CLIMATE AND DISASTER RESILIENCE OF GREATER DHAKA AREA: A MICRO LEVEL ANALYSIS

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ABSTRACT

Megacity Dhaka encounters various kinds of natural disasters quite frequently owing to its geographical location and a number of other physical and environmental conditions including low topography, land characteristics, multiplicity of rivers and the monsoon climate. Climate and disaster resilience is not the same in all parts of a city. Spatial variations in resilience patterns result from differences in the strengths and weaknesses of the city's economic, social, physical, institutional or natural aspects across its various parts. Traditional frameworks to assess adaptive capacity at the local level have focused largely on assets and capitals as indicators. While useful in understanding the capacity of a system to cope with disasters and adapt to changing environments, asset-oriented approaches overlook the processes and functions of a system (for example, governance system, community participation in decision-making, knowledge dissemination and management, structure of institutions and entitlements etc.) that are important aspects influencing the capacity of a human system to respond to climate change events.

This study used Climate Disaster Resilience Index (CDRI) - a planning tool developed by the Climate and Disaster Resilience Initiative of the Kyoto University to measure climate disaster resilience of Dhaka City in its seven drainage zones - at ward and thana level. To compute Dhaka's CDRI, a micro-level analysis was conducted and local situations of wards and thanas were assessed collecting survey data. The CDRI was quantified with 125 variables (25 components along five dimensions physical, social, economic, institutional and natural).

The CDRI analysis furnished valuable information which can be fruitfully used in strategic planning or policy formulation. The analysis provided a wealth of information that can be used to identify priority zones as well as priority sectors in Dhaka for improving disaster resilience. The study identified weaknesses and potentials of different zones in various aspects, and also provided information on relevant variables to facilitate preparation of hazard and vulnerability maps in different zones. It is expected that this analysis would facilitate area-specific action planning for addressing the weaknesses and utilizing the potentials to strengthen the climate disaster resilience of the area. Since the analysis covers most of the important physical, social, economic, institutional and environmental aspects relevant for Disaster Risk Reduction (DRR) and Climate change Adaptation (CCA), it would be easier to integrate the Disaster Management Plan of the city with its Urban Development Plan.

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INTRODUCTION

Bangladesh encounters various kinds of natural disasters quite frequently owing to its geographical location and a number of other physical and environmental conditions including low topography, land characteristics, multiplicity of rivers and the monsoon climate. Though Bangladesh's contribution to global greenhouse gas emissions is one of the lowest, its unfavorable geophysical conditions, high density of population and widespread poverty make it extremely vulnerable to climate change. Climate change related impacts such as temperature and precipitation variability, drought, flooding and extreme rainfall, cyclone and storm surge, tornado, and sea level rise have become major concerns for the country because of the adverse impacts these may have on development activities.

The factors responsible for climate change are global in nature but its impacts are felt locally. Dhaka has been declared as the most vulnerable megacity to climate change by the World Wide Fund for Nature (WWF) in 2009. The intensity and pace of present and future climate changes induced by continuous emission of greenhouse gas will be a major challenge for the city as the frequency and intensity of climate-related events are likely to increase. This will threaten the critical infrastructure that supplies the city dwellers with essential services such as electricity, water, waste disposal, transportation, telecommunication etc.

Dhaka has long been experiencing devastating floods on a regular basis. In recent past floods of 1954, 1955, 1962 and 1966 were of major significance in terms of loss of lives and properties. Floods that occurred more recently, that is, in 1987, 1988, 1998, 2004 and 2007 also severely affected the city. Among these floods of 1988, 1998 and 2994 were catastrophic. The 1998 flood which inundated about 79 percent of the city was also an unprecedented event of its kind in terms of duration and damages. The inundation depths ranged from 0.3 to over 3.0 metres which lasted for about 10 weeks. About two-third of the population were affected and suffered colossal damages in terms of housing, clothing, income and other assets.

The 2004 flood also wreaked havoc in the city. More than 5 million people or half of the city population were affected. Eighteen out of twenty two thanas went under water, the sewerage system broke down and the city residents faced an acute drinking water crisis as supplies had become contaminated. Water pipelines stretching over a few hundred kilometers and many reservoirs were also under water posing a serious threat to public health.

Apart from flooding water-logging has also become a perennial problem of the city. The problem becomes quite serious during annual monsoon with widespread and lengthy disruption of roads, telecommunications, electricity supply and water supply. In September, 2004 continuous rainfall for about 48 hours inundated most parts of the city. A record 315 millimitres of rainfall in the city on 12th and 13th September disrupted business and economic activities and affected 250 schools and 681 garment factories in addition to shopping malls, business houses and various other factories.

