the fact that working environment gets disturbed by flood water making it not possible for them to carry on with their daily business activities. Figure28 shows some of the business activities found in the study area. From top (left) clockwise, a number of motorcycles for Boda-boda business and some shops in the area are shown, some food items for sale by road side which is part of street vending business in the area, a temporary restaurant by road side where people come and buy food and then finally some other household appliances displayed on the ground by the road for sale.

Figure 27: Some business activities carried-out on streets in the study area.

5.5.2. Negative impacts of floods on business activities in the study area

From the field survey local business operators were asked to discuss how floods affect their daily business activities and a number flood impacts were mentioned and these include:

a. Decrease in sales

One of the effects of flood on business activities in the study area that were mentioned during the fieldwork is reduced sales. This factor is attributed to a decrease in the number of customers when there is flooding in the area. The major cause of this reduction in the number of customers being that when it floods, the transportation system in the area gets affected thereby restricting the movements of buyers in moving from one place to another. This in turn affects flow of business transactions within the study area and the surrounding environment.

b. Closing business

It was mentioned during the focus group discussion that sometimes business areas are closed due to flood water that is too high and this results in losses as some perishable goods get spoilt before they are sold. It was pointed out that this is one of the serious effects on business operators as they have to pay daily taxes whether they have worked or not and this has a huge impact on their livelihood as the business activities in the area were described as sole source of livelihood for business operators. During a focused group discussion, one respondent said that her business is affected by floods in several ways because when it floods she doesn't work yet she has to pay a daily tax of 1000 Ugandan shillings (0.4 USD), a monthly tax of 30,000 UGSH (12 USD) and storage fees for some people to keep her goods safe. The rainy season is one of the most difficult periods in Bwaise as floods disrupt business transactions thereby causing huge losses, one respondent said during the field-survey.

c. High expenditure

There is a problem of high expenditure when there is flooding mainly because business operators are spending a lot of money on coping strategies such as cleaning and painting. Another cause of high expenditure that was mentioned is that when it floods, prices for transport rise due to poor road conditions and lead to the increase in the prices of other commodities. This in turn has a negative effect on the livelihood of the business operators and their entire business activities.

d. Loss of stock due to flood water

As in figure25, some of the business activities are carried out along the road side in the study area and when there is flooding some of the items are washed away by flood water. One respondent said during an interview: "It is difficult these days to know when the floods are coming due to climate change seasons have changed and sometimes it rains when we are not aware and floods catch us by surprise thereby destroying our goods". Another respondent said that he lost a sack of bananas and 50kg of sugar worth 200,000 UGSH (80 USD), during the flood event on 25th of June 2012. This is a big loss for someone having a small scale business.

e. Reduced quality of goods

When it floods, flood water carries along mud and trash and when this is deposited in the workplaces the area looks dirty thereby affecting hygienic conditions of the working environment. One business operator respondent in food and accommodation business said that when it floods some people in the area empty their toilets in the flood water and human excreta is discharged this affects the quality of food items sold in the area. This has resulted in huge losses for the people in food business as everyone in the area knows that flood water contains human excreta and during rainy season many people don't use restaurants that are flooded even if the flood water is not much but because of poor hygienic conditions due to floods in the area.

f. Reduced income

During the field survey it was found out that most of the people in the area, their income depended on small business activities carried out in the area. However due to flood problems, their source of income has been affected largely mainly because when it floods businesses close for some hours or even the whole day yet the employees have to be paid and other basic needs are to be taken care of. In this regard one respondent said that "*during the rainy season we face a lot of flood problems, our income decreases yet the problems that require money increase and these are: during this period many people fall sick and hence more money for medical care, more money for organising and cleaning work places yet the number of customers during this period decrease we are really being disturbed by floods and government is not helping us at all*". Some of the respondents that were able speak on behalf of others said that flood problems are increasing in the area and their families are being seriously affected by the reduction income from their business activities which is the major source of livelihood in the area. It was highlighted during a focus group discussion that during this period some students drop out of school due to the fact that their families can't afford school fees. It should be noted that in the study area respondents refer to flooding as "a period" and this is because the flood issues in the area are seasonal and they mostly occur during rainy seasons when many floods happen depending on the amount and distribution of rainfall. It should also be noted that in the study area they experience two rainy seasons in a year. This means that the frequency of floods in the area depends heavily on the amount of rainfall received in a year.

