Urban Environment and Sustainable Livelihood:

The Case of Khulna City, Bangladesh

Ph.D Dissertation

By

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Registration No. 72/ 2012-2013

Institute of Disaster Management and Vulnerability Studies
University of Dhaka
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Submitted in fulfilment of the requirements for the

Degree of

Doctor of Philosophy

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Declaration

I do hereby sincerely declare that the dissertation entitled 'Urban Environment and Sustainable Livelihood: The Case of Khulna City, Bangladesh' submitted to the University of Dhaka, Bangladesh, for the Degree of Doctor of Philosophy at the Institute of Disaster Management and Vulnerability Studies is a completely new and original work conducted by me. It has not been submitted earlier partly or wholly to any other University or Institution for any Degree, Diploma or Fellowship.

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Certificate

With reference to the present dissertation 'Urban Environment and Sustainable Livelihood: The Case of Khulna City, Bangladesh' submitted by Mosammat Rowshan Ara at the Institute of Disaster Management and Vulnerability Studies, University of Dhaka, Bangladesh for the Degree of Doctor of philosophy (Ph.D), I certify that she has carried out the research work under my direct supervision and guidance and that the manuscript of the thesis has been scrutinized and carefully checked by me. The entire thesis comprises the candidate's own work and personal achievements and that is a stupendous work done by her. The thesis does not contain any conjoint research work either with me or with anyone else; and the final copy of this thesis, which is being submitted to the University of Dhaka, Dhaka-1000, Bangladesh has been carefully and thoroughly read and verified by me for its material and language; and hence to my entire satisfaction.

(Dr. Mahbuba Nasreen)

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Abstract

The present study aims to address the situation of vulnerable people living in urban areas in context of their access to natural resources and sustainable livelihood. It attempts to identify the links between urban environment and vulnerable peoples' in southern Bangladesh, especially in five selected locations- Rupsha, Khalishpur, Tutpara, Nirala and Gollamari in Khulna city. The data of this study were collected through applying quantitative (survey) and qualitative (case study, Focus Group Discussion and observation) methods. To assess the nature of urban environment in context of sustainable urban environment for vulnerable people, the respondents were selected by using Simple Random Sampling.Considering Purchasing Power Parity (PPP) the vulnerable people were assessed as poor whose monthly family income is not more than 10000 taka and residing at the study area for at least 10 years. Moreover, tenure insecurity, income, food, number of jobless week, literacy, access to health and access to household goods, were considered to measure the condition of vulnerability.After conducting census from the population (1414 households) fifty percent (707 households head) were selected as unit of analysis. The findings of the study indicate that the settlement of the study population in Khulna City started slowly with rural to urban migration. For understanding urban livelihood risk and to identify the causal relationship between sustainable livelihoodsin urban environment, a reliable Sustainable Livelihood Index (SLI) has been created. The sustainable urban livelihood has been measured by seven indicators viz. natural resource, financial asset, occupation, vulnerability, coping with disaster, social resource and physical asset. The result shows that the value of $R^2$is 0.993. It means that aforesaid variables have 99 percent effect on the sustainable livelihood of urban population. The mean SLI (74.61) indicates that majority of the respondents endure low level of sustainability that means that they have low access to natural and socio- economic resources.Most of the respondents (71.85%) in the study area live in slums. More than 69 percent of the respondents live in below poverty line 1. Among the respondents 32.2 percent were always threated under tenure insecurity, 14.7 percent considering themselves severely suffered from food insecurity and are characterized by tenure (48%) and employment (60%) insecurity. A combination of human and natural factors results in various urban hazards such as flooding and waterlogging due to poor

drainage, urban fires and windstorms causes havoc especially in slums. It is identified from the study that natural resources especially land, tree, water bodies, agricultural activities positively contribute to income, food, health, housing and social relations. The regression coefficients indicates that the natural resource contribute (22%) to enhance the financial resources. It is also found that access to land, water and tree species contribute to enrich food (23%), family income (16%), health (14%), social resource (21%) and reducing vulnerability in normal period and also during disaster (26%). Improved infrastructure and social asset have statistically significant positive effect on sustainable livelihood in Khulna city. The study also identifies the alternative employments and strategies for the sustainability of the livelihood of vulnerable people.

Acronyms and Abbreviations

ASA	Association of Social Advancement
BDRCS	Bangladesh Red Crescent Society
BDT	Bangladeshi Taka
BTEB	Bangladesh Technical Education Board
CARE	Cooperative for Assistance and Relief Everywhere
CBA	Collective Bargaining Agreement
CLP	Community Leadership Project
CVA	Capacities and Vulnerability Analysis
DFID	Department for International Development
DHS	Demographic and Health survey
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
FAO	Food and Agriculture Organization
FOWECA	Forestry Outlook Study for West and Central Asia
GOB	Government of Bangladesh
HBS	Household Budget Survey
HEA	Household Economy Analysis
HPNSDP	Health, Population and Nutrition Sector Development *Program*
Kcal/d	Kilocalorie per day
Kg	Kilogram
LDCs	Least Developed Countries
LMS	Living Standard Measurement Studies
MDG	Millennium Development Goals
NASS	The New Sanitation Systems
NGOs	Non Government Organizations
NIPORT	National Institute of Population Research and Training
NPDM	National Policy on Disaster Management
NSDC	National Skill Development Corporation
PAPSL	Participatory Assessment and Planning for Sustainable Livelihoods
SLI	Sustainable Livelihood Index
SPSS	Statistical Program for Social Science
TVET	Technical Vocational Education and Training
UNDP	United Nations Development Programme
UNICEF	United Nations International Children's Emergency Fund
UNMDG	United Nations Millennium Development Goals
UN	United Nations
UPFG	Urban and Peri-urban Forestry and Greening
USD	United States Dollar
WASA	Water and Sewer Authority
WHO	World Health Organization
WOCP	Water Oriented City Planning

Glossary

Chula	A kind of stove made of clay
Ghute	Wood stick made of cow dung
Jhupri	Shacks, made of jute sticks, tree leaves, jute sacks etc.
Kabiraj	Persons practicing Ayurveda or customs involving medicines
Katha	In Bangladesh one katha is standardized to 720 square feet (67 m^2), and 20 katha equals 1 bigha
Kupi	Kerosene lamp
Kutcha	Temporary house, made of clay brick, bamboo, sun-grass, wood and occasionally corrugated iron sheets as roofs
Mastaans	Gangsters
Pucca	Permanent house, life span over 25 years with walls of bricks and roofs of concrete
Purda	The seclusion of women from the sight of men or strangers, practiced by some Muslims and Hindus
Semi- Pucca	Semi-permanent house- walls are made partially of bricks, floors are cemented and roofs of corrugated iron sheets
Tan samiti	Cooperative for financial assistance formed by a group of people

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Chapter One

Introduction

1.1 Statement of the Problem: The cities ofthe developing countries have focused on reducing its environmental impact. For urban development to be socially, economically and institutionally sustainable, it is vital to review existing city environment to assess the extent to which changes are necessary to meet the needs, resources, aspirations and priorities of urban poor communities.In this context land management, energy efficiency, policy and influence, emission management, water supply, garbage collection, transportation, green building, air pollution, are need to be considered.Globally fifty four (54%) percent of the world's population residing in urban areas and by 2050, sixty six (66%) percent of the world's population is projected to be urban (United Nations, 2014). Thus better understanding ofhow people make a living in urban areas, especially the poor, is a key development priority (Department for International Development, 2000). Sustainable livelihood was fundamental to the United Nations Millennium Development Goals (UNMDG) of eradicating poverty and hunger (United Nations, 2015). Mostof thecities of developing countries are experiencing a period of enormous socioeconomic transformations that call for a similarly vast process of urban regeneration and reorientation. However, as Lees (2003) identified, there are subtleties relating to the use of these terms by academicians and policy makers. For example, urban renewal in the 1960s was public sector-driven and primarily concerned with the large-scale redevelopment of overcrowded inner city slum area (Couch, 2003). Practically, livelihood implies the means, activities, entitlements and assets by which people make a living. Asset, in this particular context, is defined as not only natural/ biological (i.e. land, water, common – property resources, flora and fauna) but also social, (i.e. community, family, social networks), human (i.e. knowledge, creation by skills), and physical (i.e. roads, markets, clients, schools, bridges) (United Nations Development Programme, 1999). However, Programme for Agricultural and Natural Resources Transformation for Improved Livelihood (Programme for Agricultural and Natural Resources Transformation for Improved Livelihoods, 2005) analyses livelihood in terms of vulnerability, assets, policies, livelihood strategies and livelihood outcomes.Urban poverty, deprivation, social inequality and polarization in the South,

are perhaps manifested most conspicuously in the housing conditions of the urban poor majority, some of which exemplify the worst form of struggle for the basic needs of life (Desai & Pillai, 1991). Bangladesh is highly vulnerable to natural hazards and the extreme effect of climate change added a new dimension to community risk and vulnerability (National Plan for Disaster Management, 2010). Moreover, different socio-political factors limit peoples' access to endowed resources and perpetuate risks and vulnerabilities of coastal inhabitants (Shamsuddoha & Chowdhury, 2007). Poor people living in the marginalized lands perusing nature dependent livelihoods are facing barriers and constraints earning wellbeing in the changing climate. Access to food, sanitation, pure drinking water, health care, education and social security are obviously inadequate in both urban and rural areas of Bangladesh. With this prevailing scenario there are gender variations in context of access to services and rights (Nasreen, 2008). Of total population current urban population is 34.3percent (2015)in Bangladesh (IndexMundi,2016).The impact of urbanization in Bangladesh in terms of mass poverty, gross inequality, high unemployment, under-employment, over-crowded housing and the proliferation of slum areas and squatters and general deterioration in overall environmental conditions have become the major concerns of policy issues (Murtaza, 2001).

Over one billion urban residents in the world live in such poor quality and overcrowded housing that they can be considered to be slum dwellers. Slums are often informal settlements that lack provision of basic services and where the inhabitants are at risk of eviction. Slum dwellers are typically more vulnerable to hunger, poverty, social exclusion, and crime (especially women and children). Adopting the sustainable livelihood approach supports an analysis of risk taking, management and mitigation by the urban poor linked to their perceptions and judgments of potential options and investments (McLeod, 2001). To reduce urban poverty in all its forms, end slum formation, increase productivity, and promote conditions for global sustainability, cities will need to ensure universal access to basic urban infrastructure and services: land, housing, water, sanitation, waste management, low-carbon energy and transportation, and information and communication technologies.

The most elaborated right related to sustainable cities is the right to adequate land, housing, which includes several core elements: legal security of tenure, including

protection against forced evictions; availability of services, including safe drinking water, adequate sanitation, energy for cooking, heating, lighting, food storage and refuse disposal; affordability.In that housing costs it should not compromise occupants' enjoyment of other human rights; accessibility, taking into account the needs of disadvantaged and marginalized groups; habitability,providing physical safety, adequate space, protection from the elements; location, in relation to employment opportunities, health care, schools, childcare centers; and cultural adequacy (Committee on Economic, Social and Cultural Rights, 2016).

Sustainable livelihoods are achieved when the poorest face conditions in which they are able to improve their quality of life and reduce their vulnerabilities in an environmentally sustainable manner. It is a notion that emphasizes that livelihoods are not only about employment and income generation, though of course these are vital aspects. They also depend on access to natural resources financial and physical assets and infrastructure, political rights, people's skills and capacities, social relationships, cultural norms and practices. Any increase in disasters, whether large or small, will threaten development gains and hinder the implementation of the Millennium Development Goals (Inter-agency Standing Committee & International Strattegy for Disaster Reduction, 2008)). Vulnerability analysis should be capable of directing development aid interventions, seeking ways to protect and enhance peoples' livelihoods, assist vulnerable people in their own self-protection, and support institutions in their role of disaster prevention.

In order to understand how people are affected by disasters, it is clearly not enough to understand only the hazards themselves. Especially women and girls in the disaster prone areas face number of problems due to their gender identity. As a result, women and girls in poor and marginal households become more vulnerable and distressed (Nasreen, 2012). Disasters happen when a natural phenomenon affects a population that is inadequately prepared and unable to recover without external assistance. The access to and control over resources during disaster therefore could reduce vulnerability and the impact of different hazards on them.

Sustainable cities depend on a healthy ecosystem that influences both human well-being and numerous economic activities. Green spaces occupy an important function in the urban context and provide critical ecosystem services in congested urban

environments, where more than half of the world's population is located (United Nations Environment Programme, 2013). Trees in cities absorb vehicular air pollutants, buffer noise, regulate temperature and provide much-needed shade from the sun in tropical and sub-tropical belts (Bowler*et al*., 2010). Greenery near residential areas promotes walking, thereby improving people's cardiovascular systems and reducing obesity (Sugiyama *et al*., 2008).Green surroundings and home gardens reduce morbidity, increasing mental peace (Maas *et al.*, 2009). In countries like Bangladesh, India and South Africa, green spaces, including home gardens, are often composed of socio-culturally important medicinal, sacred and culinary plants (Jaganmohan *et al*., 2012). Urban agriculture supports a more sustainable production of the food (organic) that uses less harmful pesticides that normally end up as an agricultural runoff. Growth of cities puts significant pressure on natural resources resulting in a drastic reduction of green open spaces, depletion of trees, floods, heat-island effects and other natural disasters, further aggravated by the effects of climate change. These challenges can be better handled by giving proper attention to the potentials of urban agriculture, which contributes to urban greening, heat reduction, storage of water and maintaining construction-free flood plains in peri-urban areas (Economic and Social Commission for Asia and the Pacific, 2012).

Khulna, located at the coastal zone and as an industrial city in Bangladesh, has been experiencing climate induced vulnerability, rapid urbanization and tremendous rise of population since 1950s. This, in turn, means greater demand on the land, lack of information and knowledge, lack of access to renewable and affordable energy and use of unsustainable farming techniques. The study on urban environment can positively contribute to ensure the sustainable livelihood of Khulna city. Moreover like many other developing countries global warming is a challenging problem for Bangladesh. Sustainable urban environment can play a potential role in this regard.

1.2 Rationale of the Study: The study discusses the environmental conditions of Khulna metropolitan city in Bangladesh and addressing its role in order to facilitate improvements of the conditions to maintain sustainable livelihood of its population. Rapid urbanization and accelerated urban population growth necessitate new consideration of the ways in which urban development is regulated so that the city and townscape provide a livable and healthful environment. Efforts to reduce vulnerability

in the South especially in Khulna, Bangladesh have a far greater impact and are more sustainable if supported by its environment.

Well connected by the rivers Rupsha and Bhairab and located at the lower extreme of the Ganges delta, Khulna city has seen as a place of trade and commerce and is a production centre for the region. During the late 1950s and 1960s Khulna became an important centre for industrial development. Many industries such as newsprint mills, shipyard, jute mills, match factories, jute bailing presses, hardboard millswere established and associated commercial activities also increased manifold.With increased activities resulting from the expanding shrimp export, Khulna has gained tremendous potential for further socio-economic activities and physical development. All these developments will have a far reaching impact on the overall environment of Khulna city (Murtaza, 2001).

On the other hand Southwestern region of Bangladesh is severely affected by frequent climatic disasters like cyclones, tidal surges, coastal flooding, waterlogging and salinity intrusion. However, people of this region are vulnerable to water related natural hazards as well as climate change impacts. Bangladesh is estimated to be the third most vulnerable country in terms of population exposed to sea level rise (Pender, 2008). If the sea level even rises slightly due to effect of global climate change a significant part of coastal area will go under water, may displace about 33 million people. Sea level rise is a growing threat to the coastal region while Khulna is one of the 15 most vulnerable cities of the world (Dasgupta*et al*., 2009). Future climate projections indicate that the increasing rate of sea level rise caused by global warming would lead to permanent inundation, drainage congestion, salinity intrusion and frequent storm surge inundatio in the Southwestern coastal region including Khulna. It is estimated that about 11 percent more land will be permanently inundated over the next century in the coastal region of Bangladesh. As a result, the Sundarbans (a Ramsar site) will be lost due to high salinity and permanent inundation by 2100(Mohal *et al*., 2010).

As this consequence most the respondents of the study area are migrated from surrounding areas mostly from Barishal, Satkhira, Faridpur and Jessore. This climate related hazards are expected to worsen with climate change. Climatic disasters adversely affect peoples' livelihood in Khulna and these disasters have increased the

vulnerability of the local communities living in the area. Climatic disasters also inundate coastal lands with high saline water which reduce soil fertility and crop production. As a consequence most of the low-income people are now facing food insecurity and potable water crisis.

Moreover state owned Khulna Newsprint Mill, Daulatpur Jute Mill, People's Jute Mill, Khulna Textile Mill, private owned Afil Jute Mill and Dada Match Factory have remained closed throwing nearly two lakhs workers and employees out of job. The poor jobless workers are getting nothing but lip service from government in the name of reopening these industries and are living in marginalland of city. Thus, the study is a modest endeavour to explore the role of natural and social resources in livelihood including housing, income, food, health, and reducing vulnerability of the urban population.

Sustainable urban development requires providing a healthy and sustainable living environment with basic services for all. But it is evident that few studies have conducted on the city environment that can positively contribute to improve the livelihood activities of the population in Khulna city. What is required therefore is to study on the Khulna city environment and its role to ensure the livelihood of urban population in the context of sustainable development. To ensure a good quality of life in a city, the environmental conditions within which a city dweller is living is of utmost importance. This would facilitate in finding out ways and means to address the problems that can reduce the vulnerability of urban poor.

1.3 Objective of the Study: The study aims to understand the efforts by Khulna City, Bangladesh to support sustainable livelihoods and reduce vulnerabilities especially of the people with an emphasis on the role of the natural and social environment.
Under this general objective the specific objectives are:

1.3.1 To understand the nature of vulnerability of the study population

1.3.2 To identify the available urban resources especially the natural resource for the respondents and to develop indicators of sustainable livelihood

1.3.3To relate the existing livelihood means of the respondents in the context of urban environment and available resources

1.3.4 To analyze the gender role in the disaster situation through access to and control over resource

1.4Theoretical Perspective of the Study: The study has its bases on the theories of urban environment and sustainable livelihood. The justification for suitability of the research within these theoretical frameworks is analyzed within social, economic, environmental, cultural and political context which is very much related to urban environment and sustainable livelihood in Khulna city, Bangladesh. To fulfill the objective of the study socio-ecological approach, Basic needs approach to poverty measurement and capability approach have been followed.

1.4.1 Socio-ecological Approach: In this study, to understand the role of natural resource in sustainable urban livelihood the socio-ecological approach has been followed. In 1869, Ernest Haeckel coined the word 'ecology' to explain the study of the relationships between different organisms and between organisms and their surroundings (Bharatdwaj, 2006). Two issues were of particular interest. First, the limitations of resources, which is caused by the depletion or absence of some nutrient or other materials needed to maintain a way of life. Second is the limitation of tolerance to climatic changes; to toxic substances; and to competition. The limitations determine how some creatures can live and adapt to certain places while others cannot.

Human ecology expands functionalism from ecology to the human mind. Peoples' perception of a complex world is a function of their ability to be able to comprehend beyond the immediate, both in time and in space. This concept manifested in the popular slogan promoting sustainability: 'think global, act local'. Moreover, peoples' conception of community stems from not only their physical location but their mental and emotional connections and varies from community as place, community as way of life, or community of collective action (Young, 1986). Richard's use of the term recognized humans as part of rather than separate from nature.The term made its first formal appearance in the field of sociology in the 1921 book *Introduction to the Science of Sociology*(Park & Burgess, 1921).

Spencer was influenced by and reciprocated his influence on the works of Charles Darwin. Herbert Spencer coined the phrase *survival of the fittest*. He was an early founder of Sociology where he developed the idea of society as an organism, and he created an early precedent for the socio-ecological approach that was the subsequent aim and link between sociology and human ecology (Claeys, 2000). In the early years,

human ecology was still deeply enmeshed in its respective disciplines: geography, sociology, anthropology, psychology, and economics. Scholars through the 1970s until present have called for a greater integration between all of the scattered disciplines that has each established formal ecological research.

Among the theorists Steiner published Human Ecology which focuses on the relationships among landscape, culture, and planning. The work highlights the beauty of scientific inquiry by revealing those purely human dimensions which underlie the concept of ecology. While Steiner & Nauser (1993) discussed specific ecological settings, such as cityscapes and waterscapes, and the relationships between socio-cultural and environmental regions, he also takes a diverse approach to ecology, considering even the unique synthesis between ecology and political geography. The ecological commons delivers a diverse supply of community services that sustains the well-being of human society.

1.4.2 Basic needs Approach: In 1974, the World Bank produced a report with the Institute of Development Studies entitled Redistribution with Growth (Chenery *et al*., 1979) which, primarily concerned with inequality, addressed the causes and dimensions of poverty, and, for the first time in an international report, explicitly identified the numbers of people living below the poverty line (in 1969). Building upon this work, the International Labour Office (ILO) became one of the early advocates of what became known as the 'Basic needs' approach to development, which, as the (1976) definition of basic needs indicates, marked the formal link between development and these earlier poverty studies.The ILO defined basic needs. First, minimum requirements (for a family) for private consumption: adequate food, shelter and clothing, as well as certain household equipment and furniture. Second, access to essential services provided by and for the community at large, such as safe drinking water, sanitation, public transport and health, educational and cultural facilities (Riddell, 2004).

By the early 1980s, attention of major policy-makers had shifted away from addressing needs, including doing so directly by targeting poor people, to a re-emphasis on growth, this time to focus on those factors deemed to be impeding economic growth. This era, of stabilization and structural adjustment policies, was built on the premise that once growth began to accelerate again, major inroads into

poverty would result, as they havedone in the 1950s and 1960s, though attention was also focused on education and health.

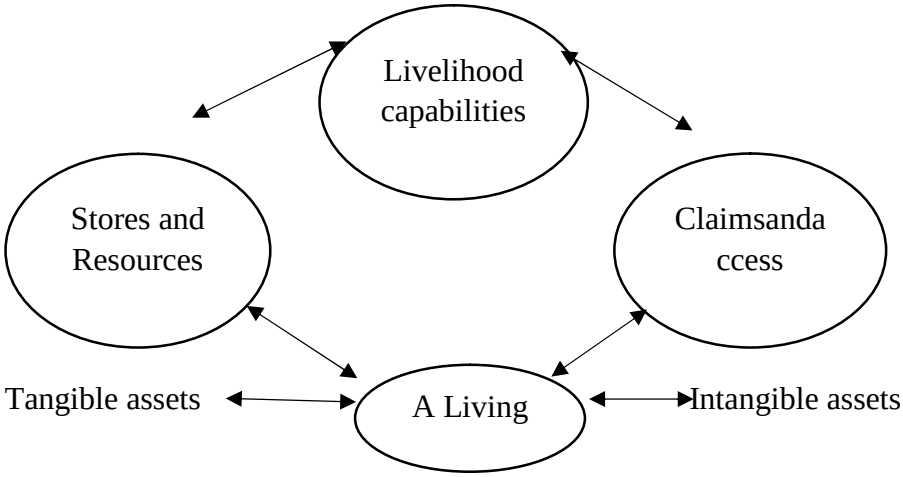
1.4.3 Capability Approach: The Capability approach has been particularly shaped by the writings of Sen (2003) on human freedoms; entitlements and empowerment. Just as basic needs need to be defined in the monetary approach and linked poverty lines, so here, basic capabilities also need to be articulated. Lists drawn up tend to include health, nutrition and education, similar to the list of basic needs identified.

Several agencies and donors are currently developing livelihoods-based approaches as bases for policy and practice formulation. These include DFID, the United Nations Development Programme (UNDP), Non-governmental Organizations (NGOs) including Oxfam and CARE, and research institutes including the Institute of Development Studies (IDS).In this study the UNDP's sustainable Livelihood approach has been followed which has more in common with the earlier 'basic needs' approaches to poverty measurement and alleviation.

Basic need is a generic term which covers approaches based on the notion that humanbeings need a basic set of resources (food, water, clothing, shelter etc.) to survive. Sen makes a clear distinction between basic needs and capabilities (Sen, 2005), but even so the influence of human development on Sustainable Livelihood Approach (SLA) is clear.

As one of UNDP's five corporate mandates, sustainable livelihoods offer a conceptual and programming framework for poverty reduction in a sustainable manner. The origins of SLA predate the origin of UNDP's human development (Haan& Zoomers, 2005).Conceptually, livelihoods denote the means, activities, entitlements and assets by which people make a living. Assets are defined as natural/biological (i.e. land, water, common-property resources, flora, fauna), social (i.e. community, family, social networks), political (i.e. participation, empowerment - sometimes included in the social category), human (i.e. education, labour, health, nutrition), physical (i.e. roads, clinics, markets, schools, bridges) and economic (i.e., jobs, savings, credit). Unlike the other agencies covered in this review, UNDP explicitly focuses on the importance of technology as a means to help people rise out of poverty.

Figure 1.1 SL approach in promoting sustainable livelihoods

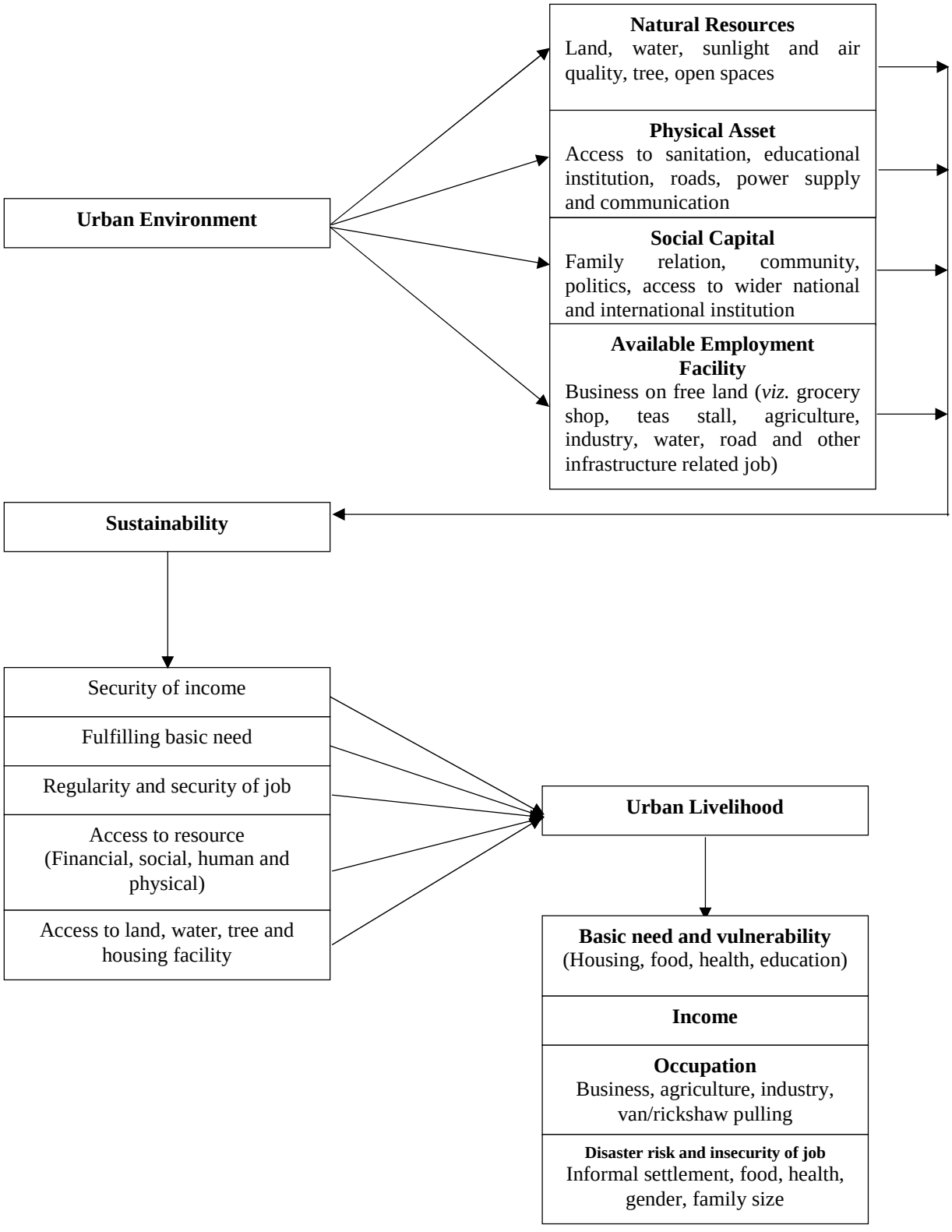


Source: Krantz, 2001 (UNDP SL)

The UNDP's SL approach serves primarily as a programming framework to devise a set of integrated support activities to improve the sustainability of livelihoods among poor and vulnerable groups by strengthening the resilience of their coping and adaptive strategies. Although this is in principle of an open-ended process, certain emphasis is given to the introduction of improved technologies as well as social and economic investments. Also, policy and governance issues as they impinge on people's livelihoods are addressed. Following these approaches the conceptual framework has been constructed for this study.

1.5 Conceptual Framework: Conceptually, livelihoods connote the means, activities, entitlements, and assets by which people make a living. Assets, in the particular context, are defined not only as natural resource (i.e. land, water, common property resources, flora, fauna) but also social (i.e. community, family, social connections, knowledge, skills) and physical (i.e. roads, markets, health facilities, schools and bridges). The sustainability of livelihoods, therefore, becomes a function of how members of a society utilize assets to meet their needs without compromising those of future generations. Therefore, for the livelihoods to be sustainable, the resources (whether natural, social, or humane) must be maintained. Within the selected set of ecosystem or biome, for example, urban setting, and over millennia, people have traditionally evolved ways of life and stores of knowledge that enable them successfully and sustainably provide for their livelihood needs.

Figure 1.2. Relations between city environment and urban livelihood



Source: Compiled by researcher based on literature review

Figure 1.2 indicates that the sustainable urban environment can be achieved. It also supports that urban environment ensures different sources of household income and improved quality of life in urban livelihood.In this study the livelihood leads the means of living involves with basic need, available urban resources and employment facility with risk of vulnerability.The study includes urban environment as natural, physical and social resourcesand available employment opportunity. Thus the sustainability of urban livelihood depends on security of job, income, basic need fulfillment and access to natural, financial and social resource.

1.6 Operational Definition of the Concepts:

1.6.1 Urban Environment: The Directorate of the urban environment (DUE) is made up of four divisions: Culture and Leisure service, Planning and environmental health, Economic regeneration and transportation, Environmental management (Dudley Metropolitan Borough Council, 2017).

In this context the study considers urban environment as:

1.6.1.1The *delivery of a sustainable environment*: focusing on land, water, sanitation, tree, and marginal resources like, river, railway, pond, lake, road and garbage to deliver the place shaping role of the local authority;

1.6.1.2The *regeneration of the urban environment*: both economically and socially with a focus on industrial development and local business growth and diversification to provide appropriate future job opportunities and equipping local people with the relevant skills(Dudley Metropolitan Borough Council, 2017);

1.6.1.3*Agriculture:*the role of agriculture in maintaining basic need like food, health education and its role in interpersonal relations and market demand of urban vulnerable people (Mougeot, 2000);

1.6.1.4*Supporting ahealthy community*: tackling health inequalities by encouraging healthy lifestyles through natural resource, income, occupational safety, noise and pollution abatement, monitoring air quality, reduction of vulnerability,stock of human and social capital even during disaster. And the provision of cultural, sports and recreation facilities; parks and open spaces; through the regulatory activities of men and women.

1.6.2 Livelihood: The dictionary meaning of livelihood is a means of living; an income. A person's livelihood refers to means of securing the necessities of life (English Oxford Living Dictionaries, 2014). It means livelihood is what we eat, what we wear, and how we are living in our residence being an element of the society. It means what we are getting any support from any organization, group, or any other means, that support our daily needs. It is also the support of life. Finally, the meaning of livelihood is a job, work, or source of income.

1.6.3 Sustainability: Sustainability refers to the maintenance or enhancement of resources productivity on a long-term basis.It includes environmentalsustainability, economicsustainability,social sustainability and institutional sustainability. Sustainability is achieved when a baseline level of economic welfare can be achieved and sustained, social exclusion is minimized and social equality is maximized. When prevailing structures and processes have capacity to continue to perform their functions over the long-term and the productivity of key natural resources is conserved or enhanced for future generation (Krantz, 2001).

1.6.4 Sustainable Livelihoods: Livelihoods compromise (s) the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and manage to enhance its capabilities and assets both now and in the future, while not undermining the natural resource base. Livelihood is sustainable which can cope with and recovers from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation. And which contributes net benefits to other livelihoods at the local and global levels (Chambers & Conway, 1991). The study considers that a household is enabled to gain sustainable livelihood security through city environment.

1.6.5 Sustainable Urban livelihood: A sustainable livelihood approach must be: sensitive to people and communities and appreciate the importance of social links for livelihoods; focused on the need for equity and the participation of the people(Meikle et al, 2001). This study also supports that a sustainable urban livelihoods model illustrates the relationship between key elements; natural, social and physical and financial resources, means of livelihood and disaster risk in the context of urban vulnerability.

Tomeasure the sustainable livelihood, the study considers seven indicators, viz. access to natural resource, access to financial resource, vulnerable situation, occupations, participation in disaster situation, access to social resource and access to physical asset.

1.6.6 Household: The term 'household' covers a wide range of residential forms, groupings of people and functions.Making a universal definition of 'household' is impossible. A common definition is a group of people who pool resources or 'eat from the same pot' (Robertson, 2012). In this study household refers to those sharing same pot. They may be members of the same family or unrelated individuals sharing a common activity e.g. street children or migrant workers.

1.6.7 Specification of a typical Family: Following Deptford*et al*., (2013) a typical household was determined during the focus group discussion of this study and was judged to contain 4 individuals: a man, a woman and 2 children. Key informants suggested that a typical family in the urban zone is of the same size. As the estimates of household income for this typical family are based on an energy requirement of 4 x 2,100 kcals, or 8,400 kcals in total, the Cost of the Diet method identifies a family of the same individuals that require as close to 8,400 kcal as possible. This typical HEA/Cost of the Diet family consists of:

1.6.7.1 An adult man, aged 30-59year, weighing 50 kg and moderately active (2,750 kcals/d)

1.6.7.2 An adult woman, aged 30-59year, 45 kg, moderately active (2,300 kcals/d) and lactating (418 kcals/d)

1.6.7.3A baby (either sex) aged 12-23 months (894 kcals/d)

1.6.7.4 Child (either sex) aged 10-11 years (2,075 kcals/d)

1.6.7.5 The total energy requirement of the family is 8,437 kcals/d.

A nutritious diet for the typical family was defined as one which provides the total of the estimated average requirement (EAR) for energy; the safe individual intake of protein; 30 percent of total energy intake from fat; the reference nutrient intake (RNI) of vitamins and minerals; and the safe intake for vitamin A, all specified by World Health Organization (2008). As the respondents of this study is vulneable people, the

poor household having no ability to maintain required calories has been considered as the family.

1.6.8 The Livelihood Resources/Assets: Assets have been defined in a variety of ways – labour, economic and social infrastructure, housing, household relations and social capital (Moser, 1998).The assets that are generally recognised within sustainable livelihoods theory, as summarized by Mcleod (2001) arenatural resources, basic infrastructure, human capital, social resources and financial resources. Following Moser's (1998) and Mcleod's(2001) definition, resources which are considered as commonly used by the respondents in the study area are given below:

1.6.8.1 Financial(income, wage earning, savings and access to credit);

1.6.8.2Human (health, education and other technical skills);

1.6.8.3 Natural (land, water, atmosphere, tree and access to open spaces);

1.6.8.4 Physical(sanitation, education and communication facilities, power supply and recreational facility); and

1.6.8.5 Social (relation with family, community, access to politics and national and international institution)

1.6.9 Poverty: To measure the poverty situation standard analysis of urban poverty has been followed in this study with especial consideration of income and food. In this study poverty has been measured by the proportion of people living on less than USD 1.25 per day (World Bank, 2013) and moderate poverty as less than $2.As the conversion rate of US$ 1 was equivalent to almost 77.63 BDT during field survey the household earning 6000 BDT per month has been considered as absolutely poor (living on less than USD 1.25 per day) and 10000 taka monthly earning household has been considered as moderately poor (living on less than $2per day). Regarding intake of food the study estimates the cost of acquiring enough food for adequate nutrition usually 2,100 kilo calories per person per day where the average calorie per person is estimated at nearly 1452 kilo calories (Deptford*et al*., 2013).

1.6.10City: A city is a relatively large and permanent settlement. Cities generally have complex systems for sanitation, utilities, land usage, housing, and transportation. The concentration of development greatly facilitates interaction between people and businesses, benefiting both parties in the process (Goodall, 1987). In this context the

study includes five areas of Khulna city: i. Nirala, ii. Gollamari, iii. Rupsha, iv. Tutpara and v. Khalishpur.

1.6.11 Vulnerability: To assess the vulnerability of the respondents Moser's Vulnerability matrix (1998) has been used to be madethe direct relationship between these indicators and the sequence is as follows:

1.6.11.1 Household members have basic needs: food, water, shelter, education, etc.

1.6.11.2 To meet these needs, household members access resources or services, for example, land, water, food, shelter, health care, electricity.

1.6.11.3 Most access is gained through payment. Payment is secured by undertaking productive activities through natural asset for example, land water, tree, and access to urban open spaces.

In this study to measure the vulnerability of the people, Cumulative Vulnerability Index (CVI) has been constructed considering seven indicators which are: tenure security, income security, intake of food in a day, regularity of wage earning, literacy situation, access to health and access to household goods.

1.6.12 Urban environment in Disaster management: Following Sanderson's (2000) observation the study considers the role of urban environment in disaster management which is concerned with delivering services with community support; services are in fact the vehicle with which social assets are being built. This is being approached in several ways:

1.6.12.1 Through the promotion of income-generating activities (financial assets);

1.6.12.2 Through personal empowerment and livelihood (human assets); and

1.6.12.3 Through community participation (social assets).

Considering all these the accessto and control over resources of community people during disaster has been measured by Cumulative Empowerment Index (CEI). The index includes seven indicators such as housing support, income security, food security, infrastructural facilities, organizational support, knowledge about disaster and emergency response.

1.6.13 Sustainable Agriculture: The study has been examined the contribution of urban agriculturein food security, nutrition and livelihoods in a combination ways by using CAI (Cumulative Agriculture Index) considering seven indicators: contribution of agriculture in income, food, health, education, clothing, interpersonal relations and meeting local market demand.

1.7 Hypothesis of the Study: The hypothesis of this study is: "Urban environment significantly contributes in sustainable livelihood of the urban people".

1.7.1 Research Questions.

Question A. What can we doto promote income generating activities that optimize sustainable resource use?

Question B. Do the sustainable livelihoods resultfrom sustainable environment of city?

Question C. Is sustainable environment a good way to achieve economic welfare in urban areas of Bangladesh?

Question D. Is there a link between urban environment and stocks of social capital to increase peoples' understanding of how their activities contribute to reduce environmental degradation?

Question E. Do the inhabitants adapting modern technology to access information, learning and share experiences on best farming practices?

1.8 Variables of the Study:

1.8.1 Independent variable: Environment

1.8.2 Dependent Variable: Livelihood

1.8.3 Intervening Variables: Land, water, tree, income, occupation, housing, health, technology, infrastructure, social capital, community participation, education, disaster, vulnerability

Chapter Two

Review of Literature

Victor & Makalle (2003) conducted a study entitled 'Poverty and Environment: Impact Analysis of Sustainable Dar es Salaam Project on Sustainable Livelihoods of Urban Poor'. The study has been carried out to identify the strengths and weaknesses in the institutional structure and associated legislation that support measures to improve the environment of the City of Dar es Salaam. The objective was to equip policy makers, particularly local government leaders, with an understanding of better means and ways of keeping the City of Dar es Salaam safe and clean without depriving its dwellers of their sustainable livelihoods. This research is presented in five Chapters. Chapter one highlights on the problem, objectives, hypothesis, study area and data sources. The background information of the study area is also presented in this chapter. In chapter two methodological issues relating to the relationship between poverty and environment are highlighted. It is emphasized here that population; affluence; and technology determine impact on environment. Chapter three describes the methodology used to gather and analyze data to explain the linkage between poverty and environment by evaluation of Sustainable Dar es Salaam Project. The process of data collection, the techniques of data analysis and the results discussion in chapter four is presented. Chapter Four also discusses in detail the findings as well as presenting the link-age between poverty and environment in the Tanzanian context.

The focus of the study is the household where socio-economic changes take place with resulting impacts on the environment. Kinondoni Municipality like other towns in developing countries is facing rapid population increase resulting to serious environmental problems including excessive pressure on existing environmental resources, infrastructure and other basic services. A wide range of issues received less poverty environment literature to date, the findings of this study constitute a real and deep scrutiny advance in understanding how different social groups under different conditions secure sustainable livelihoods, and how they relate to environmental management practices and environmental change. The study employed a combination of survey methods (HBS and LMS) to collect primary data in combination with a detailed review of literature to investigate the relationship between poverty and

environment in an urban setting. It has been found that the environment as resource base and natural sink of generated waste in all forms (solid, liquid or gaseous) has a linear relationship to the urban poor. It is identified that the higher the environmental degradation in urban areas, the higher is the level of poverty by impoverishment process (vulnerability). Hence, poverty reduction strategies in urban areas should focus not only on improving the environment through provision of basic services and facilities but also should include policy and institutional changes that focus on the vulnerability process. A major emphasis is placed on further research on dynamics of sustainable livelihoods as a poverty eradication and environmental management strategy.

The findings illustrate the understanding of the complex relationship between poverty and environment suggests investigating who owns the resources and how they are utilized (referred to as environmental entitlements). Poverty is basically lack of resources (natural, human, social, physical and financial). While the rural poor depend on natural assets and social assets for their livelihood, urban poor rely mainly on human assets (especially their physical abilities - informal employment to a large extent and knowledge - formal employment) and partly on social assets within the African culture of dependence within the extended families. The study identified that in both cases (urban or rural) resources of capital are transformed by policies, processes and institutionalization to give desirable outcomes (products, education, jobs, welfare, economic growth, clean environment, and others. Based on the understanding a three rank system of 'well provided, averagely provided and poorly provided' has been used throughout to segregate the community members at different levels of their welfare by a three points rank system.

The study reveals that in all study areas there are no longer open spaces available. While in planned settlements the once existed open spaces were either encroached into or officially allocated to other land use. In unplanned settlements every piece of land has had a dwelling or other structures built on. In planned settlements, permanent structures have been extended into road reserves narrowing the road carriageways and thus also restricting the through way. Some residents are engaged in vegetable gardening and livestock grazing on undeveloped tracts of land that include dry river valleys and on hills. These conflicting interactions between development and environment call for appropriate interventions to pave way for improved living

conditions in communities. The dominant income generating activities in the study areas, like any other areas in the Municipality, include food vending; water selling; selling of building materials such as sand, gravel, stones and limestone; urban farming; and livestock rearing; carpentry and timber works; tailoring; motor vehicle repair garages; fish mongering; hair cutting and setting salons and many others.

The study shows that there is a strong relationship between the state of the environment in urban areas and the health and welfare of its dwellers. The study concluded that a degraded environment affects the poor more in urban areas than the rich. Some specific problems were identified in urban areas which include youth unemployment; a large informal sector; inadequate urban infrastructure (especially safe water and sanitation); and a degraded environment; and special social groups which are at greater risk of getting poorer because of the deteriorating environment. The study suggests that to address urban poverty a detailed research is needed to come up with appropriate strategies. Therefore, there must be an understanding that solutions need to be found locally by building local technical capacities and financial resources if these solutions are to be effective and sustainable.

Nasreen *et al*., (2006)conducted a study on the 'Interrelationship between Poverty, Environment and Sustainable Development in Bangladesh: An Overview'.This paper attempts to focus on some of the issues and problems related to poverty and sustainable development in Bangladesh from the perspective ofenvironmental protection and ecological balance. It has been argued that poverty alleviation and environmental protection are in harmony to reinforce sustainable development. The study is an attempt to analyze the development scenario that aims at reducing poverty. However, in spite of the best efforts of government and NGOs the various indices of development in the developing countries have already faced difficulties in the context of achieving their goals and targets. This paper argues that instead of contributing to sustainability most of the development programs having a negative effect on overall environment and society.

The pertinent issues are: the analysis of poverty, and, even more important, about the effects of attempts to reduce poverty for the way to approach the analysis of the environmental sustainability. It is mentioned that such systematic analysis of environmental phenomena, at least in the social sciences, is only of recent origin. In

this paper three independent concepts are used as major variables. These are poverty, sustainable development and environment. The study focused sustainable development as development that promotes the capabilities of present people within compromising capabilities of future generations. And it will provide a broad vision for all concerns. Though the current sustainable development is advocating a new type of development agenda, i.e. optimum exploration and consumption of natural resources, unfortunately the high exploitation and high consumption of resources as well as unequal distribution of resources have created some problems that demand more than this type of sustainability.

The study reveals that people of Bangladesh are looking for self-sufficiency in food production. Food security is peoples fundamental right to determine their access and benefit sharing over their food, agricultural resources that maintain their livelihood. The study states thatthe nature of interrelationship between poverty, environment and sustainable development is a complex one and all these variables needed to be analyzed from the social, economic, political, cultural and resource management perspectives. In Bangladesh, we have adopted western development model in the context of poverty reduction, population control and sustainable resource management. But this kind of development models has failed to reduce poverty, population growth as well as environmental sustainability in a meaningful way. A number of factors are involved in this failure which includes lack of good governance and political institution, corruption, western development model, unplanned use of natural resources, defective industrialization and urbanization process, social disparity, exploitation, inequality etc.

The writers conclude that environmental issues need to be dealt with the participation of all concerned, with the government and citizens at the relevant levels. This, unfortunately, is almost absent in Bangladesh. Moreover international organizations and multinational corporations most often are pressing the government to adopt unsustainable policy, which cause serious degradation to the environment in developing countries including Bangladesh. Although poverty alleviation in Bangladesh has been considered as necessary, it must be mentioned that unplanned poverty reduction and development strategy becomes less effective and less sustainable.

In the study 'Cities, disasters and livelihoods' Sanderson (2000) describes the impacts of recent disasters in urban areas and their contribution to poverty, and highlights the little attention of urban development planning and disaster relief organizations to disaster mitigation. It also describes CARE's International Household Livelihood Security (HLS) model and how this allows an urban livelihoods approach to integrating measures for reducing poverty with measures for reducing risks from disasters. It pays particular attention to supporting low income groups and community organizations in building and diversifying their asset bases. A focus on reducing household vulnerability to shocks and stresses (including disasters) also reveals the supporting actions needed from municipal authorities and disaster relief organizations.

The study suggests that at a city management and policy level, actions leading to reduced risk need to be taken. In livelihoods parlance, the structures and processes that control the poor's access to income and resources need to take account of the risks that poor urban dwellers face, and take steps to reduce these. Most good urban programming works at both neighborhood and policy formulation levels. Much urban legislation, however, still results, if sometimes unintentionally, in increased vulnerability of the poor: the prevention of permanent services to illegal settlements can increase ill-health.Whilst the withholding of tenure inhibits consolidation of buildings, resulting in poorly-built shelters that easily collapse, catch fire or harbor disease. The study reveals that if the poor's increasing vulnerability to disasters is not addressed by policy, management or implementation then, simply put, urban living for them cannot be sustainable. At policy level, gaps between disasters and urban planning need to be closed. Proactive measures to reduce the threat of disaster need to be an integral aspect of urban planning. The study suggests that greater emphasis must be placed on proactive community-led risk reduction measures. At the neighborhood level, the building of self-reliance and, crucially, ownership of the problem are critical. Programmes which focus on the building of assets at household level leave families and neighborhoods less vulnerable, i.e. better able to withstand shocks and stresses. As the World Bank's Disaster Management Facility states, disaster mitigation needs to be mainstreamed into development practice. Livelihoods approaches to urban poverty problems provide a way of seeing vulnerability to shocks and stresses as an integral part of the development picture. The study focused that whilst livelihoods programming is at a comparatively early stage of development, and has a rurally-focused origin, it appears that it has much to offer in understanding the

dynamics of urban poverty and the role that disasters play. Such approaches place the vulnerable at the centre and, in so doing, aim to make city dwelling by the poor sustainable.

Hossain *et al.,* (2010)conducted a study on 'Urban Environmental health in Bangladesh slum: A comparative study of two metropolitan cities'. The study aims to present a comparative study of socioeconomic, physical and urban environmental health condition of two metropolitan cities in Bangladesh. Slums both from Khulna and Rajshahi city were selected for this study. Although both primary and secondary data were used, this study is mainly based on primary data gathered through household field survey. Inorder to determine the socio-economic, physical and environmental situations, only the beneficiaries of the UNICEF project were interviewed. The study finds that poor socioeconomic status and inadequacy of urban services has had an immediate effect on urban health especially of the slum poor in metropolitan cities in the country. Detailed case studies in two cities, Khulna and Rajshahi, have been undertaken. Three slums from Khulna city and five from Rajshahi city were selected emphasizing on some socio-economic, physical, environmental service and urban health.

The study explores that unlike education Khulna city is better than Rajshahi city in the case of employment and income factors because of scale of economics. A good number of heavy as well as light industries such as jute factories, fish factories, shipyard and processing plants are located in Khulna city which facilitate people to be employed. The water supply situation is satisfactory in the slums of both cities as 100 percent of households have access to safe drinking water, although in dry season, slum people in Rajshahi has to suffer because of the fall of ground water level.

The environmental health of a community is in many ways influenced by not only the socio-economic and physical conditions but also by environmental services available in the locality. The environmental status of the slums has been determined based on the state of sanitation, solid waste disposal and drainage. Although the differences in ranking their priority in urban services surfaces, the survey results demonstrate that sanitation still remains as a major environmental concern. Like sanitation solid waste disposal has appeared to be one of the major environmental problems. Grossly inadequate or absence of waste disposal facilities in poor settlements has further

aggravated the situation posing a threat to the environment. Lack of consciousness, absence of trash bins in the slums and the long distances to municipal bins are considered to be the prime causes of this worst situation. Residents in few slums claim that they pay a little monthly charge for household garbage to be collected by NGOs. In this study urban environmental health includes those aspects of human health that are determined by socio-economic, political factors and built environment. The rationale of considering only children lies in their susceptibility to the environmental problems and disease. The higher morbidity in the slums may be attributed to the poor health care facilities accessible to the slum dwellers. Survey findings illustrate that almost half of the slum population of the two cities seeks help from the quacks for their sickness. Nearly onethirds visit nearby government or private hospitals for treatment. Few go to the City Corporation health centre. Health services mostly primary health care offered to the slums are also scarce in the slums of two metropolitan cities. Although Bangladesh has achieved some progresses in health indicators of the Millennium Development Goals, still huge gap prevails in the health conditions between the rich and the poor, and also between the urban poor and the rural poor. In some instances, the deprivation of the urban poor is worse than that of the rural poor.