Dhaka is surrounded by a number of rivers that include Buriganga, Tongi, Turag, Balu and Sitlakhya. In earlier centuries the city was criss-crossed by many drainage channels which carried away run-off to the surrounding rivers. Dhaka had 43 natural canals, 17 of which no longer exist. Dhaka

WASA, however, has been able to bring the rest 26 canals under its control. Eleven canals are being rehabilitated under the Removal of Water-logging Project phase-2 while the rehabilitation works of eight canals are being carried out under a World Bank Project. With increased urbanization most of these canals have been filled up. Low-lying areas which work as retention areas for rain water are also becoming filled up with residential, industrial and other urban land uses. Consequently drainage is impeded and many parts of the city become impassable or inaccessible after normal rains. Even after an hour long rainfall many parts of the city including low and middle class residences go under water because of poor condition of drainage channels, many of which had been encroached, filled, silted and blocked due to garbage disposal. With the expansion of the city, remaining open spaces and low-lying areas are likely to face intense pressure from private land development companies and the situation would become worse if protective measures are not taken to save these lands from further encroachment.

As a rapidly urbanizing city Dhaka is faced with innumerable challenges. Rapid growth of population has been creating pressure on the city's capacity to deliver basic services. Problems of transportation, housing, water supply, sanitation, waste disposal have seriously affected the livability of the city. Being the political, economic, social and cultural centre of the nation, its protection from climate related disasters is of utmost importance. Without adequate protection, population of the city will be continuously exposed to risks from extreme climatic events and the high vulnerability of Dhaka to various hazards is a serious problem that needs urgent attention.

Climate and disaster resilience may not be the same in all parts of a city. Spatial variations in resilience patterns in a city may result from differences in the strengths and weaknesses of the city's economic, social, physical, institutional or natural aspects across its various parts. An assessment of such strengths and weaknesses is essential for identifying the areas which are exposed to various levels of risks and vulnerabilities. This is particularly important for a megacity like Dhaka which has been experiencing continuous deterioration in its natural environment due to excessive pressure of population and unbridled exploitation of its land and water resources by the private as well as the public sectors.

Current approach to climate change adaptation in Dhaka is still dependent on national level plans that are not very relevant to the city, given its megacity characteristics. The city is divided into a number of City Corporations each of which consists of a large number of Wards. These wards may vary quite significantly in terms of physical features, land development levels, land use patterns, socio-economic characteristics, and exposure to various types of natural hazards. This underlines the need for an approach that takes into account micro level variations in the adaptive capacity of a city. This research, therefore, focuses on the assessment of the local preparedness for climate-induced large-scale emergencies in greater Dhaka area taking into account ward level variations in physical, socio-economic, institutional and natural characteristics.

ASSESSMENT OF ADAPTIVE CAPACITY/RESILIENCE

Adaptive capacity of a society refers to the ability to plan, prepare for, facilitate and implement adaptation measures. The adaptive capacity of a city to cope with a potential disaster is largely determined by its ability to "resist, absorb, accommodate to and recover from the effects of a

hazard in a timely and efficient manner, including through the preservation and restoration of its essential structures and functions" (UNISDR, 2009). This ability of a city to "absorb, maintain and bounce back", referred to as its resilience, is influenced by the aspects of the physical, social, economic, institutional, and natural components of a city or an urban area (Joerin and Shaw, 2011).

Framework for Assessment of Adaptive Capacity/ Resilience

Traditional frameworks to assess adaptive capacity at the local level have focused largely on assets and capitals as indicators. While useful in understanding the capacity of a system to cope with and adapt to changing environments, asset-oriented approaches overlook the processes and functions of a system that can enhance its adaptive capacity. For example, governance system, community participation in decision-making, knowledge dissemination and management, structure of institutions and entitlements etc. are important aspects influencing the capacity of a human system to respond to climate change events. This underlines the need for a multidimensional approach for assessment of adaptation capacity at the local level.

Climate Disaster Resilience index

Climate Disaster Resilience Index (CDRI) is a planning tool developed by the Climate and Disaster Resilience Initiative of the Kyoto University. CDRI measures climate disaster resilience by considering five dimensions (Joerin and Shaw, 2011):

- physical
- social
- Economic
- institutional, and
- natural

Each dimension has five parameters and each parameter in turn has five variables.

Physical Dimension and Related Parameters and Variables

- **Electricity** (access, availability, supply capacity, dependence on external supply, alternative capacity)
- **Water** (access, availability, supply capacity, dependence on external supply, alternative capacity)
- **Sanitation and solid waste disposal** (access to sanitation, toilets, collection of wastes, waste treatment, recycling)
- **Accessibility of roads** (percentage of land transportation network, paved roads, accessibility during flooding, status of interruption after intense rainfall, roadside covered drain)
- **Housing and land use** (building code, buildings with nonpermanent structure, buildings above water logging, ownership, population living in proximity to polluted industries)

Social Dimension and Related Parameters and Variables

- **Population** (population growth, population under 14 and above 64, population of informal settlers, population density)
- **Health** (population suffering from waterborne/vector-borne diseases, population suffering from waterborne diseases after a disaster, access to primary health facilities, capacity of health facilities during a disaster, preparedness for disaster)
- **Education and awareness** (literacy rate, population's awareness about disasters, availability of public awareness programs/disaster drills, access to Internet, functionality of schools after disaster)
- **Social Capital** (population participating in community activities/clubs, acceptance level of community leader [in ward], ability of communities to build consensus and to participate in city's decision-making process (level of democracy), mixing and interlinking of social class)
- **Community preparedness during a disaster** (preparedness [logistics, materials, and management], provision of shelter for affected people, support from NGOs/CBOs, population evacuating voluntarily, population participating in relief works)