5.5.3. Positive impacts of floods on business activities in the study area

As explained in section 5.6, the effects of floods are not entirely negative and during the field survey carried out in the course of this research, some positive effects of flooding on business activities were identified in the study area and these include:

a. **Increased customers**

Though it has been mentioned earlier that in the study area some business face a challenge of decreased customers, it was however found out during field survey that when there is flooding and mainly in the rainy season as explained above, two types of business activities (clinics and drug stores) experience an increase in number of customers.

During interview business operators owning clinics and drug stores said that their revenues increase due to the increased number of customers in the period when the area is experiencing more of flood issues (Rainy season). This shows that due to poor hygienic conditions in the area during flooding in the area there is a likelihood of water-borne diseases outbreak leading to high cases of illness in the area.

b. **High revenue**

For some business activities, floods are the best moments to make more money. This was mentioned during a focus group discussion with taxi-drivers and Boda-boda drivers. "*When there is a flood roads are in bad condition so for us to take passengers from one place to another the price is either doubled or even tripled depending on the situation and this is because we are taking a big risk as it is not possible to see the road and sometimes we end up in accidents so far we have death case of a fellow Boda-boda who died through an accident due to flooded road*". As explained during focus group discussion people know that when there is flooding transport prices go high in the area. So transport business gains more money during flood incidents.

From section 2.6, it has been discussed that flood impacts can grouped into two categories which are direct and indirect impacts and based on the definitions of these categories provided in the same section, the impacts of flood on business activities in the study area were grouped as shown in the table 10.

Direct impacts	Indirect impacts
Loss of stock due to flood water	Decrease in sales
Closing of business activities	High expenditure
Reduced quality of goods	Reduced income
	Increased customers
	High revenue

Table 10: Classification of flood impacts

The results in the table 10 show that most of the flood impacts on the business activities in the study area belong to the category of indirect impacts.

6.   CONCLUSIONS AND RECOMMENDATIONS

6.1.   Conclusions

The main objective of this research was to assess the impacts of floods on business activities and coping mechanisms identification based on local business operators knowledge, experiences and perception of flood risk in Bwaise (Kampala). Based on the findings of this research, the follwing are conclusions and contributions related to the research objectives presented in chapter one of this research.

Identification and classification of business activities in the study area: The process of business identification and classification was based on questionnaire interview and site observation where a detailed information on type of business, number of employees, type of goods on the premises and spatial location of the business were the key information gathered. The classification of the business activities that was adopted is a four digit system of classification and the factors **that** were considered during classification are type of business and type of goods on premises and based on this the business activities were classified into five classes (see chapter 5, section 5.1). Based on the results from analysis it can be concluded that all of the business activities in Bwaise are small scale business activities mainly composed of small shops. It was also found out during this research that this kind of business is the major source of livelihoods in the area.

Respondents' experiences and perceptions of flooding: People's knowledge is very important factor in dealing with floods. Local knowledge provides an insight into the major characteristics of the flood such as expected flood water depth and duration in the study area. The awarenes and experiences on the floods and flood history in the area are key factors contributing to thes selection of the coping strategies employed in the area. It was found that business operators in Bwaise have been living with the floods for a long time because the area has always been a flood prone zone. Due to this fact people in the area used to consider floods to be normal. However based on the rsults from flood perceptions and recent experiences of the local business operators flood frequency has increased over past few years. It can therefore be concluded that although floods in Bwaise are relatively small scale localized with maximum water depth up to 1m and maximum water duration of 3 days, business activities in the area are still vulnerable to floods as even little amount of water can disrupt the business transactions. The results from analysis of flood risk perceptions by local business operators revealed that over 56% of the business operators in the area consider their business activities to be exposed to floods (see chapter four, section 4.3). Though these accounts may not match exactly with the technical flood model outputs of 2002, but they represent the actual feelings, perceptions and knowledge of the local people about floods that they are exposed to. Hopefully by learning from local people's actual experiences, knowledge and perceptions of floods in the study area, lessons can be learnt on how to effectively deal with flood related problems through the envolvement of local people in the flood mitigation programmes.