Results of the household surveys conducted in the slums in the two metropolitan cities show that the communities are almost homogenous not only by socio-economic, housing, environmental services and political status but also by environmental health standards. Some dissimilarities are also visible across education and housing quality. Khulna features characteristics such as low literacy, poor housing, and lower educational status. These similarities and variations in the profile of the residents in slum communities might have had an influence on environmental health. This study reports only morbidity among the children under the age of five as there are no reports of death caused by diseases during the survey.

In his writings 'The Urban Environment: Creating Livable and Sustainable Cities', Pearson (2011) developed research teams in both cities combined old maps, aerial photos and new remote sensing satellite data to reconstruct the history of landscape change. Biological impact has been measured and recorded in the landscapes of the two cities. It is observed that urban ecologists in Phoenix and Baltimore studied social and demographic aspects of the urban environment as well. People in the most-

sprawling cities, as compared to the least-sprawling cities, owned more cars per 100 households, drove a longer distance per day. However, there was no significant difference in commute time or in the incidences of diabetes or cardiovascular Disease. This study does not show causality, but the patterns and trends suggested that spatial patterns in city development have some influences on peoples' behavior, choices, and impacts relative to transportation.

The study first determined that the fast flow of water, a result of development, through the watershed was causing environmental damage in Baltimore, and worsening pollution. The study also determined that urbanization affects species and ecological communities, as cities and suburbs facilitate the spread of non-native species (because people introduce exotic ornamental plants and because urbanization's impacts on the soil, climate, and landscape favor weedy generalist species over more specialized native ones). In regard to social and demographic aspects, the researchers found that living closer to a park increases a home's property values, and in Phoenix, environmental justice comes into play, as those neighborhoods exposed to industrial pollution are populated by the less affluent, as well as by racial and ethnic minorities. In Baltimore, the reverse was witnessed, with toxic release sites in working-class white neighborhoods. The study concludes that whether addressing the people, natural communities, or changing ecosystems of the urban environment, studies on urban ecology like those in Phoenix and Baltimore is vitally informative in our ever-more urban world.

In the study 'Disaster mitigation strategies through land use planning and zoning in urban context', Sengupta &Banerji(2009) planned to establish horticultural production farm in Raya Azebo district, Raya Valley, Tigray Regional State. The project is planned to cultivate short term vegetables and fruits such as garlic, onions, pumpkin, butternut and strawberries and also asparagus, raspberries, boysenberries & grapes as long-term vegetables and fruits on 1,000 hectares. The farm in its production process involves modern development and production methods. It utilizes tractors, ploughs, disc cultivators and planters in the development of the farm. The report is prepared in line with the EIA requirements stipulated in the, International Finance Corporation's Guidance on Performance Standards on Social & Environmental Sustainability, EIA proclamation of the government of the Federal Democratic Republic of Ethiopia.

The basic purpose of the Environmental and Social Impact Assessment (ESIA) study was to identify, predict and analyze the magnitude of environmental and social impacts and propose enhancement or mitigation measures for significant environmental and social effects that are likely to be arisen from the various activities of the fruit and vegetables farm project during pre-construction, construction and operation phases. In the study various ESIA tools were used for identification, prediction and analysis of impacts. Biophysical resources survey, field observation and socioeconomic assessments and utilization of secondary data sources were utilized tools. In addition, national Environmental Impact Assessment Guidelines and International Finance Corporation's Guidance on Performance Standards on Social and Environmental Sustainability were used in identification, prediction and analysis procedures. Significant positive and negative project impacts have been identified. On top of this, environmentally sound and socially acceptable impacts enhancement and management options were also suggested. Public consultations were held with the communities living in the vicinity of the project site, and the outcome of consultations included in the report. During discussions, emphasis was given to public participation and procedures by which their participation could be initiated and promoted from the early planning of the project up to its implementation, monitoring and evaluation.

In the study 'Urban agriculture for sustainable poverty alleviation and food security' Hoornweg&Munro-Faure (2008)provides an updated insight on the role that urban agriculture can play in pursuing the Millennium Development Goals and more specifically MDG 1 and 7, related to poverty reduction, foodsecurity,and environmental sustainability. Reference is made to urban agriculture in relation to the recent and important issues affecting the world economy and the environment, regarding climate change, soaring food and energy prices. It intends to raise awareness and inform decision makers and planners of the different aspects of urban agriculture, which entails a broad range of activities, related to the food production and distribution chain, within natural resources planning and use including urban and peri-urban forestry. The paper further illustrates ongoing initiatives that substantiate how urban and peri-urban agriculture (UPA) can, in different environments, play its role as a source of employment, income and food which are the indicators towards poverty reduction and improved food security. Without being exhaustive, reference is made to major key players and stakeholders

that are committed and involved in advocating and promoting UPA as a key area of agriculture policy and sustainable development strategies.

The study identified a significant problem of interventions specifically associated regulations and measures in developing countries arise from various difficulties. One of them is controlling the mushrooming petty traders and small-scale enterprises (informal sector) in urban areas. Regulators frequently shy away from such regulations, either from fear of the effects these may have on employment and incomes of poor households (constituted as the main livelihoods) or for political motives. Studies of the distributional effects of these regulations and measures are, however, few. It is observed that urban and peri-urban agriculture contributes to local economic development, poverty alleviation, in recognition of the human right to food, the social inclusion of the urban poor and women in particular, as well as to the greening of the city and the productive reuse of urban wastes. Policy decision and integration of UPA into development strategies are prerequisites to efficiency and long-term sustainability of UPA programs, which need to address multispectral and multi-disciplinary issues including crop and livestock production, aquaculture, agro-forestry in the overall context of proper natural resource management.

Study states that with the urbanization process, urban and peri-urban agriculture has evolved from a simple, traditional and also informal activity into a commercial and professional initiative. Particular cities are much lower than the proportion of people living in very poor quality housing, lacking basic infrastructure or services. Vulnerable groups in cities often have fewer informal safety nets (kinship and community networks). Their dependence upon purchased food is further compounded by their incapacity to access and use natural resources to produce their food. Most authors on urban poverty agree that poverty is clearly becoming more in urnban.

The study suggests that with the rapid growth of the urban population and the low nutritional levels of the urban and peri-urban poor, there is tremendous scope for increasing this source of supply. Benefits of UPA include: non-market access to fresh, nutritious food for poor consumers, and income generation (especially for women); supply of urban food markets, street food and food processing, providing additional employment and income; water harvesting, water re-use, and

urban wastes re-cycling to provide water, animal feed and fertilizers for demands of UPA; integrating UPA with urban greening (UG) programs. These can provide fuel wood for urban residents, reduce urban pollution and temperatures, and offer recreation opportunities to improve quality of life for all urban residents, and in particular for youth and elderly people; providing an opportunity for participation of urban residents to benefit from the implementation of UPA/UG programs, specifically stimulating the involvement of women as complementary activity.

The study describes that urban and peri-urban agriculture can directly and indirectly contribute in pursuing several of the MDGs. The study suggests that food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life. In urban areas, the main constraints for the access to food for the household are of economic and physical nature. Food prices and household income are the two economic parameters, while distance, and costs of transport from and to markets, may represent physical constraints. Urban and peri-urban agriculture can favorably mitigate these constraints by making food and income available at household level.

The study concludes that phenomenon of urbanization brings severe challenges to ensuring household food security in a context characterized by high rates of unemployment, increasing development of the informal sector, deteriorating infrastructure, overcrowding and environmental degradation. In addition, cities should respond to increasing globalization; managing the process of decentralization; and providing basic services to theburgeoning urban poor, whose contribution to the economy is not usually matched by their access to basic services.

According toGeneral Economics Division (2015)the world has the opportunity to agree upon a new global sustainable development framework between 25 and 27 September 2015 during the 7th United Nations General Assembly (UNGA) in New York. The agreed Sustainable Development Goals (or SDGs) during the 70thUNGA succeed the Millennium Development Goals (MDGs), forged in the year 2000. While the study has been conducted, Bangladesh has made commendable progress in achieving most of the goals set in MDGs.

The study states that Bangladesh is using improved/safe drinking water; 55.9 percent of population is using improved sanitation in 2012-13. However, access to safe water for all is a challenge, as arsenic and salinity intrusion as a consequence of climate change fall out will exacerbate access to safe water especially for the poor. Millennium Development GoalsBangladesh has made commendable progress in increasing equitable access to education, reducing dropouts, improving completion of the cycle, and implementing a number of quality enhancement measures in primary education. It has already achieved gender parity in primary and secondary school enrolment. The government is in the process of implementing a comprehensive National Education Policy (2010) to achieve its comprehensive objectives. This positive development has occurred due to some specific public interventions focusing on girl students, such as stipends and exemption of tuition fees for girls in rural areas, and the stipend scheme for girls at the secondary level. This has contributed to promoting the objectives of ensuring gender equality and empowerment of women. There has been steady improvement in the social and political empowerment scenario of women in Bangladesh. The government has adopted the National Policy for Women's Development 2011 and a series of programs for empowerment of women.

Women participation in the decision making process has also marked significant improvement in the country. From the study it is found that there has been a sharp increase in the number of women parliamentarians elected in 2014 (20 percent) compared to 1991 (12.73 percent). According to the Global Gender Gap Report 2014, Bangladesh ranks 10thposition out of 142 countries in the political empowerment sphere and was awarded the prestigious Women in Parliaments Global Forum award in 2015. However, wage employment for women in Bangladesh is still low. Only one out of every five women is engaged in wage employment in the non-agricultural sector.

According to the information of the Department of Forest, the total forest area in Bangladesh was 2.60 million hectares in 2013 which is only 17.62 percent of the total land area of the country. Government forest land, managed by the Department of Forest, covers both natural and plantation forest. Out of 64 districts, 28 districts had no public forest in the past. But now almost all districts have been brought under forest coverage through Social Forestry Programme in marginal land such as roads, railway and embankment sides. Coastal afforestation programme in newly accreted

shoals is accelerated to increase forest area of the country as well as for establishing a permanent protective green belt along the coast. Moreover, efforts have been made to increase tree density in existing forests by bringing more forests under Protected Area Management System and introducing silvicultural interventions like 'Enrichment Plantation', 'Assisted Natural Regeneration' etc. Although Bangladesh is not a big emitter of CO2 and the country has no obligation to reduce greenhouse gas emissions given its LDC status, the government has identified mitigation and low carbon development as one of the priority areas in its Bangladesh Climate Change Strategy and Action Plan (BCCSAP).

It is widely recognized that climate change will affect many sectors, including water resources, agriculture and food security, ecosystems and biodiversity, human health and coastal zones in Bangladesh. The cyclones (SIDR in 2007 and AILA in 2009), and droughts and floods which occurred during the recent years indicate that IPCC predictions on extreme climate events were on track in Bangladesh. To prevent the climate change impact in the country, the Government of Bangladesh has carried out several initiatives in the policy making system. The establishment of Bangladesh Climate Change Trust (BCCT) is one of the major initiatives to address both climate change adaptation and mitigation. As per the direction of Climate Change Trust Act, 2010, BCCT was established on 24 January 2013 with effect from 13 October 2010 under the Ministry of Environment & Forests.

The establishment of Climate Change Unit (CCU) is one of the major initiatives to address both climate change adaptation and mitigation. The CCU started its activities in January 2010 under the Ministry of Environment and Forests Environmental sustainability is a core pillar of the post-2015 development agenda. Efforts to ensure global environmental sustainability have shown mixed results throughout the last 15 years. Much work remains for the post-2015 period, particularly given the acute environmental challenges the world is facing, such as climate change, food and water insecurity, and natural disasters. One theme emerging from the debate on the successor agenda to the MDGs is the importance of true integration of environment into development ambitions. Environmental sustainability is a core pillar of the post-2015 agenda and a prerequisite for lasting socioeconomic development and poverty eradication. Healthy, well-managed and diverse ecosystems and resources can play a

strong role in mitigating future environmental challenges and improving livelihoods everywhere. Therefore, it is crucial to ensure that the development agenda for the future reflects the links between socioeconomic and environmental sustainability and protects and reinforces the environmental pillar.

However, the 8 goals of MDGs somehow overlooked to consider the root causes of poverty, or gender inequality, or the urgency of holistic nature of development. As a result, according to the World Bank measurement of poverty, around 1 billion people still live on less than $1.25 a day and some 800 million people still live in hunger. In addition, women are still fighting for their rights, and millions of women still die while giving birth. In this backdrop, the UN Member States engaged in discourse for setting a comprehensive development agenda beyond 2015 at the September 2010 MDG Summit, with the end date of the MDGs in sight. In June 2012 at Rio+20, the UN Conference on Sustainable Development, UN Member States adopted.

Taking the UN Millennium Declaration into consideration, Bangladesh mainstreamed the goals in its developmental agenda which is evidently reflected through either in the Poverty Reduction Strategy Papers or ongoing Sixth Five Year Plan (6th FYP). As the terminal year of MDGs and 6th FYP coincides, implementing one, ultimately paves the way for implementing the other. Bangladesh is now in the process of formulating its Seventh Five Year Plan (7th FYP) for the period of 2016-2020. While formulating the plan document, the proposed goals by open working group (OWG) were well taken into consideration so that the proposed goals of the SDGs can be illustrated in the national plan. The goals of SDGs were also given emphasis while setting up the priority areas of the 7th FYP. As the goals, targets and indicators of the SDGs are well taken care of in the formulation process of the 7th FYP of Bangladesh, it can be said that the country will be an 'early starter' in the implementation process of the SDGs. In addition, being a commendable achiever of the MDGs and 'early starter' of SDGs, Bangladesh will perform well in attaining the SDGs goals and targets those will be signed by the head of the states in September 2015.

Fofana (2009)conducted a study entitled ‘A socio-economic sustainability assessment of livelihoods from scrap metal collection in Freetown, Sierra Leone’. To accomplish this study, semi-structured interviews and observations of the process of scrap metal collection were conducted as part of field work. Indicators that were deemed suitable

for the assessment were selected based on the concept of poverty reduction of the United Nations Millennium Development Goals.

The section one describes the research design and strategy, the methods and materials used to conduct the study and the limitations of the research. Section two presents the background of the study area and explains how the activity of scrap metal collection is accompanied in the study area. Section two further provides the theoretical basis of the study and states the environmental benefits of metal recycling and ended with a description of the indicators used for the sustainability assessment with th basis for their choice. Section three presents the results of the interviews. Section four focuses on the socio-economic sustainabilityassessment,while section five analyses and discusses the issues of the sustainability of the livelihoods of SMCs. Section six presents the conclusions and recommendations of the study and gave suggestions for further research. Two indicators of income sufficiency and income reliability are used to conduct the economic assessment. Two sub-groups of indicators are used for the assessment of the social pillar of sustainability.The two sub-groups are exposed on the basis of working conditions, and access to social services. The sub-group of indicators identified as working condition consists of four indicators. These are occupational hazards, employment security, social security and daily number of hours of work. While the second sub-group of indicators called access to social services consist of three indicators. These are access to clean water, access to electricity and access to medical services. Working conditions and access to social services are the two sub-groups of social indicators selected for the sustainability assessment. Four indicators are chosen under the sub-group indicator of working conditions. These are occupational hazards, employment security, social security and daily number of hours of work.

The study finds its theoretical basis within the concept of poverty reduction for the reason that the group of people under investigation is perceived to be poor and disadvantaged. The findings and recommendations of this study are expected to contribute towards the development of solutions for poverty reduction and an achievement of the first goal of the UNMDG. The result of theassessment indicated that scrap metal collection offers livelihood opportunities for poor people with an average monthly income greater than the minimum wage of workers in the formal employment sector. However, the economic benefit from scrap metal collection was

found to be inadequate to acces basic necessities for the social well-being of scrap metal collectors. Furthermore, issues of social security such as pension and insurance from work hazards were found to be lacking for those engaged in the activity of scrap metal collection.

The results of the interview conducted during the study reveals that scrap metal collection pose a threat to the health of collectorsfrom bodily cuts and pains and an exposure to disease contamination. The activity is largely conducted with no protective clothing such as boots and gloves. In some instances cutting of scraps from onshore abandoned vessels is done with sharp equipment with no protective clothing. Eighty three percent of respondents complained ofailment such as body pains, while 67% of respondents showed body cuts due to the activity.

The study states that the working environment of scrap metal collectors(SMCs) is very risky and unfavorable. It is risky in the sense that it exposes SMCs to the risk of body cuts in the absence of protective clothing like boots, gloves and other essential equipment to protect from body cuts. The occupational hazards are therefore enumerable starting from body cuts, body pains, disease contamination from landfill areas and harassmentfrom police and state authorities. The hazards could be minimized if SMCs wear protective clothing when fetching scrap metals. Social security for SMCs is regarded to be very vital in meeting the needs of the living conditions of SMCs at old age or when one is disabled to work due to an accident from work. Considering that the activity requires a large input of hard manual labour, it is observed that old people will find it very challenging to be engaged in this activity. The assessment on the number of hours of work per day input into the activity of scrap metal collection revealed that SMCs input a large amount of hours into their work but most of them do not realize incomes commensurate to the time spent on work. The result of the assessment conducted indicates that scrap metal collection for recycling do offer an opportunity of livelihoods for poor vulnerable people in Freetown. It isobserved that although the average monthly income generated from scrap metal collection was discoveredto be more than theminimum wage of an unskilled worker in the formal employment sector, the income was found to be inadequate to meet the economic and social development of thepeople engaged in the activity and is therefore unable to eradicate poverty and achieve the first goal of the UNMDG. The discovery of the lack of social security such as pension was also

crucial to the living conditions of retired people from the activity of scrap metal collection.

The study reveals that the opportunity of livelihoods from scrap metal collection can be transformed into meaningful benefits and be made a more sustainable strategy of improvedlivelihoods for poverty reduction and human development, if policies, regulations and the institutional capacity are streamlined and implemented towards a pro-poor agenda for human. The study recommends that SMC should also be encouraged and empoweredto diversify their income generating activities by undertaking other income activities such as farming and fishing so as to reduce the risk of vulnerability to the external stresses and shocks of scrap metal collection. Alternatively, entrepreneurs can be encourage to offer employment to SMCs with a wage adequate to meet improved socio-economic conditions of living for SMCs where issues of social security, work accidents insurance and the provision of working tools, equipment and protective clothing are well taken care of.

The study suggests that in order to improve the livelihoods and make it more sustainable so as to lift the standard of living of people engaged in informal activities. For example scrap metal collection, the implementation of multidimensional policies and regulations that will develop the capacities, choice, and diversity of livelihoods of scrap metal collectors deem vital. A bottom-up approach in the formulation of these policies and their successful implementation as deem essential. The regulations should also be stringent to protect the exploitative tendencies of foreign investors under the guise of cheap labor.

Meikle *et al*., (2001) studied on ‘Sustainable urban livelihood: Concepts and implications for policy’. The study presents that a sustainable livelihoods approach (SLA) adopts a distinctive perspective on the understanding of poverty and how to intervene to improve the conditions of the poor. A sustainable livelihoods approach to poverty eradication is one that acknowledges that poverty is a condition of insecurity rather than only a lack of wealth. Broadly a sustainable livelihood (SL) is a means of living which is resilient to shocks and stresses, and which does not adversely affect the environment. Livelihoods compromise(s) the capabilities, assets (including both material and social resources) and activities required for a means of living. This paper commissioned by DFID, examines the discussions which range around the concept;

considers the implications of the urban setting for this approach; presents a sustainable urban livelihoods model and considers some policyand practical implications of the approach for urban development interventions.

In this study the livelihoods of the urban poor are defined in large part by the opportunities and constraints under which they are operating. The paper considers that a sustainable livelihood approach to poverty eradication must be: sensitive to people and communities and appreciate the importance of social links for livelihoods. It focused on the need for equity and the participation of the poor, who must be treated as citizens rather than clients; related to other policy objectives and human right issues; sensitive to environmental needs and conditions, both of poor communities and of the requirements of broader environmentally sustainable development and holistic in approach in order to reflect both the multidimensional nature of poverty and the survival strategies of the poor. The availability and accessibility of affordable credit is important in reducing the likelihood of severe indebtedness of the urban poor. As the sale of labour is important in the context of the city economy, health care is vital in determining the quality of labour of the poor. Likewise accessibility to education and training provides the opportunity for poor men and women to improve the value of their 'human capital'. Following (Moser, 1998), the study reveals that housing is often one of the most important assets for the urban poor, as it is used for both productive (renting room, using the space as a workshop area) and reproductive purposes.

A key aspect of social networks stated in this study is access to information about opportunities and problems-one important area is information about casual labour markets and other opportunities. Some practical sustainable livelihood models have also focused on environmental sustainability. However, it should be noted that the main focus is on an understanding of assets and strategies, while little attempt has been made to develop measures of vulnerability or security. Moser (1998) vulnerability matrix is proposed here which could act as a structure for indicators and are used to assess vulnerability and assets. This matrix lists a variety of household responses to increased vulnerability where an increased incidence of these strategies can be taken to indicate that households are in a more vulnerable condition. However this is not unambiguous as an indicator of vulnerability as the household actions that indicate vulnerability are also attempts to increase security. It is described that the

ways in which these generalized notions are manifested in practice depends very much on specific contexts. The factors which make men and women vulnerable vary from place to place and from time to time, as do the assets available and strategies used to overcome this vulnerability. Thus any sustainable livelihoods approach must be tailored to specific conditions and needs.

The study entitled 'Sustainable livelihoods, mobility and access to the needs in urban and peri- urban areas' byMaunder *et al*., (2001)aims to investigate the utility of the sustainable livelihoods approach in identifying the mobility and accessibility needs of the poor, with specific reference to rural-urban linkages. The paper begins by discussing the livelihoods approach concept in relation to transport, and continues with an overview of the methodology used for the study, as well as a brief summary of findings. The two years project is on-going and is being carried out in two transport corridors in Zimbabwe and Uganda, encompassing the capital city and a secondary city respectively, and spanning both rural and peri-urban settlements. The research gives specific reference to rural-urban linkages and the way in which the provision of transport supports or inhibits the livelihood outcomes of the poor, in relation to their movements within and outside of the corridor.

The project comprises three distinct research phases incorporating a number of qualitative and quantitative research methods including focus group discussions, key informant interviews, household surveys and travel diaries. The methodology is designed to procure comprehensive data with a macro and micro dimension that will inform the sustainable livelihoods approach (LA). The concept and interpretation of transport as a livelihood asset is not well developed within the LA literature. Consequently the usefulness of the LA as a means of improving the focus and design of interventions in the transport sector aimed at meeting the mobility needs of the poor remains uncertain. The study suggests that all communities require accessibility to supplies, services, facilities and work opportunities.Accessibility depends on infrastructure and available and affordable modes of transport for the movement of people and their loads. Accessibility therefore depends on physical proximity and mobility. It may be improved by greater mobility and improved proximity.

In this study transport infrastructure includes: paths, roads, bridges, tram and train tracks and stations, waterways, airports and air planes. A variety of transport modes

are used to carry passengers and freight, namely: trucks, pickups, buses, mini-buses, cars, motorcycles, boats, trains, trams, animal transport, bicycles, handcarts and self-propelled walking. These modes are utilized for private or commercial use. Commercial transport services involve the users paying fares or hire charges. The study reveals that transport infrastructure is largely devoid of mobility enhancement in the absence of efficient modes of transport. Individual utility is derived from infrastructure when modal choice is exercised within the transport system to gain access to required goods and services. Hence the accessibility provided by a transport system has long been seen as its most fundamental function or attribute. The importance of this characteristic has overshadowed analytical distinctions, such that road and other infrastructure have been incorrectly treated as synonymous with accessibility in most developing countries. Indeed it has long been assumed that the correct role of government and aid agencies lies in the provision of road infrastructure in poor areas, and not the vehicles, without which the infrastructure becomes dysfunctional. The provision of mobility and accessibility are the main outputs of a transport system. The two are related but often confused concepts that can have distinct meanings in policy terms. The nature and implications of these meanings are central concerns of this research.

In the book entitled *Women and Girls Vulnerable or Resilient*? Nasreen (2012) focused on coping strategies and responses of rural women and girls to a common most disaster, flood. It is a longitudinal study. It explained the principal factors structuring the responses women and girls during flood. The study investigated the experience, problems and status of vulnerability of women and girls related to flood. It also identified role of women and girls in protecting their households and changes in vulnerabilities and resilience of women over the twelve years of the longitudinal research. In responding to these issues a sociological perspective is adopted but not to the exclusion of other approaches. The study stated that the occurrence of floods in Bangladesh is old but over years the problem has become greatly aggravated and is one of the main concerns of most rural households, life in which is precarious even in non-flood conditions. These problems affect women severely than men because of the wider range of responsibilities that they have for their households and the fact that those responsibilities keep them tied to their households more strictly and more effectively than those of male members.

The book starts with an introduction describing its purpose followed by a description of the significance of women in disaster research. It then proceeds to examine the situation of rural women in Bangladesh. The methods techniques and study population are discussed in chapter two. Chapter three focuses on floods and disaster management initiatives in Bangladesh and proceeds to examine the situation of floods in Bangladesh. Disaster management system in Bangladesh and initiatives taken by different actors are also highlighted in the chapter. Everyday life of women and girls during non-flood periods are discussed in chapter four. The gendered division of labor, women's role in flood management, and the maintenance of purda and women's ownership of assets are emphasized here in the context of their households' socio-economic background. Chapter five describes vulnerabilities and capabilities of women and girls during different phases of floods. Gender specific activities of women and girls during different floods are also discussed here. Chapter six focuses on the immense challenges face by particular women during floods and the resilience as ways to overcome these problems.

The study identified some responsibilities like food processing and cooking, cleaning, collecting water and fuel, bearing and rearing children, looking after livestock and income generation. It is described that despite the heavy burden which women bear in extremely difficult circumstances, they demonstrate considerable fortitude and ingenuity in their attempts to maintain their livelihoods of their households. Factors stressed in this study are the male dominated structures of a predominantly conservative and Muslim society. Study concludes that recognition of the role of poor women and girls as resilient in safeguarding the interests of their families is a necessary starting point from which to device policies to reduce the vulnerability of the rural poor to floods. Considering the importance of women in the socio-economic sense, and the important roles they are likely to play in future, it is crucial that the roles of poor women and girls during floods are recognized.

Doss *et al*., (2012) a joint initiative of an international research team was formed with four objectives: to collect individual level asset data from three different countries (Ecuador, Ghana and India) in order to demonstrate the importance and feasibility of collecting data on women's access to and ownership of property; to identify the minimal set of questions on individual level asset ownership that are needed in multi-purpose household surveys to calculate the gender asset and wealth gaps to develop

various measures of gender asset and wealth gaps that can be used by national governments to track progress toward Millennium Development Goal on gender equality and women's empowerment; and to identify the critical enabling or constraining social, economic, and institutional factors affecting women's asset ownership in order to help policymakers and others.

The study examines collected individual level asset information which is used to develop two sets of measures, the gender asset gaps (based on asset incidence) and the gender wealth gaps (based on asset values) for selected districts in Karnataka. The results reveal that there are substantial genderdisparities in asset ownership and aregreatest among high-valued assets. The study also identified that incidence-based asset inequality analysis underestimates the extent of the gender gap. The paper examined differential patterns of asset ownership by men and women and looked at inequality measures therein.The preliminary analysis suggests that there are substantial gender disparities in asset ownership across the districts of Karnataka. The inequality is highest for principal residence and agricultural land and lowest for livestock and other lower value assets which are predominantly owned by all members of the household. The gender gaps in asset ownership are the least in the coastal district of Dakshina Kannada and this could be partly attributed to the system of matrilineality that certain communities in this district practice, which is favorable to women's acquisition of assets.

The study identified greater disparities in value-based gaps than in the incidence-based gaps. Analyzing only differences in incidence of asset ownership will thus underestimate the extent of the gaps. The distribution of wealth across individuals is highly skewed in urban areas and Bengaluru while the rural areas exhibit a relatively lesser degree of inequality. This has critical implications for a more nuanced understanding of poverty and suggests that policies aimed at enabling individuals build their asset base are important. Further research is needed to understand the implications of the gender-related and other inequalities in asset ownership for individual and household welfare. But the study can be criticized as the analysis presented in this paper is preliminary; it is meant to raise questions and provoke a discussion, rather than provide all the answers.

The data collection efforts provide an opportunity to analyze asset ownership data at the individual level for rural households. This analysis, focusing on rural households, uses data representative of the state of Karnataka, India, nationally representative data from Ghana and Ecuador, and data on 350 rural households in Uganda. Initial comparative analyses of the Ecuador, Ghana and Karnataka data have analyzed the gender asset and wealth gaps for the entire sample, combining urban and rural households. Because the patterns of urbanization differ widely across the countries, it is useful to separate out the rural households. With a renewed focus on the importance of agricultural development, understanding the gendered patterns of ownership of assets in rural communities is critical. An understanding of the gender asset and wealth gaps is important for the promotion of gender equality, as both men and women should have access to assets and control over their use. In addition, evidence suggests that enhancing women's access to assets is critical not only for their own economic empowerment, but also that of their households and communities.Having assets in the hands of women significantly expands their decision-making capabilities, which in turn has a great impact of their health and wellbeing and that of their children. When women do not have ownership claims on assets owned by men in their household, they are vulnerable when the household dissolves through divorce or death. Studies have also found that women's access to assets may also decrease domestic violence against women. Improving women's rights to assets is an important poverty alleviation strategy. The data presented in this paper provide means to understand the magnitude and dimensions of the gender asset and wealth gaps in rural areas and how they vary across different developing countries and regions.

The study highlights that it is important to know whether the assets are owned by just a few individuals or whether they are widely distributed. Similarly, the gender asset gaps are useful in revealing the proportion of men and women who are owners of a particular type of asset; however, they do not take into account the variance in the quality and quantity of assets. For example, in a scenario where all women each own one small plot of land while all men own multiple large plots of land, a gender gap would not be indicated. The gender wealth gap aims to capture the quality and quantity dimensions of a given asset by examining the value of assets owned by men and women. The values were collected by asking the primary respondents about the market value for each asset; i.e., for how much the asset could be sold. In the case of joint ownership, the total value of the asset is divided equally among the owners.

In *The Sustainable Livelihood Approach to Poverty Reduction: An Introduction*, Krantz (2001)defined the concept of Sustainable Livelihood (SL) as an attempt to go beyond the conventional definitions and approaches to poverty eradication. These had been found to be too narrow because they focused only on certain aspects or manifestations of poverty, such as low income, or did not consider other vital aspects of poverty such as vulnerability and social exclusion. It is now recognized that more attention must be paid to the various factors and processes which either constrain or enhance poor people's ability to make a living in an economically, ecologically, and socially sustainable manner.

Food and Agricultural Organization (2009) convened an international meeting on urban and peri-urban forestry (UPF) entitled: 'Trees Connecting People: In Action Together' (hereafter called the 'FAO UPF Bogotá Meeting').The meeting gathered more than 50 experts from agencies and institutions worldwide, mainly coming from urban forestry, urban agriculture and urban development, governmental, NGOs and private sector. Representative from UN-Habitat, United Cities and Local Government (UCLG) were also present. The main objective of this international meeting on urban and peri-urban forestry was to achieve abetter understanding of the overall institutional, policy and networking framework, develop strategic advice to raise the profile of forests and trees on national, regional and global urban agendas, and define strategic opportunities to implement an adaptable and efficient Urban and Peri-urban Forestry Programme. This first international meeting on urban and peri-urban forestry has promoted worldwide networking and action with special emphasis to poverty alleviation and food security in developing countries.

It is stated that urban and peri-urban agriculture (UPA) still largely remains an informal sector that is not being integrated in agriculture policies or urban planning. This makes it vulnerable and also unreliable and risky. Most producers become vulnerable because they have no secured tenure status which precludes any substantial investment in terms of infrastructure or soil fertility. The study reveals that conversion of agricultural land to urban uses was a particular concern, as rapid growth and escalating land values threaten farming on prime soils. Existing farmland conversion patterns often discourage farmers from adopting sustainable practices and a long-term perspective on the value of land. At the same time, the close proximity of newly developed residential areas to farmsincreases public demand for

environmentally safe farming practices. In the same way city councils create green zones for parks, botanical gardens and golf courses within the city boundaries. Equally they could integrate urban agriculture into the planning, leaving any option open to modify the land use in the future but at the same time maintain a buffer space for urban food production. When carried out properly, with a full attention to environmental and food safety issues, UPA can contribute to food security in three ways: firstly, the quantity of food available is increased through UPA. Secondly, UPA enhances overall nutrition security by diversifying the diet of the poor through the consumption of locally produced fresh and nutritious food and allows substantial savings on energy through proximity production with limited packaging, transport and storage requirements. Thirdly, UPA offers opportunities for productive employment in a sector with low barriers to entry. The visible growth in urban and peri-urban agriculture throughout the world casts a spotlight upon some existing issues in agriculture and food security and raises new ones. These include a need for effective ways to deal with urban food insecurity, for basic infrastructure in urban areas to protect public health and the environment and for integrated resource management and land use planning.

The study suggests that the future habitability, competitiveness, and viability of the cities in developing nations will depend on whether decision makers and urban planners develop and adhere to coherent policies for managing their urban and peri-urban areas. Distinct policies and planning efforts are needed for the management of agriculture, horticulture, forestry and aquaculture in the urban and peri-urban environments. There are few models and little information available to city managers to address these competing demands, and to develop alternative visions of the future. While the interest, potential, and risks of UPA are clearly perceived, it is surprising to note that, in most cases, policy and strategy developments as well as technical guidance are still absent or only nascent. Strategic ways of dealing with the competition for water and land, as well as other environmental issues, are just emerging. It has concluded that there was a need for the development of International Guidelines for UPF in a collaborative and participatory process with international and national stakeholders as a pillar activity for international, regional and national networking, technology and knowledge transfer, as well as planning based on the inclusion of beneficiaries and promoters of UPF.

Crabtree (2008) studied on 'the role of tenure, work and cooperativism in sustainable urban livelihoods'. This paper responds to challenges posed by urban sustainability through a consideration of sustainable livelihoods within the Western, industrialized context of Australian urban areas. Application of sustainable livelihood considerations to urban areas is a task notably absent from literature to date. Sustainable urban livelihoods (SULs) necessitate that affordable housing and hybridised governance be made accessible, widespread and mainstream and that work be reinterpreted and reorganized along local, cooperative lines. This paper uses contemporary case studies and recent relevant models to illustrate why non-profit tenure systems more localised and diversified work structures and cooperative governance are crucial components for establishing sustainable livelihoods within Western cities.

The study analyses that the role of tenure, work and cooperativism in sustainable urban livelihoods cause and effect, action and impact, making it overtly in the individual's best interests to cooperate. To an extent this becomes an issue of scale, with much of Ridley's criticism leveled atlarge state systems attempting to centralize and standardize diverse, contextual phenomena and forces and subsequently creating distance and anonymity between the spaces and individuals associated with cause and effect. Success has generally occurred when there is direct and obvious feedback between individual and collective decisions, actions and impacts.

It is mentioned that effective governancerequires the combination of localised knowledge, experience and accessibility with broader knowledge, regulation, contextuality and resources. The study commends that sustainability requires that a diversity of agents are involved in governance, that multiple knowledge is accessible and are utilised for the ongoing refinement of management. One of the responses to growing unaffordability, gentrification of formerly low cost housing stock, speculation and displacement in the United States has been the conceptualisation and formation of community land trusts (CLTs).

The impact of policies institutions and processes in urban upgrading is a study conducted by Lowe & Schilderman (2001).The study aims to make a preliminary assessment of the impact of regulations on the livelihoods of urban women and men experiencing poverty. It contributes to the international research efforts of DFID sponsored KaR project Regulatory Guidelines for Urban Upgrading, includes

consideration of planning and building regulations and standards as well as the institutions and procedures concerned with implementing them.

The paper begins with a brief presentation of current Sustainable Livelihood (SL) concepts, with a particular focus on Policies Institutions and Processes (PIPs). Consideration is given to measurement of SL impact monitoring and assessment. A preliminary overview of the impacts on livelihood outcomes, with reference to building materials and housing regulations, is given pending feedback from the project research team. The paper closes by posing questions and drawing conclusions on the author's current understanding of the SL principles and their potential application to the current research program.

The study examines that the effective management of individual and household asset portfolios, and the fungibility of those assets, is critical in generating sustainable urban livelihoods. People have to trade and make trade-offs in order to realise the potential of their assets. Formalisation is a process which poor people are often excluded fromdue to a lack of voice, information and knowledge resources, management and entrepreneurial skills. The value of property and assets held by people in the informal sector are estimated to be many times higher than the cumulative worth of aid and foreign investment ever received by their countries. In the aftermath of hazardous events such as earthquakes and landslides regulations are inevitably the focus of considerable media attention. The failure to comply with existing planning and building regulations are usually cited as a key factor in the resultant loss to life, property and livelihoods.

The study reveals that the vulnerability which women face is in part due to social norms which legislative reform can begin to address by removing institutionalised discrimination. In the urban context, infrastructure is often categorised as being part of the physical asset base. Yet it is increasingly seen as desirable for infrastructure to be defined as services rather than tangible hardware such as the network of water pipes and storage tanks. There is a whole raft of related policies and politically challenging issues to overcome the constraints on accessing affordable shelter. Pro-poor change in the context of urban settlements upgrading and livelihoods must address legislative issues governing housing, infrastructure, land and property ownership, inheritance, finance, commercial activities as well as the underlying

institutional and operational environments concerned with implementation and enforcement. This paper has offered some discussions touching on these issues and in so doing employed the sustainable Livelihood Framework (SLF) as a road map and framework around which to base that discussion. It is for the research team to further debate the applicability of this approach and to assess the value in further promotion, adaptation and adoption of SL thinking and tools in the design and development of regulatory guidelines for urban up-grading.

In revisiting the research team's initial reflections on the adoption of the SLF given at the start of this paper the conclusion is drawn. The SLF is a useful tool for considering how regulations affect the livelihoods of the poor in theory; its holistic focus on local realities, the emphasis on micro-macro linkages and PIPs provide principles and approaches pertinent to the issues which the research aims to understand and address. Feedback from research teams will be instructive as to whether or not the principles or approaches assisted in the detailed design and delivery of research activities and analysis.

'Urban and peri-urban forestry and greening in west and Central Asia' conducted byAkerlund (2006), is a programme aimed to build stakeholder capacity to improve poor people's access to natural resources through the application of sustainable livelihood approaches. The sub-programme is working in the following thematic areas: Sustainable livelihood approaches in the context of access to different natural resources and making rights real, livelihoods and access to natural resources in a rapidly changing world. This thematic study on 'urban and peri-urban forestry' focuses on the potentials and constraints for urban forestry development at regional and sub-regional levels considering the current experience and future prospects of urbanization in the region that is expected to take place in the next 15 years.

The study aims at identifying and analysing the problems inherent to the growing urbanization of the region and the social, economic and environmental role trees and forests can play in improving the urban livelihood and meeting future demands of the urban population for forest products and services. The study highlights the potentials and constraints for development of UPFG at regional and sub-regional levels taking into account the current experience in the region as also taking into account the nature of urbanisation that is expected to take place up to year 2020. Specifically the study

focused on the economic, social and cultural aspects of UPFG focusing on following issues: 1. the nature of urbanisation and the differences thereof between the countries/ sub-regions including differences in the nature of migration to the cities in the region and their impact on urban and peri-urban forestry; 2. long-term trends in urbanisation, including the nature of urbanisation as determined by the various driving forces and the implications for urban and peri-urban forestry in the region; 3. current level of efforts in urban and peri-urban forestry, indicating successes and failures, and the underlying easons; 4. Effectiveness of existing institutional arrangements for promoting urban and peri-urban forestry in the region and to what extent the differences are reflected in the overall performance of urban and peri-urban forestry.

This report is a desk study carried out during four months. No personal visits to the countries have been made. The report is completed by six city case studies on UPFG carried out within the framework of the FOWECA study. Overall the report is based on material available on the internet. All statistics on urban population are from UN Population Division's online World Urbanization Prospects: The 2003 Revision Population Database, which is the most recent comprehensive database on urbanization available. In this outlook study, data of the year 2000 and prospect for 2020 have been used.

Okunlola(2013) observed the 'Sustainable Environmental Management through Urban Public Park in Southwestern Nigeria'. He opined that parks development in urban areas can be an effective planning strategyto enhance environmental management, improvement, conservation and esthetic maintenance due to its roles in upgrading quality of life, economic wellbeing and fulfilling the social needs of urban-dwelling individuals. It provides a healthy environment by reducing air pollution, urban heats, noise and green space loss. Parks in urban areas enhance city aesthetics, acts as green lungs of the city,refresh the air and provide beneficial contact with nature as an upstream health promotion intervention for the population. Parks also create natural surroundings of urban area for leisure, relaxation, recreation, psychological and physical comfort of the people. In Nigeria, the realization of the important role of public parks, natural open spaces and well-designed green spaces has resulted in the launch of the 'City Beautification Concept' of most capital cities to provide an environment conducive for quality urban living, recreation, social interaction and community action for the pursuit of legitimate pleasures and

economic activities. This paper examines the effectiveness of public parks development in urban areasas a strategy for environmental improvement, conservation, and its potential in sustaining a pleasant, exciting, invigorating and comprehensive urban environment in the capital cities of Southwestern Nigeria.

The study suggests that the development of urban Public Park is an important mechanism for regenerating conserving, beautifying and managing the environment sustainably from the effect of climate change. It also encourages healthy recreational pursuits and communication amongst the residents. It helps to retain green open spaces in urban areas adding value to properties thereby increasing their market value and enhancing the economic revival of cities and creating positive publicity for business.

Little (1999) worked on Selling to eat: petty trade and traders in peri-urban areas of sub-Saharan Africa. In this paper, the author explores the social and economic aspects of petty trade and traders in two study sites, Banjul (The Gambia) and Maputo (Mozambique), of the 'Peri-Urban Economies in Africa' project. While traders often sell a multitude of items, they emphasis here is on the buying and selling of agricultural and food products, the most important trade able. The study describes that as an occupation, trading is the most important non-farm activity and an occupation that dominates most peri-urban economies of Africa as well. This paper shows that at the lower end of the income curve, peri-urban traders take a minimal existence, combining different livelihood strategies and faring worse than local agriculturalists. Involvement in trading has been their response to unfavorable access to land, employment, and other means of improving welfare. As urban areas grow and formal sector employment declines, the size and complexity of the unofficial trading sector increases. The study reveals that with the urbanization process, urban and peri-urban agriculture has evolved from a simple, traditional and also informal activity into a commercial and professional initiative. UPA has become a key element in food security strategies. It was officially recognized by the 15th FAO-COAG (Food and Agriculture Organization- Committee on Agriculture) session in Rome during January 1999 and subsequently at the World Food Summit in 2002.

The study states that urban and peri-urban agriculture is an industry located within (intra-urban) or on the fringe (peri- urban) of a town, a city or a metropolis, which

grows and raises, processes and distributes a diversity of agriculture products, using largely human, land and water resources, products and services found in and around that urban area. The phenomenon of urbanization brings severe challenges to ensuringhousehold food security in a context characterized by high rates of unemployment, increasing development of the informal sector, deteriorating infrastructure, overcrowding and environmental degradation. In addition, cities should respond to increasing globalization; managing the process of decentralization; and providing basic services to the burgeoning urban poor, whose contribution to the economy is not usually matched by their access to basic services. In most cases, urban residents in developing countries are increasingly exposed to the daily challenges, such as lack of safe water, inadequate sanitation and lack of environmental safeguards (air pollution, exposure to toxins and waste), and increased poverty and food insecurity.

The study examines that calling the worsening of the 'world food crisis' a serious threat to the realization of the right to food for all, the UN Human Rights Council adopted by consensus a resolution affirming the impotence of taking into account the right to adequatefood, as recognized in international law. Indeed, developing responses tomany of the challenges under the framework of the right to food would ensure that these responses would be better guided by the needs of the hungry and the malnourished. It would pave the way for targeting, but also for prioritization, coordination, accountability, and participation.

The above studies discussed in this section present the problems and prospects of different strategies of livelihood sources in the context of specific areas. In this regard the study on urban environment and sustainable livelihood would assist to understand the available natural resources in Khulna city and its contribution in sustainability of the livelihood of its population.

Chapter Three

Methodology of the Study

3.1 Method: The study has been conducted by using triangulationmethod. In the social sciences, triangulation refers to the combination of two or more theories, data sources, methods or investigators in one study of a single phenomenon to converge on a single construct, and can be employed in both quantitative and qualitative studies. In this study as identified by Shih, (1998) triangulation has been used to ensure the validation of the qualitative results by quantitative studies to confirm the appropriateness for measuring a concept, to overcome challenges related to single-method and single-theory biasness and thus can be applied to confirm the research results and conclusion.

Denzin (2006) and Patton (1999) identified four types of triangulation: (a) method triangulation (involves using more than one method to gather data), (b) investigator triangulation (involves multiple researchersin an investigation), (c) theory triangulation (involves using more than one theoretical scheme in the interpretation of the phenomenon), and (d) data source triangulation (involves time, space, and persons). The study has been followed three types of triangulation:

3.1.1 Theory Triangulation: Three theoretical perspectives viz. Basic need approach, Capability approach and Socio-ecological approach have been followed in the interpretation of the phenomenon of this study.

3.1.2 Methodological Triangulation: The study has been conducted mainly through survey, case study, observation and of focus group discussion.

3.1.2.1 Procedure and Sample Size Determination: The respondents were selected from the household heads residing at the study area for at least 10 years. Byusing Simple Random Sampling technique the respondents have been selected. To determine the exact sample a household survey was conducted upon the respondents. As the half of the population the sample size has determined as 707.

3.1.3 Data Triangulation:

3.1.3.1 Census: In this study the respondents have been selected from the vulnerable population residing for at least 10 years inpurposively selected five areas of Khulna city and monthly family income is not more than Tk.10000. To know the total number of household a Census has been conducted on October, 2013 which was counted to 1414 as the study population. In this context, to determine the sample size half of the households (707) were selected by Simple Random Sampling. After conducting Census, data were collected from March, 2014 to December 2015 from the selected study population.

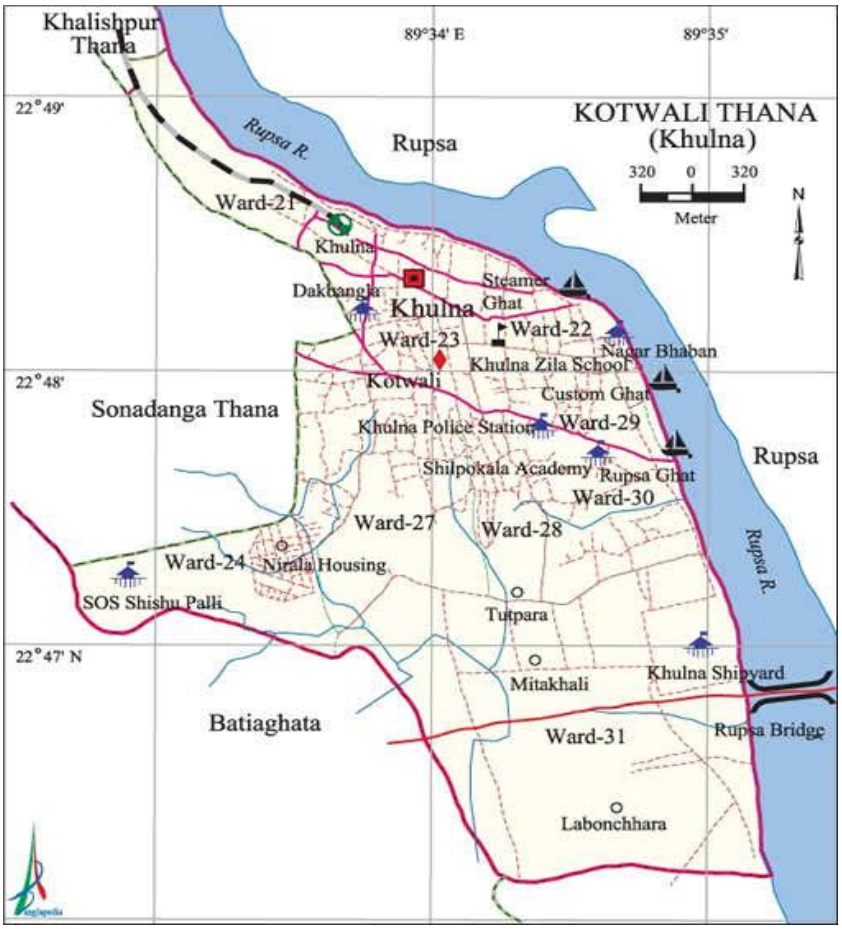
3.1.3.2 Study Area: The study has been carried out in urban areas of Khulna city in Bangladesh. And has conducted on purposivelyselected locations: i.Rupsha ii). Khalishpur iii). Tutpara iv). Nirala and v).Gollamari of Khulna city of Bangladesh.

Table 3.1 Location wise distribution of the respondents

Location	Sample	Population
Rupsha	352	704
Khalishpur	156	312
Tutpara	127	254
Nirala	44	88
Gollamari	28	56
Total	707	1414

The respondents especially in Rupsha and Khalishpurwere selected from slum areas. Thus 508 (71.85%) respondents were living in slum.

Figure 3.1 Map of the study location



Source: Banglapedia, 2017

3.1.3.3 Unit of Analysis: The unitof analysis of this study is the heads of the households of the selected categories (male, 564; female, 143) of city population who are residing at that locality for at least 10 years and household income is not more than Tk.10000. To know the sustainability of the vulnerable people the respondents were selected as having no permanent job and not skilled at work.

3.2 Sources of Data: Data have been collected from two sources: Primary source: that is field survey and Secondary source: publications related to the study, official documents, research documents etc. To analyse the access to and control over resources regarding sustainable livelihood, the study of Maxwell (1995), Parveen &Leonhaeuser (2004 have been used.The reference year selected for data collection was from March, 2014 to December, 2015.

To identify the poor vulnerable people the estimates of household income for the typical family is based on family income not more than 2$ per day (World Bank, 2013). During the field survey from March, 2014 to December, 2015 the conversion rate of US$ 1 was equivalent to almost Tk.77.63 (Bangladeshi currency). In this regard the households having not more than Tk.10000 monthly income was considered as study population. However they have no access to 2,100 kcals, or 8,400 kcals in total. Besides this informal settlement, regularity of wage earning, literacy situation, access to health and access to household goods have also been considered in this regard.

Interviews and focus group discussion were carried out to understand the means of livelihood. Especially to understand the role of agriculture in fulfilling basic need and the major social problems a one hour interview has been conducted based upon a questionnaire and focus group discussion. The questionnaire was asked during the focus group discussion based upon the documents and early observations and comments from cultivators, traders, and responses to the questionnaire. A seasonal calendar also developed in this regard.