Economic Dimension and Related Parameters and Variables

- **Income** (population below poverty line, number of income sources per household, income derived in informal sector, income disparity, percentage of households have reduced income due to a disaster)
- **Employment** (formal sector: percentage of labor unemployed, of youth unemployed, of women employed, of employees who come from outside the city, of child labor in city)
- **Household assets** (households have television, mobile phone, motorized vehicle, nonmotorized vehicle, basic furniture)
- **Finance and savings** (availability of credit facility to prevent disaster, accessibility to credits, accessibility to credits for urban poor, saving practice of households, household's properties insured)
- **Budget and subsidy** (City's annual budget for DRR and CCA, availability of subsidies/ incentives for residents to rebuild houses, alternative livelihood, health care after a disaster)

Institutional Dimension and Related Parameters and Variables

- **Mainstreaming of DRR and CCA** (mainstreaming of CCA and DRR in cities development plans, in housing and transport policies, ability [manpower] and capacity [technical] to produce development plans, extent of community participation in development plan preparation process, implementation of disaster management plan)
- **Effectiveness of cities crisis management framework** (existence of disaster management plan, existence and effectiveness of an emergency team during a disaster: leadership, availability of evacuation centers, efficiency of trained emergency workers during a disaster, existence of alternative decision-making personnel)

- **Knowledge dissemination and management** (effectiveness to learn from previous disasters, availability of disaster training programs for emergency workers, existence of disaster awareness programs for communities, capacity (books, leaflets, etc.) to disseminate disaster awareness programs (disaster education), extent of community satisfaction from disaster awareness programs)
- **Institutional collaboration with other organizations and stakeholders, during a disaster** (cities dependency on external institutions/support, collaboration and interconnectedness with neighboring cities, citiy's cooperation (support) with central municipal department for emergency management, cooperation of city's ward officials for emergency management, city's institutional collaboration with NGOs and private organizations)
- **Good governance** (effectiveness of early warning systems, accountability and transparency of city government, implementation of building codes, existence of disaster drills, promptness of city body to disseminate emergency information during a disaster to communities, capability of city body to lead recovery process)

Natural Dimension and Related Parameters and Variables

- **Intensity/severity of natural hazards** (floods, cyclones, heat waves, droughts [water scarcity], tornados)
- **Frequency of natural hazards** (floods, cyclones, heat waves, droughts [water scarcity], tornados)
- **Ecosystem services** (quality of city's biodiversity, soils, air, water bodies, urban salinity)
- **Land use in natural terms** (area vulnerable to climate-related hazards, urban morphology, settlements on hazardous ground, amount of Urban Green Space [UGS], loss of UGS)
- **Environmental policies** (use of city-level hazard maps in development activities, extent of environmental conservation regulations reflected in development plans, extent of implementation of environmental conservation policies, implementation of efficient waste management system [RRR], implementation of mitigation policies to reduce air pollution)

Computation of Climate Disaster Resilience Index (CDRI)

The CDRI questionnaire has 125 variables. Each variable ($x_1, x_2, \ldots, x_5$) provides five choices answers starting from not available/very poor (1) to best (5). In addition, all the five variables representing a parameter are ranked on the basis of weights ($w_1, w_2, \ldots, w_5$) that range from not important (1) to very important (5). Respondents are requested to assign weights to the variables and parameters in order to reflect the priorities of the cities and the relevance of the indicators to the local situation. Using data collected from the questionnaire surveys, Weighted Mean Index (WMI) method is used to compute the scores for each parameter. The formula is shown below:

$$WMI = \frac{\sum_{i=1}^{n} w_I x_I}{\sum_{i=1}^{n} w_i} = \frac{w_i x_i + w_i x_i + w_i x_i + w_i x_i + w_i x_i}{w_i + w_i + w_i + w_i + w_i}$$

The CDRI of the city is the simple average of the indexes of the five dimensions. The index value ranges from 1 to 5. Higher CDRI values are equivalent to higher preparedness to cope with climate change and disasters. Needless to say, these results are not absolute values, but serve mainly as broad policy guidance. The quality of the results is very much dependent on the quality of the input data from the survey respondents.

As the present study deals mainly with flooding and water logging, some changes have been made in the natural dimension. All the five parameters have been retained while the number of variables under four parameters have been adjusted. In case of intensity and frequency of natural hazards only flood has been considered as the variable while water bodies is the only variable that has been considered for the parameter ecosystem service. There has been no change in the number of variables under the parameter land use in natural terms. In case of environmental policies all the variables except implementation of mitigation policies to reduce air pollution has been retained. Such changes are shown below:

Natural Dimension and Related Parameters and Variables

- Intensity/severity of natural hazards (floods)
- Frequency of natural hazards (floods)
- Ecosystem services (water bodies)
- Land use in natural terms (area vulnerable to climate-related hazards, urban morphology, settlements on hazardous ground, amount of Urban Green Space [UGS], loss of UGS)
- Environmental policies (use of city-level hazard maps in development activities, extent of environmental conservation regulations reflected in development plans, extent of implementation of environmental conservation policies, implementation of efficient waste management system [RRR])

Calculation of WMI has been adjusted in accordance with the changes above.