Current coping strategies in the area: Through field survey, focus group discussions and questionnaire interviews it was mentioned several times that the area is flood prone and as a result people in the area are familiar with floods. This experience has enabled them to develop different coping strategies to deal with flood problems and a number of these are discussed in chapter five of this research. However irrespective of the awerenes of flood problems in the area, the developed coping strategies are not sufficient to protect people and their business activities against floods in the area. From the fieldwork, it was found that in the past local government has done less in helping the community to cope with the floods however currently as the flood problems are emerging to be more severe and serious in the area, government is now trying to help in flood management programmes. It can therefore be concluded that though local business operators have developed different coping mechanisms, it is necessary to plan for a more efficient coping startegies at the community level as opposed to individual coping strategies found in the area and government role should be extended and help local community in different aspects such as planning of the area development, expansion of some of the secondary and tertially drainage channels, enhancement of flood management programmes and the use of early warning systems.

Impact assessment for identified business activities: The impact assessment process for the business activities identified in the area is discussed in chapter five of this research. From the analysis of flood risk perceptions of local business it was found that local people perceive flood risk as a function of three major factors as discussed in chapter four section 4.3.1 and these are flood water depth, duration and elavation at location of business activities. Based on these three key factors, a methodology for impact assessment of business activities was developed as discussed in section 5.3 of this research. The results show that most of the business activities are affected by the floods. However the degree of impact vary depending on elevation at the location of business activities, flood water depth and duration on the premises as provided by business operators during the fieldwork. It should be noted that the analysis was done based on individual business location information and not the area. The rsults however have revealed some pattern whereby in some locations, business activities have shown a higher impact levels than others. Since the results are based on individual information on business activities given by different business operators Generally it can be concluded that business activities in the study are highly affected by floods.

Assessment of flood impacts on business activities in the area: The flood impact assessment process for business activities is discussed in chapter five of this research. The flood exposure analysis, and impact assessment clearly show that business activities in the study area are affected by floods. The impacts of floods discussed in section 5.6 of this research are based on information provided by local business operators. The impacts are classified as either direct or indirect but based on the data analysis it has been found that most of the flood impacts on the business activities in the area are indirect impacts mainly due to the fact direct impacts depend strongly on physical destruction of the properties by floods and in the case of Bwaise the severity of the floods in the area is not very high and there few cases of physical destruction of the property. However there are a number of indirect impacts due to nuisance and

disturbance caused by flood water depth and duration. This has in turn negatively impacted the flow of business transactions in the area. Though floods are mainly associated to negative impacts, it was revealed during this research that some business activities in the area benefited from floods instead. Therefore it can be concluded that even though the floods in Bwaise show no severe direct impacts on business actiivities in the area, floods have indirectly affected business activities both in negative and positive ways.

Finally it can be concluded that though the nature of the floods in the area are small scale floods, but from the results and discussions in the previous chapters it is clear that floods have greatly affected business activities in the area.

6.2.   Recommendations

The following are recommendations for further research:

❖ This research has mainly focused on the use of local knowledge in flood impact assessment and did not consider other aspects. However the data on flood effects on business activities obtained from local people may not necessarily be accurate, so further research in this area should consider other aspects such as hydrological and meteorological data for flood modelling to generate a flood hazard map for impact assessment for business activities in the area.

❖ For a more detailed analysis of impacts on business activities by floods, more data on documented sales for business activities, size of businesses in terms of income and social-economic characteristics of business operators should be considered and aspects such as recovery period are also important in the analysis of flood impacts on business activities.

❖ Since this research is mainly based on the local knowledge of the business operators, for better results it is necessary to discuss the results with local people to check the accuracy of the results and find out the areas for improvement based on the reactions of the local community.