3.3 Techniques of Data Collection: Data have been collected through an interview schedule containing both open ended and close ended items. The in-depth insight, case study has been conducted upon six sources of sustainable livelihood: trees, agriculture, small-scale business, water,waste-picking and open spaces.

3.3.1 To understand the role of urban environment in sustainable livelihood the SLI (Sustainable Livelihood Index) has been constructed. Maxwell'scumulative food security index (1995) and the cumulative empowerment index of Praveen& Leonhäuser (2004) have been used to explain the elements that constitutes a livelihood system over time.

3.3.2 The Cumulative Resource Index (CRI) has been calculated corresponding five types of resource: natural, financial, social, human and physical.

3.3.3 To understand the gender role in disaster management the Cumulative Empowerment Index (CEI) has been constructed including seven indicators viz. household resources, income security, food security, infrastructural facility, broader organizational support, knowledge about disaster and emergency response. Harvard

Analytical Framework (Candida *et al*., 2005) has also been followed to analyze gender role.

3.3.4 To measure vulnerability of the respondents the Cumulative Vulnerability Index (CVI) has been constructed considering seven indicators: (i) tenure security, (ii) income, (iii) food, (iv) regularity of wage earning, (v) literacy situation, (vi) access to health and (vii) access to household goods. Moreover Capacities and Vulnerability Analysis of Moser (1998) has also been followed.

3.3.5 Five points Likert Scale(1 for least important, 5 for most important) has been used to weigh the indicators following the method of Wyatt & Meyers (1987).

3.4 Data processing and Analyzing: For processing and analysis of data, besides using tools like, table, charts, diagrams, graphs, SPSS has been used. Collected data are processed by SPSS program and analyzed and interpreted by different statistical techniques like Regression analysis, t-test, F- test, Chi- square test, Pearson's 'R' and Fisher's exact test.

The Sustainable Livelihood Index (SLI) has been calculated to measure the role of urban environment.The SLI has been calculated by constructing Cumulative Vulnerability Index (CVI), Cumulative Empowerment Index (CEI), and Cumulative Resource Index (CRI).

3.4.1 Sustainable Livelihood Index (SLI): Maxwell (1995) followed this procedure to measure the extent of food insecurity by developing a cumulative food security index. Parveen & Leonhäuser (2004) also followed the same process to measure women empowerment by developing a cumulative empowerment index. In this study SLI is constructed based on the cumulative food security index of Maxwell (1995) and the cumulative empowerment index of Parveen& Leonhäuser (2004).

In this regard for constructing Sustainable Livelihood Index, seven indicators are used contained seven explained variables, viz. access to natural resources, security of financial resources, level of vulnerability, occupation, disaster situation, access to social resources and access to physical asset. Each indicator again has a number of sub-indicators. The quantitative part correspond to five categories e.g., 1 = very low and 5 = very high. Each indicator assigned a quantitative rank from 1 to 5 according

to the total scorefor acces to and control over resources based on the field survey. The qualitative dimension is formed to rank the key seven indicators from total scores assigned by the respondentsand from total scores assigned by the fifteen focus group participants where 7 represent'very important' and 1 represents 'less important'. The rank order is made based on total scores attaining from ranking of the individual indicator in focus group. Table no.3.2 represents the way of constructing the SLI: Measurement of Explained (Dependent) Variables. The SLI varies from 28 to 140 in which 28 denote the lowest level of sustainability and 140 denote the highest level of sustainability.

Table 3.2 Sustainable Livelihood Index

Indicators	**Quantitative rank**	**Qualitative Rank***	**SLI Range 28-140**
Natural resources	1 to 5	7	(1-5).7=7-35
Financial resources	1 to 5	6	(1-5).6=6-30
Situation of vulnerability	1 to 5	5	(1-5).5=5-25
Occupation	1 to 5	4	(1-5).4=4-20
Disaster situation	1 to 5	3	(1-5).3=3-15
Access of social resource	1 to 5	2	(1-5).2=2-10
Physical asset	1 to 5	1	(1-5).1=1-5

Source: Field survey, 2014-15

N.B* Qualitative Ranking has been made on the basis of total scores attained from ranking of the respondents such as 7=4942 score, 6=4247 score, 5=3537 score, 4=2820 score, 3= 2128 score, 2=1412 score, 1=710 score)

For better understandding about the level of sustainability attained by the respondents the SLI range is further divided into five categories and labeled as not at all (28-50), very low sustainability (51-72), low sustainability (73-94), medium sustainability (95-117) and sustainable enough (118-140)

3.4.2 Indicators

Seven indicators have been used to measure the access to resource which is discussed below:

3.4.2.1 Natural resource: It is measured in terms of 5 resources viz. (i) land, (ii) water, (iii) air and sunlight, (iv) tree and (v) open spaces (railway, riversides, garbage, and other free resources)

***3.4.2.2 Financial asset*:** Itis measured in terms of money considering :(i) family income(ii) no. of income earner, (iii) yearly family savings, (iv) regularity of wage earning and (v) access to interest free loan

***3.4.2.3Level of Vulnerability*:**Seven indicators related to maintenance of basic need are used to measure the level of vulnerability are: (i) tenure security, (ii) income security, (iii) food security, (iv) workless situation, (v) literacy situation (vi) access to health and (vii) access to household goods

3.4.2.4.Occupation*:* Five occupation has categorized in terms of nature (i) business (fisheries, grocery shop, kitchen market) (ii) agriculture (iii) industrial work (shrimp, wood, jute, ice), (iv) day labor (land and water related) and (v) other services especially van or rickshaw pulling

To measure the role of agriculture in sustainable livelihood CAI (Cumulative Agriculture Index) has also been used. In this context seven indicators are considered, which are:(i) income, (ii) food, (iii) health, (iv) education, (v) clothing, (iv)interpersonal relations and (vii) in fulfilling market demand. To assess the contribution each indicator is also categorized into five scales from not at all to very good contribution.

3.4.2.5 Situation of disaster*:*Reduction of disaster risk has been measured by access to and control over resources of seven basic need during disaster viz. (i) access to housing, (ii) income security, (iii) food security, (iv) infrastructural facilities, (v) broader organizational support, (vi) knowledge about disaster and (vii) emergency responses to disaster.

3.4.2.6 Social resource: Social resource is assessed considering 5 five types of social relations: (i) family relation, (i) relationship with outsider, (iii) involvement with politics, (iv) access to wider institution and (v) participation in community based organization

3.4.2.7 Physical asset: It is measured by five types of infrastructural facilities in the study area: (i) sanitation, (ii) access to educational institution, (iii) communication facilities, (iv) access to power supply and (v) recreational facility

Following Bangladesh Bureau of Statistics (2015) four types of house (*Pucca, Semi-pucca, Kutcha and Jhupri)*and*tong*have also been identified in the study area.

3.4.3 Regression Model: The multiple regression model of this study is:

$$SLI = \beta 0 + \beta_1 Nat + \beta_2 Fin + \beta_3 Vul + \beta_4 Occ + \beta_5 Dis + \beta_6 Soc + \beta_7 Phy + u$$

Where SLI = Sustainable Livelihood Index

Nat=Access to natural resources of the respondents

Fin= Access to financial resources of the respondents

Vul= Vulnerable situation of the respondents

Occ = Occupational status of the respondents

Dis= Access to and control over resources of the respondents during disaster

Soc= Access to social resource of the respondents

Phy= Access to physical asset of the respondents

β0 = Intercept term

β1, β2, β3, β4, β5, β6, β7 =Regression co- efficient

u = Stochastic disturbance term

Chapter Four

Background of the Study Locations and Population

4.1 Introduction: Globally, more people live in urban areas than in rural areas, with 54 per cent of the world's population residing in urban areas in 2014 (United Nations, 2014). Cities are lifelines of society and engines for economic growth. However, rapid urban growth poses many challenges to city authorities and if not well managed, cities can become generators of new vulnerabilities and hazards. Due to rapid urbanization, rural-urban migration, natural increases in population within urban areas the vast majority of the urban population are residing in slum and squatter settlements throughout the cities of Bangladesh.

Urban population is increasing mainly due to rural urban migration. Most of the migrants are rural poor who take shelter in slums, squatters, footpaths, rail stations andother scattered places (Farhana*et al*., 2012). Internal migration within Bangladesh also requires more attention, with many migrants facing challenges due to the lack of services, resources and employment opportunities. Those moving from a rural to urban setting require a different set of skills to find employment, while more capital is required for urban living costs. Most of these people with a large number are contribute to the informal sector, yet their role in economy and rights are overlooked by the formal sectors. Increased rural to urban migration has placed significant pressures on urban food and water resources (Ismail, 2016). Their suffering is manifold in cities; inhuman living and working conditions and forced and frequent eviction by the authorities are common phenomena. In Bangladeshi cities high-density, unauthorized living areas of makeshift materials without water supply, toilet facility, solid waste collection systems and electricity are commonplaces.

In Bangladesh people of coastal region are vulnerable to water related natural hazards as well as climate change impacts. Khulna, the third largest metropolitan city of Bangladesh, stands on the banks of the Rupshaand the Bhairab Rivers, located in the southwest of the country on the middle of the axis of Jessore - Mongla port, and is the second largest seaport of the country. The city covers an area of 45.65 square kilometers and has over a million inhabitants. Khulna is also an important river port city of Bangladesh. During the late 1950s and 1960s Khulna became an important

centre for industrial development (Murtaza, 2001). All these developments have a far reaching impact on the overall environment of Khulna city.

Like other cities of Bangladesh, in Khulna high-density, unauthorized living areas of makeshift materials, without water supply, toilet facility, solid waste collection systems and electricity are commonplace. As the Global Risks Perception Survey (World Economic Forum, 2015) highlights that three of the top10 risks in terms of impact over the next 10 years are environmental risks: water crises, at the top of the table, and failure of climate-change adaptation as well as biodiversity loss.

Climatic disasters adversely affect peoples' livelihood in Khulna and these disasters have increased the vulnerability of the local communities living in the area. However, people of this region are vulnerable to water related natural hazards as well as climate change impacts. The environmental condition within which a city dweller is living is of utmost importance. Thus the study servesas a background document on considering urban environmental aspects of Khulna city and socio-demographic status of its population.

4.2 SelectionoftheStudylocations: Due to understand the situation of livelihood of vulnerable people, the households of Rupsha slum area, Khalishpur kadomtala slum area, Tutpara, Nirala and Gollamari were selected as the study areas. In terms of free access to housing the areas have some in common. The Rupsha slum is developed on the Rupsha river bank whereas the khalishpur slum areas on railway, Gollamari and Tutpara areas are mostly by the side of Mour River. Nirala is on lake side and road side. There is almost no difference regarding their culture.

4.3 Socio-demographic Status of the Respondents: This section focuses on the analysis part comprising of socio-demographic status, environmental services and health of the studied vulnerable people in Khulna city. Primary data gathered through questionnaire survey have been processed, analyzed and presented in tabular form. To do this, some variables encompasses age, education, employment, income and expenditure and housing have been carefully selected which would reflect the real pictures of the living areas. Age structure of the respondents varies noticeably only between 25-39 and 40-54 age groups (Table 4.1), whereas5.9 percent are under the age of 25.

Table 4.1 Socio-economic and demographic status of the respondents

Tools	Percentage distribution of the respondents					
Age (in year) mean-42.19, mode-40, SD.14.16	10-24 (5.9)	25-39 (38.0)	40-54 (33.9)	55-69 (14.7)	70 and above (7.4)	Minimum-10 Maximum-90
Sex	Male (79.6)	Female (20.2)	Third Sex (0.1)			
Income (in BDT) Mean-4726.87	0-2000 (17.1)	2001-4000 (23.3)	4001-6000 (39.6)	6001-8000 (16.1)	8001-10000 (3.8)	
Religious status	Islam (91.4)	Sanatan (2.7)	Christianity (5.9)			
No. of dependent members	0-1 (16.1)	2 (28.1)	3 (27.7)	4 (15.8)	5 (6.6)	6 and above (5.5)
No. of family members	1-2 (17.4)	3-4 (54.9)	5-6 (24.8)	7 and above (3.0)		
Marital status	Polygamous (26.6)	Monogamous (55.7)	Divorced (3.0)	Separated (3.2)	Widowed (8.5)	Unmarried (3.0)
Types of family	Nuclear (77.1)	Extended (22.9)				
Educational status	Only can sign (19.1)	Class 1- 5 (38.8)	Class 6-9 (35.8)	SSC pass (5.2)	HSC pass and above (1.1)	
Working condition	Temporary (60.0)	Seasonal (31.4)	No work/ sometimes (8.6)			
Ownership of house	Rented (45.8)	Owner (46.0)	Gifted (2.5)	GO land (5.4)	joint ownership (0.3)	
Housing type	*Jhupri* (11.3)	*Kutcha* (51.9)	*Pucca* (1.7*)*	*Semi-pucca* (26.9)	*Tong* (7.4)	Other (0.8)
Income categories	Destitute (58.8)	Lower income (32.5)	Lower middle income (8.6)			
Law and order situation	Violated (37.9)	Deteriorated (37.6)	Good (24.5)			

Source: Field survey, 2014-15

More than 14 percent (14.7%)of respondents in the study area fall in the 55-69 years-old age group, with a gradual decrease after the age of 54. The above 69 age group constitutes 7.4 percent of the total respondents in the study area.Among the total respondents 79.6 percent of the household heads are male and 20.2 percent are female. Education of the respondents has been measured by level of education of the respondents. Among the respondents 19.1percent could only sign, 35.8 percent have

completed junior secondary level and more than 6 percent respondents have passed SSC (Secondary School Certificate).

It is observed that 46 percent respondents claimed for the ownership of the house but are situated on GO land but 5.4 percent respondents acknowledged that they are not the owner but the Government, whereas 45. 8 percent houses were rented. In the study area more than half of the houses are kutcha and only 1.7 percent are pucca houses.
Unlike education Khulna city is better regarding employment and income factors because of scale of economics. A good number of heavy as well as light industries such as jute factories, shrimp factories, saw mill, ship yard etc. are located in Khulna city which facilitate people to be employed. The present study shows that more than half of the respondents (60%) in the study area were found to be employed but not doing permanent job and 31.4 percent respondents were seasonal workers whereas 8.6 percent had no work at all. The average monthly household income per month in the study areas was 4726.87 BDT. During the field survey from March, 2014 to December, 2015 the conversion rate of US$ 1 was equivalent to almost 78 taka (Bangladeshi currency).The respondents were categorized into three classes. Among them majority (58.8%) are of destitute category (earn 0-5000 BDT), 32.5 percent are of lower and very poor and 8.6 percent are in lower middle income categories.

4.4 Major Challenges in the Study Area

4.4.1 Cities and Climate Change: In Bangladesh, southern coastal urban centers are frequently exposed to heavy monsoon rains and cyclones. Coastal areas of Bangladesh face with several natural disasters like cyclone, tidal, flood etc. In Khulna city migration from rural areas to cities is at least partially driven by the increasing prevalence of extreme weather, such as land degradation and desertification, making agriculture more difficult. In addition, there have man-made different disasters like arsenic, water logging and salinity in water & agricultural land. Most of the respondents (91.8%) of the study area were moved or migrated from nearby districts mostly from Barishal, Satkhira, Bagerhat, Faridpur and Jessore of Bangladesh.

In the study area almost 92 percent respondents are migrated from different areas of Bangladesh (Table 4.2).

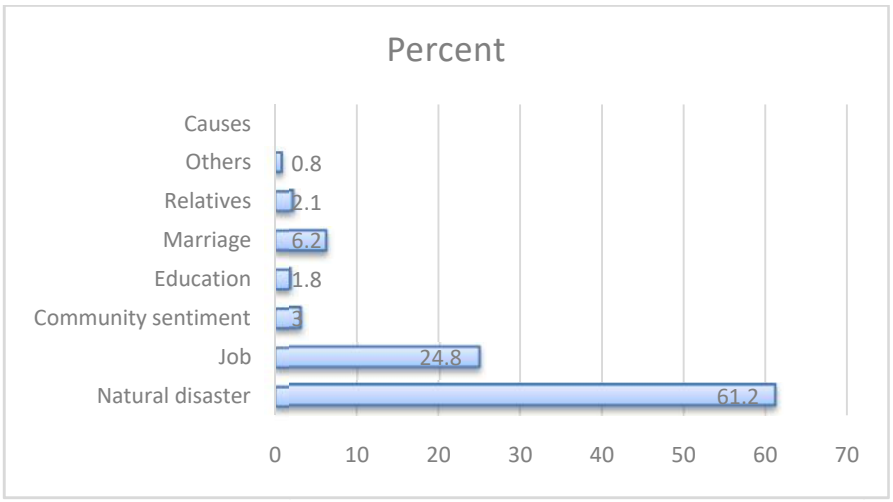
Table 4.2 The migrated people of the study area

Response	Number	Percent
Yes	649	91.8
No	58	8.2
Total	707	100.0

Source: Field survey, 2014-15

Chart 4.1 indicates that most (61.2%) of the respondents had to move to city's due to natural disaster. Among them river erosion is mentioned a mentionable factor, whereas almost 25 percent migrated in search of employment opportunities.

Chart 4.1 The causes for leaving the origin



Source: Field survey, 2014-15

4.4.2 The Infrastructural Challenge: The quality of a city's infrastructure and utility such as its housing, electricity, roads, airports, public transport, drinking water, sanitation, waste management, flood defenses, telecommunications, hospitals, schools and so forth largely determines its residents' quality of life, social inclusion and economic opportunities. Indeed, the availability and quality of infrastructure are at the core of many of the challenges faced by rapidly urbanizing cities in developing countries, which are developed further. A well-developed transport and communications infrastructure network is a prerequisite for the access to less-developed communities to core economic activities and services (World Economic Forum, 2015). The rapid pace of urbanization necessitates a greater infrastructure requirement than before. Between 2010 and 2030 world population will have increased by 2 billion, from 6.1 to 8.1 billion. Most of this will be in the developing

world, and virtually all of this will be in urban settlements. Responding these, urbanization pressures will require a majorincrease in infrastructurespending (Bhattacharya*et al*., 2012). The urban poor, living in inadequate over crowded shelters, suffer from diseases and injuries resulting from proximity to toxic and hazardous wastes; lack of clean water and sanitation; water, air and noise pollution (Sattertshwaite, 1997).They are particularly vulnerable to typhoid, diahorreal diseases, cholera and intestinal worms from contaminated water and food, as well as diseases associated with poor drainage and garbage collection (Sustainable Development Solution Network, 2013). The major environmental and health challenges in the study area are discussed below:

4.4.2.1Types of House: Bangladesh Bureau of Statistics (2015) identified four types of house (Pucca, Semi-pucca, Kutcha and Jhupri)**.** Jhupri has a ceiling of less than 4 feet high and is made of very cheap construction material like straw, bamboo, grass, leaves, polythene sheets, gunny bags etc. Khulna Statistical Metropolitan Area consists of Khulna City Corporation and its adjoining areas including municipality, cantonments and sub-urban areas. Tin-shed is a structure of normal height and its roof is made of corrugated/plain tin sheets but it does not have wall, made of bricks.

Table 4.3 Housing type in five selected areas in Khulna city

Housing type	**Percentage Distribution of the respondents**				
	Rupsha	**Khalishpur**	**Tutpara**	**Nirala**	**Gollamari**
Jhupri	17.0	5.8	6.3	6.8	-
Kutcha	43.5	44.2	63.8	93.2	82.1
Semi- pucca	25.6	40.4	25.2	-	17.9
Pucca	1.1	1.9	3.9	-	-
Tong	12.8	7.7	0.8	-	-
Total	100.00	100.00	100.00	100.00	100.00

Source: Field survey, 2014-15

In Rupsha slum area Jhupri type of house is 17.0 percent which are constructed from low cost housing materials like tin, bamboo, straw and polythene, while44.2 percent houses in Khalishpur slums are Kutcha, in Rupsha slum it is 43.5percent and approximately 12.8 percent are tong. In terms of construction materials, survey data consider that the housing situation in Rupsha and Nirala is more appalling than Tutpara and Khalishpur. Above 63 percent of houses in Tutpara are kutcha. These houses are slightly better than those of Jhupri, while about 25.2 percent houses are semi-pucca. Only 3.9 percent of the respondents are living in Pucca houses with

permanent walls. On the other hand, more than 93 percent houses in Nirala area are Kutcha, while approximately 7 percent houses are Jhupri and in Gollamari over 80 percent houses are Kutcha.

The houses (46.1%) are not so old that was built for not more than 10 years whereas pucca houses are built for more than 40 years (Table 4.4). In the study area 92.5 percent of the respondents dwell in a single room, only 4.7 percent household's heads live in house with more than one room but 2.8 percent don't have any room at all. Regarding room space, it is found that 52.5 percent houses are 11-12 square feet and only 3.4 percent are more than 15 feet with no kitchen and bathroom inside the house.

Table 4.4 Housing condition in the study area

Tools	Percentage distribution of the respondents					
Year of/No. of years to build the house	0-10 (46.1)	11-20 (28.9)	21-30 (17.0)	31-40 (6.4)	41 and above (1.7)	Mean-14.63, Max:100
No. of Rooms in the House	0 (2.8)	1 (92.5)	2 (4.7)			
Area of Room (Square feet) Mean: 11.97	9-10 (21.6)	11-12 (52.5)	13-14 (22.5)	15 and above (3.4)		
Waterlogged Area of House	Waterlogged during rainy season (56.0)	Waterlogged due to river flow (19.4)	Always flooded (18.1)	Flood free (6.5)		
Source of Fuel	Wood/ wood related (75.4)	Electricity (1.1)	Cow dung (14.4)	Leaves (9.1)		

Source: Field survey, 2014-15

In Khulna city urban flooding and waterlogging, caused by heavy rainfall, as a primary hazard which is informed by 56.0 percent respondents. In 19.4 percent cases tidal surge is the cause of waterlogging whereas,18.1 percent household always remain inundated. The respondents of the study area reported that it takes several days for the water to drain and during this time those who rely on 'occasional' work such as street vendors, rickshaw drivers, and day laborers lose their income. This stagnant water causes severe problems including restricted movement for the collection of clean drinking water, contamination of water leading to waterborne diseases and problems in sending children to school through the flood waters. To the source of fuel,75.4 percent of the respondents use wood stick and wood powder whereas, 14.4 percent households use cow dung but 9.1 percent

household use leaves as source of fuel. No household in the study area has a separate kitchen. Table 4.5 presents that more than 38 percent of the respondents have reported that they use single stove (chula) inside their house and in most cases, this is the cause of fire accident.

Table 4.5 Place of Kitchen, Bathroom and Toilet

Place	Number and percentage distribution of the respondents					
	Kitchen (Single Chula)		Bathroom		Toilet	
	No.	Percent	No.	Percent	No.	Percent
Inside	269	38.1	0	0.0	25	3.5
Outside	438	61.9	707	100.0	682	96.5
Total	707	100.0	707	100.0	707	100.0

Source: Field survey, 2014-15

There are specific government organizations (GOs) and NGOs in Khulna City that implemented and still now implementing some sanitation status improvement projects in the slum areas since 1985.WASA has also been established in Khulna City in 2008 for providing water and sanitation services in Khulna City (Roy, 2014).

4.4.2.2 Potable water: Shallow tube-wells provide most drinking water in Khulna. Those interviewed noted that this was sufficient before 10-15 years but now the water is saline and is no longer potable. In addition the water table has dropped by approximately 100-300 feet during the last 14 years and therefore in the dry season the wells are dry.

Table 4.6 Common sources of water in the study area

Water sources	Percentage distribution of the respondents				
	Rupsha	**Khalishpur**	**Tutpara**	**Nirala**	**Gollamari**
Natural source	8.8	1.2	18.9	-	17.9
Private	-	0.6	24.4	-	3.6
Tube-well	61.9	92.9	56.7	-	78.6
Deep Tube- well	29.3	5.8	-	100.0	-
Deep Tube- well with piped water	-	-	-	-	-
Total	100.00	100.00	100.00	100.00	100.00

Source: Field survey, 2014-15

The respondents in the study area reported that in these months the poorest people have no choice but to drink unsafe saline water. In Khalishpur slum area,92.9 percent of households depend on the community tube- well, which is installed by the NGO. About 24 percent in Tutpara rely on man-made house which is not fully covered; while there was no household of access to deep tube-well with piped water.

4.4.2.3 Sanitation: Khulna is one of the fast growing commercial cities in Bangladesh with a population of 1.9 million which produce about 450 ton of municipal solid wastes per day. Khulna City Corporation and community based NGOs are taking care of only 42% of the total waste generated while the rest of them are unattended. In fact, most of the wastes are collected from door-to-door without any sorting and either dumped in open space or improperly landfilled which is likely to contaminate the air and ground water (Ahsan *et. al*., 2009). It also creates other severe problems in the peri-urban areas.

4.4.2.4. Waste Disposal and Drainage: Solid waste disposal facilities indicate an appalling condition as 65.2 percent of respondents, respectively admitted that they had thrown waste into open places,28.7 percent disposed in drain. Lack of consciousness, absence of trash bins in the slums and the long distances to municipal bins are considered to be the prime causes of this poorest situation. Residents in few slums claim that they have to pay a little monthly charge for household garbage to be collected by NGOs. More than ninety four (94.3%) percentof the respondents informed that they do not have any waste disposal system (Table 4.7).

Table 4.7 Solid and liquid waste disposal system in the study area

Place and quality of waste disposal	**Percentage distribution of the respondents regarding waste disposal system**					
Disposal system	Regular (5.7)	No system (94.3)	-	-	-	-
Quality of solid waste disposal system	House (6.1)	Drain (28.7)	Open space (65.2)			
Liquid waste storage place	Pour into latrine (1.1)	Open ground (18.8)	Drain (61.4)	Pond (11.3)	Canal(4.5)	River(2.8)
Quality of sewerage system	Good (1.0)	Medium (34.4)	Low (50.5)	No system(14.1)		

Source: Field survey- 2014-15

About 6.1 percent households use municipal house for solid waste disposal and 61.4 percent respondents had thrown liquid waste into stagnant drain in the study area, whereas only 1.1 percent respondents have the system with latrine. Due to the dumping of waste into drains, lack of maintenance and irregular or no cleaning, drains have become breeding grounds for mosquitoes. Dumping waste in drains also disrupts the normal flow causing flooding and overflowing during rainy season, inundating

roads and low lying areas causing havoc and environmental hazards for city dwellers. The bad smell from drains is also a major problem as claimed by slum people.

Although the differences in ranking their priority in urban services surfaces, the data demonstrate that sanitation still remains as a major environmental concern. The overall sanitation condition in the study area shows a gloomy picture as demonstrated by data presented in the Table 4.8.

Table 4.8 Sanitation facilities in the study area

Sanitation	Percentage distribution of the respondents				
	Rupsha	**Khalishpur**	**Tutpara**	**Nirala**	**Gollamari**
Dirty surroundings	17.0	5.8	6.3	6.8	-
No drainage facility	43.5	44.2	63.8	93.2	82.1
Not sufficient air and water quality	25.6	40.4	25.2	-	17.9
Sanitary toilet and sufficient water and air quality	1.1	1.9	3.9	-	-
Improved drainage, toilet and clean surroundings	12.8	7.7	0.8	-	-
Total	100.00	100.00	100.00	100.00	100.00

Source: Field survey, 2014-15

About 12.8 percent of slum households in Rupsha have improved drainage, toilet and clean surroundings, while 7.7 percent of the households in Khalishpur slum have access to sanitary latrine, rely on the community toilets which were found to be very untidy and mal-o'dorous and for which they often had to wait in queue in the morning times. Sanitation in five areas demonstrates a varied picture, with 43.5 percent have no drainage facility in Rupsha slum and 44.2 percent in Khalishpur slum and in Nirala slum it is 93.2 percent. Of the three, one community toilet had separate entrances and facilities for women and men in Khalishpur slum, while the others had no separation. No community toilets were found to be connected to the water supply which made personal hygiene and toilet-cleaning difficult or impossible.

4.5 Health Access in the City: According to the Constitution of the People's Republic of Bangladesh, Government of Bangladesh is responsible for securing healthcare to its citizens. The Government of Bangladesh (GOB) has made remarkable progress in recent decades to improve the health status of its people. The infant and under-five mortality rates and maternal mortality ratio have decreased, the population growth rate has declined, and life expectancy at birth has increased. To sustain these achievements and address challenges like high levels of neonatal

mortality, emerging and re-emerging communicable diseases and a rising trend in non-communicable diseases, the Government is guided by the Health, Population and Nutrition Sector Development Programme (HPNSDP), 2011–2016 (World Health Organization, 2014*).*

Table 4.9 Medical facilities in the study area

Tools	Percentage distribution of the respondents			
Distance from Source of Medical Facility (in k.m.)	1 (40.0)	2 (16.1)	3 (3.7)	4 (40.2)
Child Birth with Attendants	No Attendant (13.2)	Traditional Attendant (65.6)	Urban Primary Health Care centre (17.1)	High Professional Doctor (4.1)
Number of still births in last 12 years	0 (57.0)	1(35.4)	2 (7.6)	
No. of underweight babies	1 (45.8)	2 (36.5)	3 (15.4)	4 (2.3)
Diseases prevention System for household members	Yes (1.0)	No (99.0)		
Fast Aid Facility for household members	Yes (2.7)	No (97.3)		

Source: Field survey, 2014-15

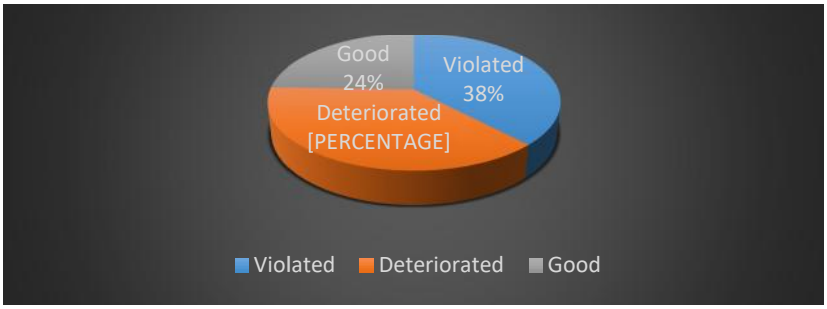
Regarding distance from source of medical facility, the situation is mostly satisfied. During child birth the respondents are supported by the traditional attendants but in 17.1 percent cases the urban primary health care centres contribute in this regard. More than 35 percent respondents were experienced with one still birth in last 12 yearsand 36.5 percent respondents having 2 underweight babies.

4.6 Social Stability: Many of the risks described above can lead to social instability.It is the rapid and unplanned nature of urbanization, rather than urbanization itself, that is linked by many researchers to such risks as urban violence and social unrest (Muggah, 2012). Rapid urbanization and the related growing demand for housing are creating pressure on the housing market and social tensions are expected to increase in the study area. The combination of inequality, competition over scarce resources such as land, impunity from the law and weak city governance increased the risk of violence and potential breakdowns in law and order.Due to diverse socio-cultural factors and many other reasons during the one and half decades the scenario of social environment in Khulna city is markedly deteriorating. Prevailing common social

crimes in the city are hijacking, vandalism, looting, stealing, toll extortion and trafficking of child and woman (Murtaza, 2001).

In the study area the law and order situation has been violated which is informed by 38 percent respondents and 38 percent respondents also reported that the situation is deteriorated. Whereas 24percent respondent opined that the law and order situation is good in their locality (Chart 4.2).

Chart 4.2 Law and order situation in the locality



Source: Field survey, 2014-15

Urbanization creates opportunities but also exacerbates risks and the speed at which it is happening challenges the capacity to plan and adapt. This is particularly true in developing economies. For rapid urbanization to provide opportunities to all, carefully considered urban planning and good governance with effective regulatory frameworks are required. Inadequate planning and ineffective governance can bring significant economic, social and environmental costs, threatening the sustainability of urban development. In developing countries lack of preparedness of governments to provide appropriate infrastructure and public services is at the core of many urban challenges, which range from the unplanned urbanization to incapacity of containing infectious disease to the challenges of building climate resilient cities. At the same time, these challenges have worsened due to the rapid and chaotic development of cities. City leaders from government, civil society and the private sector are ideally positioned to plan rapid urbanization and must act to Khulna in metropolitan growth. Result of the household surveys conducted in five areas of Khulna city shows that the communities are almost homogenous by socio-economic condition, housing status and environmental health standards. Some dissimilarities are also visible across water sources and housing quality. These similarities and variations in the profile of the

residents in the communities might have had an influence on environmental health. Although it is very difficult to make any inference on the cause of health problem of the dwellers based on a small number of socio-economic, physical and environmental variables, the inevitable consequence of poor housing environment along with inadequate urban service and its environmental impact on health have been taken for granted. However, low level of income, inadequate sanitation services, substandard housing and the crammed environment in the area studied might have impacted on the environment that led to higher morbidity among the respondents especially the slum dwellers.

Chapter Five

Assessment of Vulnerability and Sustainable Livelihood of the Urban Poor

5.1 Introduction: Vulnerability has been defined as the insecurity of the wellbeing of individuals or communities in the face of changing environments (ecological, social, economic, and political) in the form of sudden shock, long terms trends, or seasonal cycles (Moser, 1996). It is generally accepted that vulnerability has two dimensions. Firstly, the scale of the response to external shocks and secondly how quickly each household's system of livelihood tactics recovers from shocks (Chambers, 1995; Moser, 1998). The analysis of vulnerability, therefore, involves not only identification of the possible threats to the household's welfare but also requires an assessment of the resilience of households in exploiting opportunities, resisting or recovering from negative effects. The main means of resilience are assets which act as a buffer against vulnerability (Moser, 1998; Carney, 1998). Vulnerability is therefore closely linked to access to and control over assets. In an urban setting poor men and women are likely to be vulnerable to certain specific shocks and crises.Thus poverty situation of the respondents is considered to measure the vulnerable situation in this study.

The main causes of urban vulnerabilities vary from city to city. However, certain elements appear common to many urban poor residents. These are: the informal legal status of poor men and women in cities; poor living environments; and a dependence on the cash economy for basic goods and services. In the study area major sources of vulnerability were categorized as economic, environmental, human, social, physical and political. Specific vulnerabilities included (amongst others): tenure insecurity, insecurity of food, worklessness, waterlogging, seasonal work and police violence.

The forms of vulnerability can alter in response to new policy approaches and changing conditions. For example the insecurity of informal residents with no legal tenure is capricious. In this section of the study, urban livelihood has been assessed for its sustainability. Consequently, the role of urban environment in economic, social, political and institutional sustainability are discussed based on livelihood activities in reducing poverty among the poor and vulnerable especially in slum areas of Khulna

city. The respondents were carefully selected who have any one of five natural resource-based livelihood activities and later trading to add to their livelihood portfolios. In this context the sustainability denotes the role of land, water, tree, atmosphere, open space, agriculture and other infrastructural facility to meet the basic needs and reduce vulnerability of the respondents.

5.2 Assessment of Vulnerability: Vulnerability assessment requires a framework thatselects criteria and indicators to characterize the vulnerability of the coupled human-environment system. Indicator and framework for vulnerability assessment seeksto inform stakeholders of a place-base specific reaction in response to climate change impacts (Nkem *et al*., 2007). Many studies attempt to do this in the context of humandevelopment index to understand the underlying causes of vulnerability and to further strengthen adaptive capacities (World Bank, 2006). In some quantitative approaches, theindicators such as national economic capacity, human resources, and environmental capacities have been used. However, some other studies include indicators that can provide information related to the conditions, processes and structures that promote or constrain adaptive capacity (Eriksen *et al*., 2005). Vulnerability assessment offers a framework for policy measures that focus on social aspects, including poverty reduction, diversification of livelihoods, protection of common property resources and strengthening of collective action (O'Brien et *al*., 2003). Such measures enhance the abilityto respond to stress and securelivelihoods under present conditions. For example, Maxwell (1995), in the paperentitled 'Measuring food insecurity: The frequency and severity of coping strategies' defining and interpreting food security, and measuring it in reliable, valid and cost-effective ways have proven to be stubborn problems facing researchers and programs intended to monitor food security risks. It describes a particular method for distinguishing and measuring short-term food insecurity at the household level, and discusses ways of generalizing the method. An understanding of the existing local knowledge base of indigenous adaptation strategies within a community as part of the evaluation of adaptive capacityis also required to assess the vulnerability. Stakeholder interests play important roles in vulnerability assessment. Urban poor pursue their livelihood's objectives within political, social, economic and environmental contexts which make them vulnerable to poverty (Department for International Development, 1999).

As reveals in this study the major influencing factors of urban poor livelihoods include urbanization, economic trend and trend in climate change. These trends

however reinforce one another. In this regard considering the major causes of vulnerability of the respondents, seven indicators viz. tenure security, security of income, food, regularity of work, health, literacy situation and access to household asset are used to measure the vulnerable situation of the urban poor.

5.3 Poor and Vulnerable people of the Study Area: An analysis of vulnerability offers scope for addressing the one-dimensional understanding of poverty resulting from the use of poverty lines (Moser & Holland, 1997). Poverty, nowa days becomes a complex and multidimensional problem, since it is measured from not only income level, but also vulnerability and insecurity, in which poor people are more socially, economically and environmentally vulnerable (Kulindwa *et al*., 2008). According to Sanderson (2000), there is large number of poor people in the city who live in the damaged land, it is vulnerable to flood and landslide, as well as in the crowded area that is vulnerable to fire and natural disaster. Vulnerability of poor people, in a social-ecological system is blipped by the impact of climate change, rapidness of people growth and economy growth enhancement (Adger, 2006). Therefore, in this study poverty situation of the respondents has been identified to assess their vulnerable situation.

Fundamentally, poverty is the inability of getting choices and opportunities, a violation of human dignity. It means lack of basic capacity to participate effectively in society. It means not having enough to feed and clothe a family, not having a school or clinic to go to, not having the land on which to grow one's food or a job to earn one's living, not having access to credit. It represents susceptibility to violence, and it often implies living in marginal or fragile environments, without access to clean water or sanitation.

Absolute poverty is a condition characterized by severe deprivation of basic human needs,including food, safe drinking water, sanitation facilities, health, shelter, education and information. The cost of basic needs approach is most commonly used to measure poverty. In this regard on the basis of income and food intake, the poverty situation of the respondents has been measured in this study. Moreover, the clothing and housing situation are also considered here.

To measure the poverty situation standard analysis of urban poverty has been followed in this study with especial consideration of income and food. It involves the

use of poverty lines based on income or estimates of extreme poverty. It is measured by the proportion of people living on less than USD 1.25 per day (World Bank, 2013) and moderate poverty as less than $2. As the conversion rate of US$ 1 was equivalent to almost 77.63 BDT during field survey the household earning 6000 BDT per month has been considered as absolutely poor (living on less than USD 1.25 per day) and 10000 BDT monthly earning household has been considered as moderately poor (living on less than $2per day) in this study. Regarding intake of food the study estimates the cost of acquiring enough food for adequate nutrition usually 2,100 kilo calories per person per day where the average calorie per person is estimated at nearly 1452 kilo calories.

The key components of the diet selected by the cost of the diet software are papaya, a green leafy vegetable called creepers and coconut meat. Cheese has been identified by the software as an expensive source of protein, fat, vitamin A, vitamin B2, niacin, vitamin B12 (providing a 100% of the requirement for this nutrient) and calcium. Green leafy vegetables have been identified as inexpensive sources of vitamin A, soluble B group vitamins, folic acid and iron. Recommended intakes for vitamin C and being provided primarily by Solanum lycopersicum (tomato, similar to grapefruit) and ripe papaya.

Table 5.1 indicates that the annual cost of the diet for the typical family is estimated to be 39,720 (BDT). The minimum cost of a diet that meets only a household's energy need has been estimated at between 98–122 BDT per day, depending on the season and features found in the markets in the study areas of Khulna city**.**

Table 5.1 The cost of diet for family members by season

Age Group	Season 1 Winter season	Season 2 Rainy season	Season 3 Summer season	Annual Cost (BDT)
12-23 month-old	9	11	11	3720
Rest of Family	89	111	100	36000
Overall	98	122	111	39720

Source: Field survey, 2014-15

Considering purchasing power parity the household earning, 6,000 BDT per month has considered as below poverty line 1 and the respondents of monthly earning not more than 10,000 BDT has been considered as moderately poor. In this context, poverty lines of the respondents were categorised on the basis of food, as given in

Table 5.2.In the study area the respondents who receive less than 2100 kilocalorie were 98.0 percent. Poverty situation then adds the cost of other essentials such as clothing and shelter. Among the respondents 39.9 percent respondents reported that they have two cloths for normal weather and more than 81 percent respondents were without pair of shoes. More than half of the respondents were resided at rent free houses but they have to give one type of rent to the local leaders. In 22.9 percent cases, the respondents have to provide 401-800 taka as rent of the house.

Table 5.2 Level of poverty of the respondents

Tools	Percentage distribution of the respondents regarding poverty situation				
Poverty level	Under poverty line- 1 (69.3)	Under poverty line- 2 (30.7)	-	-	-
Calorie intake (Mean-1451.63)	Intake less than 2100 Kilo Calorie (98.0)	Intake more than 2100 Kilo Calorie (2.0)	-		-
Minimum two cloths in normal season	Yes (39.9)	No (60.1)	-	-	-
Minimum two winter cloths	Yes (49.2)	No (50.8)	-	-	-
Having a pair of shoes	Yes (18.7)	No (81.3)	-	-	-
Rent of house (in BDT)	0 (54.3)	Less than 401(1.7)	401-800 (22.9)	801-1200 (16.7)	1201 and above (4.4)

Source: Field survey, 2014-15

5.4 Major Vulnerabilities of the Respondents: In the study area eviction threat, insecurity of income, worklessness, insecurity of food, lack of medical facilities, low literacy situation and low access to household good are the major causes of vulnerability. Evictions threaten the livelihoods of many urban residents (Audefroy, 1994), and can have wider ranging livelihood impacts than just the loss of housing. Evicted households may also lose access to key markets or livelihood resources as they are moved to other locations, and the disruption of whole communities poses significant threats to social networks and capital. However, in some cities, while official policies often declare slum and squatter settlements to be illegal and potentially subject to eviction without warning. In selected areas governments have given implicit recognition to such communities by providing them with basic services and limited infrastructure (Douglass, 2000).The urban poor are commonly concentrated at high densities in areas of low rent. These low rents reflect the poverty of the environments and the consequent low demand for such locations (Elliott, 2006).

Another factor which has affected vulnerability in many cities has been structural adjustment policies. These have increased the vulnerability of many poor urban households, through the loss of secure public sector employment, removal of state subsidies on basic goods and services and the effect of free market policies on prices and employment. Vulnerability relating to poor environments may also be diminished as a result of housing upgrading, environmental projects or community efforts dealing with issues such as sanitation. Positive policy approaches by local authorities can diminish the vulnerability of the poor by responding to their need for security.

5.4.1 Causes of Vulnerability: The study highlighted various points of importance to understand vulnerability in the context of sustainable livelihood. The major causes identified by the respondents in the study settlements, is presented in the Table 5.3.To assess the vulnerability of the respondents seven indicators are used.

Table 5.3Causes of vulnerability of the respondents

Indicators of Vulnerability	**Percentage distribution of the respondents by the causes of vulnerability with its level**				
	1	2	3	4	5
Tenure insecurity (eviction threat)	Threated at present (32.2)	Threated for more than three times (19.2)	Threated for more than two times (28.7)	Threated once (10.7)	No threat (9.1)
Income security (BDT)	0-2000 (8.3)	2001-4000 (21.6)	4001-6000 (39.3)	6001-8000 (20.7)	8001-10000 (10.0)
Food Security	Frequently hungry in whole day (14.7)	Having meal for one time in a day (38.3)	Having meal for two times in a day (36.5)	Having meal for three times in a day (8.5)	Having meal for three times with extra food in a day (2.0)
Jobless week	37-48 (13.0)	25-36 (28.7)	13-24 (33.2)	1-12 (16.4)	Never for a weak (8.6)
Literacy situation	No formal schooling (20.7)	Completion of primary education (38.3)	Completion of class eight (34.1)	SSC pass (5.1)	HSC pass (1.8)
Access to health	Never go to doctor (12.4)	Natural ingredients (24.6)	Quack (37.3)	Paramedic (17.0)	Registered doctor (8.6)
Access to household goods	Highly dissatisfied (60.4)	Dissatisfied (15.7)	Moderately satisfied (19.4)	Satisfied (3.3)	Highly satisfied (1.3

Source: Author's compilation on the basis of field survey, 2014-2015

Among the respondents 32.2 percent were always under eviction threat, 19.2 percent were threated for more than three times and only 9.1 percent respondents had never been threated. From the Table 5.2 it is observed that more than two-third of the

respondents were under the poverty line1 that is family earning is not more than 6000 BDT and nearly one- third of the respondent's family earning is 6001-10000 BDT. The Table 5.3 shows that nearly 90 percent respondents experienced food shortage for a day with 14.7 percent considering themselves severely food insecurity, 36.5 percent respondents had the access to food for two times in a day and 8.5 percent respondents could have the meal for three times in a day. In this regard male headed households were much better than female headed households. From the Focus Group Discussions, it is observed that male polygamy adversely affects to increase vulnerability.In the study area housing, basic infrastructure and other needs, such as food and clothing, are less accessible and many migrants experience the burdens as well as the rewards of the city life.

Those in informal employment generally lack labour rights. They are therefore susceptible to sudden unemployment and the dangers accruing to unprotected working conditions (long hours, poor pay, insanitary or unsafe conditions) (Potter&Lloyd, 2016). The study supports that 13.0 respondents were jobless more or less or all the year round. Whereas, one-fourth of the respondents were jobless for less than three months in previous year before the surveyed year.The baseline data showed that about 21 percent of household heads did not go to school. Although 38.3percent had completed study to primary level, 34.1 percent had completed junior secondary school (up to grade eight). Only 5.1percent had completed secondary school (grades 9-10) and 1.8 percent achieved Higher Secondary School Certificate. Health situation is not much vulnerable in the study area. Government effective initiative and the urban primary health care centers contribute in improving the health status of urban vulnerable people. Whereas 12.4 percent respondents never used to go to doctor but 8.6 percent respondents could receive medical facility from registered doctor. The southwest coastal region is extremely vulnerable to natural and climate change-related disaster. People in this area are vulnerable to cyclones, tidal surges, river erosion and salinized water and soil. Extremely poor people tend to suffer disproportionately because they tend to live in more exposed places and depend on natural and common property resources for survival. Among the respondents 60.4 percent were highly dissatisfied with no household goods at all, whereasnearly 5 percent were satisfied with necessary household goods.

5.4.2 Common Diseases of the Respondents: Dense urban living facilitates cause the spread of infectious diseases. Particular vulnerabilities exist in countries where rapid urbanization results in informal settlements that make it difficult to control transmission and can therefore increase the risks of mosquito-transmitted epidemics, such as malaria, tuberculosis, dengue and yellow fever.Almost 700 million urban dwellers currently lack adequate sanitation (Hawkins *et al*., 2013). Such conditions create increased risks of illnesses, worm infections, cholera and diarrhoea – a leading cause of preventable death in children – and help to spread emerging infectious diseases, such as Severe Acute Respiratory Syndrome (SARS) and H1N1influenza (Alirol *et al*., 2011).

According to the Demographic and Health survey (DHS) in 2011forty two percent of ever-married women age 15-49 are anaemic. Moderate anaemia is most prevalent among children 9-11 months (48 percent). Across divisions, the level of anaemiais moderate in Khulna, 19% of women were classified as anaemic (National Institute of Population Research and Training, 2013).

Table 5.4 Common diseases affected by the respondents (Multi- response)

Diseases	**Percentage distribution of the respondents**							
	No one		Under 5 years children		Person aged more than 5 years		Both	
Malaria	325	46.0	99	14.0	275	38.9	8	1.1
Pneumonia	431	61.0	121	17.1	148	20.9	7	1.0
Acute Respiratory Infection	331	46.8	55	7.8	313	44.3	8	1.1
Diarrhoea	171	24.2	37	25.2	417	59.0	82	11.6
Anaemia	312	44.1	71	30.0	316	44.7	8	1.1
Skin disease	248	35.1	84	11.9	362	51.2	13	1.8
Urinary tract infection	328	46.4	45	6.4	329	46.5	5	.7
Worms	227	32.1	95	13.4	353	49.9	32	4.5
Minor surgery	464	65.6	21	3.0	210	29.7	12	1.7

Source: Field survey, 2014-15

The overall health status of the study area is reflected in the common diseases they suffered at the time of field survey i.e. from March, 2014 to December, 2015 (Table 5.4). The most common ailments afflicting children in the study area are malaria, pneumonia, diarrhoea, skin disease and worms. The survey results confirm a higher

number of diseases among under 5 years' children than the adults. Among 707 respondents, 46.0 percent are reported to never suffering from malaria. More than 11percent of the under 5 years' children had skin disease followed by anaemia problems (30.0%), diarrhoea (25.2%), pneumonia (17.1%) and worms (13.4%). Adult are suffering more from Acute Respiratory Infection (44.3%), urinary tract infection (46.5%) and anaemia problems (44.7%).

5.4.3 Dependence on the Cash Economy: Free goods and services, such as common land, clean water and fuel, are rare in cities. Most of the basic living needs of urban residents must be paid for in cash - making the urban poor particularly vulnerable to market vagaries such as inflation, and the removal of government's subsidies (Moser, 1998). In the study area dependence on the cash economy frequently means that poor households are vulnerable (56%) to debt (especially where they cannot rely on informal on social networks for loans). The Table 5.5 indicates that 23.6 percent respondents had received loan with 10 percent interest and 15 percent respondents received loan with 15% interest rate. Borrowing, normally at usurer rates, may lead to long-term indebtedness with disastrous results such as bonded child labour.

Table 5.5 Condition of debtness of the respondents

Condition of Deftness	Number and percentage distribution of the respondents	
	No.	Percent
Receiving loan from more than one source	123	17.4
Receiving loan with 15 % interest rate	106	15.0
Receiving loan with 10% interest rate	167	23.6
Receiving interest free loan from relatives	261	36.9
No loan at all	50	7.1
Total	707	100.0

Source: Field survey, 2014-15

5.5 Result of Multiple Linear Regression Analysis

5.5.1 Cumulative Vulnerability Index (CVI): In this study to measure the vulnerability of the respondents the Cumulative Vulnerability Index (CVI) has been constructed following the cumulative food security index of Maxwell (1995) and the cumulative empowerment index of Parveen &Leonhäuser (2004). The quantitative part correspond to five categories e.g., 1 = very low and 5 = very high. Each indicator assigned a quantitative rank from 1 to 5 according to the totalscore for access to and

control over resources based on the field survey. The qualitative dimension is formed to rank the key seven indicators from total scores assigned by the respondents. Table 5.6 represents the way of constructing the CVI: Measurement of Explained (Dependent) Variables. The measurement of vulnerability contained seven explained variables, viz. tenure security, income, food, no. of workless week, literacy situation, access to health and access to household asset. Each indicator is analyses by five points scale.