Study Area

The portion of Dhaka Metropolitan Area (DMA) that has been delineated for detailed study, as shown in Figure-1, consists of eastern part of Dhaka Metropolitan Area (136 sq. km.), Western part of Dhaka Metropolitan Area (124 sq. km.), DND Area (57 sq. km.) and Narayanganj Area (33 sq. kms.). Western part of DMA is the most built-up and densely populated. It is also protected from river flooding by an embankment system. The eastern part of DMA is exposed to river flooding from the Balu River. However, there is a plan to protect this area also from river flooding in the future.

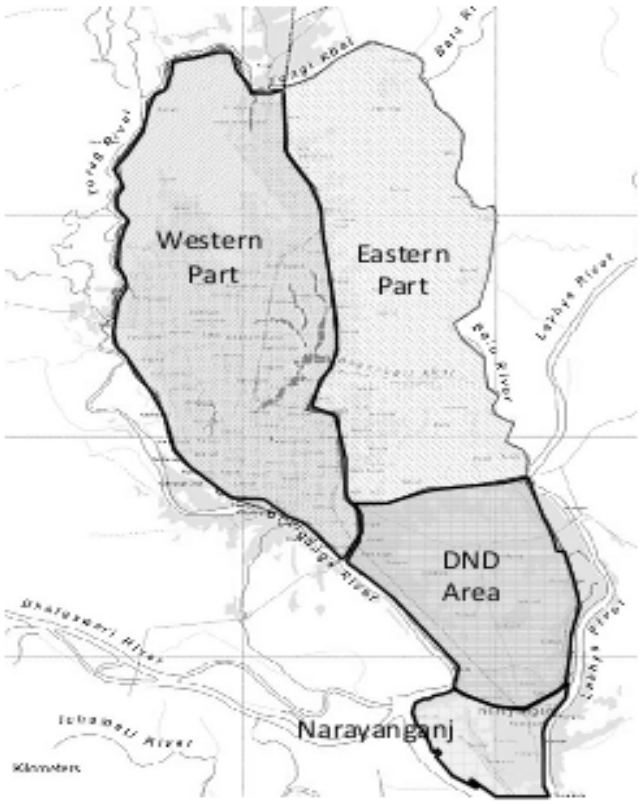
Narayanganj town and adjoining zones, with an area of 33 sq. km., is located in the southern part of the study area. It is bounded by the DND area to the north, Buriganga River to the west, the Lakhya River to the east and the Dhaleshwari River to the south. The area mainly suffers from urban flooding.

The 57 sq. km. Dhaka-Narayanganj-Demra (DND) irrigation project is also in the study area. This area was originally developed by the Bangladesh Water Development Board (BWDB) in 1962. The DND area is bounded by Lakhya river in the east, Buriganga River in the west, Narayanganj town in the south and the Dhaka-Demra-Chittagong Road cum embankment in the north. The area is protected from river floods by polders and drained by canals and pumps. Initially, this land was of comparatively low value and free of urban flooding. However, rapid growth of population has led to haphazard land development. Consequently, water-logging occurs during the monsoon season - some time for prolonged duration.

Figure-1: Detailed Study Area

Detailed study area:

i. Western Part: 136 km²
ii. Eastern Part: 124 km²
iii. DND Area : 57 km²
iv. Narayanganj: 33 km²
v. Total area: 350 km²