❖ The impact assessment was based on three factors of flood water depth, duration and elevation at the location of business activities, however some other factors such as size and type of business should be considered for further research.

❖ Further research should be broadened to other locations where business activities are concentrated.

❖ Engagement of NGO's and business community in the process of flood impact assessment would be of great importance in understanding fully the degree to which business are affected by floods in the area.

List of references

ActionAid. (2006, October, 2006). Climate change, urban flooding and the rights of the urban poor in Africa. Key findings from six African cities Retrieved 22-nov-2012, from http://allafrica.com/view/resource/main/main/id/00011059.html

Alexander, D. (1991). Natural Disasters: A Framework for Research and Teaching. *Disasters, 15*(3), 209-226. doi: 10.1111/j.1467-7717.1991.tb00455.x

Alkema, D., Nieuwenhuis, J. D., & de Jong, S. M. (2007). *Simulating floods : on the application of a 2D hydraulic model for flood hazard and risk assessment.* 147, ITC, Enschede. Retrieved from http://www.itc.nl/library/papers_2007/phd/alkema.pdf

ASEAN Disaster Risk Management Initiative. (2010). Synthesis Report on Ten ASEAN Countries Disaster Risks Assessment.

Barroca, B., Bernardara, P., Mouchel, J. M., & Hubert, G. (2006). Indicators for identification of urban flooding vulnerability. Natural Hazards and Earth System Science, Volume 6, Issue 4, pp.553-561

Birabi, A. K. (2007). Caring for the Urban Poor of Kampala, Uganda - Intervention in the Shelter Crisis Retrieved 10-11-2012, from Shelter for the Urban Poor - Proposals for Improvements – Inspired by World Urban Forum III: http://bvs.per.paho.org/texcom/cd050701/grundshe.pdf#page=247

Bull-Kamanga, L., Diagne, K., Lavell, A., Leon, E., Lerise, F., MacGregor, H., . . . Yitambe, A. (2003). From everyday hazards to disasters: the accumulation of risk in urban areas. doi: 10.1177/095624780301500109

Carter, W. N. (1991). A disaster manager's Handbook: *Disaster management* (pp. 64-67).

Dekens, J. (2007). Local Knowledge for Disaster Preparedness: A Literature Review. Nepal: Hill Side Press.

Douglas, I., Alam, K., Maghenda, M., Mcdonell, Y., Mclean , L., & Campbell, J. (2008). Unjust waters: climate change, fl ooding and the urban poor in Africa. *vol 20(1).*

Dyson, T. (2009). *The Role of the Demographic Transition in the Process of Urbanization.* Paper presented at the International Workshop on the Long Term Implications of the Demographic Transition, Universidad Complutense de Madrid, 24-26th September 2009.

Faber, R. (2006). *Flood risk analysis: Residual risks and uncerternities in an austrian context.* doctorate thesis, University of Natural Resources and Applied Life Sciences, Vienna. Retrieved from iwhw.boku.ac.at/dissertationen/faber.pdf

Fischhoff, B. (1994). Acceptable Risk: A Conceptual Proposal: Retrieved march 20, 2012, from. *Safety & Environment 5.1. Franklin Pierce Law Center: www.piercelaw.edu/risk/vol5/winter/Fischhof.htm*.

Golooba-Mutebi, F. (2003). Devolution and Outsourcing of Municipal Services in Kampala City, Uganda: An Early Assessment, . *Vol.25*(5), P.405-418. doi: 10.1002/pad.290

Goosby, S., Chiesa, C., Mielbrecht, S., & Bosse, T. (2005). *Assessing and reducing the impacts of disasters in the Asia Pacific Region, Pacific Disaster Center, First International Conference on Urban Disaster Reduction, Kobe, Japan.*

Gupta, T. N. (1994). *Vulnerability of Houses in hazard Prone Areas, The World Conference on the International Decade for Natural Disaster Reductio(IDNDR),*. Yokohama, Japan.

International Federation of Red Cross and Red Crescent Societies. (2007). Law and legal issues in international disaster response: a desk study.