The CVI varies from 30 to 114 in which 30 denote the highest level of vulnerability and 114 denote thelowest level of vulnerability.The CVI range is further divided into five categories and labeled as very high vulnerability (30-46), high vulnerability (47-63) moderate vulnerability (64-80), low vulnerability (81-97) and very low vulnerability (98-114) for better understandingabout the level of vulnerability attained by the respondents.

Table 5.6 Indicators of vulnerability

Indicators	**Quantitative rank**	**Qualitative Rank**	CVI **Range 30- 114**
Tenure security	1 to 5	7	(1-5).7=7-35
Income security	1 to 5	6	(1-5).6=6-30
Food security	1 to 5	5	(1-5).5=5-25
Workless situation	1 to 5	4	(1-5).4=4-20
Literacy situation	1 to 5	3	(1-5).3=3-15
Access to health	1 to 5	2	(1-5).2=2-10
Access to household goods	1 to 5	1	(1-5).1=1-5

Source: Author's compilation

5.5.2 Regression Model

The multiple regression modelfor vulnerability study is:

$$CVI = \beta 0 + \beta_1 Ten + \beta_2 Inc + \beta_3 Job + \beta_4 Food + \beta_5 Health + \beta_6 Sex + \beta_7 Family + u$$

Where CVI= Cumulative Vulnerability Index

Ten = Tenure security (frequency of eviction threat)

Inc = Income security of the respondents

Job = Number of jobless week

Food = Food security of the respondents

Health= Access to health facilities of the respondents

Sex = Sex of the respondents

Family = No. of family members in the household

β0 = Intercept term

β1, β2, β3, β4,β5, β6, β7 =Regression co- efficient

u = Stochastic disturbance term

Table 5.7 Effects of determinants on vulnerability

Independent variables	**Dependent variable: Cumulative Vulnerability Index (CVI)**		
	Coefficients	t (Significance level-0.000)	Standard Error
(Constant)	6.267	11.169	0.561
Tenure security	0.482	68.189	0.015
Income security	0.342	31.539	0.031
No of jobless week	0.294	28.073	0.043
Food security	0.232	26.256	0.035
Access to health	0.144	19.221	0.062
Sex	-0.016	-1.983	0.374
Number of Family Members	0.026	3.333	0.104
N= 707; Adjusted R square = 0.966; F= 2824.425 (Significance Level: 0.000)			

The regression analysis presents the positive and highly statistically significant effect of income (34%), tenure security (48%), number of jobless week (29%) and food security (23%), described by CVI. Here the value of R Square is 0.096. That means aforesaid variables have 96 percent effect on vulnerable situation of the respondents.

Thus the respondents who have higher access to basic needs services are relatively in lower level of vulnerability than the respondents who have less or no access to basic need services.

5.6 Role of Natural and Social Resource in Reducing Vulnerability: Natural resources, particularly land, water, urban agriculture, tree, urban open spaces are very important assets for the people living in the urban areas. Although sometimes the land, water, tree don't contribute directly toward their cash income, but the (indirect) benefits such as the establishment of grocery shop, tea stall, kitchen market the use of wood for heating and cooking, construction timber and urban agriculture directly enable local people to spend their money in other ways such as food, education and medical facilities.

The respondents stated that while it was very important to buy food, it was equally important for them to have a space to plant their own vegetables. By sowing their own crops or rearing animals, the women felt that they were caring for the environment as well as for their own and families health, by eating fresh and non-contaminated foods. They also consider the physical activity in itself healthy and

contributing to their sense of well-being and relaxation. In this sense they feel that urban agriculture is enhancing their quality of life.

Participation in social networks has the potential to reduce vulnerability and strengthen resilience. Social assets can also reduce insecurity and vulnerability in the relationship of different actors. Local people have a high degree of trust and better relationships with the local institutions, neighbours and relatives; whereas they showed very low trust towards state institutions such as police, courts and forest department.

Table 5.8 Role of sustainable livelihood in reducing vulnerability

Independent variables	**Dependent variable: Cumulative Vulnerability Index (CVI)**			
	Coefficients	t	Standard Error	Significance level
Constant)	16.423	8.575	1.915	0.000
Family income	0.537	18.818	0.000	0.000
Access to health	0.192	8.175	0.196	0.000
Natural resource	0.152	5.606	0.066	0.000
Social asset	0.110	4.282	0.441	0.000
Disaster	0.101	3.207	0.049	0.001
N= 707; Adjusted R square = 0.671; F= 288.366 (Significance Level: 0.000), Chi-square: 220.463, Fisher's exact test. 0.000				

In this study to understand the role of social asset five tools are used viz. family relation, relation with the outsider, political involvement, relation with wider institution and participation in community based organization.

The Table 5.8 highlights that access to health (19%), social asset (11%), natural resource (15%), and family income(53%) have the contribution to reduce vulnerability of the urban poor. Vulnerable situation also affected (10%) by disaster situation. The value of Chi-Square test (220.463) and Fisher's Exact Test (0.000) with 16 degree of freedom at 2 sided is also significant. On the basis of seven indicators the level of vulnerability has been measured and the area wise distribution of the vulnerable people is presented in the Table 5.9.

From the Table 5.9 it is found that the respondents residing at Rupsha and Khalishpur because of living in slum area are more vulnerable than the respondents of Tutpara, Nirala and Gollamari. Some easily identifiable groups were particularly vulnerable, e.g. women who had lost their productive assets like handcarts, sewing machines were forced to move into less profitable areas of work that did not require this equipment.

Table 5.9Level of vulnerability of the respondents

Level of Vulnerability	Percentage distribution of the respondents				
	Rupsha	**Khalishpur**	**Tutpara**	**Nirala**	**Gollamari**
Very high	6.0	12.8	-	2.3	-
High	37.2	41.7	14.2	20.5	25.0
Medium	39.5	34.0	33.1	38.6	39.3
Low	16.5	10.3	36.2	31.8	32.1
Very low	0.9	1.3	16.5	6.8	3.6
Total	100.00 N-352	100.00 N-156	100.00 N-127	100.00 N-44	100.00 N-28

Many coping strategies employed by vulnerable households in response to debt, such as withdrawing children from school and marrying off daughters early, help assuage the crisis in the short term, but increase vulnerability in the longer term.

The concept of vulnerability is complex and a realistic determination of people's vulnerability in large areas or worldwide extremely difficult. Some indicators, chosen for vulnerability determination show high correlation with one another.This study further exposes that in Khulna city especially in slum areas the livelihoods' trends of the urban vulnerable people are associated with uncoordinated urban expansion, climate related hazards and poor national economic performance. Major livelihoods' shocks include tenure insecurity, crisis of drinking water, inadequate food, loss of social network, loss of property, unemployment, flooding, violence and crime, pollution and health problems. The poor communities cope with urban life through 'household strategies' such as: putting more family members into the work force, through small scale business and agriculture, tree plantation, avoiding many basic goods, increasing their household size by inducting more relatives, withdrawing their children from education, constructing their own shelter, using kinship as social capital and establishing community relationships. There is a disconnection between poverty reduction policies and the realities, aspirations and needs of the poor. Therefore, this study suggests that poverty alleviation should be based on a policy framework that guarantees inclusive provision of livelihood assets and reduces vulnerability of the population in Khulna city.

Chapter Six

Access to Resources and its Role in Sustainable Urban Livelihood

6.1 Introduction: The key goals of adaptation strategies are to reduce vulnerability and to sustain and enhance the livelihoods of poor people. These strategies consequently need to be rooted in an understanding of how the poor and vulnerable sustain their livelihoods, the role of natural resources in livelihood activities and the scope for adaptation actions that reduce vulnerabilities and increase the resilience of poor people. "A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base" (Carney, 1998).

The assets that are generally recognised within sustainable livelihoods theory, as summarized by Mcleod (2001) are: Natural (Environmental) Capital: natural resources (land, water, wildlife, biodiversity, environmental resources); Physical Capital: basic infrastructure (water, sanitation, energy, transport, and communications), housing and the means and equipment of production; Human Capital: health, knowledge, skills, information, ability to labour; Social Capital: Social resources (family relation, relationships of trust, membership of groups, networks, access to wider institutions). Financial Capital: financial resources available (income, regularity of wage earning, no. of income earner, savings). The study has identified the role of natural resources in enhancing the physical, human, social and financial capital and its contribution in sustainable uses of these resources.

In this regard, the study includes land, water, atmosphere, tree, and other open spaces as natural resources, human capital as ability to labour, medical facilities, education, skills and information. Social resources include family relation, relationships of trust with outsider, membership of groups, networks and access to wider institutions. Available financial resources comprise income, regularity of wage earning, number of income earner, savings and access to interest free loan. All of these assets are important, but for the poorest and most vulnerable of the world, natural resources are of particular significance. This recognition is now reflected in international processes

such as the joint submission to the World Summit on Sustainable Development prepared bythe World Bank, European Union, UNDP and DFID: poor people tend to be most dependent upon the environment and the direct use of natural resources and therefore most severely affected when the environment is degraded or their access to natural resources is otherwise limited or denied. It is even reflected in a number of Poverty Reduction Strategy Papers (PRSPs). The vulnerable and poor people in the study area are heavily dependent on the natural resources.There is a strong correlation between natural resource management and reduction of vulnerability. Environmental protection is of significant relevance in vulnerability reduction. The role of these resources and its relations with sustainable livelihood of vulnerable people in Khulna city are presented in this chapter.

6.2 Natural Resources: In livelihood analysis, the importance and contributions of each component of natural resources differ between rural and urban environments. It is generally believed that natural capital is less important to livelihoods of the urban poor. However, as noted by Farrington *et al*., (2002) natural capital and services are becoming importantto urban poor's livelihood. Within the context of the current study, the identified natural resources which are used in the livelihood of the residents of the case study settlements include land, water bodies, trees and refuse dump. The water bodies are used for different purposes based on local circumstances. For instance, in Rupsha, Nirala, Khalishpur, Tutpara and Gollamari areas pond, river and lakes are used for purposes such as bathing, sanitary, washing (cloths and plates) and fishing. Though, as noted by many respondents, fishing is not done at commercial quantity, but it does form part of residents' livelihood strategies for meeting food needs. The water sources occupies a central position in the existence of sawmill, ice factory and shrimp industries and the survival of its residents. The river water is used for ice factory and also for transporting shrimps and logs from the hinterland, and for logs storage before they are cut into timber/plank of different sizes at sawmill. In this context, natural resourcesinclude five types of resources viz. land, water, sunlight and air quality, access to tree and access to open spaces.

6.2.1 Access to Land: Urban slums in inner cities are often located on lands that have become increasingly valuable and contested. Forced evictions then may occur, although they are contrary to the norms of international law and well-established practices of in situ local economic development and upgrading (Centre on Housing Rights and Evictions, 2006). Forced evictions need to be addressed via enabling law

and policy. For this study amount of land is measured in terms of acre. Five points scale is used to measure the amount of land. More than one- thirdof the respondents had house with 2 decimal homestead garden, whereas 5.9 percent respondents had house with 5 decimal agricultural land and this is 1.4 percent who had the access to house with more than 5 decimal agricultural land. Sustainable urban development must focus on raising the living standards of dwellers and can effectively induce investments using incentives such as tenure security, housing formalization, infrastructure improvement and livelihood creation.

Table 6.1 Available natural resources in the study area

Tools	**Percentage distribution of the respondents having access to natural resources**				
	1	2	3	4	5
Land	Only house (36.8)	House with 2 decimal homestead garden (38.2)	House with 5 decimal open space (17.7)	House with 5 decimal agricultural land (5.9)	House with more than 5 decimal agricultural land (1.4)
Water	Natural sources (rain water, pond, river) (14.9)	Created (House) (5.4)	Tube- well (63.9)	Deep Tube-well (15.8)	Deep Tube- well with piped water (0.0)
Sunlight and air	Very low (56.4)	Low (28.7)	Moderate (13.9)	Good (1.0)	Very good (0.0)
Vegetation and Tree	No contribution at all (56.4)	Low contribution (in access to housing) (28.7)	Moderate (in access to food) (13.9)	Good (in medicine, education and other basic need) (1.0)	Very good (in fulfilling market demand and infrastructural development (0.0)
Open spaces and other free resources like waste	No contribution at all (27.4)	Low contribution (in access to housing) (40.2)	Moderate (in access to food) (23.6)	Good (in medicine education and other basic need) (8.2)	Very good (in fulfilling market demand (0.6)

Source: Field survey: 2014-2015

6.2.2 Access to Improved Water, Air and Sunlight: The global MDG target for drinking water was met in 2010. Almost 91 per cent of the global population now uses an improved drinking water source. Whereas 96 per cent of the global urban population uses improved drinking water sources, compared with 84 percent of the rural population. Eight out of ten people still without improved drinking water sources live in rural areas. The least developed countries did not meet the target, but 42 per cent of their current population has gained access to improved drinking water sources

since 1990. In 2015, 663 million people still lack improved drinking water sources (United Nations Children's Fund, 2015).

In the study area it is observed that no respondent is covered by piped water supply and are obliged to obtain water from sources that are mostly private and at a cost higher than that of the piped supply. The respondents are commonly using the shallow tube- well that is 63.9 percent and it became so tough to collect water during dry season.Whereas 15.8 percent used to collect water from deep tube-well though, it is far from their house. Nearly 15 percent respondents collected water from rain, river and pond but the access is very poor. Regarding atmospheric condition, 56.4percent respondents were in very low condition with darkness and absence of air flow in their house. Nearly 15 percent respondents are in access to sunlight and fresh air.

6.2.3 Access to Vegetation and Trees: This study assesses the social importance of vegetation and tree through empirical assessment of five selected areas in the rapidly developing southern city of Khulna, Bangladesh. Vegetation played the major role in supporting nutrition by its role in food consumption, and in promoting health through the planting of species with medicinal use.

Typically, the study areas especially slum areas are densely packed housing units including Jhupri, Kutcha, Semi-pucca and Pucca houses with narrow lanes, irregularly interspersed with trees, and with potted plants placed in and around the restricted space associated with most households. The group interviews have been carried in order to understand the preferences of vegetation in their neighbourhood. The respondents (mainly women) were very close to nature, with a group size of 8–12 individuals per area. Among the respondents 56.4 percent reported that tree has no contribution at all. Nearly 29 percent reported that tree has its positive role in increasing housing facility (Table 6.1).

Trees appeared to have animportant utility function as physical entities, beyond their species-specific sacred, cultural or other properties. Most trees were observed to support clotheslines. Other practical uses include supporting tents, wires, and more (Table 6.2). A range of occupation were observed taking place under tree canopies, including the grocery shop, Chula making, kitchen market, tea stalls and telephone booths. Women in the study areas were observed conducting domestic chores such as cooking (using fuel wood), washing clothes and dishes, and grooming (such as

oilingeach other's hair, combing and removal of lice) under tree canopies; while children were often found to be playing under the shade of trees.

Table 6.2 The most dominant tree species in the study area

Scientific Name	Common Name	Relative Abundance	Uses	Activities Observed (Non-Exhaustive)
Carica papaya, Musa paradisiaca, Psidium guajava Momordica charantia, Piper betle (Plant)	papaya banana, Guava tree and other fruit tree, bitter gourd, betel plant	46.3	Fruit	Fruit consumed Washing dishes
Azadirachta indica, Gada, Epipremnum aureum, Rosa species and Jasminum species	Neem tree. Gada, money plant,rose and jasmine	28.8	Medicinal Flower	Occasion, sacred, Ornamental
Cocos nucifera, albizia saman	Coconut, rain tree	24.9	Fruit, Shade	Ornamental, shade, fuel. Socializing, washing clothes

However, all the respondents preferred potted plant species and desired more of these in their neighbourhood.The contribution of tree is assessed by 5 points scale. 1 for no contribution at all, 2 denotes low contribution (in housing), 3 signifies moderate (in access to food) whereas, 4 means good (in medicine education and other basic need) and 5 for very good (in fulfilling market demand and infrastructural development).The most dominant plants encountered in the study area were grown for fruits. The most common plants were Carica papaya (papaya), Musa paradisiaca (banana), Momordica charantia (bitter gourd) and Piper betle (betel plant). It is native to Khulna and highly usable in southern Bangladesh. Nearly one-thirdof the tree population in the study area had medicinal properties. A large proportion of plants have grown in Khalishpur and Gollamari are Solanum lycopersicum (tomato) and brinjal. Plants with ornamental and medicinal uses were almost equal in proportion. Gada, Epipremnum aureum (money plant), Rosa species (rose) and Jasminum species (jasmine) were the most common ornamental plants, present in more than 28percent of the trees in the study area. The coconut and rain tree accounting for 24.9 percent of the sampled population. Thus, it is found that the majority of the trees found in the study areas have multiple uses, and are of high economic value.

The coconut is widely known as 'Kalpavriksha', meaning the tree which provides everything. It is nutritious, medicinal and provides many products used for various daily needs including coconuts for consumption, coconut husk for fuel and fibre. The

second most frequently found tree species 'neem' is sacred and medicinal. Every part of the tree is used in traditional medicine.

The slum dwellers responded positively to the survey regarding their preferences fora green neighbourhood. The respondents (mainly women) were keen on improving their neighbourhood. The respondents wanted moretrees in their surroundings, and largely preferred the coconut tree. Others did not desire more trees, citing land issues such as lack of space and ownership.

Table 6.3 Tree of choice by the respondents

Tree of Choice	**Area**	**Reason**
Shade-giving	Rupsha	Shade
Plant and shade	Khalishpur	Shade and Health
Flowering trees	Nirala	Flowers
Fruit trees	Tutpara	Fruits
Compact tree	Gollamari	Compact tree with small basal area

Source: Field survey, 2014-2015

The urban dwellers responded positivel to the survey regarding their preferences for a green neighbourhood. Most of the respondents (among women) were keen on improving their neighbourhood. The respondents in Rupsha slum area, mostly wanted more trees in their surroundings, and largely preferred the rain tree as it is the source of fuel, shade and capital, moreover it is rapidly grown tree. Fruit tree is very common in Tutparaand the respondents of Khalishpur area prefer shade tree, plant and trees which are very essential for improved health. However, all the respondents preferred potted plant species and desired more of these in their neighbourhood. The pots used were highly innovative addressing key issues such as limitation of space and finances. The types of pots seen were plastic bags, earthen pots, plastic pots, cemented structures, discarded paint containers, plastic buckets, metallic cans, aluminium pots, battery cans and aluminium buckets. Although some areas had no trees, all of them had plants.

6.2.4 Access to Open Spaces: In many cities, the green space cover is very low in the densely built areas of the inner city and the 19th century extensions but much higher in low density housing areas. In the study area, the open spaces not only include public parks, playing fields, cemeteries but also the green spaces within the different land uses such as gardens in residential areas, green space on institutional grounds, in commercial developments, as well as land where the former use was abandoned

(derelict land). In Khalishpur areas the railways lines and adjacent land is an opportunity for creating green space corridors. Large green spaces are also being found along motorways, big roads and other linear infrastructures in other four areas of Khulna city. The composition of city's green space includes formally designated open spaces (woods, paved city spaces with plants, parks, gardens, sport grounds and burial places) and other actual green spaces (water, water margins, transport corridor verges, farmland, horticulture, derelict land, domestic gardens and private open spaces). These green spaces in the city have the influence on ecological services. Not only green spaces other free resource like waste play an important role as a source of urban livelihood among the poor. It involves the collection, sorting and recycling of materials such as glass, metal and paper, scavenging for food, and the services associated with waste disposal and removal (case study-5).

Among the respondents 27.4 percent could not use urban open spaces, whereas 40.2 percent responded that they are using the open spaces to housing and one- third of the respondents fulfilling basic need by using open spaces to vegetable cultivation, livestock rearing, kitchen market and tea stall (Table 6.1). Access to green places also contributes to older people staying active and enhances the quality of life through increased physical activity and social interaction.

Table 6.4 Regression coefficients of access to natural resources in the study area

Independent variables	**Dependent variable: Natural Resource Index (NRI)**		
	Coefficients	t (Significance level-.000)	Standard Error
(Constant)	5.359	13.398	0.400
Access to land	0.641	52.197	0.019
Access to portablewater sources	0.401	35.704	0.024
Benefited from trees	0.272	21.625	0.051
Benefited from open spaces	0.174	13.275	0.106
Sex	-0.028	-2.413 (.016 sig.)	0.215
N= 707; Adjusted R^2 = 0.915; F= 1522.342 (Significance Level: 0.000)			

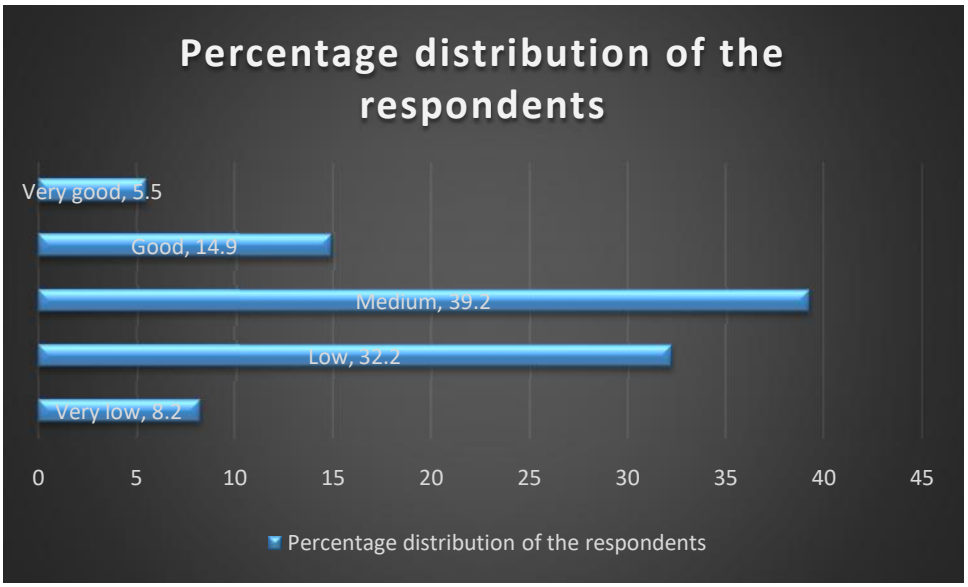
Source: Author's compilation

Considering these natural resources the regression model has been created.The value of R squire is 0.915. That means aforesaid variables have 91 percent effect on natural resources (Table 6.4).

Land plays the most important role as natural resource that is 64 percent followed by access to improved water sources (40%), vegetation and trees (27%) and benefitted

from open space (17%). The regression analysis also supports the concept of ecofeminism. Here the effect of sex variable is -0.028. That means female are very close to nature. Considering the above five variables the level of natural resources of the respondents has been identified (Chart 6.1).

Chart 6.1 Access to natural resources of the respondents in the study area



Source: Field survey, 2014-2015, mean- 19.40, mode- 21.00

The Chart 6.1 shows that 8.2 percent respondents had the very low access to natural resources and 39.2 percent had the medium access, the value range is 31-38. The mean and mode value is19.40 and 21.00 that means majority of the respondents were in this group. On the other hand**,** 14.9 percent were in good access to land, water, trees and other marginal resources.

6.3 Access to Natural Resources and its Role in Financial assets

6.3.1 Economic context: The urban poor survive through undertaking a variety of income generating activities. In most developing cities, the main part of these income-generating activities takes place in the informal sector (Tshuma & Jari, 2013). Another source of vulnerability for the urban poor relates to the linkages between specific cities and the global economy (Douglass, 2000).In this study financial asset is measured in terms of money.The respondents are mostly surviving through informal employment with low cash incomes and insecure conditions. Those in informal employment tend to lack labour rights.They are therefore susceptible to sudden

unemployment and the dangers accruing to unprotected working conditions, such as long hours, poor pay and insanitary or unsafe conditions. In Khulna city formal employment has decreased as a result of collapsed of the manufacturing industries. Thus, while financial capital is normally one of the most important asset groupsfor the urban poor, it is also one of the most problematic as features of poverty reinforce barriers blocking access to employment and credit.

Table 6.5 Access to financial asset of the respondents

Tools	Percentage distribution of the respondents				
	1	2	3	4	5
Family income (Mean-4726.87 BDT)	0-2000 (8.3)	2001-4000 (21.6)	4001-6000 (39.3)	6001-8000 (20.7)	8001-10000 (10.0)
No. of income earner	0 (2.6)	1 (72.0)	2 (23.9)	3 (.7)	4 (0.7)
Yearly family savings	0-5000 (85.6)	5001-10000 (9.1)	10001-15000 (2.7)	15001-20000 (1.6)	20001 and above (1.1)
Regularity of wage earning	Not more than 1 month at work (13.4)	3 months at work (28.6)	6 months at work (33.0)	9 months at work (16.4)	Never been workless for a week in last year (8.6)
Access to interest free loan	No access to loan (66.6)	Access to loan from family members (22.5)	Access to loan from relatives (8.5)	Access to loan from community members (1.4)	Access to loan from more than three sources (1.0)

Source: Field survey, 2014-2015

Access to credit in the formal financial sector is one of the biggest problems facing urban poor men and women in the study area.Theincome of the respondents is computed by five points scale*:* (i) Family income (1=Tk.0-2000, 2=Tk 2001-Tk.4000, 3=Tk.4001-Tk.6000, 4=Tk.6001-Tk.8000 and 5=Tk.8001-Tk.10000). Two-third of the respondents do not earn more than 6000 BDT in a month. Average monthly income is found to be less than 5000 BDT. Numbers of income earners are categorized into 5 points. 1 means no income earner, 2 indicates 1 income earner, 3 for 2 income earners, 4 connotes 3 income earners and 5 implies 4 income earners.

Money saved yearly is measured in terms of 5 points scale. In this regard 1stands for Tk.0-Tk.5000, 2 means Tk.5001-Tk.10000, 3 specifies Tk.10001-Tk.15000, 4 denotes Tk.15001-Tk.20000 and 5 represents Tk.20001and above amount of savings. The interviews revealed that in maximum cases (85.6%) the yearly savings is 5000 BDT or below. Less than 3 percent respondents could save 15000 BDT in a year. Regularity of wage earning is categorized in to 5 points. Where, 1 is used for not more than 1 months at work, 2 means 3 months at work, 3 signifies 6 months at work, 4

indicates 9 months at work and 5 specifies never been workless for a week in the last year.

More than one-thirdof the respondents were 6 months at work in last year. Less than one-fourth of the respondents were nine or more than nine months employed in last year.Whereas, 72.0 percent respondents informed that they have only one income earner in their family. Access to interest free loan is measured in terms of money. Regarding access to interest free loan 66.6 percent respondents told that they have no access to interest free loan and nearly 11 percent respondents could receive loan from the relatives and community members.

Table 6.6 Percentage distribution of the respondents by access to natural resources and its contribution in increasing financial asset

Family Income (in BDT)		**Natural resource**					**Total**
		Very low	Low	Moderate	Good	Very good	
0-2000	No	6	32	20	0	1	59
	%	10.3%	14.0%	7.2%	0.0%	2.6%	8.3%
2001-4000	No	20	74	46	7	6	153
	%	34.5%	32.5%	16.6%	6.7%	15.4%	21.6%
4001-6000	No	20	97	125	31	5	278
	%	34.5%	42.5%	45.1%	29.5%	12.8%	39.3%
6001-8000	No	6	13	62	51	14	146
	%	10.3%	5.7%	22.4%	48.6%	35.9%	20.7%
8001-10000	No	6	12	24	16	13	71
	%	10.3%	5.3%	8.7%	15.2%	33.3%	10.0%
Total (Chi-Square test-220.463)	No	58	228	277	105	39	707
	%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: Field survey, 2014-2015

Income from the sale of labour is often one of the most important assets for the urban poor and one which they tend to prioritise (Twigg, 1998). The importance of income for the urban poor relates to the highly 'commoditised' nature of cities, leading to a higher dependence on cash.Table 6.6 indicates that the respondents who have more natural resources could contribute to increase family income**.** The value of Chi-Square test (220.463) and Fisher's Exact Test (0.000) with 16 degree of freedom at 2 sided significant indicates that financial capital is one of the most important asset for the urban poor.

6.4 Human Capital: Human capital refers to the skills, knowledge and ability to work. Financial capital, in terms of access to employment and earnings, is strongly dependent on adequate human capital. In turn, human capital is highly dependent on adequate nutrition, health care, safe environmental conditions, and education. Poor

people living in urban areas normally have better access to health services than their counterparts in rural areas. In urban areas of Bangladesh, 'the availability of allopathic drug therapy has increased enormously over the last quarter century: every urban slum dweller can have quick recourse to a local chemist or clinic (Crook & Dyson, 1982). Furthermore, government health programmes tend to have a better coverage in urban areas.

Table 6.7 Access to human resources of the respondents

Tools	**Percentage distribution of the respondents by level of human asset**					Total
	1	2	3	4	5	
Ability to labor	Not able (8.5)	Less able (29.0)	Moderately(44.6)	Able bodied (16.7)	Perfectly able (1.3)	100.00
Health facilities	No doctor (12.6)	Natural ingredients (24.6)	Quack(37.3)	Paramedic (16.8)	Registered (8.6)	100.00
Education	Only can sign (19.1)	Class 1- 5 (38.8)	Class 6-9 (35.8)	SSC pass (5.2)	HSC pass and above (1.1)	100.00
Skillness at work	No knowledge at work (87.1)	Having informal little technical education (11.2)	Having theoretical knowledge at work (1.7)	Having formal technical knowledge at work (0.0)	Having formal technical and theoretical knowledge at work (0.0)	100.00
Information assist livelihood strategies	No information at all (26.9)	Information from family (30.7)	Information from community (25.2)	Information from national organization (10.9)	Information from international organization (6.4)	100.00

Source: Field survey, 2014-2015

In the study area especially in Nirala and RupshaSSFP (Smiling Sun Franchise Program) clinics offer a set of government-approved primary care services, called the essential service delivery (ESD) package, that includes basic curative care, family planning, and maternal care services.Five tools have been considered to assess the human asset of the respondents.

Ability to labor is measured by frequency of having nutritious food in a day. In this regard 1 is valued for not able (frequently hungry for all day long), 2 for less able of having meal for once in a day, 3 is valued for moderately able with having meal for twice in a day that contains 44.6 percent of the respondents, 4 for able bodied to having meal for three times in a dayand 5 for perfectly able of having meal for three times with extra food in a day which constitutes only 1.3 percent.

Health facility is measured by five sources of medical facilities of the respondents. Among the total 12.6 percent responded that they did not use to go to the doctor, 24.6 percent respondents use natural ingredients. More than 37 percent respondents seek to quack for their illness and one-fourth of the respondents visited urban primary health care centres and government hospital in this regard.

Educational status of the respondents has been measured by level of education. Among the respondents 19.1percent could only sign, 38.8 percent household head had completed primary education, whereas 35.8 percent had completed junior secondary level and more than 6 percent respondents have passed SSC. As the vulnerable people most of the respondents were not skilled at all. Skillness at work is measured by having theoretical and technical knowledge of the respondents regarding five types of fields. Among the respondents 87.1 percent were not skilled at their work at all,the respondents having little informal technical education indicates 2 that contains11.2 percent, 3 for having theoretical education at work, 4 for having formal technical knowledge at work and 5 means having formal technical and theoretical knowledge at work which contains no respondent at all.

Five sources are used to understand the sources of information. Where 1 denotes no information at all,2 for information from family, one -fourth of the respondents have been informed about the livelihood strategies from community, 4 is valued for information from national organization which contains 10.9 percent of the respondentsand 5 signifies access to information from international organization.

The study reflects that the health advantages of urban living are reduced for older generations. Environmental hazards offset to some extent the advantage of better availability of treatment. Furthermore, while healthcare is relatively available, it is generally at a cost. Among the respondents in the study area tends to be less health expenditure on women and female children, as was documented in the case of a cholera epidemic in Bangladesh, where female fatalities were three times higher than male because women tend to be taken to hospital only when the disease is far more advanced.

6.5 Social Resources: Social networking plays an important role in coping with urban life since it works as 'social capital'. A key asset for both the urban and the rural poor is social capital. Social capital is a valuable and critical resource for poor urban

households, especially during times of crisis and socio-economic change (Moser, 1996; Dersham & Gzirishvilli, 1998). The respondents, in Khulnacity, were often seen gathering together under tree canopies and communicating. Social interaction in green spaces can improve bonding and create a better sense of community. Apart from normal social interactions amongst communities, knowledge sharing is a crucial resource that may aid community building.

A range of occupations were observed taking place under tree canopies, including the grocery shop, stove (chula)making (case study-5), kitchen market, tea stalls and telephone booths. Women in the study areas were observed conducting domestic chores such as cooking (using fuel wood), washing clothes and dishes and grooming (such as oiling each other's hair, combing and removal of lice) under tree canopies; while children were often found to be playing under the shade of trees. The most commonly observed activity, however, was of groups of people sitting under tree canopies and conversing/socializing. In this study social asset is assessed considering 5 five types of social relations viz, family relation, relationship with neighbours, involvement with politics, access to wider institution, and participation in community based organization by the respondents.

Family relation is assessed by 5 tools. In the study area 33.0 percent respondents could not maintain good relation with their family. One-third of the respondents could maintain moderate and good relation with the family members. In this regard family type is a responsible factor to maintain social relations. About 62.1 percent of the urban poor have close relationships with their neighbours. Employment and land lordship also plays important role for social networks for a considerable portion of urban poor.

The poor mostly maintain their relationships with relatives, friends and village fellows who are living in the same community. The poor households who are living in the city for a long period of time have wider social network. These long-term households maintain more relationships outside their communities than the households recently migrated to the city. Social network working as a social capital helps to perpetuate reciprocity in their microeconomic life.

Table: 6.8Social capital as an important livelihood asset of the respondents

Tools	Percentage distribution of the respondents maintaining social relations					Total
	1	2	3	4	5	
Family relation	Not good at all (33.0)	Not good (34.9)	Moderate (21.4)	Good (9.2)	Very good (1.6)	100.00
Relationship with outsider/neighbours	Very limited (37.9)	Not good (42.4)	Moderate (14.4)	Good (4.1)	Very good (1.1)	
Involvement with Politics	Not at all only voting right (84.3)	Very limited (8.5)	Limited (6.5)	Good (0.4)	Very good (0.3)	100.00
Access to wider institution	Very low (access to neighbours (67.2)	Low (access to community (13.2)	Moderate (participation with local administration) (18.1)	Good (Personal relation with national NGOs) (1.4)	Very good (access to international NGOs)(0.1)	100.00
Participation in community based organization	Verylowparticipation (90.0)	Low participation (3.3)	Moderate participation (3.7)	Active participation (2.1)	Very active formal participation (1.0)	100.00

Source: Field survey, 2014-2015

Political capital is defined broadly as the ability to use power in support of political or economic positions and so enhance livelihoods; it refers to both the legitimate distribution of rights and power as well as the illicit operation of power which generally frustrates efforts by the poor to access and defend entitlements and use them to build up capital assets (Baumann &Sinha, 2001).

As the vulnerable people, the respondents had limited involvement with politics and 18.1 percent participated in local administrative activities like distribution of resource in the community. The regression analysis supported that the male are participated more in social activities than the female.Community participation, grouping, factionalism and feuds are characteristics of the urban poor. The poor form committees to resolve existing conflicts in the neighbourhood. They rarely rely on help from law enforcement agencies (especially the police) to mediate in or mitigate their problems. About 10 percent of the urban poor are members of different community based political organizations, cooperatives and voluntary organizations.

The single headed households who have mostly migrated to the city recently are not interested in city politics. They are mostly interested to earn more money so that they can support their family members. But the majority (84.3%) shared strong nationalist or liberal political ideology and cast their votes mostly based on their party ideology. A considerable portion of the poor (7.1% -limited, good and very good) participate in action politics like picketing during strikes, joining public meetings and joining party

meetings. Despite participating in different political activities and maintaining contact with the elected bodies, they cannot achieve their expected goals. The leaders use them for their interests and generally ignore their claims.

Table 6.9 Regression coefficients of access to social relations maintained by the respondents

Independent variables	**Dependent variable: Social capital**		
	Coefficients	t (Significance level-0.000)	Standard Error
(Constant)	0.641	3.404	0.001
Family relations	0.584	73.236	0..000
Relationship of trust with outsider	0.372	46.636	0.000
Involvement with politics	0.259	42.346	0.000
Participation in community based organization	0.090	14.425	0.000
Sex	0.013	2.049	0.041
N= 707; Adjusted R^2 = 0.976; F= 5606.318 (Significance Level: 0.000), chi-square-477.584			

The regression analysis shows the positive role of social resources in enhancing livelihood resources.The value of R Square (0.976) indicates that aforesaid variables have 97 percent influences on social asset. Among these, family contributes more (58%). Marital status is an influential factor in stock of social capital. From the study it is observed that the family based on monogamy marriage could maintain good relation than the family founded by polygamy. The value of Chi-Square test (477.584) and Fisher's Exact Test (0.000) with 20 degree of freedom at 2 sided significant test also supports that.

6.6 Physical Asset: Physical asset is measured by five types of infrastructural facilities in the study area. The basic infrastructure for transport, buildings, water management, energy, and communications and productive capital (tools, machines, etc.) enables people to pursue the livelihoods. It includes both those that people own and those that they have access to (roads, irrigation systems, telephone networks, etc.), whether provided by government or the private sector (and whether free or paid for).

6.6.1 Access to Improved Sanitation: Adequate sanitation services, including safe disposal of human waste, garbage collection, and wastewater disposal, are essential for ensuring the health and well-being of urban dwellers. Inadequate sanitation is a major cause of disease and improvements in sanitation have been shown to have significant beneficial health impacts both in households and across communities. The global MDG target for sanitation has been missed by almost 700 million people, 68

per cent of the global population now uses an improved sanitation facility. The only developing regions to meet the sanitation target were the Caucasus and Central Asia, Eastern Asia, Northern Africa and Western Asia; 2.1 billion people have gained access to an improved sanitation facility since 1990. Whereas 82 per cent of the global urban population and 51 per cent of the rural population use improved sanitation facilities. In 2015, 2.4 billion people still lack improved sanitation facilities (United Nations Children's Fund, 2015).

In this study sanitation facility has been assessed by five types of facilities. In this regard 1 is valued for very low with dirty surroundings and open space toilet containing 16.1 percent of the respondents, 2 for low sanitation where there is no drainage facility and toilet type is hanging (15.6%), 3 is valued for moderate sanitation with no sufficient air and water quality and have the access to ccommunity toilet (62.8%), 4 for good sanitation with sanitary toilet and sufficient water and airwhich constitutes 3.0 percent of the respondents and 5 is evaluated for very good sanitation with improved drainage,twin pit toilet and clean surroundings.Only 2.5percent respondents were in this category (Table 6.10).

6.6.2 Access to Educational Institution: Five types of educational institution are considered to measure the access to educational institution by using 5 points scale. Value 1 is given for access to no school at all, 2 for NGO school, 3 for primary school, where 19.4 percent respondents having the access to this. In this context 4 is valued for secondary school and 5 for higher secondary and higher institution and 1.4 percent of the respondents had the access to higher educational institution.

6.6.3 Communication Facilities: Access to mobility is unequal, both between high-income and low-income countries and within countries and cities. The poor make fewer trips and spend a greater proportion of their time and income getting to where they want to go (World Business Council For Sustainable Development, 2016). Communication is critical to successful urbanization, as well as social and economic development. It connects people to jobs, markets, essential services and political representation. It enables businesses to contribute to development, by serving new markets and unlocking new resources. Five types of communication facilities have been considered to assess the access to communication facilities in the study area (presented in the Table 6.10). Value 1represents for communication on foot which

constitutes 53.2 percent of the respondents, 2 for bicycle and 19.5 percent respondents had the access to it. More than 20 percent respondents used public bus to go to the outside of their home which is valued as 3, while 6.8 percent of the respondents used taxi/professional vehicle and no one had motor bike or any personal car.

Table 6.10 Physical asset in the study area

Physical asset	**Percentage distribution of the respondents by level of access to physical resources**				
	1	2	3	4	5
Sanitation	Very low (16.1)	Low (15.6)	Moderate (62.8)	Good (3.0)	Very good(2.5)
Access to educational institution (within 3 k.m. from home)	No school at all (60.2)	NGO school (12.0)	Primary school (19.4)	Secondary school (6.6)	Higher Secondary and higher institution (1.4)
Road/communication facility	On foot (53.2)	Bicycle (19.5)	Public bus (20.5)	Taxi/professional vehicle (6.8)	Motor bike/ personal car (0.0)
Power system	No power (kerosene Kupi (17.4)	Storage Battery (18.2)	Electricity (not authorized) (28.0)	Sub power connection (27.0)	Direct electricity(9.3)
Recreational facility	No access to open space (47.4)	Sports facility (33.8)	Open space with secured sitting arrangement (9.2)	Access to arrange picnic (7.5)	Well-equipped park with all recreational facilities (2.1)

Source: Field survey, 2014-2015

6.6.4 Access to Power supply: Fossil fuel subsidies up almost 30 percent to $523 billion in 2011, led by MENA (Middle East and North Africa) CO2 emissions at record high, while renewables industry under strain. Despite new international efforts, 1.3 billion people still lack electricity. Among urban populations, 700 million lacked access to clean fuels in 2005, with 279 million lacking electricity (Mahendra, 2014). In the study area five sources of power have been used by the respondents. More than 17 percent respondents had no access to electricity in their house and reported that they use kerosene Kupi. More than three-fourth of the respondents had the access to electricity.

6.6.5 Recreational facility: It is identified by five types of infrastructural facilities of the respondents. In this case 1represents no access to open space, 2 for sports facility, 3 denotes open space with secured sitting arrangement, 4 means access to arrange picnic and 5 for well-equipped park with all recreational facilities.

Among the respondents 47.4 percent informed about no access to open space and 33.8 percent informed about the access to sports facility beside their house, whereasonly 2.1 percent have access to well-equipped park with all recreational facilities. Other physical assets such as jewellery or household goods may be obtained to satisfy cultural norms and basic needs. In addition to these roles, these assets can also act as a store of value and be pawned or sold during times of crisis.

The Table 6.11 describes that natural resource has its positive contribution in family income (15.9%), in food (23%)), in health (14%), in financial asset (22%), in social resource (21%), in reducing vulnerability (28%) and in human asset (26%). In this context it is found that natural resourcecontribute more in increasing financial asset, food, social asset, human asset and reducing vulnerability than in family income and health.

Table 6.11 Role of natural resources inenhancing social and human capital

Dependent Variable	**R^2**	**F (Sig 0.000)**	**t (Sig 0.000)**
Family income	0.159	0.133117	7.022
Food	0.230	210.148	3.273
Access to Health	0.141	115.800	5.953
Financial asset	0.220	198.327	8.785
Disaster	0.263	251.965	9.245
Social resource	0.213	190.472	5.266
Vulnerability	0.280	273.945	11.615
Human asset	0.261	248.489	13.952
a. Predictors: (Constant), Natural resource			

In view of the importance of the location of housing especially the houses of community of Rupsha slum attract industrialist with skills in shrimp works. But in the majority of resettlement sites Tutpara, Nirala and Khalishpur were far from workplaces.Although many of these blue ecosystem services are beneficial to most of the respondents, yet manyrespondents have acknowledged that they are affected by many of the ecosystem disservices. Ecosystem disservices that affect the respondent are storm water overflow, rainfall induced waterlogging and flooding. The most common negative utilities that they get from ecosystem disservices includes decomposed wastes and bad smell, ugly view, waterbornediseases, airborne insect, prevalence of malaria mosquito and income loss.

Among the study population a significant migrant did not create improved livelihood opportunity. They invariably live below the poverty line-1 and have little access to

employment basically in formal sectors. The poor people enriched with natural resources are less vulnerable than those who have low access to natural resources. The respondents are suffering from tenure insecurity, housing formalization, lack of infrastructural facility;skills; knowledge and ability to work.The poor communities cope with urban life through 'household strategies' such as: putting more family members into the work force, through small scale-business, increasing their household size by inducting more relatives, withdrawing their children from education, and establishing patron-client relationships with local leaders. Vegetable cultivation and tree plantation in Khulna city appears to play a significant role in improving social capital, health and nutrition.The benefit from natural resources includes fresh air, shedding, natural cooling, biomass fuel, earning wage etc. There is an intra-household variation of coping with poverty and deprivation based on households having more than one income earning member, having access to urban land, and access to city politics for better prospects of well-being. However the home-based income generating activities could contribute in improving livelihoods.Urban government should take greater initiative to create opportunities for the poor sections of city's population.

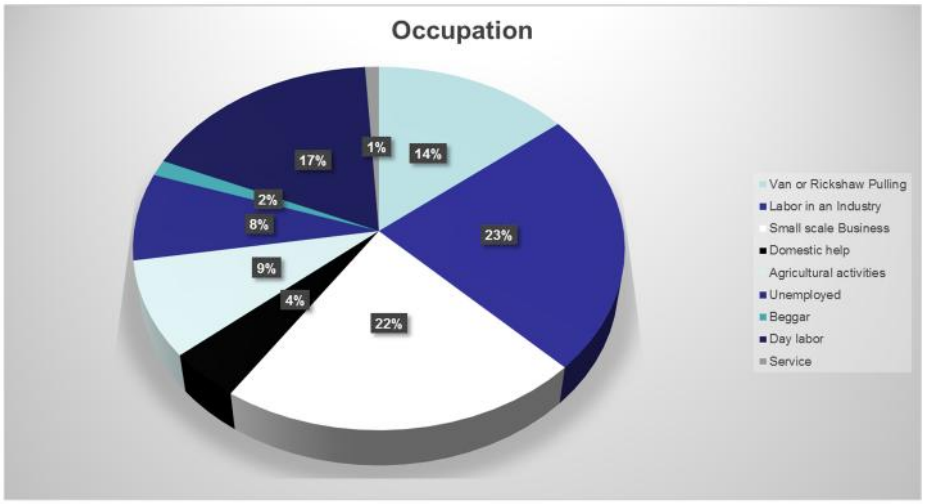
Chapter Seven

Means of Livelihood of the Respondents in Context of Urban Environment

7.1 Introduction: This chapter presents evidence on occupational status of the respondents, including wage earning condition, total household income and income diversification, potential shocks to livelihoods, safety nets (and the lack of them), and coping strategies. The information gives an overall view of the means of livelihoods of Khulna city and the threats and constraints that affect peoples' ability to earn a living.

7.2 Occupational Status of the Respondents: The main occupation of the respondents are presented in the Chart 7.1

Chart 7.1 Main occupation of the respondents



Source: Field survey, 2014-15

The urban poor are mostly employed in self-managed low paid jobs in the informal urban sectors like rickshaw pulling (14%), day labor (17%), factory work (23%), agricultural activities (9%), and domestic help (4%). Small portion of the respondents (1%) works in government and non-government organizations. About 8 percent of the urban poor frequently face underemployment due to lack of employment opportunities, physical illness, staying in their ancestral villages. Rickshaw pulling was the most popular because it requires no skills and is easily available. Income is estimated at Tk. 40-200 per day, depending on the number of hours worked and if the worker owns the rickshaw. Begging is reported to be a coping mechanism mainly for

abandoned women with children who can earn Tk. 250 per week. Some beggars, day laborers and unemployed are also involved in waste-picking and lived on urban free resources.

The Table 7.1 shows that significant portions of the female workers (47.55%) are doing temporary work and 35.66 percent involved in seasonal work. In most cases, the seasonal workers are worked in shrimp depot in unsafe working condition. It sometimes causes injuries and damages to their physical and mental health. The rates of income, wage and productivity are very low (only 30 BDT) per day among the urban poor.

Table 7.1 Working condition of the respondents

Sex	**Percentage distribution of the respondents by working condition**				**Total**
	Temporary	Seasonal	Sometimes	Other	
Male	313 (55.50)	218 (38.65)	31 (5.50)	2 (.35)	564 (79.77)
Female	68 (47.55)	51(35.66)	18 (12.59)	6 (4.20)	143 (20.23)
Total	381	269	49	8	707 (100.00)

Source: Field survey, 2014-15

The condition of female-headed households is comparatively more miserable than male-headed households. Entering more household members into the workforce is the main survival strategy of the urban poor. This is why female participation in the urban work force is mentionable (20.23%) among the respondents. Sometimes the female members use domestic spaces for both production and reproduction through operating income-generating activities with the assistance from other family members.

Labor-based, income-generating activities are the most important source of income in the sample, particularly for poorer groups in Khulna city.

Table 7.2 Wage earner in the households of the respondents

Sex	**Percentage distribution of the respondents by wage earning situation**					**Total**
	No work at all	Frequently irregular	Irregular	Moderately regular	Mostly regular	
Male	41 (7.27)	136 (24.11)	218 (38.65)	110 (19.50)	59 (10.46)	564
Female	51(35.66)	67 (46.85)	17 (11.89)	6 (4.20)	2 (1.40)	143
Total	92	203	235	116	61	707

Source: Field survey, 2014-15

Among all individuals in the survey sample, 38.65 percent male headed households were employed in the sense that they have engaged in a labor-based, income-generating activity for almost 6 months in last year (before the surveyed year) described by the Table 7.2. Of all women in the sample over 35 percent were employed for 1-12 weeks and 7.27 percent of male in the sample fall into this category. Of the remains, 10.46 percent male have involved in almost all the year round, but among the women small proportion (1.40%) were in this category.

Income from industry (predominantly shrimp depot) contributes more for female-headed households, while male-headed households rely greatly on wage labor. Regarding confirmation letter of service three persons have the security of their job but not permanent while 19 respondents had the risk allowance facility at their work and most of them were mainly industrial workers.

Table 7.3 Employment facilities of the respondents

Facilities at work	**Number of the respondents**			
	Yes		**No**	
	Male	Female	Male	Female
Confirmation letter of Service	2	1	562	142
Risk allowance facility at work	15	4	549	139

Source: Field survey, 2014-15

7.3 Income Levels and Sources: Average monthly income is significantly higher for male-headed households than for female-headed households. It is also noticed from the study that households headed by married women may have levels of welfare comparable to those of male-headed households and that households headed by divorced and widowed women are more disadvantaged than others. For the purpose of the study, income includes not only earned income but unearned income from the sale of property or other consumer durable goods, and net borrowing or lending.

Table 7.4 Income of the respondents by sex

Sex	**Income (BDT)**		**Total**
	Mean	Standard Deviation	
Female	2825.17	1901.323	143
Male	5209.04	2099.194	564
Total	4726.87	2271.431	707

Source: Field survey, 2014-15

Data from Table 7.4 can be used to calculate the average income of the female headed households engaged in informal and formal work, providing a means of verifying the growing trend toward male headed household.