Local Level CDRI

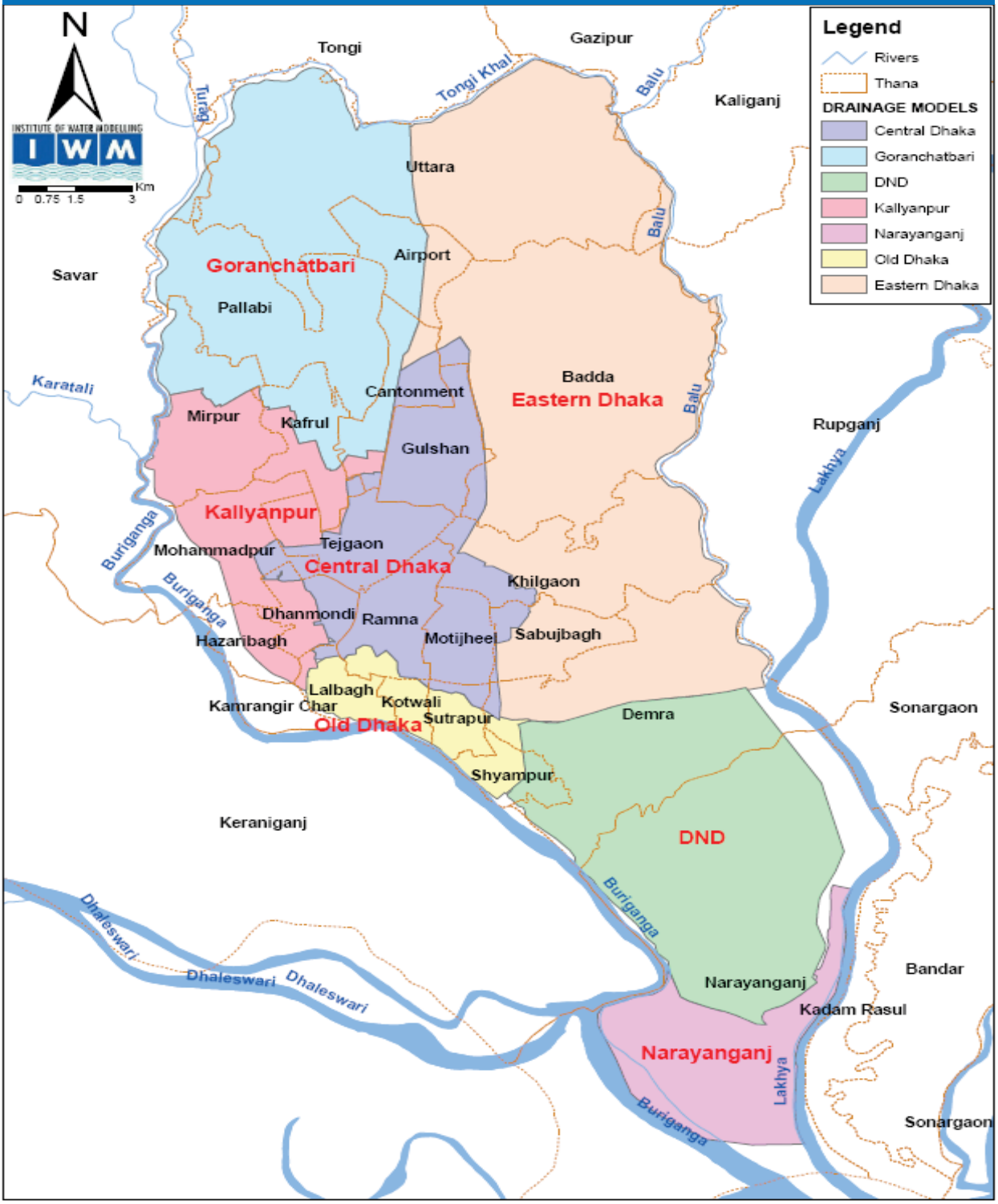
For the purpose of detailed hydrologic modeling the study area covering 351 square kilometres has been divided into seven model zones/zones. These are shown in Figure-2 and described as follows:

1. **Western Dhaka (Goranchatbari):** this zone in the north-western part of the city covers approximately 64 square kilometers. This area consists of six thanas including Airport, Pallabi, Savar, Tongi, Uttara and Kafrul. There are seven wards in the area.
2. **Western Dhaka (Kallyanpur):** This zone covers approximately 28 square kilometers in the south-western part of the city. It includes parts of Mahammadpur, Mirpur, Kafrul, and Hazaribagh thanas. The area has fifteen wards.

3. **Eastern Dhaka:** The zone covers the whole of eastern Dhaka from Tongi Khal to Demra. Total area is about 118 square kilometers that includes Badda, Khilgao and parts of sabujbagh and Rupganj thanas.
4. **Central Dhaka:** this zone located in the middle of the city consists of 8 thanas and parts of 7 other thanas. The area has 44 wards of Dhaka North and South city corporations and covers 39 square kilometers.
5. **Old Dhaka:** This is a high density area in the south along the Buriganga river covering approximately twelve square kilometers. It includes nineteen wards of Lalbagh, Kotwali, Sutrapur and shyampur thanas of old Dhaka.
6. **DND Area:** this zone in the southern part of the city includes five wards of Shyampur thana and the area of Demra thana. It covers approximately 57 square kilometers.
7. **Narayanganj:** this area includes nine wards of former Narayanganj Pourashava and part of the area under Narayanganj sadar thana. It covers approximately 33 square kilometers.

CDRI has been computed for these seven zones/ zone so as to obtain information about local level resilience against flood and water logging in the city. In this connection, reference may be made of an earlier study by Parvin and Shaw (2011) that investigated disaster resilience of Dhaka City Corporation area at zonal level using CDRI. The present study differs from the study by Parvin and Shaw in two respects. First, the present study area is larger than the earlier study. Second, in the present study analysis is carried out at three spatial levels- ward at the lowest level, a larger area consisting of several wards at the second level and the city at the highest level. In the study by Parvin and Shaw, analysis was done at two levels- at zone level and city level.