ISDR. (2004). Living with Risk. A Global Review of Disaster Reduction Initiatives (pp. 250-258): United Nations Office for Disaster Risk Reduction (UNISDR):http://preventionweb.net/go/657.

Kandilioti, G., & Makropoulos, C. (2011). Preliminary flood risk assessment: the case of Athens. doi: 10.1007/s11069-011-9930-5

Kulabako, R. (2010). *Environmental Sanitation Situation and Solute Transport in Variable Saturated Soil in Peri-urban Kampala.* Doctoral thesis, KTH, School of Architecture and the Built Environment (ABE), Land and Water Resources Engineering, Environmental Management and Assessment, Stockholm, Sweden.

Lwasa, S. (2010). Adapting urban areas in Africa to climate change: the case of Kampala. *Current Opinion in Environmental Sustainability, 2*(3), 166-171. doi: 10.1016/j.cosust.2010.06.009

Matagi, S. (2002). Some Issues of Environmental Concern in Kampala, the Capital City of Uganda. *Environmental Monitoring and Assessment, 77*(2), 121-138. doi: 10.1023/a:1015860820467

Medal , L., & Boyer, M. (2010). Urban Slums in-sub-Saharan Africa: Understanding their Origins/ Evolutions and Methods for Improvement: Interdisciplinary Themes Journal, The Planned World: Urban, Rural, Wild - Articles Vol.2(1)

Mukwaya, Sengendo, H., & Lwasa, S. (2010). Urban Development Transitions and Their Implications for Poverty Reduction and Policy Planning in Uganda. *Urban Forum, 21*(3), 267-281. doi: 10.1007/s12132-010-9090-9

Mukwaya, Sengendo, H., & Lwasa, S. (2012). Enhancing Security and Resilience of Low-Income Communities to Climate Change in Growing Cities: An Assessment of Flood Management and Planning Regimes in Kampala City, Uganda. doi: 10.1007/978-3-642-28626-1_26

Nott, J. (2006). Extreme Events: A Physical Reconstruction and Risk Assessment. United Kingdom, Cambridge University Press.

Nyakaana, J. B., Sengendo, H., & Lwasa, S. (2007). Population, Urban Development and the Environment in Uganda: Tthe case of Kampala city and its Environs: Retrieved April 25, 2012 from: www.unhabitat.org/downloads/docs/CCCIKampalaUganda.pdf.

Olorunfemi, F. B. (2011). *Managing Flood Disasters under a Changing Climate: Lessons from Nigeria and South Africa.* Paper presented at the Niser Research Seminar Series, 3rd May 2011, Ibadan, Nigeria .

Patel, R. B. M. D., M.P.H., , & Burke, T. F., M.D.,. (2009). Urbanization — An Emerging Humanitarian Disaster. *The New England Journal of Medicine, 361(8):741-3.*

Pelling, M. (2003). Natural disasters and social resilience: *The Vulnerability of Cities* (pp. 38-41).

Pelling, M., Özerdem, A., & Barakat, S. (2002). The macro-economic impact of disasters. *vol.2.* doi: 10.1191/1464993402ps042ra

Pistrika, A., & Tsakiris, G. (2007). Flood Risk Assessment: A Methodological Framework: Retrieved on 15-11-2012 from Centre for the Assessment of Natural Hazards & Proactive Planning: http://www.ntua.gr/hazard/publications/EWRA_2007.Pistrika.pdf

Ramin, B. (2009). Slums, climate change and human health in sub-Saharan Africa: Retrieved 13-11-2012, from Bulletin of the World Health Organization 2009;87:886-886.
http://www.scielosp.org/pdf/bwho/v87n12/02.pdf

Robinson, D. P. (2010). Regional Economic Impacts of the 2008 Cedar Rapids Flood. George Mason University, School For Public Policy.

Scawthorn, C. F. A., Blais, N., Seligson, H., Tate, E., Mifflin, E., Thomas, W., . . . Jones, C. (2006). HAZUS-MH Flood Loss Estimation Methodology. I: Overview and Flood Hazard Characterization. doi: 10.1061/ASCE1527-698820067:260

Sliuzas, R. (2012). *Toward Integrated Flood Management in Kampala, Uganda.* Paper presented at the AESOP 26t h Annual Congress Ÿ 11-15 Ju ly 2012 Ÿ METU, Ankara.