The average monthly income of households is only Tk.4727 (US$71). But the intra-household income difference (Std.2271) is quite significant. Income-generating activitiesof men and women differ markedly (Table 7.4). The monthly income for households in labor in an industry is less than the respondents involved in small-scale business.

Table 7.5 Mean income of the respondents regarding occupation

Occupation	**Income (in BDT) Mean- 4727, Sd-2271**		**No. of respondents**
	Mean	Std. Deviation	
Van or Rickshaw Pulling	4964.00	1573.166	100
Labor in an Industry	4930.61	1703.078	165
Small-scale Business	5692.90	2137.000	155
Domestic help	2206.45	1271.989	31
Agricultural activities	5721.31	2532.332	61
Day labor	4975.20	1797.965	123
Service	4714.29	2884.689	7
Unemployed	1294.55	1731.347	55
Beggar	1600.00	1125.463	10
Total			707

Source: Field survey, 2014-15, Value of Chi-square:102.413

Households with an unemployed head report the lowest monthly incomes. Among households whose members have involved in agricultural activities, small-scale business man and day laborer have significantly higher income than rickshaw puller, industrial workers and service holders. The value of chi-square tests (102.413) and Fisher's Exact Test (0.000 also supports that. Moreover the agricultural activities like homestead garden livestock and poultry rearing also have the important role in increasing income. The wood and shrimp related industry also contribute to increase income.

A comparative analysis on the occupational status of current years and previous years of the respondents is presented in the Table 7.6. It is found that the number of the respondents has increased more in small-scale business and agricultural activates than the previous year. Whereas, the number of workers in an industry have decreased in the surveyed year as in many cases the industry has collapsed than the previous year.

Table 7.6 Current and previous year's occupation of the respondents (Crosstabulation)

Main Occupation in surveyed year	Main Occupation in Previous Year (Number of the respondents)						Total
	Agriculture	Industry	Business	Day labor	Rickshaw pulling/Not Defined	Unemployed	
Van or Rickshaw Pulling	4	56	4	3	32	1	100
Labor in an Industry	4	109	4	6	38	4	165
Small-scale Business	7	48	55	6	36	3	155
Domestic help	0	9	0	6	12	4	31
Agricultural activities	24	14	15	0	6	2	61
Unemployed	0	22	0	2	14	17	55
Beggar	0	0	0	0	8	2	10
Day labor	1	56	8	13	37	8	123
Service	0	5	1	0	0	1	7
Total	40	319	87	36	183	42	707

Source: Field survey, 2014-15

7.4 Urban Agricultural Livelihoods

7.4.1 Agricultural activities: Nowa day, urban agriculture practised by the urban poor attracts the attention of social scientists. It has been observed that it is mainly poor farmers from rural areas who have developed green areas in the vicinity of urban areas.Urban agriculture is broadly defined as food production in urban areas, usually with an emphasis on livestock keeping and cultivation (Mougeot, 2000). In terms of production activities urban agriculture may be limited to food production in urban areas (Page, 2002), or it may be extended to include other types of production such as forestry, parks, gardens, orchards, fuel wood plantations, aquaculture and related activities'(Baker, 1995). Urban agriculture includes greenbelts around cities, farming at the city's edge, vegetable plots in community gardens and food production in thousands of vacant inner-city lots (Brown *et al*., 2002).

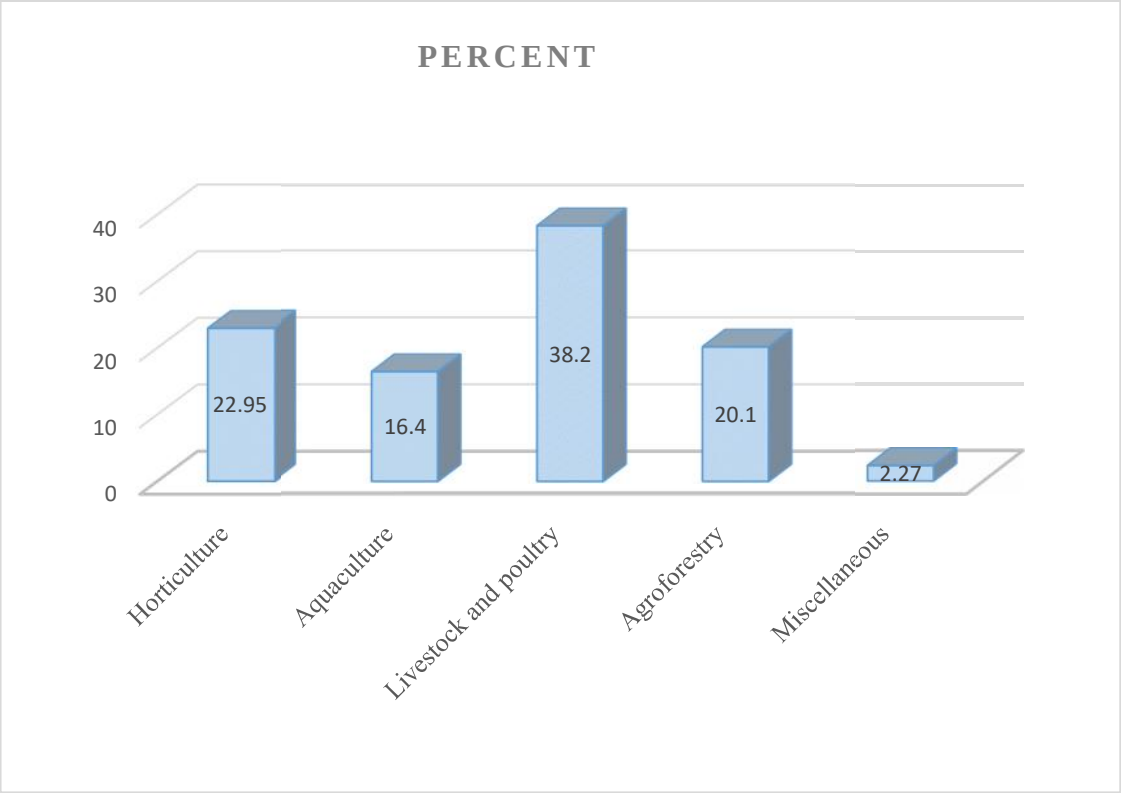
Urban agriculture can be an important part of an urban livelihood strategy. Various studies have demonstrated that it can have some impact on household food security, either by providing an additional income source, increasing dietary diversity, or helping to protect against seasonal unavailability in the food supply (Sustainable Development Solution Network, 2013).Typically urban agriculture applies intensive production methods, frequently using and reusing natural resources and urban wastes,

to yield a diverse array of land, water, and air based fauna and flora, contributing to the food security, health, livelihood, and environment of the individual, household, and community (Smit & Ratta, 2001). Urban agriculture is considered to be part of the informal sector because it shares the same characteristics, such as simple access, dependence on indigenous resources, labour intensive, lack of formal training and irregular markets. In the midst of concrete jungles, urban agriculture is perceived as a sign of hope, the ability to breath.

Several authors emphasize areas where theliterature on urban agriculture is commonly weak. Page (2002), conducted a study on urban agriculture in Cameroon and argues that the development of literature particularly, has a tendency to neglect the history of urban farming and its political implications. Furthermore, describing urban agriculture exclusively in terms of an economic response to hardship neglects the cultural, political, ecological and value dimensions of farming activities. Therefore, the present study states the contribution of agriculture in reducing the vulnerability and ensuring the sustainable livelihood of the urban poor. In this context following Ellis (1998) seven indicators are used to assess the contribution of agriculture in sustainability of urban livelihood. The indicators are income, food, health, education, clothing, interpersonal relations and market demand. To understand the role of agriculture in fulfilling basic need, half (353) of the respondents were selected from those who were involved in agricultural activities, here another half were not involved in agricultural activities.

Chart 7.2 shows that 22.95 percent respondents were involved in producing vegetables and fruits. But in most cases the respondents were not the owner of farm but the sharecroppers. The highest percent (38.2%) were involved in livestock rearing and 20.1 percent in homestead forestry.

Chart 7.2 Agricultural activities in the study area



Source: Field survey, 2014-2015

The common farming activity in the study area is presented in the Table 7.7.

Table 7.7 Common farming activities in the study area

Farming systems	Products	Fields/where and how
Aquaculture	Fish, vegetables, seaweed, fodder	Ponds, river, cages, estuaries, sewage, lagoons, wetlands
Horticulture	Vegetables, fruit, compost	Home sites, parks, rights-of-way, rooftops, containers, wetlands
Livestock and Poultry	Milk, eggs, meat, manure, hides, fur	Zero-grazing, railways and roadsides, hillsides, peri urban open spaces
Agroforestry	Fuel, fruit, nuts, compost, building and handicraft materials	Street trees, home sites, steep slopes, vineyards, greenbelts, wetlands, orchard, forests, parks, hedgerows
Miscellaneous	Houseplants, medicine, beverages, herbs, flowers, insecticides, mushrooms	Ornamental horticulture, rooftops, containers, sheds, beehives, cages, urban forests

Source: Author's compilation

In this study aquaculture includes fish crops of all types as well as many vegetable crops. It takes place in man-made tanks or in ponds, lakes, rivers, estuaries. Fish and water vegetables raised in wastewater are sometimes purified less completely than

that needed for direct human consumption. In many cases, the process of raising these crops purifies the wastewater to a cleaner state than some current sources of potable water. Intensive production of vegetables and fruits (including market gardening or truck farming) is the most common in the study area. Poorest slum dwellers growing a few Solanum lycopersicum*(*tomato*)*and brinjals on some spaces around the hut andinvolved in agribusinesses beside the railways especially at Khalishpur. Urban crops are generally perishable, high-value, or special crops, including culinary and medicinal herbs. Some special horticultural crops are presented in the Table 7.8.

The range of livestock raised in cities includes chicken, cows, goats, ducks, geese, pigeons and worms. Animal husbandry generally has a main product (meat) and a number of useful by products, including milk, eggs, fur, hides, feathers, and dung. In poor families elsewhere, some of these by products are more important than the meat. The animals are often treated by the poorest as insurance they can be sold in an emergency as a source of quick cash. Urban poultry production has an important role to play in the future food supply in Khulna city.

Particularly in Tutpara, Nirala and Gollamari areas trees offer the poorest urban residents a means of generating income. Activities include collecting nuts; recovering fallen trees for use as fuel wood, construction material, or wood for handicrafts; and gathering fodder, herbs, or shrubbery. Bees are essential for both agricultural and natural ecosystems, and worm production is essential for composting especially for shrimp cultivation. Moreover beverage crops including grapes, palm, medicinal crops, cactus, flowers and other ornamentals are highly perishable in the study area.

As women have reproductive roles they predominate in backyard gardening. A woman in Gollamari told that “men can control larger portions of land and tend to produce cereal crops, whereas women have small plots that they work more intensively to produce vegetables”. In terms of livestock and poultry production generally women are involved, though women are more likely to enter into collective poultry production than their husbands are.

The most dominant plant encountered in the study area were Carica papaya (papaya), Musa paradisiaca (banana), Momordica charantia(bitter gourd) and Piper betle (betel plant). Nearly one-third of the tree population in the study area had medicinal

properties. A large proportion of plants have grown in the study area are Solanum lycopersicum (tomato) and brinjal.

Table 7.8 Horticultural products in the study area

Scientific Name	**Common Name**	**Relative Abundance**
Carica papaya, Musa paradisiaca, Psidium guajava Momordica charantia, Piper betle (Plant)	Papaya banana, Guava tree and other fruit tree, Bitter gourd, Betel plant	46.3
Azadirachta indica, Gada, Epipremnum aureum, Rosa species and Jasminum species	Neem tree, Gada, money plant,rose and jasmine	28.8
Cocos nucifera, Albizia saman	Coconut, rain tree	24.9

Plants grown for consumption included Cocos nucifera, Carica papaya, Musa paradisiaca (fruits and leaves), provide rich sources of proteins, vitamins and minerals, and are known to play a vital role in meeting nutritional deficiencies and alleviating poverty. It is found that the majority of the trees found in the study areas have multiple uses and are of high economic value (Table 6.2). Notably, almost all the plants encountered were actively planted by the respondents especially by women.

7.4.2 Agriculture in fulfilling Basic need: In the study area the respondents are benefited from urban agriculture. It contributes in income, food improving health, enhancing education and developing interpersonal communication (Table 7.9).

7.4.2.1 Income: Urban agriculture expands the economic base of the city through production, processing, packaging, and marketing of consumable products. This results in an increase in entrepreneurial activities and the creation of jobs, as well as reducing food costs and improving quality (Smit & Ratta, 2001). In the study area a range of occupation were observed taking place under tree canopies, including the grocery shop, chula making, kitchen market, tea stalls and telephone booths. Among the respondents 42.2 percent told about moderate contribution of agriculture in income that means they were in Tk.40001- Tk.6000 income group and 10.8 percent were in Tk.6001- Tk.8000 income group and mentioned about good contribution of agriculture in income.

7.4.2.2 Food: Urban agriculture is associated with increased consumption of fruits and vegetables (Golden, 2013*)* which decrease risk for disease and can be a cost-effective way to provide citizens with quality, fresh produce in urban settings. People

are more likely to try new vegetables when they take an active role in the planting and cultivation of an urban garden. Daily intake of a variety of fruits and vegetables is linked to a decreased risk of chronic diseases including diabetes, heart disease and cancer.

Nearly 42 percent respondents responded that agriculture contribute to have two times meal in a day. Though, as noted by the respondents, fishing is not done at commercial quantity, but it does for meeting food needs. Many urban gardens reduce the strain on food banks and other emergency food providers by donating shares of their harvest and provide fresh produce in areas that otherwise might be food deserts.

Table: 7.9 Contribution of agriculture in fulfilling basic need of the respondents

Contribution of agriculture in sustainable livelihood	Percentage distribution of the respondents regarding basic need						
	Income	Food	Health	Education	Clothing	Interpersonal relations	Market demand
Very low sustainability (no contribution at all)	2.5	2.8	2.0	3.7	3.7	4.0	48.4
Low sustainability (low contribution)	42.5	37.1	37.1	22.9	36.5	26.1	41.1
Moderate sustainability (moderate contribution)	42.2	41.6	44.5	53.3	43.6	43.3	10.2
Sustainable enough (Good contribution)	10.8	15.0	12.2	15.0	13.3	20.1	.3
Well sustainability (Very good contribution)	2.0	3.4	4.2	5.1	2.8	6.5	0.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Author's compilation based on field survey 2014-2015

A comparative analysis has been presented regarding the role of agriculture in fulfilling the demand of income and food.

From the Table 7.10 it is found that among the respondents involved in agriculture 15.01percent respondents could receive the food for three times in a day but it was 5.10percent from those who were not involved in agricultural activities. The mean income of the respondents not involved in agricultural activities is less than those who were involved in agricultural activities.

Table 7. 10 Comparative analysis on the role of agriculture in food and income

Involvement in Agricultural activities	Food security (Percentage distribution of the Respondents)					Income	
	Very low security	Less security	Moderate security	Secured enough	Well secured	Mean income (BDT)	Standard Deviation
Not involved in agricultural activities (N- 353)	19.55	41.08	33.14	5.10	1.13	4376.06	2190.266
Involved in agricultural activities (N- 353)	2.83	37.11	41.64	15.01	3.40	5080.45	2296.585

Source: Author's compilation

7.4.2.3 Health: When individuals come together around urban agriculture, physical activity levels are often increased (Kingsley *et al*., 2009). Through the Focus Group Discussion the respondents informed that everything involved in gardening, from turning the soil to digging holes, contributes to an individual's physical activity. Many state that working in agriculture is much more interesting and fulfilling the need than going to the gym. Households in Khulna city take advantage of vacant land and contribute not only to their household food needs but also the needs of their resident city. Regarding health, 44.5 percent respondents argued that agricultural production has its moderate contribution and 12.2 percent respondents told about good contribution by providing with food, fodder and medicinal ingredients (Table 7.9).

7.4.2.4 Education: Some community urban farms can be quite efficient and help women to find work, who in some cases are marginalized from finding employment in the formal economy. From the case study (Case study- 2) it is acknowledged that milk and egg directly contribute in nutrition diet that subsidizes in brain development and the female respondent reported that this source of food subsidize their child education. From the Table 7.9 it is found that 53.3 percent respondents reported that the agricultural production moderately contributes in their child education but 15 percent respondents told about the good contribution in this regard.

7.4.2.5 Social Relations: Urban agricultural activities can have a large impact on the social and emotional well-being of individuals. Individuals report to have decreased levels of stress and better overall mental health when they have opportunities to interact with nature through a garden. Urban gardens are thought to be relaxing and calming, and offer a space of retreat in densely populated urban areas (Wakefield*et al*., 2007). Urban gardens are often places that facilitate positive social interaction,

which also contributes to overall social and emotional well-being. Many gardens facilitate the improvement of social networks within the communities that they are located. For many neighborhoods, gardens provide a 'symbolic focus', which leads to increased neighborhood pride (Armstrong, 2000).

From the case study (Case study- 2) and Focus Group Discussion it is informed that when individuals come together around urban agriculture, physical activity levels are often increased. Everything that is involved in starting and maintaining a garden, from turning the soil to digging holes, contributes to an individual's physical activity. Many state that working in agriculture is much more interesting and fulfilling than going to the gym, and that it makes getting exercise. In addition through urban agriculture is actually getting to the gardens- many people either walk or ride their bike to the sites, which provides many physical benefits.

Some community urban farms can be quite efficient and help women to find work, who in some cases are marginalized from finding employment in the formal economy. The respondents in the study area were often seen gathering together in vegetable garden and communicating. Agricultural activities appeared to have an important utility function as physical entities, beyond their species-specific sacred, cultural or other properties.More than 43 percent respondents told about moderate contribution that is medium sustainability and 20.1 percent respondents informed that they could maintain good social relation as the contribution of agriculture (Table 7.9). Urban agriculture may improve the livability and built environment in communities that lack supermarkets and other infrastructure due to the presence of high unemployment caused by deindustrialization.

7.4.2.6 Fulfilling Market demand: Community and residential gardening, as well as small-scale farming, save household food dollars. They promote nutrition and free cash for non-garden foods and other items. This allows families to generate larger incomes selling to local grocers or to local outdoor markets. Regarding the fulfillment of market demand the response of the respondents is not satisfactory. Table 7.9 presents that 41.1 percent of the respondents reported about the low contribution of agriculture in fulfilling market demand.

Table 7.11 Role of agriculture in sustainable livelihood

Independent variables	Dependent variable: CumulativeAgricultureIndex (CAI)			
	Coefficients	**T**	**Standard Error**	**Significance level**
Constant)	0.999	2.455	0.407	0.015
Income	0.312	28.342	0.037	0.000
Food	0.274	41.614	0.196	0.000
Health	0.246	40.472	0.066	0.000
Education	0.256	32.661	0.441	0.000
Interpersonal relations	0.131	17.416	0.049	0.000
Market demand	0.031	3.034		0.003
N= 707; Adjusted R square = 0.992; F= 7034.266 (Significance Level: 0.000),Chi-square: 220.463, Fisher's exact test 0.000				

The regression analysis provides a clear representation about the contribution of agriculture. The value of R^2 (0.99) denotes that the agriculture has its enormous contribution to fulfill the basic need of the respondents. The regression coefficients indicatethat the agricultural contribution in income (31%), food (27%), access to health (24%), education (25%) and 13% in interpersonal relations ultimately ensures the sustainability of livelihood of the respondents.

Urban agriculture improves the quality of the urban environment through greening and results in a reduction in pollution. It also makes of the city a healthier place to live by improving the quality of the environment. It has the potential to become a dynamic economic sector that quickly adapts to changing urban conditions and demands, intensifying its productivity and diversifying its functions.

Thus the constraints and limitation of urban agriculture should be removed. From the case study it is observed that space is at a premium in cities and is accordingly expensive and difficult to secure. In some cases farms are built on vacant land that offers little security in terms of long-term land access. Community gardens are typically established on vacant or abandoned land, and the farmers/gardeners often do not own the land they tend. Therefore, in Khulna city public and private land, authorize leasing agreements with private landowners, clear contaminated land, and authorize use of municipal land can inventory. Agricultural training can help to ensure greater farming success in this regard.

7.5 Coping Strategies: In the absence of formal safety nets, people rely heavily on their own strategies at the community, household, and individual levels. During times of economic stress, these strategies are likely to be the only available options.

Household strategies for coping with shocks fall into several categories: income-related strategies (include diversification, temporary migration in search of alternative income sources, and casual labor), expenditure-reduction strategies save money by cutting spending on consumption and purchases.Household composition strategies may include temporary or long-term migration, placing children in foster care, and in extreme cases, breaking up a household, and food consumption or rationing strategies.

Kinship linkages have weakened significantly over time. But they still exist among the indigenous population and can be a significant source of assistance in times of difficulty (Fayorsey, 1995). Kinship linkages are also common among the respondents. More than 8 percent respondents told about kinship ties by which they survive together specially at the time of crises. But because these linkages may span considerably greater physical distances, they are often not a ready source of support in an emergency. Among the respondents 12.59 percent told about community sentiment as an essential coping strategy (Table 7.12).

In the indigenous communities of the city, 'town councils' help maintain cleanliness and community cohesion, although the extent to which these councils are active varies considerably. But participation in community welfare or self-help organizations is quite low as noted above. Subsequent focus groups revealed that this finding reflected formal membership more than informal participation and that participation in many organizations is very informal. Nevertheless, even these data indicate a much higher rate of participation among male-headed households than among female-headed households and among migrant as opposed to indigenous households.

Membership in a tan samiti (cooperative) is a common means of accumulating capital for either to purchase or their business investment. The most common form of tan samiti is organized by a group of about 15 to 20 members. Each member deposits 20-50 taka every day. After 1 week the total amount of taka is provided by the group to one member. In this process every member receives this facility for a time and a good amount of money could receive by them and to contribute in business and other income generating activities.

Table 7.12notes that 10.47 percent of all households reported having to rely on loan from family, community and from GOs and NGOs. Households that reported increasing income-generating activities in the previous year engaged in a significantly

higher number of activities in tree plantation (12.73) than the training facilities (of the sample 9.05 percent) and were making much better use of their labor resources. Thus tree contributes in greater extent in enhancing livelihood opportunities of the urban poor. In case of 34.23 percent of households, people temporarily left their homes in the city and went elsewhere looking for work.

Expenditure reduction strategies are also common. Typically, households delay largepurchases (or do not make them at all), but in times of real economic stress people cut more important forms of expenditure. Food purchases, the largest and most elastic element of the household expenditures, may be the first target for reductions. Under more severe stress households may cut expenditures for health care or education (Maxwell *et al*., 2000).

Table 7.12 Coping strategies in urban livelihood

Strategies	**Number and percentage of the respondents**	
	Number	Percent
Community work	89	12.59
Kinship ties	59	8.35
Loan facilities	74	10.47
Applying traditional knowledge	89	12.59
Tree plantation	90	12.73
Training	64	9.05
Work through all the year round	242	34.23
Total	707	100.00

Source: Field survey, 2014-2015

The case studies showed that households employ a variety of strategies related to food consumption at times when the available food in the household is insufficient to feed all members and there is no money to buy more. In generic terms, these include dietary changes, temporary measures to increase the amount of food available, temporary measures to reduce the number of people who have to be fed,and rationing or somehow managing the shortfall in available food.

In this study agriculture is clearly reported as the most important income source for producers in the five study areas of Khulna city. It is found that a large part of the people involved in urban agriculture is the urban poor. Especially in Tutpara and Gollamari, urban agriculture has contributed positively towards food security for the dwellers. In Khalishpur slum, families involved in urban agriculture have been able to add an indirect income which is significant in relation to the household

economies. In Tutpara, Nirala and Gollamari crop cultivation, vegetable cultivation and of innovative gardening also help in enhance self-sustenance that ultimately improving livelihoods.

However, the majority of agricultural production is for self-consumption, with surpluses being sold in the market. Urban farmers face many similar challenges when starting or expanding an urban farm like, lack of land security, poor access to water, and contaminated soil, among others. They use variety of methods to increase income and work towards financial sustainability. In this regard a plan for long-term financial sustainability is vital for ensuring both long-term success and other funding opportunities. Governmental policy should create the proper framework conditions for optimal development of the social, economic and ecological benefits of urban agriculture.

The study shows that household heads were working as wage laborers, small-scale business owner, construction workers, van pullers and housemaids. A significant number of women from both female-headed and male-headed households engaged with different income generating activities. It is found that grocery shop, kitchen market, cloth businesses, tea stall in open spaces were viable livelihoods options as small-scale businesses for vulnerable people.

The household head received productive assets to establish small–scale businesses, undertake livestock and poultry rearing, set up grocery shops, buy sewing machines and mortgage in land. A number of respondents also received skill-based training for small businesses, poultry and livestock rearing and vegetable gardening. Although the percentages for households mentioning agriculture as the main occupation are lower than the percentage for households identifying industrial work and business as main income sources, agriculture is clearly reported as the most important income source for producers in the five study areas of Khulna city. These include provision of better nutrition, poverty alleviation, employment creation and environmental conservation.

Chapter Eight

Gender Difference in Access to and Control over Resources during Disaster

8.1 Introduction: A person's level of risk to a hazard and their capacity to respond to or prepare for a disaster can be affected by a person's gender. Although 'gender' is not just about women, it is a reality that women and girls are disproportionately affected by disasters. This is due to the roles, responsibilities and attitudes attributed to men and women, which impact on their access to resources and information; decision making; participation and leadership. Disasters often exacerbate and reinforce gender inequalities (International Federation of Red Cross and Red Crescent Societies, 2015).

Men and women may have access to resources, either within or outside the household, in that they are able to use them in some ways. They may not, however, always have control over these resources. Sixty-five percent of the world's urban population currently live in coastal areas, and this percentage is expected to increase to seventy-four percent by 2025 (United Nations Human settlements Programme, 2011). Most mega-cities are either located on seacoasts or directly linked with riverbeds, increasing the exposure in hazard-prone areas. According to the Intergovernmental Panel on Climate Change(2012), by 2100, with the likelihood of 90–100 percent sea-level rise will contribute to upward trends in extreme coastal high water levels. Potential hazards in coastal areas and cities built near rivers are coastal flooding, erosion of beaches, sedimentation in river floors, flooding, and landslides. These hazards can intensify with a combination of intensified tropical storms. In addition to these hazards, cities are also expected to be affected by severe heat and cold events. women's and men's different roles, responsibilities, and access to resources influence how each will be affected by different hazards, and how they will cope with and recover from disaster. During disaster women face number of problems due to their gender identity (Nasreen, 2008).

Women are the most vulnerable and the best poised to curb the effects of climate change (Women's Environment & Development Organization, 2007). It has been also observed that sometimes women face an array of physical, psychological and

social problems (Faisal &Kabir, 2005; Ahmed, 2010). Salinity, waterlogging and frequently occurring natural disaster due to climate change have been making this scenario more difficult and complex. In recent study Nasreen (2012) shows that climate change induced disasters affect both women and men but the burden of coping with disasters falls heavily on women. Women usually single women without children, widows or divorced have less ownership over resources such as land titles, property ownership, household assets and savings. These increase the severity of loss during disasters and limit a person's ability to rebuild their livelihoods.

Certain aspects of gender equality, such as female education and women's share of employment, can have a positive impact on economy (Kabeer & Natali, 2013). Many UN agencies and international organizations have sought to incorporate gender into their policies (United Nations, 2009). The centrality of gender equality has also been articulated in the outcome document of the UnitedNations Conference on Sustainable Development, entitled 'The future we want', adopted in 2012, which included recognition of the importance of gender equality and women's empowerment across the three pillars of sustainable development, economic, social and environmental and resolve to promote gender equality and women's full participation in sustainable development policies, programmes and decision-making at all levels (United Nations, 2014). The process of empowerment undoubtedly differs from situation to situation of vulnerability. Thereby, empowerment depends on challenging change agents and communities based upon the extent of-the presence or absence of empowerment elements such as access to knowledge and skills, access to income, assets and credit facilities and access to entitlements over land.

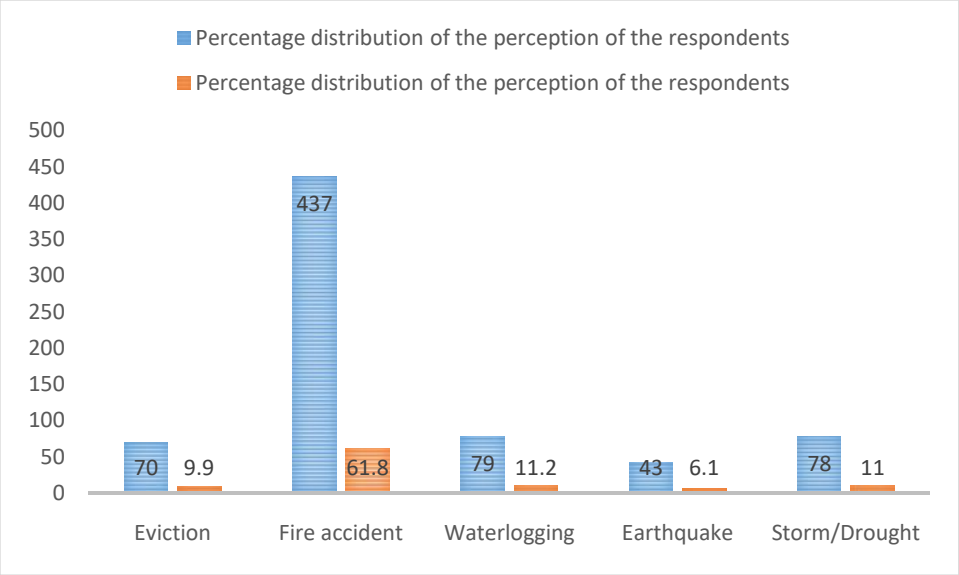
In the southwest coast including the Khulna area, women are more vulnerable to the impacts of climate change since they are often not allowed to participate in the public activities and discussions, and therefore are less likely to receive critical information for emergency preparedness. Women have very limited access to information and training which restrict their capacity of adapting toclimate change impacts. Besides, most climate change policies and programs are not gender sensitive (United Nations Development Programme, 2011). In many cases, socio-economic factors also hinder women's adaptation capacities and increase their vulnerability. The study thus discusses different tangible elements of sustainable livelihoods for

women within the overarching frame of gender responsive economic, social and environmental sustainability.

Considering this the access to and control over resources during disaster in Khulna city is measured by CEI (Cumulative Empowerment Index) including seven indicators: household asset, income security, food security, infrastructural support, broader organizational support, knowledge about disaster and emergency response

8.2 Disaster in the Study Area: In the study area the respondents are staying in dangerous places such as riverbanks, steep slopes, along railroad tracks, or near toxic waste dumps. The occupied land is needed for an infrastructure project that is required for the general welfare; or an occupant is in clear violation of another person's property rights. This study focuses on women's participation, perceptions and local contextualization in Khulna City. These processes are undertaken to address livelihood challenges of urban dwellers.

Chart 8.1 Serious disaster in the locality



Source: Field survey, 2014-2015

A combination of human and natural factors results in various urban hazards with serious impacts on the poor. In the study area flooding and waterlogging due to poor drainage are widespread. Windstorms and urban fires cause havoc especially in slums because of the weak construction of houses; unplanned urbanization and sub-standard

building practices pose great risk in the event of a major earthquake. The serious disaster especially facing by the respondents is presented in the Chart 8.1.

As in urban area the respondents noted (Chart 8.1) about fire accident as frequently occurred and serious disaster in the locality. Eviction is also responsible for disruption of livelihood of the respondents. Another disaster cause vulnerability of the respondents is waterlogging. Among the respondents female are affected more from disaster than the male.The frequency of these disasters is presented in the Table 8.1.

Table 8.1 The frequency of disaster in the study area

Serious disaster in the locality	**Percentage distribution of the respondents regarding prevalence of disaster**				
Fire accident	Never(35.1)	Once (14.9)	three times (20.7)	Four times (23.2)	Five times and more (6.2)
Eviction	Threated at present (32.2)	Threated more than three times (19.2)	Threated more than two times (28.7)	Threated once (10.7)	No threat (9.1)
Waterlogging	Waterlogged during rainy season (56.0)	Waterlogged due to river flow (19.4)	Always flooded (18.1)	Flood free (6.5)	

Source: Field survey, 2014-2015

Among the respondents 20.7 percent informed that fire accident occurred in their locality for about three times whereas, in 23.2 percent cases it was four times and 6.2 percent respondents told about five or more times attacked by fire accident. In the study area especially in the slum areas, the lanes are so narrow that it is not possible for Fire Service and Civil Defense Authorityto go through their equipment to distinguish the fire and this is why, the fire disrupts the locality and create disaster situation. Through Focus Group Discussion the respondents informed that in most cases fire safety starts in the kitchen. Cooking by single chula inside the house is the leading cause of home fires. Electrical problems and delays to respond to fire incidents and inadequate water hydrants hundred houses have been destroyed by fire. Frailty and health problems make the women children and elderly, particularly those over the age of 75, at increased risk of accidents, usually occurring at home.

8.3 Access to and Control over Resources during Disaster: In practice, not all assets are owned by, or fully in the control of, men and women who are attempting to

use them in their livelihoods strategies but in practice institutional and practical barriers may limit the access to the poor to the benefits of such programmes. It is therefore important to assess and distinguish between access to and control over assets.

Control over resources means more than use, as it implies power and a control over decision-making about how and when the resource should be used or distributed. The different access to and control over resources by the various men and women both within households and more widely within urban communities is a key area of concern. In urban areas individuals and groups exercise their power to ensure control over resources.

Sen's concept of 'entitlement' can be helpful in understanding the extent of peoples' access to and control over resources (Sen, 1981). 'Entitlement' is the ability to command access to different forms of capital assets through the use of financial resources, formal and informal relationships with other groups and individuals or legal rights. To identify the access and control over resources collected data have been used to demonstrate women's lack of secure access to resources, including land, income, food, infrastructural facility, different organizational support, information and participation in emergency situation. Chambers's distinction between tangible and intangible assets (Chambers, 1995) is another way of looking at the difference between access to and control over resources. Thus tangible assets are those physical assets which are owned, while intangible assets such as social capital or legal frameworks help men and women to ensure their access to assets which they do not directly own or have control over.

The study includes tangible assets as land and common property resources capital, knowledge, and intangible assets as different organizational support, and infrastructural facilities. However, many of the patterns and conditions that tend to characterise urban areas mean that the emphasis on different types of assets used by the urban poor and the factors affecting the accessibility of these assets. In terms of gender analysis access to and control over resources have been identified as key gender issues. Data collected using the tools provided in this study were used to demonstrate women's lack of secure access to resources, including land, income, food, infrastructural facility, different organizational support, information and

participation in emergency situation.Considering these seven indicators the regression analysis (Table 8.4) has been made.

Each indicator again has a number of sub-indicators. The quantitative part correspond to five categories e.g., 1=very low and 5=very high. Each indicator assigned a quantitative rank from 1 to 5 according to the total scorefor access to and control over resources based on the field survey. Table 8.2 represents the way of constructing the CEI: Measurement of Explained (Dependent) Variables.

The CEI range is divided into five categories and labeled asvery highly disaster prone (27-36), highly disaster prone (37-46), moderately disaster prone (47-56), low disaster prone (57-66) and very low disaster prone (67 and above).

Table 8.2 Indicators of Cumulative Empowerment Index

Indicators	**Quantitative rank**	**Qualitative Rank**	**CEI Range 27- 69**
Access to household resources	1 to 5	7	(1-5).7=7-35
Income security	1 to 5	6	(1-5).6=6-30
Food security	1 to 5	5	(1-5).5=5-25
Infrastructural facilities	1 to 5	4	(1-5).4=4-20
Broader organizational support	1 to 5	3	(1-5).3=3-15
Knowledge about disaster	1 to 5	2	(1-5).2=2-10
Emergency responses	1 to 5	1	(1-5).1=1-5

The multiple regression model of this case is:

$$CEI = \beta 0 + \beta_1 Shelter + \beta_2 Inc + \beta_3 Org + \beta_4 Infra + \beta_5 Food + \beta_6 Knowledge + \beta_7 Age + u$$

Where CEI= Cumulative Empowerment Index

Shelter = Access to shelter during disaster
Inc = Income security of the respondents

Org = Organizational support

Infra= Infrastructural facilities in the locality

Food = Security of food during disaster

Knowledge = Knowledge about disaster of the respondents

Age = Age of the respondents

β0 = Intercept term

β1, β2, β3, β4,β5, β6, β7 =Regression co- efficient

u = Stochastic disturbance term

The access to and control over resources are presented in the Table 8.3.

Table 8.3 Percentage distribution of the respondents by access to and control over resources during disaster

Access to and Control over Resources	**Percentage distribution of the respondents by control over resources**					**Total**
	1	2	3	4	5	
Access to shelter	Public school/community center (60.3)	Relatives house (15.8)	Own house (19.4)	Own house with 2 decimal space (3.3)	Own safe location (1.3)	100.00
Income security	Income not sufficient (68.09)	Adequate income (19.4)	Production facilities (9.6)	Adequate production (1.1)	Savings (1.0)	100.00
Food Security	No security (Frequently hungry in whole day) (88.7)	Less security (Having meal for one time in a day) (10.0)	Moderate security (Having meal for two times in a day) (1.0)	Secured enough (Having meal for three times in a day) (0.3)	Highly secured (Three times meal with extra food) (0.0)	100.00
Infrastructural facilities	Very low housing system (84.4)	Water facility (13.6)	Road facility (.1)	Health facility (0.6)	Electricity facility (1.3)	100.00
Broader organizational support	Moderate political support (44.1)	NGO support (34.7)	Responsive local government (19.5)	Enabling legislative support (1.4)	International organization (.3)	100.00
Knowledge about disaster	Very little knowledge (57.7)	Having local knowledge (33.2)	Public information to prevent (8.1)	Knowledge about early warning (0.7)	Training of rescue (0.3)	100.00
Emergency responses	To save life (24.5)	To reduce health impacts in family (33.5)	Contribute in economic solvency (34.2)	To ensure public safety (7.6)	To meet subsistence needs of the people (0.1)	100.00

Source: Field survey, 2014-2015

In the study area the population lives in slums are characterised by tenure insecurity and evictions, and controlled by land lords who charge exorbitant rates for basic services. Such situations deter investments for improving living conditions. Poor quality housing is typical and basic public are non-existent or very limited.

During disaster 19.4 percent respondent's family could take shelter in their house and 1.3 percent respondents had the access to own secured place. More than 68 percent respondents had no security of income during disaster and 9.6 percent respondents could maintain production facilities. Considering these seven indicators the regression model (Table 8.4) and regression coefficients have been made.

Table 8.4 Effects of determinants on women empowerment during disaster

Independent variables	Dependent variable: Cumulative Empowerment Index (CEI)		
	Coefficients	t (Significance level-0.000)	Standard Error
(Constant)	5.250	11.476	0.561
Housing support	0.621	66.144	0.015
Income security	0.422	45.867	0.031
Food security	0.171	19.834	0.035
Infrastructural facility	0.201	12	0.062
Knowledge about disaster	0.137	-1.983	0.374
Sex	0.029	3.333	0.104
N= 707; Adjusted R2 = 0.949; F= 2209.70 (Significance Level: 0.000)			

Table 8.4 analyses that the aforesaid variables have 95 percent influence on disaster situation. Among above indicators, housing support has the greater contribution (62%) to reduce the disaster risk in the locality than income security (42%), infrastructural facility (20%) and food security(17%).The gender distribution of these resources is presented in the Table 8.5.

8.3.1 Shelter: UN-HABITAT's *State of the World's Cities Report 2008-2009*(United Nations Human Settlements Programme, 2008) shows that "in some countries, woman-headed households suffer disproportionately from inadequate housing in poor urban neighbourhoods. In the study area, for example85.31 percent of woman-headed households suffer from shelter deprivations. These relate to the lack of durable housing, insufficient living space, poor access to clean water, inadequate sanitation or insecure tenure. The initiatives undertaken so far have limited success especially in granting tenure security, and the private landowners or local authorities that trespassed public spaces resort to forceful eviction. Amidst all these, there is the need for the formulation and implementation of climate resilience policies that address stakeholder participations in mitigating climate change consequences and enhance livelihood development.

It is vital that women and men from all social and economic groupings in disaster-affected communities actively participate in the design and location of new housing and communal infrastructure, such as water and sanitation facilities and community halls, as well as the repair of existing structures (Chew & Ramdas, 2005).

Among the respondents 53.90 male household head had to rely on public accommodation during disaster but in case of female headed household the

percentage is 85.31. More than 23 percent male heads had the access to stay at their own house where in case of female respondents the percentage is only 4.20.

Table 8.5 Gender difference of the respondents regarding access to and control over resources during disaster

Access to shelter	**Number and Percentage distribution of the respondents by sex**				
	Male (N-564)		Female (N-143)		Total percent
	No.	Percent	No.	Percent	
Public school/community center	304	53.90	122	85.31	60.3
Relative's house	98	17.38	14	9.79	15.8
Own house	131	23.23	6	4.20	19.4
Own house with 2 decimal space	22	3.90	1	0.70	3.3
Own safe location	9	1.60	0	0.0	1.3
Income security					
Income not sufficient	358	63.48	129	90.21	68.9
Access to adequate income	126	22.46	11	7.69	19.4
Production facilities	65	11.52	3	2.10	9.6
Adequate production	8	1.42	0	0.0	1.1
Savings	7	1.24	0	0.0	1.0
Food security					
No security	490	86.88	137	95.80	88.7
Less security	66	11.70	5	3.50	10.0
Moderate security	6	1.06	1	0.70	1.0
Secured enough	2	0.35	0	0.0	0.3
Highly secured	-	-	-	-	-
Organizational support					
Moderate political support	250	44.33	62	43.36	44.1
NGO support	177	31.38	68	47.55	34.7
Responsive local government	126	22.34	12	8.39	19.5
Enabling legislative support	9	1.60	1	0.70	1.4
International organization	2	0.35	0	0.0	0.3
Knowledge about disaster					
Very little knowledge	345	61.17	63	44.06	57.7
Having traditional knowledge	166	29.43	69	48.25	33.2
Public information to prevent	49	8.69	8	5.59	8.1
Knowledge about early warning	2	0.35	3	2.09	0.7
Training of rescue	2	0.35	0	0.0	0.3
Emergency responses					
To save life	108	19.15	65	45.45	24.5
To reduce health problems in family	180	31.91	57	39.8	33.5
Contribute in economic solvency	224	39.72	18	12.2	34.2
To ensure public safety	51	9.04	3	2.10	7.6
To meet subsistence needs of the people	1	0.70	0	0.0	0.1
Infrastructural facilities					
Very low housing system	471	83.51	126	88.11	84.4
Access to water facility	79	14.01	17	11.89	13.6
Access to road facility	1	0.18	0	0.0	0.1
Access to health facility	4	0.71	0	0.0	0.6
Access to electricity facility	9	1.60	0	0.0	1.3

Source: Field survey, 2014-2015

The vulnerable people of the study area face various barriers to obtaining post-disaster land and property rights. Housing construction projects can offer such people opportunities to recognize formal ownership of this important asset. This may then in turn be used to gain access to credit for other productive activities.

8.3.2 Income security: Even though women often face inequitable access to control over resources and income generation opportunities, disaster and climate risk management must take into account the important economic contributions of women and how they are, or might be, affected by disasters. As a United Nations Environment Programme study explains: women contribute work and energy towards income generation and carry out a disproportional amount of daily labour compared to men in household and community spheres, such as cooking, cleaning, child care, care of older or sick family members, providing work for collective projects and during weddings, funerals and other cultural ceremonies (Nellemann *et al*., 2011).

The roles women play in contributing to a household's food security or income, whether as family members or heads of the household, need to be understood. Women's livelihood recovery activities should be designed that meet their needs, in addition to those of the men in the household. From the Table 8.5 it is found that 90.21 percent female households heads can not earn sufficient income where 63.48 male respondents were in this group. More than 11percent male household heads had the access to production facilities but only 2.10 percent respondents had this access.

8.3.3 Food security: Traditional roles mean women are usually responsible for household tasks, including ensuring enough food for her family. It is evident that women's own adoptive techniques and initiatives become crucial for their family sustenance and ensuring food security (Nasreen, 2008). After a disaster, food insecurity places large amounts of pressure on women as they must provide for their families. This may be further impacted due to a family's poverty levels, highlighting the added vulnerabilities for people of lower socioeconomic status.

It is also found from the Table 8.5 that 86.88 percent male respondents had no security of food during disaster and among the female headed household 95.80 percent were in this group. Among the female household head no one had the access to secured food and 1.06 percent male respondents could maintain moderate security that means having two times in a day during disaster. Female headed households or

male family members have migrated to find work elsewhere. In the study area women's main producing activities are cultivating home vegetable gardens, rearing livestock, playing key roles in crop and fish production and marketing, running small businesses such as selling snacks or making cakes and day labour.

8.3.4 Organizational Support during Disaster: Women are most often careers for the elderly. But with increased urbanisation and greater numbers entering the workforce, women are less likely to be at home during the day to spend time with older relatives (United Nations Human Settlements Programme, 2008). While governments promote more gender equitable work places, they should also invest in gender-responsive programmes and services for older people, providing not only care but also political support for them to stay active.More than 44 percent male respondents had this type of support and 47.55 percent female respondents had the access to the facilities of NGOs (Table 8.5).

8.3.5 Access to Information: Globally women and girls are systematically excluded from education, particularly those of lower socioeconomic status: 876 million people in the world are illiterate, of them two third are women (United Nations, 2009). Gender inequities can be evident in a lack of, or inadequate, early warning information targeting women and evacuation procedures and arrangements. Indeed, knowledge of early warnings and the decision to evacuate may be the exclusive domain of men. In some cases, women may be ill-informed about natural hazards and not allowed to make the decision to evacuate. This was the case, for example, in Bangladesh's Cyclone Gorky in 1991 in which women accounted for 90 percent of the 140,000 fatalities (Ikeda, 1995). From the Focus Group Discussion it is recognized that women felt that the most reliable information sources were their neighbors and community members, second leading source is mass media and family then relatives coming in third most reliable source. From the case study it is also identified that the gender difference and economic condition play influential role in disaster management. Moreover household members who planted vegetable (like papaya, brinjal, Solanum lycopersicum, and gourd) could participate more in disaster management than those having less or no access to natural resources (Case study- 2). The study found evidence that community diversity (in wealth, ethnicity, and power) hinders participation in community-level disaster mitigation strategies. For example, a respondent who was asked about the cause for not addressing the maintenance of

sluice gate by the community. She answered that especially the owners of ice factory locked the gate to preserve water for their factory and in most cases that is the cause of flooding.

After the initial observation Group Discussion were held with the participants. Among the respondents 48.25 percent female household heads reported having traditional knowledge, and 8.69 percent male respondents had access to public information to prevent disaster. Participants had showed their activitieswhat they had done in their homes to secure their furniture (Table 8.5). Furthermore, 0.35 percentmale participants answered that they had knowledge about early warning. The result showed that there was a strong potential forusing women's network and communication to disseminate disaster risk reduction strategy.

8.3.6 Emergency response: The frequent and different types of disaster management with the shift of paradigm from emergency response to proactive disaster risk reduction have been observed (Nasreen, 2012). The important roles or potential roles women take on are often not recognized, and women themselves are largely marginalized in the development of disaster risk reduction (DRR) policy and decision-making processes and their voices go unheard (United Nations, 2009).While women may not hold positions of visible political leadership (for example, as mayors), women are key to a society's social fabric and hence, its capacity for resilience. They shape behavior and transmit culture and knowledge through kin and social networks, which are critical to risk prevention and response efforts.

More than19 percent male respondents reported that they contributed to save life during disaster and 39.8 percent female respondents participated to reduce health related problems in family whereas only 2.10 percent respondents participated to ensure public safety.Furthermore 1 male respondentcan contribute to meet subsistence needs of the people (Table 8.5). Table 8.6 highlights that the male respondents participate more in community decision making process during the disaster period than the male counterparts.

During the response phase of a disaster, needs relating to gender and diversity are often overlooked. They can be seen as an addon or secondary to what would be considered essential relief, for example distributing food and shelter.

Table 8.6 Gender difference regarding participation in decision making to emergency at community level during disaster

Level of Participation	Number of respondents by sex		Total
	Male	Female	
Very low	65	108	173
Low	57	180	237
Moderate	18	224	242
Highly participate	3	51	54
Very highly participate	0	1	1
Total	143	564	707

Source: Field survey, 2014-2015

It is well demonstrated that gender and diversity is a priority in the emergency phase of a response, that it adds quality, reach and accountability to operations.Failure to use a gender and diversity approach can result in harmful or poor quality response,examples of gender and diversity vulnerabilities in urban disaster response and recovery.

8.3.7 Infrastructural facilities after Disaster: A growing number of urban governance programmes and tools have been developed to improve women's participation and empowerment, targeting diverse groups of women from the grassroots to technical experts to the highest levels of academia and politics. By empowering citizens and enabling them to request greater gender equality and accountability, these initiatives play a strong role in helping towns and cities develop into vibrant and sustainable living environments, with equitable economic and social benefits.

More than 80 percent of both male and female headed households reported about low housing facilities that mean low sanitation and poor drainage system at the time of waterlogging and fire accident (Table 8.5). In major cases, it is so tough to go through ambulance because of narrow lane. The respondents are also deprived from heath facility and power supply during disaster. After measuring by CEI the disaster situation of the respondents has been assessed that is presented in the Table 8.7.