Figure-2: Subdivisions of Study Area for Local Analysis



Data Collection

Data used to assess the level of disaster resilience were collected from primary as well as secondary sources. The questionnaire that was used to collect data comprised one hundred and twenty five different variables which were grouped into twenty five parameters which were again grouped into five dimensions: physical, social, economic, institutional and natural. These variables, parameters and dimensions have already been described above. The questionnaire was treated as a 5x5x5 matrix. There were a total of 125 questions used to assess the situation with respect 125 variables in different parts (wards and thanas) of the study zones. Respondents used a 5-point rating scale to assess the status (condition) of each variable where 1 means the worst status/condition and 5 means the best. In addition to assessment of status or condition of each variable, the importance/ weight of each variable, influencing disaster resilience has also been assessed. A group of disaster management experts were asked to assign a weight (1 to 5, least to highest) to each variable according to their perceived importance.

Data were collected from planners who were involved in the preparation of the Detailed Area Plan (2009) of Dhaka metropolitan Area. For the preparation of the plan extensive socio-economic and physical surveys were carried out. The planners belonged to different consultancy firms each of which was responsible for preparing the plan of a particular area of the city. Data on some variables, especially related to physical and social aspects, were also collected from secondary sources such as reports of the population census, 2011 and detailed Area Plan Reports. The 5-point rating scale was applied to these data to determine the status of a variable in a particular area. Data collected through questionnaire survey and secondary sources were then used to compute the Climate Disaster Resilience Index (CDRI) of the city and its various parts through the application of the formula as shown above.

CLIMATE DISASTER RESILIENCE OF DHAKA CITY

In this study disaster resilience of the city is measured by the Climate Disaster resilience Index (CDRI) score which varies between 1 and 5. Score 1 shows poor or worst resilience while score 5 indicates best resilience. These scores have been grouped into four categories each of which shows a particular level of resilience. Thus, resilience levels according to CDRI Scores are: 1 – 2 = Poor, 2.1 – 3.0 = Moderate/Medium, 3.1 – 4.0 = Good, 4.1 – 5.0 = Best.

Overall CDRI of the city is the average of the CDRI scores obtained by the city in five major dimensions: physical, social, economic, institutional and natural. Figure-3 shows the resilience of the city by major dimensions as well as overall resilience. The city has an overall CDRI of 2.35 which indicates that the city has moderate level of resilience. There are, however, variations in the levels of resilience by major dimensions. Institutional resilience is lowest while physical resilience is highest. It is important to note that CDRI scores for physical, social, economic and natural dimensions vary between 2.16 and 2.73 which indicate moderate level of resilience while CDRI score for institutional dimension is 1.96 which indicates poor level of resilience. Institutional capacity of the city is thus very weak.

Components of Major Dimensions

Within the same level of resilience there may be variation in the degree of resilience. Thus, physical dimension has higher degree of resilience than social, economic or natural dimensions although resilience levels of all these dimensions have been categorized as moderate. These variations mainly result from the variations in the CDRI scores of various parameters/components that make up these dimensions.

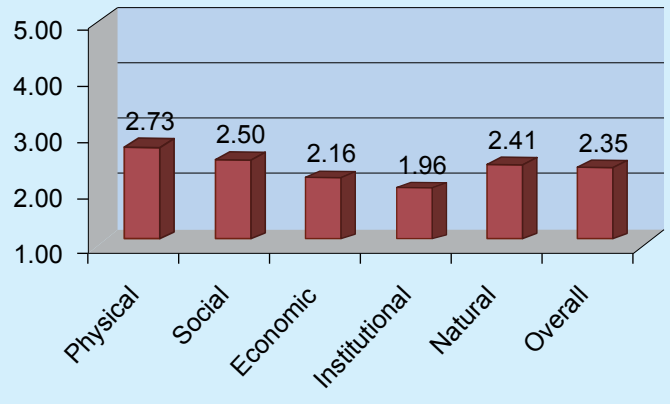
Physical Dimension

Physical dimension has five components: electricity, water supply, sanitation and solid waste disposal, accessibility of roads, and housing and land use. Figure-4 presents the CDRI scores of various physical components. CDRI score for electricity is 2.90 which is highest and this is followed by accessibility of roads (2.93), sanitation and solid waste disposal (2.74), housing and land use (2.57), and water (2.52). It is important to note that CDRI scores of all these components also fall in the moderate category. Within this category, however, water has the lowest degree of resilience.

Status and importance of Variables

CDRI score of a particular component is the weighted average of the scores of five variables that are represented by the component. The score of each variable under a particular component/parameter shows the current status/condition of the variable in the study area. These variables have also been given weights by a team of experts and average of the weights for each variable shows the level of importance of the variable for the city in terms of disaster resilience. Table-1 of Annex-I shows the variables under each component of the physical dimension, their scores and corresponding status/ condition as well as their weights and corresponding level of importance.