The National Archives. (2003). *Business classification scheme design.* Retrieved from nationalarchives.gov.uk.

UNDP. (1994). Vulnerability and Risk assessment , 2nd Edition Cambridge, United kingdom.

UNDP. (2011). Multi-hazard risk assessment in the Rakhine state of Myanmar: Exposure analysis and Risk profile :Retrieved from www.gripweb.org/gripweb/sites/default/.../Exposure_Risk_report.pdf.

UNFPA. (2007). Unleashing the Potential of Urban Growth: *State of World Population 2007*: United Nation Population Fund: www.unfpa.org/public/publications/pid/408.

Van Westen, C. J., Van Asch, T. W. J., & Soeters, R. (2005). Landslide hazard and risk zonation—why is it still so difficult? doi: 10.1007/s10064-005-0023-0

Vestbro, D. U. (2011). Impacts of Urbanisation in Low-Income Countries. School of Architecture and the Built Environment, the Royal Institute of Technology (KTH), SE-10044 Stockholm, Sweden.

Vojinovic, Z., & Abbott, M. B. (2012). From Quantitative to Qualitative Flood risk assessment and mitigation *Flood Risk and Social Justice* (pp. pp.32-34).

Wang , Y., Li , Z., Tang, Z., & Zeng, G. (2011). A GIS-Based Spatial Multi-Criteria Approach for Flood Risk Assessment in the Dongting Lake Region, Hunan, Central China. doi: 10.1007/s11269-011-9866-2

Wisner, B., Blaikie, P., Cannon, T., & Davis, I. (2003). At Risk: natural hazards, people's vulnerability and disasters (Vol. 2, pp. 113-120).

World Bank. (2010). The Economics of Effective Prevention *Natural Hazards, UnNatural Disasters*. Washington, DC: World Bank, United Nations.

Zapata-Marti, R. (1997). *Methodological approaches: the ECLAC methodology. In Center for the Research on the Epidemiology of Disasters (CRED), Assessment of the economic impact of natural and man-made disasters. Proceedings of the expert consultation on methodologies, Brussels, 29–30 September, Universite Catholique de Louvain, Belgium,10–12.*

Zhou, Q., Mikkelsen, P. S., Halsnæs, K., & Arnbjerg-Nielsen, K. (2012). Framework for economic pluvial flood risk assessment considering climate change effects and adaptation benefits. *Journal of Hydrology, 414–415*(0), 539-549. doi: 10.1016/j.jhydrol.2011.11.031

Appendices

Appendix 1: Field survey questionnaire

FIELDWORK SURVEY QUESTIONNAIRE

Researcher: Alphonse Kamugisha
Contact: kamugisha29266@itc.nl
Research tittle: Assessing the impacts of flood hazard on business activities in Bwaise, Kampala.

This information will only be used for research purposes

Questionnaire code: _____

Business type: _____

Business operator's status: ☐ *Business owner*   ☐ *Employee   (tick one)*

Number of employees: _____ Operating days form…………………………………………………………………………..

Operating hours…….

Type of goods on premises ☐ *Perishable goods*   ☐ *Non-perishable goods*   ☐ *both*

    a.   Flood hazard characteristics
    1.   *What is the cause(s) of flooding in this area according to your opinion?(if more than one, use ranking)*

    2.   *How many floods have you experienced in this place since May 2012?*

         _____

    3.   *How long does the flood water stay on the premises?*

         _____

4. *Did you experience flood on 25th of June 2012?*

   ☐ *Yes*   ☐ *No   (tick one)*

   If you answered yes, what was the height of flood water during this flood event?