From the Table 8.7 it is found that 37.41 percent male household heads were highly disaster-prone whereas, the female were 74.82 and no female household is in the category of very low disaster prone but 4.96 percent male household heads belong to this category**.**

Table 8.7 Disaster situation faced by the respondents on the basis of CEI

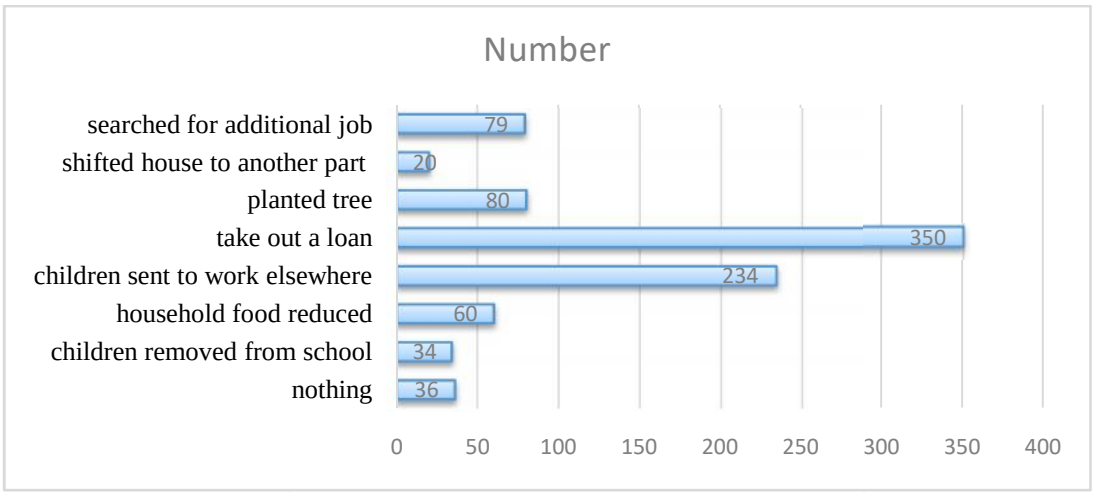
Disaster situation	Sex	
	Male	Female
Very highly disaster prone (27-36)	211 (37.41)	107 (74.82)
Highly disaster prone (37-46)	140 (24.82)	24 (16.78)
Moderately disaster prone (47-56)	122 (21.63)	10 (6.99)
Low disaster prone (57-66)	63(11.17)	2 (1.40)
Very low disaster prone (67 and above)	28 (4.96)	0
Total	564	143

Source: Author's compilation

8.4 Livelihood Risks and Mitigation Strategies: The major livelihood risks of the respondents are uncertainty associated with the job in shrimp industry. Shrimp cultivation has a risk of seasonality. The shrimp has its three months production and for the rest of the time,the workers have been workless, but the respondents want to cultivate white fish with shrimp in all the year round. Several other strategies were proposed by the beneficiaries involved in the above activities for managing risk, which have been listed in Chart 8.2.

8.4.1 Household Mitigation and Coping Strategies: Taking out a loan, followed by reducing household food expenditure at different times and in response to various types of shocks (such as a medical emergency) or, in the case of the financial strategies, to afford expenses such as weddings or ceremonies are the major coping strategies followed by the respondents.

Chart 8.2: Household coping strategies (multi- response)



Source: Field survey, 2014-2015

Households that were fully affected by disaster (crops, land, house, or grain stores) were significantly more likely to use the above coping strategies. In most cases, taking out a loan was the most common choice, nearly half of the households fully affected, reporting taking out a loan. The only exception was if grain stores were affected, then 60 of households said that they also had to reduce household consumption, whereas the grains were a source of food. Often these strategies were taken in conjunction with each other, such as taking a child out of school and sending them to live or work elsewhere, and reducing household food and searching for an additional job.

Households who planted vegetable (like papaya, brinjal, Solanum lycopersicum, gourd) were significantly more likely to have their land only partially affected compared to fully affected. In this regard, community-level strategies clearly mitigated floods for the communities that utilized them. However, the study found evidence that community diversity (in wealth, ethnicity, and power) hinders participation in community-level mitigation strategies.Lack of interest from the non-affected households meant that no community-wide action has been taken. Observation at a flood mitigation community meeting indicated that households at higher elevations appeared to be the most reluctant to engage in broader flood mitigation efforts (interview notes).

Sustainable cities support the equal participation of women and men, especially in urban planning and management, as well as governance. The study shows that in the study area women are participated in fulfilling basic need especially in their family, but there is still persistent under-representation by women decision-making at the time of emergency in disaster management. Women as well as men are fully involved in planning disaster risk reduction strategies and are full participants in recovery efforts are more likely to succeed. Disaster response strategies could protect and assist women as well as men are better for the community as a whole. Women should be effectively engaged in disaster and climate risk management prevention, planning, decision-making and implementation efforts. Moreover governments' engagement of women's civil society organizations should be incentivized as a way to overcome their exclusion from decision-making. This means that governments and international humanitarian actors must devote time to identifying women's associations and networks which are active in the community and creating mechanisms for their

effective participation.While governments promote more gender equitable work places, they should also invest in gender-responsive programmes and services for older people providing not only care but also political support for them to stay active. By empowering citizens and enabling those to request greater equality and accountability these initiatives could play a strong role in helping cities to develop into vibrant and sustainable living environments with equitable economic and social benefits.

Chapter Nine

Sustainable Urban Livelihood and Environment

9.1 Introduction: The livelihoods of the urban poor are defined in large part by the opportunities and constraints under which they are operating. It is therefore necessary, in order to understand the nature of sustainable urban livelihoods, to understand the urban context. Livelihood refers to how people structure their means of living, – how they use capabilities, assets, and activities in a resilient manner to sniff around and look for opportunities, to diversify by adding enterprises, and to multiply activities and relationship for stability (Ellis (1998), cited by Kazungu *et al*., (2014)). The livelihood outcomes according to Ellis (1998) include more income, improved food security, improved shelter, education and reduced vulnerability. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base (Chambers & Conway, 1991). From this definition, one can see sustainability as not only the availability of natural resources to provide the support needed for man's survival but also the capability of the individual to effect the conversion of commodities (goods and services) into functionings. With regard to Scoones (1998), a livelihood comprises the capabilities, assets (including material and social resources) and activities required for a means for living.

The urban poor are commonly concentrated at high densities in areas of low rent. These low rents reflect the poverty of the environments and the consequent low demand for such locations (Elliott, 2006). They are frequently on polluted land close to industrial facilities or where waste dumps are sited and watercourses are contaminated, or on hillsides and river plains which are susceptible to landslides and flooding. The result is that the urban poor are frequently vulnerable to a range of environmental and health hazards (Wratten, 1995). Multidimensional poverty and its relation to vulnerability remain happen in Khulna city, especially in slum areas. The respondents in the study area live in crowded condition, with limited access to social services, low level of education, and do not have skill as well as main asset, especially land. Such conditions cause vulnerable to the attack of social, political and economic

changes. It is therefore necessary to understand the nature of sustainable livelihoods in the urban context.

Thus, the study is a modest endeavour to explore the role of natural and social resources in livelihood including housing, income, food, health, and reducing vulnerability of the urban population.Therefore the sustainable livelihood SLI (Sustainable Livelihood Index) has been constructed considering seven explained variables, viz.(i) level of vulnerability (chapter five), (ii) access to natural resources,(iii) security of financial asset,(iv) access to social resource, (v) access to physicalasset(chapter six), (vi) occupation (chapter seven), and (vii) disaster situation (chapter eight). The multiple regression model of this study is:

$$SLI = \beta 0 + \beta_1 Nat + \beta_2 Fin + \beta_3 Vul + \beta_4 Occ + \beta_5 Dis + \beta_6 Soc + \beta_7 Phy + u$$

(Detailed presented in chapter three)

The Sustainable Livelihood Index (SLI) has been calculated to measure the role of urban environment. The SLI has been calculated by constructing Cumulative Vulnerability Index (CVI), Cumulative Empowerment Index (CEI), and Cumulative Resource Index (CRI). The Cumulative Resource Index (CRI) has been calculated corresponding four types of resources: natural, financial, social, and physical (NRI,FRI, SRI, and PRI). The calculation and summary buildup summarization of these variables are presented in this chapter.

9.2 Livelihood Resources Portfolios of the Urban Vulnerable people: In this section, livelihood resources of the selected areas and their residents are discussed under natural, financial, physical and social assets as contained in Sustainable Livelihood Index (SLI).

9.2.1 Natural Resources: In livelihood analysis, the importance and contributions of each component of natural capital differ between rural and urban environments. It is generally believed that natural capital is less important to livelihoods of the urban poor. However, as noted by Farrington*et al*., (2002), natural capital andservices are becoming important to urban poor's livelihood. Sustainable cities depend on a healthy ecosystem that influences both human well-being and numerous economic activities. Urban natural resources have largely been regarded as land for agriculture, water for service provision, and more recently trees for amenity provision in parks or

homesteads. However, natural resources as the components of natural capital, defined in the assets framework of the sustainable livelihoods approach, then it has the scope to broaden the understandings of natural resources within urban areas, and to explore their contribution to urban livelihoods. Ellis (1999) defines natural capital as the land, water and biological resources that are utilized by people to generate a means of survival. Both Ellis (1999) and Carney (1998) state that natural capital is sometimes referred to as environmental resources, with the components thought of as jointly comprising 'the environment'. Both emphasise that natural capital is not static, and that it can comprise both renewable and non-renewable resources. In this context the study reflects the relation between urban natural resources (land, water, tree, atmosphere and other open spaces) and city sustainability is addressed through the investigation of the value of urban nature as provider of social services essential to the quality of human life, which in turn, is a key component of sustainable development.

In this study the natural resources includes 5 assets land, water, sunlight and air quality, trees and open spaces. Among all, the respondents having free access to land can earn more from land related business like grocery shop kitchen market, fish business and agricultural activities. The water bodies are used for different purposes such as bathing, sanitary, washing (cloths and plates) and fishing. Fishing is an important part of residents' livelihood strategies for meeting food needs. The river water is used for ice factory and for transporting shrimps and logs from the hinterland. Vegetable cultivation and tree plantation in Khulna city appears to play a significant role in job security as well as improving social capital, health and nutrition.Therefore, it contributes in reducing vulnerability and resilient with disaster that have a positive effect on sustainable livelihood of vulnerable people in Khulna city.Table 9.1 represents the way of constructing the NRI (Natural Resource Index).

Table 9.1 Index of Natural Resources

Indicators	Quantitative rank	Qualitative Rank	NRI Range 15- 53
Land	1 to 5	5	(1-5).5=5-25
Water	1 to 5	4	(1-5).4=4-20
Sunlight and air quality	1 to 5	3	(1-5).3=3-15
Tree	1 to 5	2	(1-5).2=2-10
Open spaces	1 to 5	1	(1-5).1=1-5

The NRI varies from 15 to 53 in which15 denotes the lowest level of sustainability and 53 denote the highest level of sustainability.

For better understandding about the level of natural resources attained by the respondents the NRI range is further divided into five categories and labeled as very low (15-22), low (23-30), medium (31-38), high (39-46) and very high (47-53). Following this procedure the index has been constructed for other resources (financial, social and physical) and also for understanding vulnerability and access to resource during disaster.

In the study area, respondents are expected to ensure the security of food, housing and income. The natural resource based livelihood activities to them have long gestation periods and tied them to activities that do not yield immediate returns for their families. The study indicated that the poor in the study area rely on short-term livelihood activities such as daily casual labour, involvement in shrimp industry, most of which are only dictated by the season and therefore, may not be sustainable on all-year-round basis, if not over exploited. The longest 'gestation' period for the natural resource-based livelihood activities identified is land based. The shortest is the wood industry. The problem the poor face with these long gestation period is that they often lack the capital to sustain the livelihood investment at the same time enough food to sustain the family while waiting, which often becomes impossible when it comes to the issue of survival.

Table 9.2 Gestation period of livelihood activities

Livelihood Activity	**Gestation Period**
Farming	12 months (average)
Livestock rearing	9 months
Vegetable cultivation	9 months
wood working industries	6 months
Shrimp cultivation	3-6 months
Trading	12 months (average)

Source: Field survey, 2014-2015

According to the respondents, those involved in buying and selling, produce every day and therefore earn some income on daily basis for sustaining their households. Therefore, trading is a better option for such group of individuals.Farming is the familiar livelihood activity around which the people have developed their capabilities. Yet farming is being practised in a constraining environment. There is a dearth of land space for farming as well as market, labour and institutional support. The study has discovered that in places like Tutpara, Nirala and Gollamari is only seen as a

backyard garden and even those, farming on a more serious note are confronted with marketing. This applies mostly to those in predominantly vegetable farm produce.

Business especially grocery shop, tea stall, and kitchen market mentioned as sustainable. As traditional livelihood activity of the respondents having developed skills and capabilities in the organisation of small-scale business activities, a few have developed huge capital base, others subsist on small capital that they have managed to live on with their families. The risk factor in trading according to the respondents is very minimal compared with the other livelihood activities because most of them are petty traders in food items, which has a well-established demand in the Khulna city especially in slum areas, and involves small capital outlays, which could easily be recapitalised in the event of loss. Business (like cloth business, grocery shop) has mentioned as sustainable because mainly women took it up. This brings a gender dimension into perspective. Trading therefore becomes more appealing to most women especially in Rupsha.

9.2.2 Financial Resources: In urban areas, possession of financial asset is important in accessing and accumulating other livelihood assets. In this study, financial capital is measured as household's monthly income, savings and ability to meet the basic needs, and also access to credit and sources of credit. Household income is essential for maintaining sustainable livelihood. Living in an urban area is characterised by a high level of commoditization which means urban dwellers have to pay for most of the goods and services consumed (Moser, 1998; Rakodi &Lloyd-Jones, 2002).

Financial resources (explained in chapter six) is computed by access to five types of resource (i) family income(ii) number of income earner, (iii) yearly family savings,(iv) regularity of wage earning and (v) access to interest free loan.The FRI (Financial Resource Index) has been constructed to assess the access to financial resources of therespondents. The FRI varies from 9 to 63 in which 9 denote the very low access to financial resources and 63 denote the higher to financial resources. For better understandding about the level of financial resources attained by the respondents the FRI range is further divided into five categories and labeled as very low (9-19), low (20-30), medium (31-41), high (42-52) and very high (53-63) (Table 9.3).

9.2.3 Social Resources: Social capital could come in form of social networks, relationships, reciprocity, kindred (Putnam, 1993). In this study access to social resource is assessed considering five types of social relations.Social capital (explained in chapter six) is computed by access to five types of resources: (i) family relation (ii) relationship with neighbours (iii) involvement with politics, (iv) access to wider institution and (v) participation in community based organization.

For better understandding about the level of social capital attained by the respondents the SRI (Social Resource Index) range is further divided into five categories and labeled as very low (15-21), low (22-28), medium (29-35), good (36-42) and very good (43 and above), presented in the Table 9.3.

9.2.4 Physical Asset: In urban areas, housing is one of the most important physical assets that a household can possess, as it can be used productively and to ease the pressure on finances (Schütte, 2016). In developing countries, housing conditions are generally poor. Overcrowding is noted at both household and community levels. The result of this study manifested in pressure on theavailable utilities, and poor housing and general environmental conditions. Conditions of sanitation facilities are generally poor. Physical asset (explained in chapter six) is computed by access to five types of resources. (i) types of toilet (ii) access to educational institution, (iii) communication facilities, (iv) access to power supply and (v) recreational facility. The PAI (Physical Asset Index) varies from 15 to 54. The access to natural, social, financial and social resources of the respondents is presented in chapter six. On the basis of NRI, SRI, FRI and PAI, the distribution of the respondents with the level of all these resources is described in the Table 9.3.

The Table 9.3 shows that 8.2 percent respondents had the very low access to natural resources and 39.2 percent had the medium access, the value range is 31-38. The mean and mode value is 32.62 and 28.00 that means majority of the respondents were in this group. On the other hand**,** 14.9 percent were in high access to land water, trees and other marginal resources.

It is observed that 33.5 percent respondents had low access to financial resources and 40.9 percent had the medium access that the range is 31-41. The mean value (33.07) means that in average, the respondents have the medium access to financial resources and 15.1 percent respondents possessed high status with a good access to credit facilities.

Table 9.3 Access to resources of the respondents

Resource types	**Percentage distribution of the respondents by level of access to resources**				
Natural resource mean-32.62, mode-28.00	15-22 Very low (8.2)	23-30 Low (32.2)	31-38 Medium (39.2)	39-46 High (14.9)	47-53 Very high (5.5)
Financial resources(mean-33.07, mode-31.00	Very low (9-19) 7.2	Low (20-30) 33.5	Medium (31-41) 40.9	High (42-52) 15.1	Very high (53-63) 4.1
Physical asset (mean-33.19, mode-31.00-Max-54)	Very (15-21) low 4.0	Low (22-28) 20.2	Moderate (29-35) 43.3	Good (36-42) 27.9	Very good (43 and above) 4.7
Social capital mean-26.10, mode- 15.00 Max-56	Very low (15-21) 30.6	Low (22-28) 39.9	Moderate (29-35) 16.4	Good (36-42) 9.6	Very good (43 and above) 3.5

Source: Author's compilation on the basis of field survey, 2014-2015

The Table 9.3 shows that 4.0 percent respondents had the very low access to physical asset.The mean (33.19) and mode value (31.00) denotes that the majority had the moderate access to physical asset. On the other hand, 27.9 percent had good access to infrastructural facility.The level of social asset of the respondents is also presented in the Table 9.3. In the study area more than 16.4 percent were in moderate access to social capital. The mean value (26.10) indicates that majority were in lower access to social capital.On the other hand,more than 13 percent had the good and very good access to family relation and relation with outsider.

Table 9.4 Role of social asset in reducing vulnerability

Level social resource	**Number of respondents regarding vulnerable situation**					
	30-46 Very high vulnerability	47-63 High vulnerability	64-80 Medium vulnerability	81-97 Low vulnerability	98- 114 Very low vulnerability	**Total**
Very low (15-21)	28	102	69	15	2	216
Low (22-28)	11	100	115	52	4	282
Moderate (29-35)	3	21	48	37	7	116
Good (36-42)	0	5	21	29	13	68
Very good (43 and above)	0	2	9	10	4	25
Total (mean-26.107, mode-15.00 Max-56)	42	230	262	143	30	707

Though the respondents have little political participation, in some cases their community feelings is very high that is in many cases their strength to live. The social asset represents an important part of urban livelihood. In this context the role of social resources in reducing vulnerability is presented by the Table 9.4.

9.3 Occupation: In the study area the respondents are mostly employed in self-managed low paid jobs in the informal urban sectors like rickshaw pulling, day labor, factory work, agricultural activities and domestic help. A small portion works in government and non-government organizations. The respondents were also face underemployment frequently due to lack of employment opportunities, physical illness, staying in their ancestral villages. Rickshaw pulling was the most popular because it requires no skills and is easily available. For the study purpose the occupation were categorized into five (Table 9.5).

Table 9.5 Occupational status of the respondents

Occupation	Number	Percent
Rickshaw pulling/ Not defined	203	28.7
Industrial work	132	18.7
Day labor/Construction work	156	22.1
Agriculture	62	8.8
Business	154	21.8
Total	707	100.00

Source: Field survey, 2014-2015

Table 9.5 shows that 28.7 percent respondents were rickshaw puller followed by day laborer (22.1%), industrial workers(18.7%), and small-scale traders (21.8%), whereas8.8 percentwereinvolved in agricultural activities. This is supported by the fact that respondents were very much convinced to provide land for livestock rearing and development of shop. As the traditional livelihood activity, the majority of women in the Rupsha slum area work at shrimp industry and over the centuries, women have developed skills and capabilities in the industry, in shrimp related activities. While a few have developed huge capital base, others subsist on small capital that they have managed to live on with their families. The risk factor in shrimp industry to the respondents is season but now a day very few are involved in almost all of the year round in packing with cutting, very minimal compared with the other livelihood activities.

9.4 Level of Vulnerability: Urban poor pursue their livelihood's objectives within political, social, economic and environmental contexts which make them vulnerable to poverty. Often, vulnerability manifests inform of trends, shocks and seasonality (Department for International Development, 1999). As reveals in this study the major trends which have influence on urban poor livelihoods include tenure security, income and food security and disaster. These threats however reinforce one another.

Considering seven indicators related to maintenance of basic need Cumulative Vulnerability Index (CVI) has been used to measure the level of vulnerability which are: (i) tenure security, (ii) income security, (iii) food security, (iv) jobless situation, (v) literacy situation, (vi) access to health and (vii) access to household goods (Chapter five). Therefore, on the basis of CVI the situation of vulnerability of the respondents has been assessed (Table 9.6).

Table 9.6 percentage distribution of the respondents by the level of vulnerability

Vulnerability	**Percentage distribution of the respondents by the level of vulnerability**				
Mean- 72.96, mode- 61.00	Very high (30-46) vulnerability5.9	High vulnerability (47-63) 32.5	Medium vulnerability (64-80) 37.1	Low vulnerability (81-97) 20.2	Very low vulnerability (98- 114) 4.2

The Table 9.6 shows that 32.5 percent respondents were highly vulnerable but 20.2 percent respondents were in low vulnerable situation. The mode (61), indicates that majority of the respondents were highly vulnerable.

9.5 Disaster Situation: Disasters are a complex mix of natural hazards and human action. All over the world, but especially in LDCs, vulnerable people often suffer repeated, multiple, mutually reinforcing, and sometimes simultaneous shocks to their families, their settlements and their livelihoods. Disasters are the brake on economic and human development at the household level (when livestock, crops, homes and tools are repeatedly destroyed) and at the national level when roads, bridges, hospitals, schools and other facilities are damaged (Winser*et al*., 2003). These repeated shocks erode whatever attempts have been made to accumulate resources and savings. The access to and control over resources during disaster therefore could reduce vulnerability and the impact of different hazards on them. Access to such resources is based on social and economic relations, including the social relations of production, gender, ethnicity, status and age, meaning that rights and obligations are

not distributed equally among all people. Especially women and girls in the disaster prone areas face number of problems due to their gender identity. As a result, women and girls in poor and marginal households become more vulnerable and distressed (Nasreen, 2012).

Table 9.7 Disaster situation challenged by the respondents

Situation of Disaster	**Number**	**Percent**
Very highly disaster prone (27-36)	318	45.0
Highly disaster prone (37-46)	164	23.2
Moderately disaster prone (47-56)	132	18.7
Low disaster prone (57-66)	65	9.2
Very low disaster prone (67 and above)	28	4.0
Total (mean- 41.77, mode- 31 Max-85)	707	100.00

In this study, the level of access to and control over resources during disaster has been attained by the respondents.

The CEI range is further divided into five categories and labeled as very highly disaster prone (27-36), highly disaster prone (37-46), moderately disaster prone (47-56), low disaster prone (57-66) and very low disaster prone (67 and above), discussed in the chapter eight. On the basis of this value the situation of disaster of the respondents has been assessed.

The Table 9.7 presents that 45.0 percent respondents were very highly disaster prone that means had low access to basic need like food, shelter, education and medical facilities. Whereas nearly 15percent of the respondents were in low and very low disaster prone.In this regard natural resource has its influential role to reduce vulnerability in mitigating disaster situation.

Table 9.8 Role of natural resources in reducing vulnerability during disaster

Natural resources (Level with value)	**Number of respondents** Disaster situation					**Total**
	27-36 Very highly disaster prone	37-46 Highly disaster prone	47-56 Moderately disaster prone	57-66 Low disaster prone	67 and above Very low disaster prone	
Very low (15-22)	35	12	9	2	0	58
Low (23-30)	155	45	22	5	1	228
Medium (31-38)	113	71	59	27	7	277
High (39-46)	10	29	33	20	13	105
Very high (47-53)	5	7	9	11	7	39

Total (Mean-32.62, mode-28.00)	318	164	132	65	28	707

Table 9.8 indicates that the respondents having low natural resources are highly disaster prone than the respondents enriched with natural resources.

Therefore, the Sustainable Livelihood Index has been construed considering the above mentioned explained variables: natural resource, financial asset, social resource, physical asset, occupation, vulnerability and disaster situation.

9.6 Level of Sustainability of the Respondents

Table 9.9 Percentage distribution of the respondents regarding sustainable livelihood

Indicators of Sustainable livelihood	**Percentage distribution of the respondents (with level)**					**Total**
	1	2	3	4	5	
Natural resource (Mean 19.4059, SD 6.9)	Very low (8.2)	Low (32.2)	Medium (39.2)	High (14.9)	Very high (5.5)	100.00
Financial resource (Mean.16.5233 SD. 5.6)	Very low (7.2)	Low (33.5)	Medium (40.0)	High (15.1)	Very high (4.1)	100.00
Vulnerability (Mean.14.2150, SD. 4.77)	Very High (5.9)	High (32.5)	Medium (37.1)	Low (20.2)	Very low (4.2)	100.00
occupation	Rickshaw Pulling/Not defined/ (28.7)	Industry (18.7)	Construction (22.1)	Agriculture (8.8)	Business (21.8)	100.00
Disaster situation (Mean.41.7680, SD.11.75)	Very low (45.0)	Low (23.2)	Medium (18.7)	High (9.2)	Very high (4.0)	100.00
Social asset (Mean. 26.1075, SD.9.39)	Very low (30.6)	Low (39.9)	Medium (16.4)	High (9.6)	Very high (3.5)	100.00
Physical asset (Mean. 33.1881, SD.7.01)	Very low (4.0)	Low (20.2)	Medium (43.3)	High (27.9)	Very high (4.7)	100.00

Table 9.9shows the distribution of the respondents by seven indicators of sustainable livelihood.

9.6.1 Sustainable Livelihood Index (SLI)

Seven indicators are used to construct the Sustainable Livelihood Index. Each indicator again has a number of sub-indicators. The quantitative part correspond to five categories e.g., 1=very low and 5=very high. Each indicator assigned a

quantitative rank from 1 to 5 according to the total score for access to and control over resources based on the field survey. The qualitative dimension is formed to rank the key seven indicators (viz. access to natural resources, security of financial asset, level of vulnerability, occupation, disaster situation, access to social resource and access to physical asset) from total scores assigned by the respondents (detailed is presented in chapter three, Table- 3.2).

The Table 9.10 shows that the mean value (74.61) indicates that on average the respondents were in low level of sustainability, but 15.8 percent were in moderate level of sustainability and only 3.5 percent were sustainable enough. In this regard the regression model has also been drawn (Table 9.11).

Table 9.10 Level of sustainability of the respondents

Level of sustainability	**Number and percentage distribution of the respondents**	
	Number	Percent
Not at all (28-50)	87	12.3
Very Low (51-72)	274	38.8
Low (73-94)	209	29.6
Moderate (95-117)	112	15.8
Sustainable enough (118-140)	25	3.5
Total (Mean-74.61, SD-20.91)	707	100

The value of R square (0.993) means that the above mentioned variables have 99% effects on sustainable livelihood of urban population.Among the variables natural asset (land, water, sunlight and air quality, tree) has contributed (35%) more, than financial asset (income, working situation, number of income earner, savings) which is 26.6percent following low vulnerable situation (25%), occupational status (30%), fulfilling basic need in disaster situation (19%) and physical asset (03%).

Table 9.11 Effects of determinants of livelihood on sustainability

Independent variables	Dependent variable: Sustainable Livelihood Index (SLI)		
	Coefficients	t	Significance level
(Constant)	1.122	3.335	0.001
Natural resource	0.350	91.477	0.000
Financial asset	0.266	54.962	0.000
Vulnerability	0.249	50.565	0.000
Occupation	0.297	85.555	0.000
Disaster	0.190	43.465	0.000
Physical asset	0.036	11.031	0.000

N= 707; Adjusted R2 = 0.993; F= 15911.975 (Significance Level: 0.000)significant at 1% level of significance

The role of natural environment on the basis of SLI and NRI is presented in the Table 9.12.

9.6.2 Resource, Vulnerability and Sustainable Livelihood

Table 9.12 Access to natural resource and sustainability (cross tabulation)

Level of Natural resource	**Number of respondents**					**Total**
	Level of sustainability					
	28-50 Not at all	51-72 Very low sustainability	73-94 Low sustainability	95-117 Medium sustainability	118-140 Sustainable enough	
Very low (15-22)	25	25	8	0	0	58
Low (23-30)	54	140	32	2	0	228
Moderate (31-38)	8	107	128	33	1	277
Good (39-46)	0	1	37	60	7	105
Very good (47-53)	0	1	4	19	15	39
Total (Value of Chi square-593.567)	87	274	209	114	23	707

The Table 9.12 shows that the respondents enriched with natural resources are in medium level of sustainability (60) and sustainable enough but the respondents with very poor natural resources are in very low and low level of sustainability.

The value of Chi square test (593.567) with Fisher's exact test (0.000) of 16 degree of freedom is also significant (0.000).Not only the natural resources, the social resource also contribute in sustainable livelihood (Table 9.13).

The Table 9.13 presents that the respondents who have the good stock of social capital are sustainable enough but the respondents with low level of social capital are not sustainable at all or in very low level of sustainability. The level of vulnerability is a significant indicator of sustainable livelihood.

Table 9.13 The contribution of social resource in sustainable livelihood (cross tabulation)

Level of social asset	**Number of respondents**					Total
	Level of sustainability on the basis of SLI					
	Not at all	Very low sustainability	Low sustainability	Medium sustainability	Sustainable enough	
Very low	54	113	42	7	0	216
Low	22	133	99	28	0	282
Medium	10	21	47	34	4	116

High	1	3	17	36	11	105
Very high	0	4	4	9	8	39
Total	87	274	209	114	23	707

It is found (Table- 9.14) that the less vulnerable people are sustainable enough or in medium level of sustainability.

Table 9.14Cross tabulation of level of sustainability and vulnerability on the basis of CVI and SLI

Level of vulnerability	**Number of the respondents**					**Total**
	Level of sustainability					
	Not at all	Very low sustainability	Low sustainability	Medium sustainability	Sustainable enough	
Very high vulnerability	35	7	0	0	0	42
High vulnerability	46	160	24	0	0	230
Medium vulnerability	6	97	130	29	0	262
Low vulnerability	0	10	52	72	9	143
Very low vulnerability	0	0	3	13	14	30
Total	87	274	209	114	23	707

The respondents of this study are vulnerable people therefore, no respondent was highly sustainable. From every household one male member and one female member were asked to tell about their expected livelihood pattern. In this regard long-term pattern of livelihood was expected more to the female members than the male members.

Table 9.15 Expected livelihood pattern

Pattern of livelihood	**Male Choice**		**Female choice**	
	Number	**Percent**	**Number**	**Percent**
Long-term	474	67.0	512	72.4
Short-term	233	33.0	195	27.6
Total	707	100.00	707	100.00

Both male (67%) and female members (72.4%) like long-term livelihood pattern than the short-term pattern 33percent and 27.6 percent respectively (Table- 9.15). The preferable long- term livelihood patterns are child education and permanent job facility, tree plantation, agriculture, development of tea stall and grocery shop whereas, micro-credit facilities and access to interest free loan are short-term livelihood facilities among others.

9.6.3 Result of hypothesis tests:

The results of hypothesis tests of this study are:

9.6.3.1 The natural resource has its positive contribution in social capital

9.6.3.2 Male polygamy has negative influence on social resource

9.6.3.3 Health facilities enhance human asset

9.6.3.4 The more the age the less the human asset

9.6.3.5 The more the natural resource the more the family income, food, land, access to health, financial asset, coping with disaster, social resource and reduced vulnerability

9.6.3.6 Family income positively influences financial asset

9.6.3.7 Urban infrastructure positively contributes in sustainable livelihood

9.6.3.8 Women are very close to nature

9.6.3.9 Nature based occupation contributes more in income and regularity of wage earning

9.6.3.10 Unban agriculture positively contributes to meet the basic need, in reducing vulnerability and to increase social and financial asset

9.6.3.11 Male have more access to and control over resources than the female during disaster

9.6.3.12 The more the natural resource the less the vulnerability

The study, through the lens of Sustainable Livelihood Index has detailed indicators of livelihoods of the vulnerable people in Khulna city. The study reveals that majority earn below the national minimum wage, which is not adequate for a living. This study further exposes that urban poor in Khulna city pursue their livelihood objectives amidst vulnerability contexts, which further impoverished them. Major livelihoods' shocks include threat of eviction, loss of property, loss of social network, unemployment, flooding, violence and crime, pollution and health problems. These shocks however reinforces one another thereby worsen the condition of the urban poor. Although it must be noted that occurrence of many of these shocks are not in any way limited to informal settlements, however, urban poor are disproportionally vulnerable and affected because they arealready experiencing multiple deprivations and exclusions in terms of infrastructural and urban services provisions. More importantly their livelihood is based on instable and inadequate assets. This study therefore suggests that one important element in reducing poverty is a policy framework that guarantees inclusive provision of land, trees and other natural resources and at the same time reduces livelihood's vulnerability.

Chapter Ten

Discussions, Conclusionsand Policy Recommendation

10.1 Discussions: This section summarizes key findings of the study on sustainability of urban livelihood of the vulnerable people of Khulna city. The study discusses the urban environmental resources and its role in maintaining sustainable livelihood of its population. Rapid urbanization and accelerated urban population growth necessitate new consideration of the ways in which urban development is regulated so that the city and townscape provide a livable and healthful environment.

During the late 1950s and 1960s Khulna was an important center for industrial development due to the development of many industries like newsprint mills, shipyard, jute mills, match factories, jute bailing, presses, hardboard mills, with increased activities resulting from the expanding shrimp export. On the other hand, as situated in southwestern region of Bangladesh, Khulna city is severely affected by frequent climatic disasters like cyclones, tidal surges, coastal flooding, waterlogging and salinity intrusion. These climatic disasters adversely affect peoples' livelihood in Khulna and these disasters have increased the vulnerability of the local communities living in the area. As the consequence of this, most the respondents (91.8%) of the study area are migrated from surrounding areas mostly from Barishal, Satkhira, Bagerhat and Jessore. Climatic disasters also inundate coastal lands with high saline water which reduce soil fertility and crop production.

Moreover state owned Khulna Newsprint Mill, Daulatpur Jute Mill, People's Jute Mill, Khulna Textile Mill, private owned Afil Jute Mill and Dada Match Factory have remained closed throwing the workers and employees out of job. The workers become jobless and are getting nothing but lip service from government in the name of reopening these industries and are living in marginalland of city. Therefore the study has been conductedon the Khulna city environment and its role to ensure the livelihood of urban population in the context of sustainable development. To ensure a good quality of life in a city, the environmental conditions within which a city dweller is living is of utmost importance. To fulfill the objective of the study 'basic needs' approaches to developmenthas been followed, which, as the (1976) definition of basic needs indicates, marked the formal link between development and the socio-

ecological approach while Steiner & Nauser (2003) discusses specific ecological settings. The study defines livelihood as a means of living; an income. Thus a person's livelihood refers to means of securing the necessities of life. Whereas sustainability refers to the maintenance or enhancement of resources productivity on a long-term basis.Livelihoods compromise(s) the capabilities, assets (including both material and social resources) and thus sustainable livelihood could achieved when it can cope with and recover from stresses and shocks and manage to enhance its capabilities and assets both now and in the future, while not undermining the natural resource base.

The respondents who are victim of tenure insecurity and lack of income, food, employment, education, health and household asset were considered as vulnerable people. Then urban vulnerability is assessed by two categories environmental and socioeconomic aspects. The environmental vulnerability is related to housing condition, sources of water, sanitation, waste management and climate change in the study area. Along these environmental challenges, health related inequalities and children's exposure are also considered. Similarly, inequalities in social security have been identified for vulnerable groups such as children and elderly people, low-education household's unemployed persons and violence. Age structure of the respondents varies noticeably only between 25-39 and 40-54 age groups. Among the total respondents 79.6 percent of the household heads are male. The present study shows that more than half of the respondents (60%) in the study area were found to be employed but not doing permanent job. The average monthly household income per month in the study areas was 4727 BDT. Majority (58.8%) of the respondents were destitute people (earn 0-5000 BDT) and very poor in number (8.6%) were in lower middle class. About 47 percent respondents claimed for the ownership of the house but are situated on GO land. The majority of houses (93.2%), in Nirala are Kutcha and in Tutpara 25.2percent are semi- pucca.Among the respondents about 38 percent reported that the law and order situation has been violated but 24.5 percent respondents opined that the law and order situation is good in their locality. In Khulna city migration from rural areas to cities is at least partially driven by the increasing prevalence of extreme weather, such as land degradation and desertification, making agriculture more difficult. In addition, there have man-made disasters like arsenic, waterlogging and salinity in water & agricultural land.

The stagnant water cause for tidal surge creates severe problems including restrictedmovement for the collection of clean drinking water. Contamination of water leading to water borne diseases and problems for sending children to school due to the flood waters. The overall sanitation condition in the study area shows a gloomy picture. About 12.8 percent of slum households in Rupsha have improved drainage, toilet and clean surroundings, while 7.7 percent of the households in Khalishpurhave access to the community toilets which were found to be very untidy and mal-o'dorous. No community toilet was found to be connected to the water supply which made personal hygiene and toilet-cleaning difficult or impossible. It is also found that no household in the study area has a separate kitchen.

Although sanitation services have reached a good number of respondents in the study area, still many slum dwellers are being left out. Other services such as solid waste disposal and drainage were found to be in a very poor condition. Lack of these urban environmental services coupled with other socio-economic and housing attributes might have had an impact on the environment and public health.

Cumulative Vulnerability Index (CVI) has been used to assess the vulnerability. Considering the cause of vulnerability of the respondents, seven indicators are used to measure the situation of vulnerability: tenure security, income, food, number of jobless week, literacy situation, access to health and access to household asset. Here the value of R Square is 0.96. That means aforesaid variables have 96 percent effect on vulnerable situation of the respondents. Among them tenure insecurity (48%), number of jobless week (29%) and food security (23%) are colossal responsible factors. Considering purchasing power parity the household's earning of 6000 BDT per month has considered as under the poverty line 1 and the respondents of monthly earning not more than 10000 BDT has considered as moderately poor. More than 69 percent respondents were below the poverty line 1. Among the respondents 32.2 percent were always threated under tenure insecurity, 14.7 percent considering themselves severely suffered from food insecurity, 38.3 percent respondents had the access to food for one time in a day and 8.5 percent respondents could have the meal for three times in a day. Although 38.3 percent had completed study to primary level and 1.8 percent have achieved the Higher Secondary School Certificate (HSC). Health situation is not much vulnerable in the study area. More than 85percent respondents could receive the treatment at the time of illness whereas12.4percent respondents

never used to go to doctor. The study shows that natural resources (48.4%) particularly land, water, urban agriculture, tree and social resource (11%) contribute more to reduce vulnerability of the urban poor.

Some easily identifiable groups were particularly vulnerable, e.g. women who had lost their productive assets like handcarts, sewing machines were forced to move into less profitable areas of work that did not require this equipment. Many coping strategies employed by vulnerable households in response to debt are identified such as use of natural resources applying traditional knowledge, withdrawing children from school and marrying off daughters early, help assuage the crisis in the short-term.

The study emphasises on the role of urban natural resources in sustainable urban livelihood. The land, water, trees are major natural resources of the study area. In this regard the value of R squire is 0.916. That means aforesaid variables have 91 percent effect on natural resources. Among them land plays the most vital role as natural resource that is 64 percent. The improved water sources (40%), vegetation and trees (27%) also play the significant role in desirable livelihood. The result of linear regression presents that the natural resource contributes in food (23%), income (16%), health (14%), social (21%) and human asset (26%). The regression analysis also supports the concept of ecofeminism. Here the effect of sex variable is -0.028. That means female are very close to nature. Moreover, the contributions of physical, social, financial and human resources are also considerable hare.

In realizing the contribution of agriculture the Cumulative Agriculture Index (CAI) has been calculated. The result shows that agriculture has its contribution in fulfilling basic need of the respondents.Among the indicators agriculture has its greater contribution in income (31%), following 27percent in food, 24 percent in health, 25percent in education and 13percent in developing the interpersonal relations. The respondents are mostly employed in self-managed low paid jobs in the informal urban sectors like rickshaw pulling (14%), day labor (17%), factory work (23%), agricultural activities (8.8%), and domestic help (4%). A small portion (1%) work in government and non-government organizations, especially in Tutpara and Gollamari, urban agriculture has contributed positively in food security and fulfilling other basic needs. In Tutpara, Nirala and Gollamari, crop cultivation, vegetable cultivation and of innovative gardening has been observed. Apart from using readily available

materials for creating small home gardens, these areas residents showed enthusiasm for increasing potted plants in their neighbourhoods that help enhance self-sustenance, ultimately improving livelihoods.

To identify the access to and control over resources seven types of means are considered to construct the Cumulative Empowerment Index (CEI). These are access to land, income, food, infrastructural facility, organizational support, information and participation in emergency situation. The value of R square (0.975) indicates that the aforesaid variables have 97%influence on access to and control over resources. Among these indicators, housing support has the greater contribution (61%) to reduce the disaster risk in the locality than income security (42 %), infrastructural facility (20%) and food security (17%). As in urban area the respondents noted about fire accident as frequently occurred and serious disaster in the locality. Eviction is also responsible for disruption of livelihood of the respondents. Another disaster which causes vulnerability of the respondents is waterlogging. From the study it is found that, 37.4 percent male household heads were highly disaster-prone whereas the female were 74.82 and no female household is in the category of very low disaster prone.It is also found from the Table 8.5that 86.88 percent male respondents had no security of food during disaster and 95.80 percent were among the female headed households (chapter eight). The most common uncertainty associated with the job in shrimp industry is the risk of seasonality. Many strategies like taking out loan, followed by reducing household food expenditure, vegetable cultivation, participation in community-level mitigation strategies were proposed by the beneficiaries involved in managing risk.

Therefore the sustainable urban livelihood has been measured by seven indicators viz. natural resource, financial asset, occupation, vulnerability, coping with disaster, social resource and physical asset. The result shows that the value of $R^2$is 0.993. That means aforesaid variables have 99% effect on access to natural, social and economic resource which is statistically significant. It is identified from the study that natural resources especially free land, improved infrastructure and social resource have statistically significant positive effect on sustainable livelihood in Khulna city. The mean SLI (74.61) indicates that majority of the respondents exercise low level of sustainability that means have low access to natural and socio- economic resources.The respondents who have more natural resources and other improved

infrastructure, have higher access to sustainable livelihood than the others who have limited access to natural, socio-economic and infrastructural facilities.

10.2 Conclusions and Policy recommendation: By applying both qualitative and quantitative data colleting tools as well as analysis, the study is an attempt to understand the role of the environment to benefit for the vulnerable people in an urban settlement in Khulna city. Study reveals that urban poor have instable and inadequate access to livelihoods assetsand infrastructural facility such as food, housing, health, education, sanitation and job security. The basic infrastructure and urban services are physically available to the residents of the vulnerable people in Khulna city. However, the quality remains poor and access to them remains inadequate. As noted in the study, much of the vulnerability of the urban poor of Khulna city derives from situations which undermine their legal status and rights. They invariably live below the poverty line and have little access to formal employment. They are also vulnerable in terms of their physical and social capital. They have been struggling to secure a sustainable livelihood in the city despite living for a long period of time. In this regard feasible policy should be adapted to take account of this and to promote the secure access of the poor to livelihoods and assets.

This is against the backdrop that majority of the respondents earn below the national minimum wage, which is not adequate for a living. Among the people who have free access of land can earn more from land and water related business like grocery shop kitchen market, fish business and agricultural activities. Vegetable cultivation and tree plantation in Khulna city appears to play a significant role in improving social capital, health and nutrition.Therefore, on the basis of empirical findings, it can be concluded that natural resources and its related occupation and infrastructural development contribute to increase income, job security and social capital;reduce vulnerability and resilient with disaster that have a positive effect on sustainable livelihood of vulnerable people in Khulna city.

The benefit from natural resources includes fresh air, shedding, natural cooling, biomass fuel, earning wage etc. There is an intra-household variation of coping with poverty and deprivation based on households having more than one income earning member, having access to urban land, and access to city politics for better prospects of wellbeing. However the home-based income generating activities could contribute in

improving livelihoods.Urban government should take greater initiative to create opportunities for the vulnerable people of Khulna city, Bangladesh.

While rural migrants continue to come to Khulna in search of employment, finding remunerative employment is a major challenge for the poor. Jobs tend to be low paying, and do not provide much security. To cope, additional household members, particularly women and children, enter the labor market to earn what they can. Simultaneously, the development of one of the main formal employment providers of Khulna, the industrial sector is jeopardized especially by the collective act of owner and CBA. In this context, the balance of Khulna's labor market strongly depends on policy measures taken on the national scale. To ensure the sustainable livelihood of the poorest people in the southern urban areas of Bangladesh, the policy makers must understand and address the root causesof urban vulnerability. However, empowerment and institutional support are crucial in building up sustainable livelihood of vulnerable people.

The study findings support for the implementation of the policies to encourage urban development through diversifying manufacturing beyond the shrimp, jute and other industrial sectors. Improving education levels and skills of workers could have huge benefits in increasing access to credit. Effective policy could provide a strategy for addressing poor areas, including the mandate and specific guidance for prioritizing the delivery of services to the urban poor and dealing with the issue of legal land tenure. Clearly identifying roles and responsibilities within Government, as well as for partners outside the Government (e.g. NGOs, private sector) could help to ensure implementation and strengthening the role of local municipalities. Enforcing law and order is essential for the sustainability of the respondents. While mastaans do provide services to the poor who have no other options, though the practices of extortion are illegal. It can detract from city development. Moreover agricultural land needs to be managed sustainably. In this regard farmer-to-farmer learning and training enables individuals to realize their own capacity to make decisions as they move from semi-subsistence livelihoods to those incorporating commercial agricultural opportunities.To fulfill the basic need and maintaining recreation, natural green space including, national parks and nature reserves, wetlands and coastal margins should be well preserved and accessible for the vulnerable people. For example, in Bangladesh some projects have contributed to elevating women’s status

in rural areas by providing land titles in both men's and women's names. This may be a fruitful project also in urban areas especially the gift of land in peri-urban areas for poor vulnerable people. Different kind of assistance for women from diverse organizations (viz. BDRCS, CLP, World Vision) such as providing with sewing machine, livestock, flood proof tube-well, training on crop cultivation, fish production could contribute in sustainability of urban livelihood.

Some important proposals specifiedby the respondents of the studycould be persisted and endured. They stated that government should pay attention to peoples' needs in sustainable livelihood achievement through development of natural resource management. The respondents identified that there is the urgent need to create separate kitchen to diminish fire accident and strictly maintain thesluice gate in solving the waterlogging problem. Enhancing peoples' awareness of environment and natural resources conservation and establishment of policies related directly to the society in coastal areas of Bangladesh. Moreover creation of kitchen market, twelve months fish cultivation, establishment of government founded home-based industries for female, tree plantation, aged/ children's school and providingwith more financial assistance from the rich and the government are the essential needs of the respondents by which they think that sustainable livelihood could be ensured. In this regard global policy frameworks must acknowledge the people especially affected by environmental stress and natural disaster that can help in building up livelihood resilience and protect socio-cultural wellbeing of the urban population especially in coastal areas of Bangladesh.

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Appendices

Appendix 1- Case Studies

Natural resources (NRs), and their contribution to livelihoods have been widely explored (often within the context of contributions to livelihoods), yet have received relatively little attention within the urban context. They can however contribute significantly, if modestly, to urban livelihoods in a number of often 'hidden' ways to enhance our understanding of the dynamics of urban-based natural resource related livelihoods. It aims to provide increased understanding of the ways in which urban 'natural' resources are used to support urban livelihoods. Urban NRs have largely been regarded as land for agriculture, water for service provision (irrigation, sanitation), and more recently trees for amenity provision in parks or homesteads. However, natural resource as the component has its contribution to urban livelihoods.

Ellis (1999) defines natural capital as the land, water and biological resources that are utilised by people to generate a means of survival. Both Ellis (1999) and Carney (1998) state that natural capital is sometimes referred to as 'environmental resources', with the components thought of as jointly comprising 'the environment'. Both emphasise that natural capital is not static, and that it can comprise both renewable and non-renewable resources. In this study six means of livelihood (tree, agriculture, business, waste, water and open spaces), have been studied as the cases.

Case Study 1: Urban Trees

One of the most universally recognized roles of trees is as a way to replenish fertility (Chivaura-Mususa *et al*., 2000). In many parts of the world, improved tree-based systems, e.g. shelterbelts, windbreaks, alley cropping, hedgerows, home gardens, tree cover crops, have been adopted to protect lands and improve agricultural crop production. For instance, in semi-arid and sub-humid countries integrated tree-crop-livestock management systems using agro-silvipasture, alley cropping, conservation agricultureand using nitrogen fixing woody species (Liu, 2001).

In early settlements trees were viewed as propitious for urban settlement. The existence of trees was evidence of water availability, land fertility, abundance of game or simply a parasol that allowed peaceful shelter. In fact, 'the names of many places

in Khulna city are by the name of trees. Through the increased urbanisation towns and cities have pushed back areas of forests and woodlands. The land of forests are used for building, roads and other urban infrastructure, whilst elsewhere trees have been used to meet urban needs for fuel wood. In this context it is widely assumed that both the prevalence and importance of forest and tree products in urban areas has declined. The respondents argued that urban populations still depend heavily on the consumption of popular forest foods, even in urban areas, and that urban trees are important in providing foods and commodities, as well as holding spiritual and cultural significance.

Development in forestry focuses on economic benefits, employment and support of agriculture in 'developing countries' that reduces noise, air pollution, reduces climatic extremes and provides beauty and shade. It also contributes in improving water quality, providing food, fuel and fodder and in income generating activities. Thus the people in the study area seek some parts of their livelihood through the use of trees.

Photo 1 Tree contributes in sustainable livelihood

Trees provide vital materials with which shelters can be constructed. Rain trees retain their role as a community meeting place for discussion, consultation and education. The coconut trees provide nuts, fruits and a range of ingredients for medicines. A kabiraj named Siddik Talukder (64) in Rupsha slum area was asked for his medicine for the disease he provides for treatment. The name of the disease he treats is jaundice. The members of his family are 8 with six children. Kabiraji is his main occupation. He is satisfied with his treatment. Every day a good number of patients receive his treatment. The ingredient used for the treatment is the water of green

coconut. The nut of coconut is a good source of food especially for their children. It is also the source of fuel of his household. But now a day he is worried about the sustainability of their livelihood. He argued that "now it is so tough to collect green coconut because of lack of its availability". He was asked about the cause of it and he answered that "the mobile network, lack of awareness, lack of space for tree plantation and waterlogging are the responsible factors. The livelihood of such profession is being hampered due to this situation. So tree plantation and its maintenance is necessary for the improvement of urban environment". Under the rain tree land based small-scale business like tea stall, grocery shop, has also been developed. Suraya, a 70 years old woman said that "the tea stall is built by my husband with no materials but under this rain tree and this stall is only the source of income". They are living with a daughter (widowed) with her son. And during the rainy season the stall is covered with polythene as a roof.

Trees are also seen as fulfilling a range of cultural, social and psychological needs of urban dwellers indeed, poor people (if they have time) are the most frequent users of municipal parks and open spaces, because they cannot afford to pay for other sources of recreation. Activities involving urban tree products are used for both income generation and subsistence by different groups and between geographical regions. Once upon a time during the field work a man, Abdul Jalil (50) from a group of people sitting under a banyan tree said that "in our free time we are gossiping or sometimes conducted our community meeting here. This is the source of our inspiration. It is the place from where we acquire the team spirit. It is also the source of our unity".