Figure-3: Resilience of the City in major Dimensions

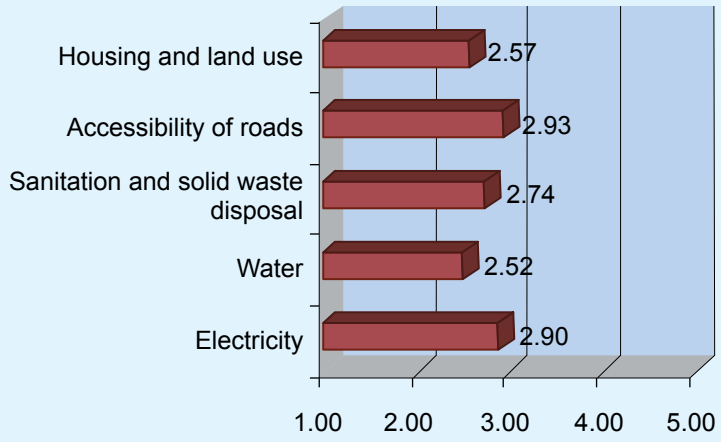


The status of majority of the physical variables (15 out of 25) in the city as a whole is moderate while only three variables have good status. The status of seven variables is poor indicating that most of the physical variables (22 out of 25) are either in poor or moderate condition. Even within the same status, variables differ in terms of their performances as indicated by the scores.

Out of 25 variables under physical dimension, 3 variables are of highest importance, 14 variables are highly important, 7 variables are moderately important and 1 variable is of low importance for the city in terms of its disaster resilience. The variables which are of highest importance are access to water supply, availability of water supply and access to sanitation. Even among the highly important variables, some are more important than others as indicted by the weights. Thus

accessibility to and availability of electricity, toilet facility, accessibility to roads during disaster, building code and buildings above water logging are more important than others of the same category so far as disaster resilience of the city is concerned.

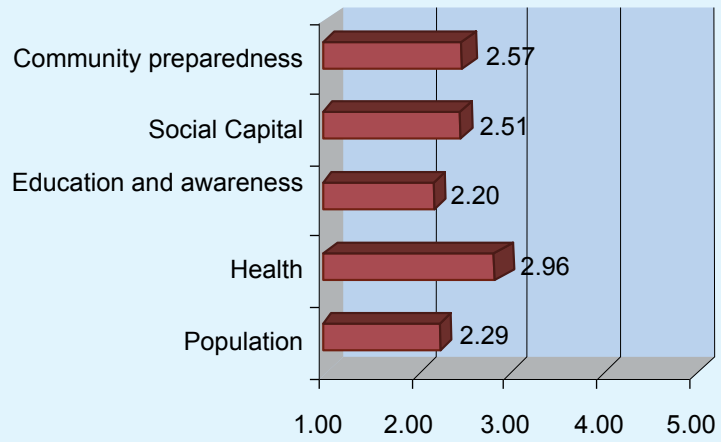
Figure-4: CDRI : Physical Dimension



Social Dimension

Figure-5 shows the CDRI scores of various social components. Out of five components of social dimension, four components, that is, population, education and awareness, social capital, and community preparedness have CDRI scores that vary between 2.20 and 2.96 and therefore show moderate level of resilience. The CDRI score of the remaining component, that is, health is 2.96 indicating a level of resilience that is categorized as moderate. Among the components having moderate level of resilience, social capital and community preparedness have higher degrees of resilience than population, and education and awareness.

Figure-5: CDRI : Social Dimension



Status and Importance of Variables

Table-2 of Annex-I shows the variables under each component of the social dimension, their scores and corresponding status/condition as well as their weights and corresponding level of importance. The status of twelve social variables is poor while that of ten variables is moderate. Only two variables have been rated as good by the planners. These are health related variables that include population suffering from waterborne diseases and population suffering from waterborne diseases after a disaster. It is important to note that nearly 50% of the social variables are perceived as performing poorly while performance of 40% of the variables is perceived as moderate. What is more striking is that all the variables related to education and awareness has been rated as poor or worst. Only health related variables have been rated as moderate or good.

As regards importance of variables as assigned by the experts, it is found that one social variable, that is, capacity of health facilities during a disaster is of highest importance while 18 other social variables are highly important, 5 variables are moderately important and one variable is of low importance in terms of disaster resilience of the city. Among highly important variables, population density, access to primary health facilities, preparedness for disaster, population's awareness about disaster, acceptance level of community leaders, preparedness in terms of logistics, materials and management, and provision of shelter for affected people are more important than other highly important variables.

A comparison of importance and present status of variables indicates that the present status of nine highly important social variables is rated as poor which negatively affects the resilience of the city. Out of five moderately important social variables, performance of two variables is rated as moderate while the rest three variables are performing poorly.