   _____

5. *What is the maximum height of flood water you have experienced in this location since May 2012?*

   _____

   When was that (date) _____, how long did this flood water stay?
   _____

   ### a.   Flood severity perception

6. *To what degree do you think this area and your business are in danger due to flooding?*

	Not in danger at all			very much in danger
	1	*2*	*3*	*4*
Area				
Business				

   ### b.   Awareness and coping mechanisms

7. *Did you know that this place is a flood prone area before starting your business here?*

   ☐ *Yes*   ☐ *No*

   If yes, what is the reason(s) for having your business in this area?

   _____

8. *Is your business insured against flooding?*

   ☐ *Yes*   ☐ *No   (tick one)*

9. *What do you do to protect your business against floods?*

   i.   *Before flooding* _____

   ii. *During flooding* _____

iii. *After flooding* _____

10. *What is the approximate cost of protection measures that you apply in question nine above?*

    _____

11. *What kind of clean-up do you do after flooding?*

    _____

12. *How much is the clean-up cost?*

    _____

13. *Do you receive any help from the government, NGO's or community services?*

    ☐ *Yes*   ☐ *No* *(tick one)*

    If yes, what kind of help do you receive and from who? (Please specify)

    _____

    iv. **Flood impacts on business**

14. *How do the floods affect your business?*

    _____

15. *How many times have you had to close your business due to floods since May 2012?*

    _____

16. *Did you lose any of your stock during the flood event on 25th June 2012or any other event since May 2012? (specify when)*

    _____

    If yes, what did you lose? (Provide records if any)

    _____

17. Have you ever considered moving from this place?

☐ Yes   ☐ No   (tick one)

If your answer is no, give reason(s) why?

_____

18. Do the employees get paid even during the period of flooding?

☐ Yes   ☐ No   (tick one)

If your answer is no, explain why?

_____

19. Do you experience a decrease in sales during floods?

☐ Yes   ☐ No
If yes, how long does it take to recover? (Provide documented evidence on sales if any)

_____

20. Does flooding affect your income?

☐ Yes   ☐ No

If yes, please explain how _____

Any other information about flooding in this area, please feel free to share with us.

………..

………..

…….

Thank you for your time and cooperation

Appendix 2: Statistical analysis

Correlation levels between variables

		Business risk	Slope	Near distance	Duration	Water depth
Business risk	Pearson Correlation	1	-.304**	.177	.422**	.723**
	Sig. (1-tailed)		.002	.047	.000	.000
	N	90	90	90	90	90
Slope	Pearson Correlation	-.304**	1	-.187	-.052	-.196
	Sig. (1-tailed)	.002		.039	.312	.032
	N	90	90	90	90	90
Near distance	Pearson Correlation	.177	-.187	1	.106	-.039
	Sig. (1-tailed)	.047	.039		.159	.357
	N	90	90	90	90	90
Water duration	Pearson Correlation	.422**	-.052	.106	1	.338**
	Sig. (1-tailed)	.000	.312	.159		.001
	N	90	90	90	90	90
Water depth	Pearson Correlation	.723**	-.196	-.039	.338**	1
	Sig. (1-tailed)	.000	.032	.357	.001	
	N	90	90	90	90	90

**. Correlation is significant at the 0.01 level (1-tailed).

Appendix 3: Business activities identified in the study area.

SNo.	Business code	Description
1	22	Butchery
2	23	Clinics and drug stores
3	22	Dairy and other milk related products
4	23	Driving school and other schools in the area
5	24	Electronic shops, phone accessories and repairing
6	22	Food stores and Glossaries
7	25	Furniture workshops
8	25	Garages and car washing services
9	24	General retail shops
10	24	Hardware shops
11	22	Hotels, Restaurants and Bars
12	24	Kiosks, Market vendors and Boutiques
13	25	Metal workshops
14	21	Money transfer services
15	25	Petrol stations
16	23	Hair care services
17	25	Scrap gathering and selling services
18	23	Shoes repairing services
19	21	Sports betting services
20	24	Super markets and mini-supermarkets

Appendix 4: Types of business activities in the area

Business Classes	Perishable goods	Non-perishable goods	Both
Financial services	0	3	0
Food and accomodation	9	1	1
Personal services	0	7	1
Shops	4	24	23
Workshops	0	16	1