Rafiqul (46) in Tutpara argued that "urban forestry programmes can help to strengthen urban community-building. But community-based efforts are hampered for the lack of well-organized groups and lack of participation. There is also almost absence of participation of women and children in decision-making, planning and management of urban trees. In this regard, from the choice of tree species to actual planting, tending and (where appropriate) harvesting of tree products, urban dwellers should be able, and actively encouraged, to participate in decision-making and implementation as far as possible". Another woman, Bilkis (50) in Tutparatold that "there is a lack of knowledge about the extension for which conflicts arise over ownership or usufruct rights to trees on public land, the forms that these conflicts take

and the social (for example gender) dimensions that these conflicts have. On the one hand, it can be argued that people are unlikely to care for trees or other vegetation planted on land that they do not own or feel responsible for plantation". She expressed that "if people do not have secure tenure they are less likely to invest time and resources in planting trees that may only start to provide material benefits after a number of years". To them landownership is unclear but people actually plant trees to claim ownership of land themselves.

Trees outside forests improve air quality and microclimate; provide water protection, wildlife habitat, recreation and increased carbon sequestration and biodiversity. They are also imbued with symbolic cultural value being important parts of language, history, art, religion, medicine, politics, and so forth. They are sometimes called 'trees of wonder' due to their longevity or their impressive size. Millions of vulnerable people rely heavily on forest resources for their livelihoods, but they lack an effective political decision voice and rights. In this context, it is futile to attempt to protect forest resources without addressing their local needs and extending their rights. Formal policies are partly hindered by the difficulties associated with the valuation of trees. Whilst trees can be valued in terms of their tangible benefits (the value of fruit that they bear or firewood they provide) it is much more difficult to value the intangible benefits (shade, cultural values, etc.). Formal policies that do exist tend to be top-down, and characterised by institutional conflict. Whether lack of tenure security is a constraint in urban areas that prevents or discourages people from planting trees or whether lack of clarity over land ownership presents opportunities for people to 'colonise' vacant plots in urban areas. Thus tenure arrangements (both for trees and land) might encourage the use of urban trees to support livelihoods.

At national and international levels, the importance of tree outside forest as a resource is often overlooked. Only limited initiatives existed prior to 1993, when the Kotka meeting analysed their role in the context of the world forest resources assessment. Since then, many case studies, conducted at national and regional levels, have identified serious challenges facing the successful promotion of trees outside forests as a tool for sustainable livelihoods and environment improvement. High population pressures on limited lands and forest resources have led to the breakdown of traditional tree-based systems practices that allow regeneration of vegetation cover. Systems such as shifting cultivation, and nomadic grazing in the semi-arid areas, that

had become well proven by centuries of use, have often broken down leading to land and soil degradation, adverse environmental impacts and increased poverty.

To bridge the gaps between their needs and conservation needs, forest and tree resources must be managed for sustainable livelihoods with the objective of attaining a multi-functional landscape that yields a range of goods and services. This will require other simultaneous actions, such as multiple scale activities and careful consideration of how social and political changes influence success of different interventions and management practices.

Case Study 2: Urban agriculture

Urban agriculture (UA) has been defined in various ways that distinguish between levels of urbanisation (particularly between peri-urban and urban activity), between different types of activity. The study includes agricultural and gardening activities (for example vegetable production, livestock rearing, aquaculture and flower/ornamental gardens) of five selected areas of Khulna city. With respect to Bangladesh, Khulna has gone so far as to call urban agriculture a 'micro level or people' initiative to cope with economic crisis whiles governments struggle to carry out their structural adjustment programmes. Through agriculture the respondents seek livelihoods, in the context of structural adjustment programmes which have reduced employment opportunities and reducing vulnerability in terms of education and healthcare services.

The presence of farmers in cities and towns is seen as a signal that urban development has, somehow, gone wrong but it does underpin a range of objections to urban agriculture that they are incorrect or misleading. The need for urban agriculture research to advocate the beneficial economic impacts on poor urban households stems from the negative perception of urban agriculture in the eyes of urban development policy-makers and city planners.

Land is the key resource in enabling people to get involved in all forms of agriculture. To cultivate, households need access to land either through ownership or leasing or, though this is risky, by invading vacant plots or unused land though the study population are much more vulnerable to losing the access. The cultivators especially in Tutpara and Khalishpur areas are benefited more from urban agriculture. In many locations, especially where overcrowding is acute, the contribution of cultivation to

the livelihoods of very poor households is limited. Thus, one important thing to note about urban agriculture is that the conditions in which poorer and richer households cultivate are very different. The plots are large enough to vegetable and crop cultivation of the persons those who are industrial workers, day laborers and cultivators. On the other hand, poorer households have to find vacant land (off-plot urban agriculture), sometimes far from their homes, on which to grow food.

Gender difference also noticed regarding agricultural activities. As women have reproductive roles they predominate in back-yard gardening. Fatema (35) in Gollamari told that "men can control larger portions of land and tend to produce cereal crops, whereas women have small plots that they work more intensively to produce vegetables. In livestock and poultry production generally women are involved, though women are more likely to enter into collective poultry production than their husbands are".

Mst. Piara Begum is a 40 years old woman. Once upon a time, she and her husband were extremely poor. After the death of her husband she become alone and now is living with her daughter who is widow. They live in the railway slum of Khalishpur. Eviction forced them to move out from home in many times. Even at the time of cooking they are evicted. But they were living at that place for having no alternative place of residence. In 2013, ASA NGO provided her a goat. This goat is now grown and has given birth six. By selling the milk of goat Piara Begum earn some money for her survival. She also sold some of the goats. Before the death her husband became unemployed since he was suffering from illness for long times. The profit from other goat's sale was also used for her husband's treatment. These assets helped the family to meet almost all of their dietary needs. Apart from goat rearing, Piara also produces handmade products. By selling these products like fan, packet made of paper, woodstick made of cowdung (Ghute*),* she also earns money that helps her to maintain her family satisfactorily.

Photo 2 Agriculture contributes in urban economy

Urban agriculture contributes in overcoming environmental problems rather bizarre given that poor households are forced to live adjacent to industrial areas that release toxic chemicals into the air and local water courses. It the importance of community networks and development processes that arise from urban agriculture. One woman named Amena(63) in Khalishpur slum area argued that "urban agriculture can be essentialin establishing social networks, empowering women and promoting community development, which symbolize peoples' permanent roots in the city and their sense of stability. Moreover, by growing particular foods that are traditionally eaten women take more control of the allocation of food within the household. Not only that through the empowerment of women, agricultural activity establish, and strengthen social networks.particularly the strong bond and trust that acted as a catalysts for the community taking action against rape, violence and child abuse in the community".

Elsewhere urban agriculture has been problematised in terms of the negative impact that it can have on the environment in urban areas particularly through soil erosion. Just as with the use of other natural resources in urban areas, in Khulna city, Bangladesh. Environmental impact has been viewed as a problem to be solved but very little attention has been paid to the potential positive environmental benefits of urban agriculture (for example, impacts on air pollution, the greening of the environment, etc.). Through the appropriate forms of land tenure and access to other production material and training, urban agriculture could contribute to a very large proportion of the income of urban households. So it is needed to identify the best

ways of developing linkages between urban agriculture and other activities that enable people to mitigate risk, get access to more remunerative livelihoods and, ultimately, lift them out of poverty.

Case Study 3 Small- scale business

Small scale business activities in cities promoting economy and ultimately spread socio-economic benefits to broader segment of those formerly not employed in formal occupation by the Government in cities. It is increasingly recognized that the sector contributes substantially to job creation and poverty alleviation (Kazungu*et al*., 2014).

As in the study area more than 60 percent of the respondents fall below the basic needs poverty line and the improvement in living standard is associated with the development of SMEs (Small and Medium-sized Enterprises) and their operations in the country. Thus, they encourage small-scale business operation as an effective way of fostering growth and improving livelihood in urban settlements, since they contribute in urban employment. However, small businesses are facing challenges such as being inhibited by access to finance, poor managerial skills and lack of training opportunities and high cost of inputs). The contribution of vegetable garden as a form of small-scale businesses in livelihood sustainability is looking at the prospects and challenges facing micro and small enterprises. Access to loan from financial institutions by nursery gardeners has been a problem due to lack of collateral as security for loan. This makes them to operate under very minimal capital and this hinders the growth potential of these agribusiness enterprises.

Findings reveal that all those involved in gardening have an assurance of daily meals, this has been a great achievement of small business operations. In the study area small- scale businesses make effective use of available local resources, simple and affordable technology and contribute substantially to job creation, income generation, income distribution and effective utilization of available local resources. As in the case of vegetable garden and livestock rearing, this is a venue for poor-resource people with limited skills and education and among the most useful livelihood strategies.

In light of the findings of this study it is imminent that income generated from small-scale business dealing with kitchen market, grocery shop, livestock and

poultry.Vegetable gardening enabled operators and owners to have an access to basic human needs such as food, shelter and clothing. It also enabled them in access to health and education services. However, operators in this sector are facing a number of institutional constraints which include but not limited to lack of room for expansion of the business (land for expansion), market, knowledge to financial services (capital) and access to capital.

A woman (75 years old) named Monnuzan lives at Tutpara in Khulna city. Her family consists of five members including two sons, one daughter-in-law and one grandson. She is a widow. Her husband has died by a bus accident. She is a temporary worker of a jute mill with very limited earning (3000 BDT per month). Her elder son is now in a jail as a victim of local politics. Her younger son has been suffering from autism.It is so toughfor her to maintain her family with only her income. Moreover a significant amount of her income has been spent to meet up their son's need. Poverty is the main problem for maintaining other expenses of her family. So she was searching for an extra job by which she can maintain her family expenditure appropriately. This is the story of her life before involved with Jatiya Mohila Sangstha.

After receiving the training from Jatiya Mohila Sangsthashe was gradually feeling confidence enough to make changes towards development during that time. From training sessions, she learnt more about the adaptation measures against disaster. From this training program she learnt about sewing. She then earned money by weaving nets as a result of indigenous knowledge. This knowledge was achieved from her father. The training continued for three months. Transport allowance for the trainee was provided by Jatiya Mohila Sangstha. From this organization she got a sewing machine. Since then, she has been sewing clothes with that machine commercially. She had earned a lot of money by doing that job. After that, by using this money she bought a goat and some ducks. She gets milk and egg from that. By selling milk and egg she earns more money from which some money is spent for meeting up the other requirements of the family. Besides this, she also saves money. By using these savings, she has also bought a cow.

Monnuzan effectively used her achieved knowledge and skills that she received from training programme. Now she has practical knowledge on how to become economically solvent by using formal skills. Her family is also impressed to see new

abilities of income generating activities. Now, after two years, the positive effect of the programme is still sustaining in the community. She has significantly accomplished her life in a right way, so she is successfully able to contribute to the family.

Photo 3 Traditional business activities contribute in women empowerment

In case of the enterprises which pay a monthly share for getting rid of their wastes, the textile and clothes industries occupied the first rank, while the wooden industries come in the last place. As well as, the wooden industries occupied the first rank among those throwing their solid wastes in garbage places, while textile industries occupied the last place in this group. From this view, the absence of cooperation between small enterprises in the study area, together with the lack of enough ecological awareness, consequently lead these enterprises to get rid of their wastes without any concern. However, if there is any kind of coordination or spatial relationship between these enterprises, there could have a possibility of collecting these wastes and recycling them to get raw materials that are to be utilized once again in the manufacturing process. Accordingly, it can preserve the natural resources and decrease the negative effect on environment.

Wood manufacturing sector contains furniture industry, door and windows shapes and frames. A worker in a wood industry told that wood industry is very common in both Rupsha and Khalishpuras a large source of small-scale enterprise. Wood Processing produces large amount of (as shown in Photo 5) sawdust is often collected

and sold at a very cheap price. The sawdust is used in general as fuel. It is also used in many shops and restaurants to help cleaning the floors of these enterprises easily.

Street-vending activities are widespread throughout the city, and are a way of gaining livelihoods and of regaining the social esteem lost by. Broadly speaking, in the study area vendors can be classified into two main groups: walking vendors and fixed vendors.A group of vendors informed that "the first category includes porters, vegetable sellers (shrimp head, wood buckles, brinjal, spinach, sweet potatoes, amaranth), fruit sellers (mangoes, oranges, avocadoes, pineapples, bananas) and sellers of bread, cakes and pastry, cooked food, and modern and traditional medicine. They are also sellers of different kinds of manufactured goods including soap, cigarettes, matches, cigarette lighters, nail cutters, pens, pencils, notebooks, watches, combs, tissues, children's and adult clothing, body lotion, tooth-paste, razor blades and knives. The second category includes people who work in fixed locations, including battery and tire repairers, mechanics and cobblers, and vendors of modern and traditional medicines, cooked foods, frozen foods (fish, meat and poultry) and tubers (sweet potatoes and street entrepreneurs). With all the political, economic and social changes that have taken place in Khulna city, the characteristics of the labour market and the working population has altered. Most notable is the changing role of women within society. Their role as the main income earner for many households has increased over the last 15 years.

Given the low literacy rate for women in the study area (20.23 percent against 79.77 percent for men), many of them are excluded from the formal employment market, and so work as street entrepreneurs. Lacking qualifications for formal employment or any form of wage labour, women find themselves obliged to work in many cases, on the streets. Women working as street entrepreneurs were sharing skills, information about their products, responsibilities, markets, clients and even capital and money to help those who were on the edge of bankruptcy. Some of the women who were interviewed were single mothers, divorcees or widows, and were heads of households. The political and economic crises in Khulna city have brought about many changes in social organization. The female-headed households are being hit by chronic poverty more than male-headed households.

Some of the respondents had been unemployed for more than ten years and were unable to find any work in the formal sector. Long-term unemployment has huge consequences- the longer people remain unemployed, the more they forget their skills and become unemployable. They sell clothes, soap, body creams, vegetables, cooked foods, frozen fish, frozen meat and poultry, bread, peanuts, palm oil, all kinds of fruit and all kinds of tubers.

The majority of respondents, especially those who worked in the open air, had started their businesses with a mere 100-200 BDT capital. Those who were well established and had shops had started their businesses with capital of between 1000 BDT and 5,000BDT.

Photo 4 Grocery shop on railway in Khalishpur slum areas

Nevertheless, for many poor households it constitutes the main or only source of income. Although it has never been easy to get people to talk about their income from street-vending activities, and there are few reliable research available on the informal sector that includes data on daily incomes and profits, the author endeavored to win peoples' confidence and gather such information. Most of the sellers who earned more than 200 BDT a day worked in the middle of the city, where there is 24-hour activity. Sellers with a daily profit of more than 300 BDT (after deducting all costs) were mainly to be found on road side shops mainly in Rupsha and Khalishpur slum areas.

High inflation, constant price fluctuations have made it very difficult for sellers to increase their profits. Comparing monthly income and expenditure study showed that

people were far from escaping chronic poverty. Their economic activities on the streets did not allow them to improve their living conditions. Many of them were still living in poverty and in appalling conditions, characterized by poor dwellings, poor food, poor health, high numbers of malnourished children, high infant mortality rates, poor education for the children, unclean water, lack of electricity and sanitation, and difficult conditions of movement. This is why, in Khulna, poor people engage in more than one income-generating activity, each member of the household exploiting the field he or she knows best in order to increase their level of income.

Case study -4 Waste-picking

Waste-picking as a livelihood activity is seen as a reflection of the gross inequalities of urban life. In terms of the livelihoods of poor people, waste-picking and sweeping are most important.There is a growing body of research that suggests a different view of waste and waste picking might be appropriate if we are to think more innovatively about urban development and about anti-poverty development strategies in urban areas (Bunting *et al*., 2001). The collection of organic waste, for example, means that there is less rotting rubbish left lying in the streets. On the other hand, conservation may involve prevention of poor people's access to, for example, water resources or to grazing land for their animals. In this context even in urban areas, waste-picking offers a survival strategy for some of the most marginalized people without compromising or competing with environmental demands. Indeed, effective waste-pickings can strengthen environmental protection and well-being in urban areas. However, there is still much about waste resources. For example, in an attempt to better understand the ways in which natural resources contribute to urban livelihoods, the combination of organic or naturally-occurring resources at dumps and garbage tips or in household dustbins challenges us to think more carefully about what constitutes a 'natural' resource in an urban context, and indeed in a rural context. The aim of this case study is to review the range of resources and activities that contribute to the livelihoods of poor people within the urban waste sector.

There are various ways of defining waste. Bharadwaj *et al*, (2015) argues argues that waste is discarded material which has no value in normal use or for ordinary use. Solid wastes are those undesirable, useless and unwanted materials and substances that come from human and animal activities. Generation of wastes is inevitable.

Problems arise when waste is considered as a raw material for recycling operations undertaken by some organization, or when waste is to be treated in some ways before disposal that changes its physical and chemical nature. In both these cases the original waste disappears to be replaced by a commodity (following re-cycling) or by an entirely new and different waste (following treatment).

Similarly, at the core of legal definitions, waste is the notion of discarding materials. It is not the nature of the material itself that defines whether something is waste, but the actions of the holder of the material (European Chemical Industry Council, 2013). Solid waste management is a huge part of the urban economy and there are a plethora of different livelihood activities that make up the waste economy. In the study area the activities through which people participate in waste collection and recycling are the 'wet' stream of pickers, waste water, sweepers and domestic workers, and a 'dry' stream of waste hawkers, middle and main dealers and recycling industries.

There is a distinction between surrounding service-based waste management and commodity-based economic activity. For example, commodities-based activity relies on trading, and waste pickers can find themselves subject to global price fluctuations in recyclable commodities (e.g. paper), whilst the emptying of latrines is worth only what people are willing to pay for the service. It is a broad range of activities that include people in various locations, from households up to large-scale recycling and transportation industries. The poor make their living sorting and sifting through that which is of no value to their richer counterparts.

The respondents involved in waste-picking generally sift and sort through waste at garbage dumps, some sort public rubbish bins for aluminium cans, glass, paper and food. Parveen (53) living in Nirala informed that "as they are disproportionately disadvantaged in the labour market, tend to predominate in the waste-picking sector, along with children. Men and women collect different types of materials. Men tend to collect higher value materials whilst women and children are left to lower value materials. Men dominate higher value materials in waste-picking because they are geographically more mobile than women".

There is stigma attached to people who work with waste in poor urban areas. As waste pickers are seen as being dirty, they are linked to the view that both are the problems to be solved or a barrier to be overcome in the pursuit of urban development.

Evidence from Rupsha and Khalishpur slum areas demonstrates that the low social status of people working with waste is compounded by the idea that people are born to this work. For example, some people from Christians and of Dalit (untouchables) groups of Hindus also from Muslims work with waste is often the preserve of hereditary status groups, either through tribal origin or ancestral occupation.

Most dumps in urban areas are viewed as common land, there are sometimes City Corporation rules governing access to them, so households living close to dumps often share tacit usufruct rights to 'graze' the dumpsite. The women interviewed at Nirala told that "we have a belly, the other people who come in this area to collect waste even by own hand and commonly search for food so why should we object. Though in some cases people search through waste bins for glass, paper and aluminium cans, there can be fierce territorial confrontations over waste bins on particular streets and roads. It is not unusual to see waste pickers, especially children, fighting over scraps of food or glass bottles on which a deposit will be repaid".

Dealers are able to dominate the market in certain areas of the city, or in certain parts of the dump, either because the costs of travelling elsewhere to sell recovered materials are too high or because waste pickers often find themselves caught in interlocking markets or in patronage relationships (for example when dealers extend credit to them). It is observed from the study that a street boy has the greatest affiliation towards those who purchase from him. He normally gives two or five taka to the boy, a kind of understanding that he will look after him at the time of crises. Sometimes if they protest they will be caught and will be beaten up and a lot of harassment. Sometimes he is more than a parent to the child. Like the way he looks after him when he is sick and when he is in the police station he will go and pick him up and come. He will do all those things. At the same time he can be a tremendous exploiter. So it is cruelty with co-existence.

In comparison with other activities that are based around natural resource use in urban areas (for example urban cultivation), waste-based livelihoods are not so dependent on having access to land and individual usufruct rights to that land so they take place even where there is very high population density. Therefore, many aspects of community-based waste management and economic activity require further work including understanding social networks and community relationships. The gender

issues related to this, the most appropriate forms of organisation and collective action to support waste-picking, especially with reference to relationships between the public and private sectors, about the ways to get access to more remunerative sources of livelihood through education and training. Government and Non-government organisations have played a significant role in enabling waste pickers in various places to get recognition from the government and in some cases to be more fully (or formally) integrated into formal waste management systems. Some NGOs have provided education to the children of waste pickers to try and help them to escape the poverty trap that forces them into waste-picking as adults. Adult and child waste pickers have also be given education to enable them to better protect themselves from the health risks associated with their work. In understanding the problems and life leading pattern simple models of social capital (for example those focusing on vertical and horizontal networks) so through collective action, waste pickers can form cooperatives for marketing wastes to get access to higher prices for their commodities. Moreover, formal organisation can help to decrease the stigma and negative attitudes associated with waste-picking.

Case Study 5: Water bodies

Water is at the core of sustainable development and is critical for socio-economic development, healthy ecosystems and for human survival itself. It is vital for reducing the global burden of disease and improving the health, welfare and productivity of populations. It is central to the production and preservation of a host of benefits and services for people. Water is also at the heart of adaptation to climate change, serving as the crucial link between the climate system, human society and the environment. In recent years a growing body of water and livelihoods thinking has emerged which takes as its starting point an understanding of the way poor people make a living, and recognises that the poor typically pursue a 'portfolio' of activities to manage poverty and vulnerability (Nicol, 2000). A key issue is understanding water as a productive asset which can be combined with other assets to generate financial and non-financial livelihood benefits (Overseas Development Institute, 2003). Surface water drainage is generally classed as 'wastewater' but the importance of gutters, sewers and dug-outs as a source of water for the poor, especially for urban agriculture, is also now increasingly recognised (Veenhuizen, 2006). Water supply development in urban areas remains dominated by health-focused approaches which emphasise the need to

increase coverage of 'safe' water supplies. However more recent research has highlighted the fact that the benefits of improved water access extend far beyond basic health impacts (Lovell*et al*., 2002). Water is centrally important, not just for basic human consumption, but for a wide range of different livelihood activities. Furthermore, the priority of poor water users themselves is often not so much improving water quality but rather improving the quantity and, crucially, the reliability of supplies. The concept of secure water usefully directs attention to the means by which poor water users access water as well as the sustainability of supply arrangements (Overseas Development Institute, 2003).

Water is a finite and irreplaceable resource that is fundamental to human well-being. It is only renewable if well managed. Today, more than 1.7 billion people live in river basins where depletion through use exceeds natural recharge, a trend that will see two-third of the world's population living in water-stressed countries by 2025. A total of 748 million people still do not have access to an improved drinking water source and existing indicators do not address the safety and reliability of water supplies. To reach the requirements of the right to access to safe drinking water requires real improvements for several billions of people (United Nations Department of Economic and Social Affairs, 2017).

In this study the term urban water resources is used to refer to freshwater used for productive and reproductive uses (including sanitation). As an industrial area besides household level the water is used in industrial and agricultural uses. Poor people in urban settings of Khulna city typically rely on multiple water sources. Different sources are often associated with different uses e.g. drinking, washing, irrigation etc. The main sourcesof water in Khulna city are shallow and deep tube-well, open wells, rivers, lakes, pond, and boreholes. Roof water harvesting is also of growing importance in household-level uses in Khulna city.

Household use of water extends beyond domestic uses such as drinking, washing, cleaning clothes and cooking into other small-scale enterprises such as the brewing of beer, hair salons, soap production and leather tanning. In addition water is essential for many small businesses from food stalls to shops to hairdressers and hotels etc., but the relative importance of water quality and quantity for each varies. Certain small-scale backyard industries e.g. shrimp depot, leather tanning, beer brewing, production

of food oils, soap and detergents etc. are particularly water intensive. This means a focus on the quantity and reliability of water supplies is needed rather than on water quality alone. Elsewhere people depend on watercourses within urban areas for fishing.

Especiallly in Rupsha slum areas the shrimp depots are developed for standing by the side of the river. Water is very essential for shrimp processing activities ready for its export. In that sense the water has its enormous contribution in earning of foreign currency. For instance, in Rupsha, Nirala, Khalishpur, Tutpara and Gollamari areas pond, river and lakes is used for purposes such as bathing, sanitary, washing (cloths and plates) and fishing. Though, as noted by various respondents, fishing is not done at commercial quantity, but is part of residents' livelihood strategies for meeting food needs. The water sources occupies a central position in the existence of sawmill, ice factory and shrimp industries and the survival of its residents. The river water is use for ice factory and also for transporting shrimps and logs from the hinterland, and for logs storage before they are cut into timber/plank of different sizes at sawmill. Moreover, the soil collected from riverbank is used for chula making (photo-6). A large number of people choose this system as their profession.

Agriculture is also an important water use especially in Rupsha, Gollamari and Tutpara areas, mostly producing perishable fruit and vegetables either for local markets or own consumption. The scale of these activities varies significantly from household plots to organised cultivation of large areas. Levels of irrigation required also vary and depend on climate and soil characteristics. Irrigation water is commonly diverted from rivers, gutters and sewers but is also drawn in many cases from water points designed for domestic use. Many poor urban households also keep livestock, either for own use or producing meat and dairy products for market, which can consume large quantities of water. Water sources and courses themselves are important for fishing and other forms of aquaculture in the study areas.

One way towards sustainable development is to close water and resource circuits at the city-level. This decreases the city's water requirement from, and its influence on, the ecosystem and makes it more independent and resilient. Technical intelligent solutions that serve this purpose are based on the separate collection of various wastewater streams, targeted and appropriate water treatment, the recirculation of

water resources, and the recovery of nutrients and organic matter contained. The New Alternative Sanitation Systems (NASS) offer solutions to these principles. Many of these technologies focus on domestic wastewater, which plays a central role in urban areas. Due to its modular design and the choice of the degree of centrality, such solutions can be combined and implemented at the level of the bathroom, the house, the block, the neighborhood or even the whole city.

Wastewater reuse is defined as, using wastewater or reclaimed water from one application for another application (United States Environmental Protection Agency, 2004). Especially, in response to an increasing scarcity of water in many urban areas owing to population growth and industrialization the reuse of treated wastewater might be a promising element within the concept of the WOCP. In this context, the wastewater treatment of urban hot spots like industrial enterprises and hospitals combined with water reuse systems might be an interesting option in order to improve environmental protection and to tap still unexplored water sources. In Rupshaslum area there is a government regulated water purification system. Almost all the waste water has been preserved in this place and after purification the usable water is supplied for the purpose of different domestic and agricultural activities.

In urban areas, the synergies between the goods and services provided by aquatic ecosystems as well as with the other element of the biosphere (such as soil, air, vegetation and climate) are important purposes for urban management. The following examples highlight this global view.

The presence of Rupsha and Mour River in the study area decreases local floods, improves flood storage capacity and reduces downstream flooding. It is also a cost-effective alternative to traditional engineering. The development of walking and cycling along rivers and green areas path has also encourage the use of green transports such as cycling and walking for short journeys (school, local grocery shop, sport complexes) and hence according to Hof *et al*., (2012) reducing the CO2 and other greenhouse gases emission as well as enhancing air quality. A well-structured soil with a thick organic layer over the surface horizon is improving the water retention and drainage respectively in and through the soil. By flowing through the soil, the water quality is enhanced, the recharge of the groundwater table is effective,

flooding and erosion is reduced. By ensuring the development of parks, forest and other green areas, this can be effective.

Moreover, water absorbs and releases heat and hence reduces the need for winter heating and summer air conditioning. Generally distances covered in search of water are shorter in urban areas than in rural areas but women in urban areas are also vulnerable to assault, especially whilst collecting water early in the morning or late at night. An added problem in many Khulna city is seasonal water shortage resulting in water rationing whereby use of public taps may be restricted to a few hours each day. Unlike most rural areas, private water vending is a common occupation in urban settings. Moreover inhabitants of informal/illegal settlements or slums often have no formal rights to the land they live on. This tenure insecurity is a major disincentive to investment in water supply solutions. Communities themselves are unlikely to invest in expensive infrastructure if there is a prospect of eviction and similarly large private sector operators regard these areas as commercially non-viable.

Therefore the concept of water security is useful in focusing attention on policy and institutional arrangements which affect access to water and thereby determine livelihood options and strategies. Current institutional arrangements need to be understood in the context of wider policy trends, notably the recent global shift in water policy from supply-led to demand-led approaches. In the face of recent trends in water supply development which militate against them, poor urban water users are increasingly looking to alternative water sources. Rainwater harvesting is increasingly popular in the study areas often supported by NGOs.

Photo 5 The river water is used for transporting shrimp and logs from the hinterland

Photo 6 Chula- making (by using soil of river bank) is an essential means of livelihood

Photo 7 The shrimp depots have established by the side of the river

Case Study 6: Urban Spaces: Reserves, Parks and Wasteland

Land has a vast array of uses –agriculture, housing, firewood, animal grazing, gathering food, medicine and materials for artisanal activities, and for space for a range of economic activities. This is acknowledged in the literature, as is the centrality of land to social security, economic development, identity and a sense of belonging (Wanyeki, 2003). Land lies at the heart of social, political and economic life in the study area, where agriculture, natural resources and other land-based activities are fundamental to livelihoods, food security, incomes and employment. Land also continues to have major historical and spiritual significance for the

respondents. Land for settlement and housing is of vital importance to the urban poor. Access to land in urban areas takes many forms, ranging from formal, legal occupancy to a range of informal and technically illegal forms of occupancy. Urban spaces (land) are a key resource for many urban livelihoods, especially those based on natural resources. Competition for land is fierce and even so-called 'vacant' or 'unused' land is usually a key resource for some livelihood activity or another. Land is used for growing agricultural crops or trees from which various products are taken (for example, fruit, leaves, and wood for construction, furniture, fences and fire). Pastoralists graze cattle, goats and sheep on open land or roadside verges and their animals also browse on bushes and trees.

The spaces are reserves (state managed but in some places have a form of community involvement either through planning and management or through waged work associated with conservation/preservation of areas), parks, wasteland/brown field sites. Commons (provide a communal site for access to natural resources, principally grazing, but also collection of veld food, grass, trees etc), verges (provide access to natural resources such as grazing, fodder collection, verge side crop production, trees etc. For example, in Tutpara and Khalishpur, rubbish dumps have provided the grazing resources for cattle and formal agreements have been made between the local government and local communities who want to graze their cattle on the dumps. Local communities benefit because of free grazing resources for their cattle (they would otherwise have to pay for grazing or fodder) and the local government benefit as they have found that the cattle manure helps accelerate the decomposing process. While these may be formalised spaces, much rubbish in urban areas is also on wasteland and brown field sites.

Ultimately, public space systems can only be sustainable if adequate resources are available for their creation, expansion, management and care. A sustained flow of such resources can only, come from a city's own income. In turn, such income, generally in the form of taxes, derives from economic expansion and increased property values. Economic expansion comes from investment and investment depends on such factors as mobility, safety attractiveness. This is the virtuous public space cycle. Public space provides important but often underestimated benefits to all forms of entrepreneurship and business, both formal and informal. In the study area, public spaces particularly are the places where informal business like grocery shop, teastall

and kitchen market carried out in an orderly and legitimate way, thus providing poorer urban dwellers with precious livelihood opportunities. Informal trading can be regularized and legitimized, taking place in recycled public spaces and more traditional municipal markets. Public spaces have played the role as producers of environmental sustainability. The negative consequences of excessive paved surfaces in cities are well known parks, gardens and playgrounds, particularly when well distributed in an urban area, are essential antidotes to this problem and open and green spaces perform vital ecological functions. A well-planned city-wide public space system can create green networks to regenerate ecological systems and restore environmental connectivity (wildlife, sanctuaries and water courses) and support biodiversity in urban areas. This can, in turn, create ample benefits for the citizenry at large and attract visitors. The role that public spaces can play in the provision of ecological services is extremely important in the mitigation and adaptation strategies to climate change. A city with a strong web of productive and natural green areas that are linked to forms of active urban stewardship is better suited to tackle some of the challenges posed by climate change.

Parks in urban areas enhance city aesthetics, act as green lungs of the city, refresh the air and provide beneficial contact with nature as an upstream health promotion intervention for the population. Parks also create natural surroundings of urban area for leisure, relaxation, recreation, psychological and physical comfort of the people. Monirul (80) in Nirala opined that "parks development in urban areas can be an effective planning strategy to enhance environmental management, improvement, conservation and esthetic maintenance due to its roles in upgrading quality of life, economic well-being and fulfilling the social needs of urban-dwelling individuals. It provides a healthy environment by reducing air pollution, urban heats, noise and green space loss". In Khalishpur, the realization of the important role of public parks, natural open spaces and well-designed green spaces has resulted in the launch of the 'City Beautification Concept'of most capital cities to provide an environment conducive for quality urban living, recreation, social interaction and community action for the pursuit of legitimate pleasures and economic activities. Thus the effectiveness of public parks development in urban areas is a strategy for environmental improvement, conservation, and its potential in sustaining a pleasant, exciting, invigorating and comprehensive urban environment in Khulna city of Bangladesh.

The study specifies urban free spaces as land (private, state or communal) that is used either for conservation purposes (e.g. reserves), recreation (e.g. parks and community gardens), or wasteland (including dumps, verges, 'brown field' sites etc.). All these areas may form the sites on which livelihood activities take place (e.g. grazing resources, land for cultivation etc.), may have the potential to be transformed into sites to support livelihoods (e.g. through conservation). They also provide direct access to some natural resources to support livelihoods e.g. tree and bush resources, wild foods. Areas such as parks contribute to livelihoods through improvements in well-being and quality of life. A key element of this case study is the overlap with the previous case studies, as land can be viewed as the basis for many of the activities described above.

The opportunities to rear animals in the study areas are heavily dependent on access to land for grazing, whether grazing takes place on roadside verges or at the local rubbish dump. A major problem in many urban areas in developing countries is land tenure.Different forms of urban space need to be addressed as they make important and often overlapping contributions to the livelihoods of the urban poor.

Thus the study suggests that the development of urban Public Park is an important mechanism for regenerating conserving, beautifying and managing the environment sustainably from the effect of climate change. Italso encourages healthy recreational pursuits and communication amongst the residents. It helps to retain green open spaces in urban areas adding value to properties thereby increasing their market value and enhancing the economic revival of cities and creating positive publicity for business.

Appendix 2

Interview Schedule (In English) On

Urban Environment and Sustainable Livelihood: The Case of Khulna City, Bangladesh

[The collected data will be used for the research only, and will not be disclosed under any circumstance. In case of publication the identity of the respondents will be protected.

Date: ___/___/___

Schedule No: ___/___/___

Household No: ___ ___ Street with no. Location: ___ __

1. **Personal Information of the Respondent** Thana: ___

Name of key informants:___

V 1. Age: _____ Years	V 2. Sex: a Male b Female
V 3. Religion: 1 Islam 2 *Sanatan* 3 Christianity 4 Buddhism 5. Other _____	V4.Years ofSchooling: _____ Years
V 5. Occupation: _____	V 6. Monthly Income: _____ BDT
Please Mark with a **(√) Sign**.	In Case of Other/Open Qu., **Please Specify**.

2. Information of the Family

Family Members of the HH[1]

Sl. No.	Relation with the HHH[2]	Age	Sex	Marital Status	AaM[3]	YoS[4]	Occupation	Monthly Income [in BDT]	Total HH Income [in BDT] (V 9)
1.									
2.									
3.									
4.									
5.									
6.									
7.									
8.									
9.									
10.									
Please Mark with a **(√) Sign**.					In Case of Other/Open Qu., Please Specify.				

V 7. Type of Family:	Nature: a Nuclear b Extended c Broken d. Other_____	Income: a Single-Earned b Dual-Income
	Marriage: a Polygamous b Monogamous	
V 8. Size of the Family:	a Children [Below 5]: ____ b Children/Adolescent [5-18]: ____ c Adult [19-55]: ____ d Aged [55 ≥]: ____	e Total: _____ Person
V 9. Monthly Household Expenditure [in BDT]:	a Food(by age and season): _____ b Medical: _____c Education: _____d housing e transport f. fuel g. Miscellaneous: _____	

V 10. Savings __ (taka in the last year/total)	V 11. No. of live birth babies (in last 12 years): male---- female---_____N/A _____
V12. No. of still birth babies (in last 12 years) male---- female---_____N/A	V 13. No. of low birth weight babies---------- /N/A .

14. What was your main job in last year? 1. Agriculture 2. Business 3. Construction 4. Not defined 5.others

15. Are you?1. Worker 2. Employer 3. Self employment 4. Informal worker 5.others

[1] Household
[2] Head of the Household
[3] Age at Marriage
[4] Year of Schooling

16. What is the status of your work? 1. Permanent 2. Temporary 3. Seasonal 4. Part time

17. How long have you been jobless in the last 12 months?----------weeks, what was the cause for being jobless?

3. Information of the Household

18. Are you living here since birth? 1. Yes 2.No

19. (If no) How long have you been living here? ----------years

20. Why are you living here? 1. In search of job 2. Education 3. Marriage 4. Others

21. Do you have any plan to leave your place of residence? 1. Yes 2.No,
If yes, why? And where do you want to live in?

22. Where is your place of birth?

23. Before living here where have you lived?

24. What type of house you live? 1. Single 2.Joint 3.Slum 4.Barrack 5.Flat 6.others

25. When was this house constructed?

26. What are the materials used to construct your house? 1.Wall 2. Floor 3.Roof

27. No. of rooms ----------Floor space ---------- (m^2)

28. What is the status of the following facilities?

space	Place		
	In house	Outside	Others
Kitchen			
Bathroom			

29. Rental Pattern of Households

Owner	Rented	Rent free	Other

30. If rented,how much do you pay per month (in BDT)? ----------

31. Land ownership pattern

Government land	Private land	Others

32. What is the amount of your own land (in acre)? 1. Homestead---------2. Cultivable-

33. What is the source of water (with quality) of your household?

Water (1.Pure 2.Polluted)	Tube-well/Deep tube-well	Municipal Tap	Own pond	Community pond	River	Other
Drinking						

Cooking						
Bathroom use						
Laundry						
Dish washing						

34. Mention about transport facilities for communication.1.On foot 2.Cycle/ Motor cycle 3. Own car 4. Vehicle of others 5. Public bus 6. Professional vehicle
7. Rickshaw 8. Taxi 9. Others
35. What type of transport are used by your school going children? /Not applicable
36. Please mention about the type of toilet facilities of your household?

Community latrine	Twin-pit	Connected to drain	Hanging	Slab	Open space	No toilet

37. Households' toilet sharing Pattern:1.Not shared 2.Sharing one Latrine 3. Others

38. Drainage 1. Well drained 2. Moderately drained 3.Poorly drained

39. Method of solid waste disposal

Method	1.Good	2.Fair	3.Poor	4.Verypoor
1. Fixed place 2. Open space				
1.Well provided 2Averagely provided				

40. Liquid waste disposal system

Method	Septic tank	Pour into latrine	Open ground	Others
1Well provided 2.Averagely provided/ Causes				

41. Flooding in the household 1. Fully flooded 2. Partially flooded 3. Flood free

42. Do you have access to electricity at your household? 1. Yes 2.No

43. What is the fuel source of your household?

4. Access to Resources

44. Available natural resources (put tick mark)

Tools	1	2	3	4	2
Land	Only house	House with 2 decimal homestead garden	House with 5 decimal open space	House with 5 decimal agricultural land	House with more than 5 decimal agricultural land
Water	Natural sources (Pond, river)	Created (House)	Tube-well	Deep Tube-well	Deep Tube-well with piped water
Sunlight and air	Very low	Low	Moderate	Good	Very good
Vegetation and Tree	No contribution at all	Low contribution (access to housing)	Moderate (access to food)	Good (in medicine, education and other basic need)	Very good (in fulfilling market demand and infrastructural development
Open spaces (free)	No contribution at all	Low contribution (access to housing)	Moderate (access to food)	Good (in medicine education and other basic need)	Very good (in fulfilling market demand

45. Do you have access to tree at your home/community? 1. Yes 2.No
46. If yes, please mention about most dominant plant and tree and its uses.
47. Do you have access to urban green belts? 1. Yes 2.No
48. If yes, mention the area (in acre)?
49. What type of trees do you prefer to plant in your locality? 1 Shade-giving 2. Plant and shade 3. Flowering trees 4. Fruit trees 5. Others

50. Types of urban park in the study area/ Not applicable

Types of parks	Number	Area (in acre)	Name
Mini parks			
Neighborhood parks			
Community parks			
Regional parks			
Special use properties/facilities			

51. What are the facilities of urban parks received by you?

Type of park	Facilities					
	Picnic area	Security	Game facilities	Exercise path	Rest room	Others

52.What is the role of urban parks and open space in sustainable livelihood (with value)?

53. Access to financial resources (put a tick mark)

Tools	1	2	3	4	5
Family income (BDT)	0-2000	2001-4000	4001-6000	6001-8000	8001-10000
No. of income earner	0	1	2	3	4
Yearly family savings (BDT)	0-5000	5001-10000	10001-15000	15001-20000	20001 and above
Regularity of wage earning	Not more than 1 month at work	3 months at work	6 months at work	9 months at work	Never been workless for a week in last year
Access to interest free loan	No access to loan	Access to loan from family members	Access to loan from relatives	Access to loan from community members	Access to loan from more than three sources

54. What are the risks associated with the income generating activities?

…….

55. Does any of the following affect your source of income?

Gender	Ethnicity	culture	History	Religion	Kinship	Lack of willingness	Other

56. If one or more, how?

57. Human resources (put tick mark)

Ability to labor	Not able	Less able	Moderately able	Able bodied	Perfectly able
Health facilities	No doctor	Natural ingredients	Quack	Paramedic	Registered
Education	Only can sign	Class 1- 5	Class 6-9	SSC pass	HSC pass and above
Skillness at work	No knowledge at work	Having informal little technical education	Having theoretical education at work	Having formal technical knowledge at work	Having formal technical and theoretical knowledge at work
Information assist livelihood strategies	No information at all	Information from family	Information from community	Information from national organization	Information from international organization

58. Do the family members affected by the following diseases?

< 5 YEARS OF AGE			**> 5 YEARS OF AGE**		**Both**
S/N	Diseases	Diagnosed 1.yes/2.no	Diseases	Diagnosed 1.yes/2.no	Diagnosed 1.yes/2.no

1.	Malaria		Malaria		Malaria
2.	Pneumonia		Pneumonia		Pneumonia
3.	Acute Respiratory Infection		Acute Respiratory Infection		Acute Respiratory Infection
4.	Diarrhoea		Diarrhoea		Diarrhoea
5.	Anaemia		Anaemia		Anaemia
6.	Skin infection		Skin infection		Skin infection
7.	Urinary tract infection		Urinary tract infection		Urinary tract infection
8.	Worms		Worms		Worms
9.	Minor surgery		Minor surgery		Minor surgery
10.	Others		Others		Others

59. Is there any prevention facility from the diseases of your family members?
1.Yes 2.No

60. Do you have access to primary health care (potential means) 1.Yes 2.No

61. What is the distance of source of medical facilities from residence (in k.m)?

62. Access to Social asset (put tick mark)

Family relation	Not good at all	Not good	Moderate	Good	Very good
Relationship with outsider/neighbour	Very limited	Not good	Moderate	Good	Very good
Involvement with Politics	Not at all only voting right	Very limited	Limited	Good	Very good
Access to wider institution	Very low (access to neighbors)	Low (access to community)	Moderate (participation with local administration)	Good (Personal relation with national NGOs)	Very good (access to international NGOs)
Participation in community based organization	Verylowparticipation	Low participation	Moderate participation	Active participation	Very active formal participation

63. How much time do you spend as your leisure time in a day?----------hours

64. Are you involved in cultural activities (dance/song/theater)? 1. No 2.Sometimes 3. Regular 4.Others

65. Who participate more in family and community decision making? Please specify.

66. What is the situation of law and order in your locality?
1. Violated 2.Deturated 2.good3.Very good

67. Access to Physical asset (put tick mark)

Sanitation	Very low (dirty surroundings)	Low (no drainage facility)	Moderate (not sufficient air and water quality)	Good (sanitary toilet and sufficient water and air quality)	Very good (improved drainage, toilet and clean surroundings)
Access of educational institution (within 3 k.m. from house)	No school at all	NGO school	Primary school	Secondary school	Higher secondary and higher institution
Road/communication facility	On foot	Bicycle	Public bus	Taxi/profes sional vehicle	Motor bike/ personal car
Power system	No power (*kerosin Kupi*	Storage Battery	Electricity (not authorized)	Sub power connection	Direct electricity
Recreation facility	No access to open space	Sports facility	Open space with secured sitting arrangement	Access of arranging picnic	Well-equipped park with all recreational facilities

68. How would you evaluate your locality? 1. Dirty city 2. Considered as an old city 3. Modern, beautiful city

69. What type of pollution affects your lives? 1. water 2 air 3. noise 4 others 5 none
70. If any, what is the cause?

71. Do you receive any type of facility from homestead land, local land, roads, river/water bodies, railways, market, and waste in your locality? 1. Yes 2. No

72. If yes, how these contribute/ could contribute in sustainable livelihood?

Sector	land	roads	river/pond other water bodies	railways	market	waste	other	Park
1. Food security								
2. As income source								
3. Education								
4. Ecological								
5. Human relation								
6. Agro- forestry								
7. Others								

5. Vulnerability and Sustainable Livelihood Strategies

73. Do you know about sustainable livelihood? 1. Yes 2. No

74. If yes, please mention about the institutional arrangements to achieve sustainable livelihood

75. What type of livelihood strategies you want to achieve?

76.

Short term	1.Male 0.Female
Long term	1.Male 0.Female

What will be the Livelihood outcomes?

More income	Increased wellbeing	Reduced vulnerability	More sustainable NR base	other

77. Please mention about the gestation period of livelihood activities.

78. Is your income adequate to support your household/dependents? 1. Yes 2. No

79. If engaged in other income activity, which is the predominant or more gainful activity?

80. Do you have the access to following facilities in your working environment?

Appointment Letter	Risk allowance	Leave Weekly/Maternity	Environment	Medical	Toilet

81. Are you in debt? 1. Yes 2. No
82. If yes, what is the interest rate?
83. What is the amount of food (in k.c.) you have in a day?
1. Calorie intake---2.protein intake --- 3.fat free calorie-----

84. What is the number of cloth, you wear? 1.Normal dress---2.winter cloth---pair of shoes---

85. What are the major causes of vulnerability?

86. Please put a tick mark on the specific fact

	1	2	3	4	5
Eviction Threat	Threated at present	Threated for more than three times	Threated for more than two times	Threated once	No threat
Income security (in BDT)	0-2000	2001-4000	4001-6000	6001-8000	8001-10000
Food Security	Frequently hungry in whole day	Having meal for one time in a day	Having meal for two times in a day	Having meal for three times in a day	Having meal for three times with extra food in a day
Workless week	37-48	25-36	13-24	1-12	Never for a weak
Literacy situation	No formal schooling	Completion of primary education	Completion of class eight	SSC pass	HSC pass
Access to health	Never go to doctor	Natural ingredients	Quack	Paramedic	Registered doctor
Access to household goods	Highly dissatisfied	Dissatisfied	Moderately satisfied	Satisfied	Highly satisfied

87. Please mention about the coping strategies in urban livelihood

6. Sustainable Agriculture

88. Are you involved with any of the followings? Please specify.

1 Horticulture	2.Aquaculture	3.livestock and poultry	4.Agro forestry	5. Miscellaneous	6.N/A

89. Who does agricultural work, (How)?

90. Is there any gender gap in agricultural assets and resources?1.Yes 2.No,

91. If yes, what type of?

Gender gaps	resources					
The gender gap	Land	Labor	Capital	marketing	Education	Technology
ways to reduce						

92. Is there any agro-based industry in your locality? 1.Yes 2.No

93. If yes, what type of?1.Rice 2.Oil 3.Jute 4.Cotton 5. Sugar 6.Shrimp7.Wood 8.Others

94. Contribution of agriculture in maintaining basic need of the household(put tick mark)

Level of contribution	**Income**	**Food**	**Health**	**Education**	**Clothing**	**Interpersonal relations**	**Market demand**
Very low sustainability (no contribution at all)							
Low sustainability (low contribution)							
Moderate sustainability (moderate contribution)							
Sustainable enough (Good contribution)							
Well sustainability (Very good contribution)							
Total							

95. What strategies could strengthen community agriculture for sustainable development?

1. Community Investment Programmes (CIP's) 2. Training 3. Technology 4. Loan facilities 5. Others

7. Petty trading:

96. Are you involved in petty trading? If yes, what type of?

97. What type of business could contribute more to survive over time and how?

98. What are the constraints for small-scale enterprises?

99. How could you solve the problem? Please specify.

8. Gender role in Disaster risk reduction and climate change

100. Mention about the disaster risk (with frequency) in your area

Rank	Most frequent disaster		Most dangerous risk		Priority to deal with	
No.	0.Female	1.Male	0.Female	1.Male	0.Female	1.Male

101. Do the people of your locality concerned about disaster? 1. Yes 2.No

102. If yes, what is their perception about climate change?

103. Please mention about prepared planning and early-warning systems for disaster risk reduction, how is it possible to ensure its access?

104. Access to and control over resources during disaster (please put tick mark)

Access to shelter	Public school/community center	Relatives house	Own house	Own house with land	Own safe location
Income security	Income not sufficient	Adequate income	Production facilities	Adequate production	Savings
Food Security	No security (Frequently hungry in whole day)	Less security (Having meal for one time in a day)	Moderate security (Having meal for two times in a day)	Secured enough (Having meal for three times in a day)	Highly secured (Three times meal with extra food)
Infrastructural facilities	Very low housing system	Water facility	Road facility	Health facility	Electricity facility
Broader organizational support	Moderate political support	NGO support	Responsive local government	Enabling legislative support	International organization
Knowledge about disaster	Very little knowledge	Having local knowledge	Public information to prevent	Knowledge about early warning	Training of rescue
Emergency responses	To save life	To reduce health impacts in family	Contribute in economic solvency	To ensure public safety	To meet subsistence needs of the people

105. Please talk about the impact of the disaster on social organization.

106. Do you feel that you have the ability to shape your lives in post disaster situation?

1.Yes 2.No

107. What is the institutional support to disaster risk reduction or mitigation activities? What are the challenges regarding this?

108. Is participation in development work of women/ other marginal groups ensured?

1. Yes 2.No If yes, by whom?

109. How does community assist/could assist to adapt and cope with disaster risk and climate change?

Assist/could assist	Issues								
	Food security	Water supply	Employment	Loan	Livestock	Life cost	Fuel	Households asset	Others
Female									
Male									

110. What may be the ways to reduce underlying risk factors?

Thank You

Appendix 2.2

mv¶vrKvi mPx (evsjvq)

bMicwi‡ek I †UKmB RxebhvÎv: Ljbv kn‡i cwiPvwjZ GKwU M‡elYv

[সংগৃহীত উপাত্ত কেবলমাত্র গবেষণা কাজে ব্যবহৃত হবে এবং সর্বোতভাবে এর গোপনীয়তা রক্ষা করা হবে]

তারিখ: ___/___/___ সাক্ষাৎকারের নম্বর: ___/___/___

বাড়ী নং: ____ ____ রাস্তা নং-, এলাকা: ____ __থানা : ____

উত্তরদাতার ব্যক্তিগত তথ্য ঃ

উত্তরদাতার নাম ঃ

V১.বয়স ঃ: _____ বৎসর	V . ২. লিংগ ঃ ১.পুরুষ২.নারী
V ৩. ধর্ম ঃ: ১.ইসলাম২.সনাতন৩.খ্রীষ্টান৪.বৌদ্ধ.৫.অন্যান্য	V৪.শিক্ষা গ্রহণের বছর ঃ ..... বৎসর
V ৫. পেশা ঃ _____	V৬.মাসিকআয়ঃ _____ টাকা
দয়া করে সঠিক স্থানে টিক (√) চিহ্ন দিন	

২. পরিবারের তথ্য ঃ

পরিবারের অন্যান্য সদস্য ঃ

ক্রমিক নং	পরিবার প্রধানের সাাথে সম্পর্ক	বয়স	লিংগ	বৈবাহিক অবস্থা	বিবাহ কালীণ বয়স	শিক্ষা গ্রহণের বছর	পেশা	মাসিক আয় [টাকায়]	পরিবারের আয় [টাকায়] (V ৯)
১.									
২.									
৩.									
৪.									
৫.									

V ৭.পরিবারের ধরণ	১.একক ২.বর্ধিত ৩.একক উপার্জিত	৪.যৌথ উপার্জিত ৫. একবিবাহ৬.বহুবিবাহ ৭.অন্যান্য
V ৮.পরিবারের আকার ঃ	১.শিশু (৫ বছরের কম বয়সী) ..... জন ২. শিশু/ কিশোর (৫-১৮ বৎসর) ..... জন ৩.প্রাপ্ত বয়স্ক (১৯-৫৫ বৎসর) ..... জন ৪. ৫৫+.. ৫. মোট সংখ্যা__ জন	
V ৯.পরিবারের মাসিক ব্যয় (টাকা)	নিম্নলিখিত খাতে প্রতি মাসে গড়ে কত ব্যয় হয়? ১. খাদ্য .....২. স্বাস্থ্য ৩. শিক্ষা --- ৪. গৃহ ব্যবস্থাপনা -------৫. যাতায়াত -----৬. জ্বালানী ------ ৭.বিবিধ	
V ১০.গত এক বছরে সঞ্চয় ও মোট সঞ্চয় কত (নগদ অর্থে)? _____ টাকা		
১১.গত বারো বছরে কতগুলো ছেলেমেয়ে জীবিত জন্মগ্রহণ করেছে? ছেলে..... মেয়ে এবং ১২. কতগুলো ছেলেমেয়ে মৃত অবস্থায় জন্ম নিয়েছে ছেলে..... মেয়ে.	১৩.কম ওজনে জন্ম নেওয়া শিশুর সংখ্যা --- ---- / প্রযোজ্য নয়	

১ পরিবার

২ পরিবারপ্রধান

৩ বিবাহ কালীণ বয়স

৪ শিক্ষা গ্রহণের বছর

১৪.গত বৎসরে প্রধান কাজ কি করতেন? ১.কৃষি ২.ব্যবসা ৩.নির্মাণ কাজ ৪.উত্তমরূপে সংজ্ঞায়িত নয় ৫.বেকার

৬.অন্যান্য

১৫.আপনি কি? ১.শ্রমিক অথবা কর্মচারী ২.নিয়োগকর্তা ৩.নিজ কর্মে নিয়োজিত ৪.অবেতনভূক্ত পরিবারেরকর্মী

৫. অন্যান্য

১৬. আপনার কাজ কি? ১. স্থায়ী ২. অস্থায়ী ৩.মৌসুমভিত্তিক ৪.সাময়িক (মাঝে মাঝে)

১৭. বিগত ১২ মাসে সব কাজ একত্র ধরে আপনি কতদিন কাজ করেননি? .....সপ্তাহ ,কাজ না করার কারণ কি?

3. evm¯‘vb Z_¨

১৮. আপনি কি জন্ম থেকে এখানে বাস করছেন? ১.হ্যাঁ ২. না

১৯. . (না হলে) কত বৎসর ধরে আছেন? ..... বৎসর

২০. আপনি কেন এখানে বাস করছেন? ১. কর্মসংস্থান ২.শিক্ষা ৩.বিবাহ ৪.অন্যান্য

২১.আপনি কি বাস্তুত্যাগের পরিকল্পনা করছেন? ১.হ্যাঁ ২. না হ্যাঁ হলে কেন এবং কোথায় যেতে চান?

২২. আপনার জন্মস্থান কোথায়?

২৩ এখানে আসার পূর্বে আপনি কোথায় বাস করতেন?

২৪. আপনার এটা কি ধরনের বাসস্থান? ১.একক বাড়ি ২.আধা সংলগ্ন বাড়ি ৩.সারিতে বাড়ি ৩. ফ্লাট ৪. ব্যারাক ৫.অন্যান্য

২৫.কোন বৎসরে এই বাড়ী নির্মাণ করা হয়েছিল / কত বৎসর আগে?

২৬.আপনার বাড়ী তৈরীতে ব্যবহৃত উপাদান কি? ১.দেয়াল ..... ২.মেঝে .....৩. ছাঁদ .....

২৭.আপনার বাসগৃহে কয়টি কামরা আছে কামরার সংখ্যা .... কামরাগুলোর আয়তন কত?..... বর্গফুট

২৮.পরিবারের সদস্যদের এককভাবে ব্যবহারের জন্য নিম্নলিখিত ব্যবস্থা আছে কি?

কক্ষ	অবস্থান		
	ভেতরে	বাইরে	অন্যান্য
রান্নাঘর			
স্নানাগার			

২৯. বসতবাটীর কি আপনি? ১.মালিক ২.যৌথ মালিক

২.ভাড়াটে ৩.নিয়োগকর্তা প্রদত্ত বাড়ী ৪. অন্যান্য (নির্দিষ্ট করুন)

৩০. ভাড়ায় হলে প্রতি মাসে কত ভাড়া দেন? ভাড়া ..... টাকা

৩১. জমির মালিকানার ধরণ: ১.সরকারি ২.ব্যক্তিগত ৩.অন্যান্য

৩২. আপনি কতটুকু জমির মালিক (একরে)? ১. বাস্তুভিটা---------- ২.চাষের যোগ্য----------

৩৩. কোন উৎস থেকে আপনি পানি পেয়ে থাকেন?

জল(গুণগত মান- ১. দূষিত ২. বিশুদ্ধ/দূরত্ব	উৎস					
	নলকুপ/গভীর নলকুপ	মিউনিসিপ্যাল ট্যাপ	ব্যক্তিগত পুকুর	জন সাধারণের পুকুর	নদী	অন্যান্য
পানীয় জল						
রান্নাবান্নার জল						
গোসলের জল						
কাপড় ধোবার জল						
থালা বাসন মাজার জল						

৩৪. যথাস্থানে যেতে আপনার যাতায়াত ব্যবস্থা আছে কি? ১.পায়ে হেঁটে ২.সাইকেলে/ মোটর সাইকেলে ৩.ব্যক্তিগত গাড়ীতে ৪.অন্যের গাড়ীতে ৫.সাধারণ পরিবহণে ৬. নিয়োগকর্তা প্রদত্ত বাস ৬. রিক্সাতে৭. ট্যাক্সিতে ৮.অন্যান্য

৩৫. স্কুলে যেতে আপনার ছেলেমেয়েদের যাতায়াতের কি ব্যবস্থা আছে? / প্রযোজ্য নয়

৩৬. আপনার পরিবারের ব্যবহৃত ল্যাট্রিনের ধরণ কি?

জন সাধারণের	বদ্ধ ট্যাংকবিশিষ্ট	ড্রেনের সাথে সংযুক্ত	ঝুলন্ত	স্লা-াব	খোলা জায়গায়	কোন ব্যবস্থা নেই

৩৭. ল্যাট্রিন ব্যবহারের ধরণ ১. ব্যক্তিগত ২.যৌথ ৩. অন্যান্য

৩৮. নিস্কাশন ব্যবস্থা ১. উন্নত ২. মধ্যম ৩. নিম্ন

39.eR¨ ব্যবস্থাপনা

ব্যবস্থা	উন্নত	মোটামুটি	ভাল না	খারাপ
ফেলার স্থান ১.নির্ধারিত জায়গা ২.আশেপাশে				
১.নিয়মিত ২. অনিয়মিত ৩. অন্যান্য				

৪০. ময়লা পানি ফেলার স্থান

ফেলার ব্যবস্থা	বদ্ধ ট্যাংক বিশিষ্ট	ল্যাট্রিনের সাথে সংযুক্ত	খোলা জায়গায়	ড্রেনে	অন্যান্য
১.নিয়মিত ২. অনিয়মিত / কারণ					

৪১. বাড়ীর প্লাবিত এলাকা ১. সম্পূর্ণ ২. আংশিক ৩. প্লাবিত নয়

৪২. আপনার বাড়ীতে বিদ্যুৎ সংযোগ আছে কি? ১.হ্যাঁ ২. না

৪৩. আপনার পরিবারের জ্বালানীর উৎস কি?

4. m¤ú‡'i weeiY:

৪৪. প্রাকৃতিক m¤ú' দয়া করে সঠিক স্থানে টিক (√) চিহ্ন দিন

ধরণ	১	২	৩	৪	৫
জমি	শুধুমাত্র ঘর	ঘরসহ ২ডেসিমেল সবজির বাগান	ঘরসহ ৫ ডেসিমেল খোলা জায়গা	ঘরসহ ৫ ডেসিমেল কৃষি জমি	ঘরসহ ৫ ডেসিমেলের বেশি কৃষি জমি
পানি	প্রাকৃতিক উৎস (বৃষ্টি, পুকুর, নদী)	কৃত্রিম উৎস (হাউজ)	নলকুপ	গভীর নলকুপ	পাইপসহ গভীর নলকুপ
আলো বাতাস	খুব কম	কম	মুটামুটি	ভাল	খুব ভাল
বনায়ন/গাছ	খুব কম	কম	মুটামুটি	ভাল	খুব ভাল
খোলা জায়গা	খুব কম	কম	মুটামুটি	ভাল	খুব ভাল

৪৫.আপনার বাড়ীতে/ এলাকায় গাছ আছে কি? ১.হ্যাঁ ২. না
৪৬. হ্যাঁ হলে, কি ধরণের গাছ এবং গাছ লাগানোর উদ্দেশ্য কি?

৪৭.আপনার এলাকায় নগর সবুজ বেষ্টনী আছে কি? ১.হ্যাঁ ২. না
৪৮. হ্যাঁ হলে আয়তন কত (একরে)?
৪৯. আপনার এলাকায় কি ধরণের গাছ লাগাতে পছন্দ করেন?

৫০. আপনার এলাকায় কোন ধরণের পার্ক আছে?/ প্রযোজ্য নয়

পার্কের ধরণ	সংখ্যা	আয়তন (একরে)	নাম
ছোট পার্ক			
পার্শ্ববর্তী পার্ক			
এলাকাভিত্তিক পার্ক			
আঞ্চলিক পার্ক			
বিশেষায়িত পার্ক			

৫১.আপনি পার্ক থেকে কোন ধরণের সুবিধা পেয়ে থাকেন?

পার্কের ধরণ	সুবিধা					
	পিকনিকের ব্যবস্থা	নিরাপত্তা	খেলাধুলার ব্যবস্থা	ব্যায়ামাগার	বিশ্রামের ব্যবস্থা	অন্যান্য

৫২. নগরের পার্ক/ খোলা জায়গা কিভাবে টেকসই জীবনযাত্রায় সহায়তা করতে পারে?

জায়গা পার্ক/	ভূমিকা						
	পরিবেশ উন্নয়ন	সাম্প্রদায়িক সহযোগিতা	বিনিয়োগ	বিনোদন	স্বাস্থ্য ক্ষেত্রে	কৃষি ক্ষেত্রে	অন্যান্য

৫৩. অর্থনৈতিক সম্পদ- দয়া করে সঠিক স্থানে টিক (√) চিহ্ন দিন।

ধরণ	১	২	৩	৪	৫
পারিবারিক আয় (টাকায়)	২০০০	২০০১- ৪০০০	৪০০১- ৬০০০	৬০০১- ৮০০০	৮০০১- ১০০০০
পরিবারের উপার্যনক্ষম সদস্য	০	১	২	৩	৪
বার্ষিক পারিবারিক সঞ্চয় (টাকায়)	১- ২০০০	২০০১- ৪০০০	৪০০১- ৬০০০	৬০০১- ৮০০০	৮০০১- ১০০০০
আয়ের ব্যবস্থা (গত বছরে)	১ মাসের বেশি কর্মে নিযুক্ত নয়	৩ মাস কর্মে নিযুক্ত	৬ মাস কর্মে নিযুক্ত	৯ মাস কর্মে নিযুক্ত	সারা বছর কর্মে নিযুক্ত
সুদমুক্ত ঋণ ব্যবস্থা	কোন ব্যবস্থা নাই	পারিবারের সদস্যদের কাছ থেকে অর্থ সহায়তা	আত্মীয়দের কাছ থেকে অর্থ সহায়তা	সম্প্রদায়ের সদস্যদের কাছ থেকে অর্থ সহায়তা	বিভিন্ন উৎস থেকে অর্থ সহায়তা

৫৪. আপনার আয় উপার্জনের পথে ঝুঁকি সম্পর্কে বলুন।

৫৫. নিম্নের কোন্‌টি দ্বারা আপনার আয়ের উৎস প্রভাবিত হয়? / কোনটি নয়

১.জেন্ডার	২.বর্ণ	৩.সংস্কৃতি	৪.ইতিহাস	৫.ধর্ম	৬.জ্ঞাতি সম্পর্ক	৭.সদিচ্ছার অভাব	৮. অন্যান্য

৫৬. উপরের কোনটি হলে, কিভাবে?

৫৭. মানবীয় mgvß'-দয়া করে সঠিক স্থানে টিক (√) চিহ্ন দিন।

ধরণ	১	২	৩	৪	৫
শারীরিক সক্ষমতা	খুব কম	কম	মুটামুটি	ভালো	খুব ভালো
স্বাস্থ্য সুবিধা	ডাক্তার দেখায় না	প্রাকৃতিক উৎস নির্ভর	হাতুড়ে ডাক্তার	প্যারামেডিক	রেজিস্ট্রার্ড ডাক্তার
শিক্ষাগত যোগ্যতা	শুধুমাত্র স্বাক্ষরজ্ঞান সম্পন্ন	১ম- ৫ম শ্রেণি	৬ষঠ- ৯ম শ্রেণি	এস, এস,সি পাশ	এইচ, এস,সি পাশ এবং তদূর্ধ্ব
কর্ম দক্ষতা	কোন কর্মজ্ঞান নাই	অপ্রশিক্ষিত সাধারণ কৌশলগত অভিজ্ঞতা সম্পন্ন	পুঁথিগত জ্ঞান	প্রশিক্ষিত কৌশলগত জ্ঞান	পুঁথিগত জ্ঞান সহ প্রশিক্ষিত প্রযুক্তিগত জ্ঞান
জীবিকা উন্নয়নে তথ্য সহায়তা	কোন সহায়তা নাই	পরিবারের সহায়তা	সাম্প্রদায়িক সহায়তা	দেশীয় সংগঠনের সহায়তা	আন্তর্জাতিক সংগঠনের সহায়তা

৫৮. আপনার পরিবারের সদস্যরা কখনও নিম্নলিখিত রোগে আক্রান্ত হয়েছে?

যাদের বয়স ৫ বছর/ তার কম			যাদের বয়স ৫ বছরের বেশী	
ক্রমিক নং	রোগের নাম	চিকিৎসা গ্রহণ করেছে১হ্যাঁ ২না	রোগের নাম	চিকিৎসা গ্রহণ করেছেন১হ্যাঁ ২না
১.	ম্যালেরিয়া		ম্যালেরিয়া	
২.	নিউমোনিয়া		নিউমোনিয়া	
৩.	শ্বাসকষ্টজনিত অসুবিধা		শ্বাসকষ্টজনিত অসুবিধা	
৪.	ডায়রিয়া		ডায়রিয়া	
৫.	রক্তস্বল্পতা		রক্তস্বল্পতা	
৬.	চর্মরোগ		চর্মরোগ	
৭.	মূত্রনালীর সংক্রমন		মূত্রনালীর সংক্রমন	
৮.	কৃমি		কৃমি	
৯.	ছোট অপারেশন		ছোট অপারেশন	
১০.	অন্যান্য		অন্যান্য	

৫৯.আপনার পরিবারের সদস্যদের রোগ প্রতিরোধকের সুবিধা আছে কি? ১.হ্যাঁ ২. না

৬০. আপনার কি প্রাথমিক স্বাস্থ্য সেবা প্রাপ্তি সুবিধা আছে? ১.হ্যাঁ ২. না

৬১. আপনার আবাসস্থল থেকে সেবা কেন্দ্রের দূরত্ব কত? ----------কিঃ মিঃ

৬২. সামাজিক সম্পর্ক- নিম্নলিখিত প্রযোজ্য ক্ষেত্রে টিক (√) চিহ্ন দিন

ধরণ	১	২	৩	৪	৫
পারিবারিক সম্পর্ক	খুব ভালো নয়	ভালো নয়	মুটামুটি	ভালো	খুব ভালো
পরিবারের বাহিরে সম্পর্ক	খুব ভাল নয়	ভালো নয়	মুটামুটি	ভালো	খুব ভালো
রাজনৈতিক সম্পৃক্ততা	খুব কম	কম	মুটামুটি	ভালো	খুব ভালো
প্রাতিষ্ঠানিক সম্পর্ক	খুব কম	কম	মুটামুটি	ভালো	খুব ভালো
সাম্প্রদায়িক সংগঠনের সহিত সম্পৃক্ততা	খুব কম	কম	মুটামুটি	ভালো	খুব ভালো

৬৩. সারাদিনে কতটুকু অবসর সময় পান? ..... ঘন্টা

৬৪. সাংস্কৃতিক কর্মে(নাচ, গান, থিয়েটার) ইত্যাদিতে তৎপর কি? ১.মোটেই নয় ২.সীমিতভাবে তৎপর

৩.অত্যধিকভাবে তৎপর

৬৫. পরিবার ও সমাজের সিদ্ধান্ত গ্রহণে কে বেশী অংশগ্রহণ করে?

৬৬. আপনার এলাকার আইন শৃঙ্খলার অবস্থা কি? ১.আইন শৃঙ্খল ভঙ্গ হয় ২.আইন শৃঙ্খলার অবনতি৩.পর্যাপ্ত

৪. উত্তম

৬৭. অবকাঠামোগত অবস্থা-নিম্নলিখিত প্রযোজ্য ক্ষেত্রে টিক (√) চিহ্ন দিন

ধরণ	১	২	৩	৪	৫
নিস্কাশন ব্যবস্থা	নোংরা পরিবেশ	ড্রেনের ব্যবস্থা	আলো বাতাস পর্যাপ্ত নয়	ভালো	খুব ভালো (গ্রহণ করা চলে)
শিক্ষা প্রাতিষ্ঠানের অবস্থান (৩ কিলো মিটারের মধ্যে)	কোন প্রতিষ্ঠান নাই	এনজিও স্কুল	প্রাথমিক বিদ্যালয়	মাধ্যমিক বিদ্যালয়	উচ্চ মাধ্যমিক বা তদূর্ধ্ব প্রতিষ্ঠান
যোগাযোগ ব্যবস্থা	পায়ে হেঁটে	সাইকেলে	.সাধারণ পরিবহনে	ট্যাক্সিতে/ নিয়োগকর্তা প্রদত্ত বাসে	মটর সাইকেলে/ব্যক্তিগত গাড়িতে
বিদ্যুৎ সংযোগ	বিদ্যুৎ নাই	ব্যাটারী চালিত	বৈধ সংযোগ নাই	অন্য ঘরের থেকে সংযোগ নেওয়া	বৈধ সংযোগ আছে
বিনোদন	কোন খোলা জায়গা নাই	খেলাধুলার ব্যবস্থা	নিরাপত্তাসহ বিশ্রামের ব্যবস্থা	পিকনিকের ব্যবস্থা	সব ধরনের বিনোদন ব্যবস্থা

৬৮.আপনার এলাকা কেমন বলে আপনি মনে করেন? ১. নোংরা শহর ২. গ্রহণ করা চলে (পুরোনো ধরণের শহর) ৩. সুন্দর, আধুনিক শহর

৬৯. নিম্নের কোন ধরনের দূষণ দ্বারা আপনি ক্ষতিগ্রস্থ হন? ১.পানি২.বায়ূ৩.শব্দ৪. Aন্যান্য ৫.কোনটিই নয়

৭০. উপরের কোনটি হলে কেন?

৭১.আপনার বাড়ীর ভূমি এলাকার ভূমি, রাস্তাঘাট,নদী/ জলাশয়,রেল লাইন,বাজার থেকে সুবিধা পানকি? ১.হ্যাঁ ২. না

৭২. হ্যাঁ হলে, কিভাবে আপনার টেকসই জীবনযাত্রায় সহায়তা করে /করতে পারে?

ক্ষেত্র	ভূমি	রাস্তাঘাট	নদী/ পুকুর জলাশয়	রেল লাইন	বাজার	eR¨	অন্যান্য
১. খাদ্য নিরাপত্তায়							
২. আয়ের উৎস হিসেবে							
৩. শিক্ষা ক্ষেত্রে							
৪. পরিবেশগত							
৫. সম্পর্ক উন্নয়ন							
৬. কৃষি বনায়ন							
৭. জ্বালানী							
৮. অন্যান্য							

5. fvjbv‡iwewjwU (bvRKZv)I †UKmB RxebhvÎvi †KŠkj

৭৩. টেকসই জীবনযাত্রা সম্পর্কে আপনি জানেনকি? ১.হ্যাঁ ২. না

৭৪. হ্যাঁ হলে প্রাতিষ্ঠানিকভাবে কিভাবে টেকসই জীবনযাত্রার নিশ্চয়তা প্রদান করা যায় সে সম্পর্কে দয়া করে বলুন।

স্বল্প মেয়াদী	0.নারী১.পুরুষ
দীর্ঘ মেয়াদী	0.নারী১.পুরুষ

৭৫. টেকসই জীবনযাত্রা নিশ্চিতকরণের কোন কৌশলটি আপনি পছন্দ করেন?

৭৬.এক্ষেত্রে জীবনযাত্রার উন্নয়ন কেমন হতে পারে বলে আপনি মনে করেন?

বেশী আয় উপার্জন	সঠিক কল্যাণ	কম নির্ভরশীলতা	প্রাকৃতিক সম্পদ নির্ভর টেকসই উন্নয়ন	অন্যান্য

৭৭. এক্ষেত্রে জীবনযাত্রার স্থায়ীত্ব সম্পর্কে বলুন।

৭৮. আপনার উপার্জিত আয় কি আপনার পরিবারের চাহিদা মেটাতে সক্ষম? ১.হ্যাঁ ২. না

৭৯.যদি অন্য কোন আয় উপার্জনের সাথে সম্পৃক্ত থাকেন, তবে কোন ধরণের কর্ম লাভজনক বলে আপনি মনে করেন? / প্রযোজ্য নয়

৮০. কর্মক্ষেত্রে নিম্নলিখিত সুবিধা পান কি?

নিয়োগপত্র	ঝুঁকি ভাতা	ছুটি	কর্ম পরিবেশ	স্বাস্থ্য সেবা	ল্যাট্রিন	অন্যান্য	প্রযোজ্য নয়

৮১.আপনি কি ঋণগ্রস্থ? ১.হ্যাঁ ২. না

৮২. হ্যাঁ হলে সময়/ সূত্র/ শর্ত/ সুদের পরিমাণ/ হার সম্পর্কে বলুন।

৮৩. প্রতিদিন কতটুকু কিঃ ক্যালরী গ্রহণ করেন? ১.ক্যালরী গ্রহণ------২.প্রোটিন গ্রহণ----৩.শ্বেতসার বর্জিত ক্যালরী----

৮৪. পরিধানের বস্ত্র কয়টি? ১. সাধারণ মৌসুমে------২. শীত বস্ত্র -------- জুতা

৮৫. ভালনারেবিলিটির (নাজুকতা)মূল কারণগুলো বলুন।

৮৬. নিম্নলিখিত প্রযোজ্য ক্ষেত্রে টিক (√) চিহ্ন দিন

ধরণ	১	২	৩	৪	৫
উচ্ছেদের ভয়	বর্তমানে হুমকির সম্মুখীন	তিন বা ততোধিক বার উচ্ছেদ হয়েছে	দইু বা ততোধিক বার উচ্ছেদ হয়েছে	একবার উচ্ছেদ হয়েছে	না উচ্ছেদ হয়নি
আয় নিরাপত্তা (টাকায়)	০-২০০০	২০০১- ৪০০০	৪০০১- ৬০০০	৬০০১- ৮০০০	৮০০১- ১০০০০
খাদ্য নিরাপত্তা	প্রায়ই অভুক্ত থাকে	প্রতিদিন একবেলা খাইতে পায়	. প্রতিদিন দুই বেলা খাইতে পায়	প্রতিদিন তিন বেলা খাইতে পায়	প্রতিদিন তিন বেলা সহ অতিরিক্ত খায়
কর্মহীন সপ্তাহ	৩৭-৪৮	২৫-৩৬	১৩-২৪	১-১২	কোন সপ্তাহ নয়
শিক্ষাগত অবস্থা	প্রাতিষ্ঠানিক শিক্ষা নাই	৫ম শ্রেণি পর্যন্ত	৮ম শ্রেণি পর্যন্ত	এস, এস,সি পাশ	এইচ, এস,সি পাশ এবং তদূর্ধ্ব
স্বাস্থ্যগত অবস্থা	ডাক্তার দেখায় না	প্রাকৃতিক উৎস নির্ভর	হাতুড়ে ডাক্তার	প্যারামেডিক	রেজিস্ট্রার্ড ডাক্তার
পারিবারিক mgú‘	খুবই অসন্তুষ্ট	অসন্তুষ্ট	মুটামুটি সন্তুষ্ট	সন্তুষ্ট	খুবই সন্তুষ্ট

৮৭. এক্ষেত্রে কিভাবে খাপ খাওয়ানো যায়?

6.†UKmB KwI e¨e¯v

৮৮.আপনি নিচের কোনটির সাথে সম্পৃক্ত? ১. ক্ষেত খামার ২. মৎস্য চাষ ৩.পশুপালন ৪. বনায়ন ৫. সম্পৃক্ত নয়

৮৯. কৃষি কাজের সাথে কে কিভাবে সংযুক্ত?

৯০. কৃষি সম্পত্তির ক্ষেত্রে কোন জেন্ডার বৈষম্য আছে কি? ? ১.হ্যাঁ ২. না

৯১.হ্যাঁ হলে কোন ধরণের?

বৈষম্য	সম্পদ					
জেন্ডার বৈষম্য	ভূমি	শ্রম	মূলধন	বাজারজাত	প্রশিক্ষণ	প্রযুক্তি
কিভাবে তা দূর করা যায়?						

৯২. আপনার এলাকায় কৃষিভিত্তিক কোন শিল্প কারখানা আছে কি? ১.হ্যাঁ ২. না

৯৩. হ্যাঁ হলে কোন ধরণের? ১. ধান ২. তেল ৩. পাট ৪. বস্ত্র ৫. চিনি ৬. . চিংড়ী ৭.কাঠ ৮. অন্যান্য

৯৪. কৃষি নিম্নলিখিত ক্ষেত্রে কিভাবে সহযোগিতা করে/করতে পারে?

অবদান	আয় উপার্জনে	খাদ্য নিরাপত্তায়	স্বাস্থ্য সুবিধা	শিক্ষা সুবিধা	পোশাক সুবিধা	পারস্পারিক সম্পর্ক উন্নয়নে	স্থানীয় বাজারের সরবরাহে
কোন অবদান নাই							
খুব কম							
কম							
মুটামুটি							
ভালো							
খুব ভালো							

৯৫. এক্ষেত্রে কিভাবে টেকসই উন্নয়ন নিশ্চিত করা যায়? ১. সাম্প্রদায়িক বিনিয়োগ নিশ্চিত করে ২.প্রশিক্ষণ ৩.প্রযুক্তি ৪.ঋণ সহায়তা ৫.অন্যান্য

7.¶‘ e¨emv

৯৬. আপনি কি ক্ষুদ্র ব্যবসায়ের সাথে সম্পৃক্ত? ১.হ্যাঁ ২. না হ্যাঁ হলে কোন ধরণের?

৯৭. আপনার ব্যবসা কিভাবে টিকিয়ে রেখেছেন? সে সম্পর্কে বলুন।

৯৮. আপনার ব্যবসায়েরবাঁধা কি? ১. দারিদ্র ২. অশিক্ষা ৩. সরবরাহের অনিশ্চয়তা ৪. প্রযুক্তিগত জ্ঞানের অভাব ৫.পারিপার্শ্বিক সুযোগ সুবিধার অভাব ৬. অন্যান্য

৯৯. সমস্যাগুলো কিভাবে সমাধান করা যায় বলে আপনি মনে করেন?

8. Rjevq cwieZb, ‘‡hvM c‡kvgb I †RÛvi

১০০. আপনার এলাকার দূর্যোগ সম্পর্কে বলুন।

ক্রমিক নং	খুব বেশী সংঘটিত		খুব মারাত্মক দূর্যোগ		কোনটিকে বেশী গুরুত্ব দেওয়া উচিত?	
	০.নারী	১.পুরুষ	০.নারী	১.পুরুষ	০.নারী	১.পুরুষ

১০১. দূর্যোগের ব্যাপারে আপনার এলাকার জনগণ কি সচেতন? ১.হ্যাঁ ২. না

১০২. হ্যাঁ হলে, জলবায়ূ পরিবর্তন সম্পর্কে তাদেরদৃষ্টিভঙ্গি কি?

১০৩. দূর্যোগ প্রশোমনে পূর্ব প্রস্তুতি ও সতর্কীকরণ ব্যবস্থা সম্পর্কে বলুন, কিভাবে তা নিশ্চিত করা যায়?

১০৪. দূর্যোগকালীণঅবস্থা - নিম্নলিখিত প্রযোজ্য ক্ষেত্রে টিক (√) চিহ্ন দিন

ধরণ	১	২	৩	৪	৫
আশ্রয়	স্কুলে	আত্মীয়ের বাসায়	নিজ ঘরে	নিজ বাড়িতে	নিজের খুবই নিরাপদ আশ্রয়
আয় নিরাপত্তা	আয় পর্যাপ্ত নয়	আয় পর্যাপ্ত	পর্যাপ্ত আয়সহ উৎপাদন সুবিধা	পর্যাপ্ত উৎপাদন	সঞ্চয়
খাদ্য নিরাপত্তা	প্রায়ই অভুক্ত থাকে	প্রতিদিন একবেলা খাইতে পায়	প্রতিদিন দুই বেলা খাইতে পায়	প্রতিদিন তিন বেলা খাইতে পায়	প্রতিদিন তিন বেলা সহ অতিরিক্ত খায়
অবকাঠামো	খুবই খারাপ	পানি সরবরাহের ব্যবস্থা	যোগাযোগ ব্যবস্থা	স্বাস্থ্য সুবিধা	বিদ্যুৎ সুবিধা
প্রাতিষ্ঠানিক সহায়তা	মুটামুটি রাজনৈতিক সহায়তা	এনজিও সহায়তা	স্থানীয় রাজনৈতিক সহায়তা	আইনগত সহায়তা	আন্তর্জাতিক সহায়তা
দূর্যোগ সম্পর্কে জ্ঞান	খুবই কম	লোকায়ত	সাধারন জ্ঞান সম্পন্ন	দূর্যোগ সতর্কীকরণ প্রশিক্ষন প্রাপ্ত	উদ্ধার প্রশিক্ষন প্রাপ্ত
দূর্যোগ প্রশোমনে/ উন্নয়ন কাজে অংশগ্রহণ	জীবন বাঁচাতে	পারিবারিক স্বাস্থ্যগত সমস্যা নিরসনে	অর্থনৈতিক সমস্যা মোকাবলায়	জনগনের জীবনের নিরাপত্তায়	জনগনের জীবিকার নিরাপত্তায়

১০৫. দূর্যোগের সামাজিক প্রভাব সম্পর্কে বলুন।

১০৬. আপনি কি নিজেকে দূর্যোগ পরবর্তী জীবন যাপনে সক্ষম বলে মনে করেন? ১.হ্যাঁ ২. না

১০৭. দূর্যোগ প্রশোমনে প্রাতিষ্ঠানিক সহায়তা সম্পর্কে বলুন, এক্ষেত্রে ঝুঁকিসমূহ কি?

১০৮. দূর্যোগ প্রশোমনে নারী বা অন্য ক্ষুদ্র গোষ্ঠী উন্নয়ন কাজে অংশগ্রহণ করে? ১.হ্যাঁ ২. না, হ্যাঁ, হলে, কারা বেশী অংশগ্রহণ করে?

১০৯. দূর্যোগ মোকাবেলায় খাপ খাওয়ানোর ক্ষেত্রে সম্প্রদায় কিভাবে সহায়তা ১.করে/ ২.করতে পারে?

সহায়তা করে/ করতে পারে	ক্ষেত্র								
	খাদ্য নিরাপত্তায়	পানির সরবরাহে	কর্ম সংস্থানে	ঋণ গ্রহণে	গবাদি পশুর ক্ষেত্রে	জীবনযাত্রার ব্যয় হ্রাসে	জ্বালানী	গৃহসম্পদ রক্ষার্থে	অন্যান্য
নারী									
পুরুষ									

১১০. জীবনযাত্রার ঝুঁকি নিরসনে কি পদক্ষেপ গ্রহণ করা যেতে পারে বলে আপনি মনে করেন?

ধন্যবাদ

Appendix 3

Photograph

Photo 8 Homestead garden

Photo 9 Living with nature

Photo 10 Clumsy housing at *Khalishpur Kodomtola* railway slum

Photo 11 Eviction threat in railway slum

Photo 12 Living with always inundated houses

Photo 13 Respondents especially of *Rupsha* slum suffer from tidal surge

Photo 14 Toilet, kitchen, bed all are at same place

Photo 15 Waste disposal on river bank

Photo 16 Living with pets (four-legged friend)

Photo 17 Nature- based fuel wood collection

Photo 18 Homestead forestry

Photo 19 Ice factory on river bank

Photo 20 NGO Contributes in building Community toilet

Photo 21 River based livelihood

Appendix 4

Indicators

4.1 Indicators of the Study: Seven indicators are used to measure the sustainable livelihood of the respondents, besides these others indicators for assessing human asset and contribution of agriculture are discussed below:

4.1.1Natural resource: Itis measured in terms of 5 resources viz.

(i) Land: Amount of land is measured in terms of acre. Five points scale is used to measure the amount of land. 1 for only house, 2 for house with homestead garden, 3 for house with 5 decimal open space, 4 for house with 5 decimal agricultural land and 5 for house with more than 5 decimal agricultural land.

(ii) Sources of water: Five sources are identified in order to categorize the sources of safe water. Where,1 stands for natural sources (pond, river, rain water), 2 for created (house), 3 for tube-well, 4 for deep tube-well and 5 for deep tube-well with piped water.

(iii) Sanitation: Sanitation system is categorized in to 5 points.Regarding this 1 is valued for very low with dirty surroundings, 2 for low with no drainage facility, 3 for moderate with no sufficient air and water quality, 4 for good with sanitary toilet and sufficient water and air and 5 for very good with improved drainage, toilet and clean surroundings.

(iv) Tree: The contribution of tree is assessed by 5 points scale. In this context 1 denotesno contribution at all, 2 for low contribution (in housing), 3 for moderate (access to food), 4 for good (in medicine education and other basic need) and 5 for very good (in fulfilling market demand and infrastructural development).

(v) Free resources are considered as open space; railway, riversides, garbage, and other free resources with 5 points scale. Here, 1 is used for no contribution at all, 2 for low contribution (access to housing), 3 for moderate (access to food), 4 for good (in medicine education and other basic need) and 5 for very good (in fulfilling market demand).

4.1.2 Financial asset: Financial asset is measured in terms of money.

(i) Income: Income of the respondents is computed by five points scale.

(i) Family income-BDT (1=0-2000, 2= 2001-4000, 3=4001-6000,4=6001-8000 and 5=8001-10000) (ii) Number of income earner: Number of income earners are

categorized into 5 pints. Where 1 means no income earner, 2 for 1income earner, 3 for 2 income earners, 4 for 3 income earners and 5 for 4 income earners.

(iii) Yearly family savings: Money saved yearly is measured in terms of 5 points scale. In this regard 1 denotesTk.0 -Tk.5000, 2 for Tk.5001- Tk.10000, 3 forTk.10001- Tk.15000, 4 for Tk.15001- Tk.20000 and 5 forTk. 20001 and above amount of savings.

(iv) Regularity of wage earning: Regularity of wage earning is categorized in to 5 points. In this context 1 is used for not more than 1 months at work, 2 for 3 months at work, 3 for 6 months at work, 4 for 9 months at work and 5 for never been workless for a week in last year

(v)Access to interest free loan: It is measured in termsofmoney. It is computed by 5 sources of loan without any interest. Where 1 signifies no access to loan, 2 for access to loan from family members, 3 for access to loan from relatives, 4 for access to loan from community members and 5 for access to loan from more than three sources.

4.1.3 *Level of Vulnerability*: Seven indicators related to maintenance of basic need are used to measure the level of vulnerability which are:

(i) Tenure security: It has been measured in terms of frequency of threat. In this regard 1 indicatesthreated at present, 2 for threated more than three times, 3 for more than two times, 4 for threated once and 5 for no threat

(ii) Income security: Security of income is measured in terms of money (taka) generated monthly. Income of the respondents is computed by five points scale: 1 for Tk.1- Tk.2000, 2 for Tk.2001- Tk.4000, 3 for Tk.4001-Tk.6000, 4 forTk. 6001- Tk.8000 and 5 forTk. 8001- Tk.1000.

(iii) Food security: food security is measured by 5 points. Where 1 directs frequently hungry in a day, 2 for intake of food for 1 time in a day, 3 for intake of food for 2 times in a day, 4 for intake of food for 3 times in a day and 5 for intake of food for three times with extra food.

(iv) Jobless situation: Numbers of workless week are considered for measuring jobless situation. In this context 1 designates workless for 37-48 weeks, 2 for workless for 25-36 weeks, 3 for workless for 13-24 weeks, 4 for workless for 1-12 weeks and 5 for never been workless even for a week.

(v) Literacy situation: Literacy situation is measured by year of schooling of the respondents by using 5 points scale. In this context 1 is valued for no formal

schooling, 2 for completion of primary education, 3 for completion of class eight, 4 for SSC pass and 5 for HSC pass and above

(vi) Access to health: Types of medical treatment are considered for assessing access to health. Regarding this 1 is valued for never used go to doctor, 2 for use of natural ingredients, 3 for access to quack, 4 for access to paramedic doctor and 5 for access to registered doctor

(vii) Access to household goods: Ownership of assets is measured in terms of assets at the time of disaster. Seven items of assets are selected for this study. It is categorized into five points scale: 1 for highly dissatisfied with no household goods at all, 2 for having only cooking materials, 3 for access to materials for production, 4 for having necessary household goods and 5 for access to sufficient materials

4.1.4 ***Nature based occupation****:* in terms of nature occupation has been categorized in to five types: (i) business (fish, grocery shop, kitchen market) (ii) agriculture (iii) industrial work (shrimp, wood, jute, ice), (iv) day labor (land and water related) and (v) other services especially van or rickshaw puller

To measure the role of agriculture in sustainable livelihood CAI (Cumulative Agriculture Index) has also been used. In this context seven indicators are considered: contribution (i) in income (ii) in food (iii) in health (iv) in education (v) in clothing (iv) in interpersonal relations and (vii) in fulfilling market demand. To assess the contribution each indicator is also categorized into five scales from not at all to very good contribution.

4.1.5 Situation of disaster*:* Reduction of disaster risk has been measured by access to and control over resources regarding seven basic needs during disaster.

(i) Access to housing: Five tools are considered in terms of assessing housing facilities: 1 for public school/community center, 2 for relative's house, 3 for own house, 4 for own house with 5 decimal land and 5 for own safe location

(ii) Income security: It is measured in terms of money (taka) generated monthly. Income of the respondents is computed by five points scale: 1 for income not sufficient (Tk.1- Tk.2000 taka), 2 for access toadequate income(Tk.2001- Tk.4000), 3 for production facilities(Tk.4001-Tk. 6000), 4 for adequate production (Tk.6001-Tk. 8000) and 5 for savings (Tk.8001- Tk.1000).

(iii) Food security: Food security is measured by 5 points scale. Where1 denotesno security (frequently hungry in whole day), 2 for less security (having meal for one

time in a day), 3 for less security (having meal for two times in a day), 4 for intake of food for 3 times in a day and 5 for secured enough (having meal for three times in a day with extra food).

(iv) Infrastructural facilities: It is assessed by 5 points scale, viz. 1 for very low housing system, 2 for water facility. 3 for road facility, 4 for health facility and 5 for facility of power supply in house

(v) Broader organizational support: is assessed by access to different types of organization: 1 for very low support of local politics, 2 for support of NGOs, 3 for responsive local government, 4 for enabling legislative support and 5 for support of international organization

(vi) Knowledge about disaster: It is measured by 5 points scale: 1 for very little knowledge, 2 for having local knowledge 3 for access to public information to prevent, 4 for knowledge about early warning and 5 for having training of rescue

(vii) Emergency responses to disaster: In this regard 5 indicators are used to measure the emergency response to disaster: 1 for to save life, 2 to reduce health impacts in family, 3 for contribute in economic solvency, 4 to ensure public safety and 5 to meet subsistence needs of the people

4.1.6 Social resource: Socialresource is assessed considering 5 five types of social relations.

(i) Family relation is assessed by 5 tools: 1 for not good at all, 2 for not good, 3 for moderate, 4 for good and 5 for very good relation

(i) Relationship with neighbors: It is measured by 5 answer of the respondents. Where 1 signifiesnot at all, 2 for very limited, 3 for moderate, 4 for good and 5 for very good relations

(iii) Involvement with politics: It is measured by 5 points scale: 1 for not at all, 2 for very limited, 3 for limited, 4 for good and 5 for very good.

(iv) Access to wider institution: To assess the access to wider institution 5 points scale are used. In this context 1 is valued for very low (access to neighbors), 2 for low (access to community), 3 represent moderate (participation with local administration), 4 for Good (Personal relation with national NGOs) and 5 for access to international NGOs

(v) Participation in community based organization: Frequency and intimacy with organization are considered to measure the participation of the respondents in community based organization. Where 1 directs very low participation, 2 for low

participation, 3 for moderate participation, 4 for active participation and 5 for very active formal participation

4.1.7 Physical asset: It is measured by five types of infrastructural facilities of the respondents (i) Types of toilet: 1 for open space, 2 for hanging, 3 for community toilet, 4 for single pit and 5 for twin pit.

(ii) Access to educational institution: Five types of educational institution are considered to measure the access to educational institution by using 5 points scale. Where 1 is valued for no school at all, 2 for NGO School, 3 for primary school, 4 for secondary school and 5 for higher secondary and higher institution

(iii) Communication facilities: It is assessed by five types of infrastructural facilities of the respondents: 1 for on foot, 2 for bicycle, 3 for public bus, 4 for taxi/professional vehicle and 5 for motor bike/ personal car

(iv) Access to power supply: It is measured by five types of power system. In this regard 1 means no power supply (*kerosin Kupi*), 2 for storage battery, 3 for electricity (not authorized), 4 for sub power connection and 5 for direct electricity and

(v) Recreational facility: It is identified by five types of infrastructural facilities of the respondents. Regarding this1 denotes no access to open space, 2 for sports facility, 3 for open space with secured sitting arrangement, 4 denote access of arranging picnic and 5 is for well-equipped park with all recreational facilities

4.1.8 Human asset: Five tools were considered to assess the human asset of the respondents. (i) Ability to labor: It is measured by frequency of having meal in a day. Where 1 signifies not able (frequently hungry all day long), 2 for less able (having meal for once in a day), 3 (moderately able with having meal for twice in a day), 4 for able bodied (having meal for three times in a day)and 5 for perfectly able of having meal for three times with extra food in a day.

(ii) Health: It is measured by five types of medical facilities of the respondents.Where 1is for no access of doctor, 2 for natural ingredients, 3 for quack, 4 for paramedicand 5 for registered doctor

(iii) Education: It is measured by access to five types of educational institution. In this context1 means only can sign, 2 for class 1 to 5, 3 for class 6 to 9, 4 for SSC pass and 5 for HSC pass and above

(iv) Skillness at work: It is measured by having five types of fields of knowledge and technology of the respondents. Where 1 directsno knowledge at work, 2 for having little informal technical education, 3 for having theoretical education at work, 4 for having formal technical knowledge at work and 5 for having formal technical and theoretical knowledge at work

(v) Information assist livelihood strategies: Five sources of information are used to understand the sources of information. Where 1 is used for no information at all, 2 for information from family, 3 for information from community, 4 for information from national organization and 5 for information from international organization

Table Appendix 4.1 Indicators of natural resource

Indicators	Quantitative rank	Qualitative Rank	NRI Range 15- 53
Land	1 to 5	5	(1-5).5=5-25
Water	1 to 5	4	(1-5).4=4-20
Sunlight and air quality	1 to 5	3	(1-5).3=3-15
Tree	1 to 5	2	(1-5).2=2-10
Open spaces	1 to 5	1	(1-5).1=1-5

Table Appendix 4.2 Indicators of social resource

Indicators	Quantitative rank	Qualitative Rank	SRI Range 15- 56
Family relation	1 to 5	5	(1-5).5=5-25
Relationship with outsider	1 to 5	4	(1-5).4=4-20
Involvement with Politics	1 to 5	3	(1-5).3=3-15
Access to wider institution	1 to 5	2	(1-5).2=2-10
Participation in community based organization	1 to 5	1	(1-5).1=1-5

Table Appendix 4.3 Indicators of physical asset

Indicators	Quantitative rank	Qualitative Rank	PAI Range 15- 54
Sanitation	1 to 5	5	(1-5).5=5-25
Access to educational institution	1 to 5	4	(1-5).4=4-20
Road/communication facility	1 to 5	3	(1-5).3=3-15
Power system	1 to 5	2	(1-5).2=2-10
Recreation facility	1 to 5	1	(1-5).1=1-5

Table Appendix 4.4 Indicators of human resource

Indicators	Quantitative rank	Qualitative Rank	HRI Range 15- 59
Ability to labor	1 to 5	5	(1-5).5=5-25
Health facilities	1 to 5	4	(1-5).4=4-20
Education	1 to 5	3	(1-5).3=3-15
Skillness at work	1 to 5	2	(1-5).2=2-10
Information assist livelihood strategies	1 to 5	1	(1-5).1=1-5

Table Appendix 4.5 Indicators of financial resource

Indicators	Quantitative rank	Qualitative Rank*	FRI Range 9- 63
Family income	1 to 5	5	(1-5).5=5-25
No. of income earner	1 to 5	4	(1-5).4=4-20
Yearly family savings	1 to 5	3	(1-5).3=3-15
Regularity of wage earning	1 to 5	2	(1-5).2=2-10
Access to interest free loan	1 to 5	1	(1-5).1=1-5

Table Appendix 4.6 Indicators of vulnerability

Indicators	Quantitative rank	Qualitative Rank	CVI Range 30- 114
Tenure security	1 to 5	7	(1-5).7=7-35
Income security	1 to 5	6	(1-5).6=6-30
Food security	1 to 5	5	(1-5).5=5-25
Workless situation	1 to 5	4	(1-5).4=4-20
Literacy situation	1 to 5	3	(1-5).3=3-15
Access to health	1 to 5	2	(1-5).2=2-10
Access to household goods	1 to 5	1	(1-5).1=1-5

Table Appendix 4.7 Indicators of access to resources during disaster

Indicators	Quantitative rank	Qualitative Rank	CEI Range 27- 69
Access to household resources	1 to 5	7	(1-5).7=7-35
Income security	1 to 5	6	(1-5).6=6-30
Food Security	1 to 5	5	(1-5).5=5-25
Infrastructural facilities	1 to 5	4	(1-5).4=4-20
Broader organizational support	1 to 5	3	(1-5).3=3-15
Knowledge about disaster	1 to 5	2	(1-5).2=2-10
Emergency responses	1 to 5	1	(1-5).1=1-5

Table Appendix 4.8 Indicators of agricultural contribution in sustainable livelihood

Indicators	Quantitative rank	Qualitative Rank	CAI Range 26- 135
Income	1 to 5	7	(1-5)7=7-35
Food	1 to 5	6	(1-5)6=6-30
Health	1 to 5	5	(1-5)5=5-25
Education	1 to 5	4	(1-5)4=4-20
Clothing	1 to 5	3	(1-5)3=3-15
Interpersonal relations	1 to 5	2	(1-5)2=2-10
Market demand	1 to 5	1	(1-5)1=1-5

4.2 Moser -Vulnerability matrix: Moser (1998) proposes a vulnerability matrix which could act as a structure for indicators which are used to assess vulnerability and assets (Table Appendix 4.9). This matrix lists a variety of household responses to increased vulnerability. This model could be used as a basis of indictors for vulnerability, and thus sustainability, where an increased incidence of these strategies can be taken to indicate that households are in a more vulnerable condition. However this is not unambiguous as an indicator of vulnerability as the household actions that indicate vulnerability are also attempts to increase security. Thus if a community is characterised by growing labour force participation by women, household income diversification and increased community activity it could be taken as a sign that households in that community were in a state of growing vulnerability. However at the same time, these actions could help to reduce that vulnerability, making the direct relationship between these indicators and vulnerability unclear. Nonetheless, Moser's model is important as the only model which attempts to directly address indicators for vulnerability, rather than focusing solely on assets or livelihoods strategies.

Table Appendix 4.9 Moser- vulnerability matrix

Type of Asset	Household Response
Labour	• Increase in the number of women working, mainly in the formal sector • Allocate a disproportionate share of women's time to meet increasing responsibilities • Allocate more time in obtaining services in response to declining quality of infrastructure • Increase reliance on child labour
Housing	•Diversify income through home based enterprises and renting out • Adopt inter-generational plot identification strategies to accommodate children's households
Social + Economic Infrastructure	Substitute private for public goods and services
Household Relations	•Increase reliance on extended family support networks • Increase labour migration and remittances
Social capital	Increase reliance on informal credit arrangements • Increase reliance on informal credit arrangements • Increase informal support networks among households • Increase community level activity