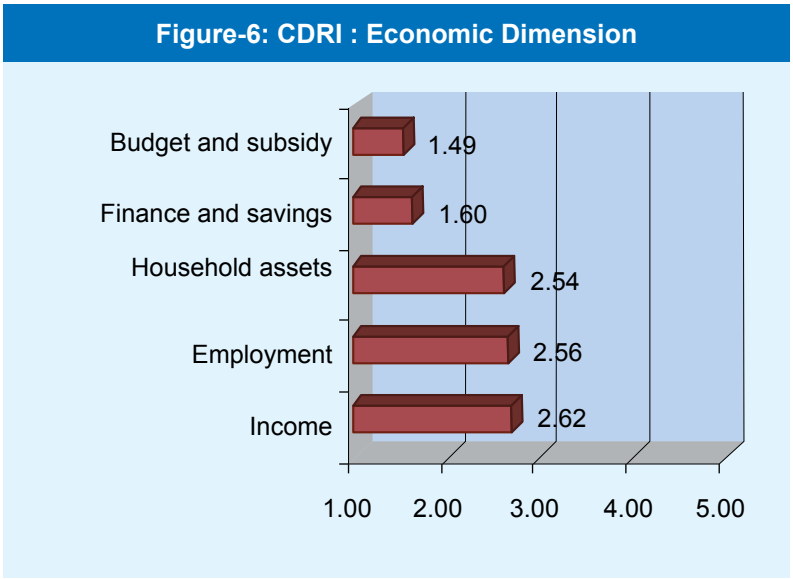
Economic Dimension

Although economic resilience of the city is moderate, there are significant variations among the components/parameters (Figure-6). CDRI scores of two components - budget and subsidy, and finance and savings are 1.49 and 1.60 respectively indicating poor disaster resilience of these components. Disaster resilience of rest three components- household assets, employment and income is moderate since their CDRI scores vary between 2.54 and 2.62.

Status and Importance of Variables

Table-3 of Annex-I shows the variables under each component of the economic dimension, their scores and corresponding status/condition as well as their weights and corresponding level of importance.

Figure-6: CDRI : Economic Dimension



Poor resilience of two economic components can be explained with reference to the current status of the performance of the variables under these components. Thus out of five variables under budget and subsidy, current status of three variables- funding for city's disaster management, city's annual budget for DRR and CCA and availability of incentive/subsidy to rebuild houses is poor while the current status of the rest two variables- alternative livelihood and health care after a disaster is worst. Similarly, all the five variables under finance and savings have scores that vary between 1.38 and 2.08 showing poor or worst condition of these variables for the city as a whole.

A comparison of status and importance of economic variables shows some important results that have significant implications for the city's climate disaster management. Out of 25 economic variables that are considered highly important for disaster resilience the status of eight variables is poor, one variable is worst and the rest three variables is moderate indicating the vulnerable situation of the city in terms of economic aspects. The performance of moderately important variables, however, is a little bit better. Out of eleven moderately important variables, the status of five variables is moderate, four variables is poor and two variables is worst. Population below poverty line is considered as the variable of highest importance for disaster resilience. Its status in the city is moderate.

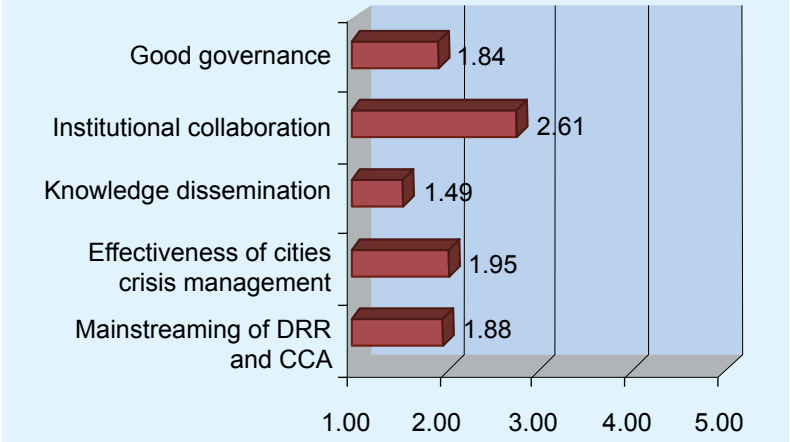
Institutional Dimension

Institutional dimension has five components: good governance, institutional collaboration with other organizations, knowledge dissemination and management, effectiveness of city's crisis management framework, and mainstreaming of DRR and CCA. CDRI scores of these components are shown in figure-7. The scores vary between 1.49 and 2.61 with four components having scores less than 2.00. Thus four out of five institutional components have poor disaster resilience while only one component- institutional collaboration with other organizations and stakeholders, has moderate resilience. Institutionally also the city is extremely vulnerable to climate disasters.

Status and Importance of Variables

Table-4 of Annex-I shows the variables under each component of the Institutional dimension, their scores and corresponding status/condition as well as their weights and corresponding level of importance. Institutional vulnerability of the city results mainly from the poor performance of the variables belonging to five components of the institutional dimension. Out of 25 variables, the status of three variables is worst and that of nineteen variables is poor. Only three variables have a moderate status. It is important to note that three out of five components, that is, good governance, knowledge dissemination and management, and mainstreaming of DRR and CCA have all the variables the status of which is either worst or poor. The status of variables belonging to other components also does not give a much better picture.

Figure-7: CDRI : Institutional Dimension



A comparison of importance and present status of variables indicates that the present status of fourteen highly important institutional variables is rated as poor which negatively affects the resilience of the city. Out of four variables of highest importance, three variables have poor status and one variable has moderate status while out of four moderately important variables, two have poor and two have worst status.

Natural Dimension

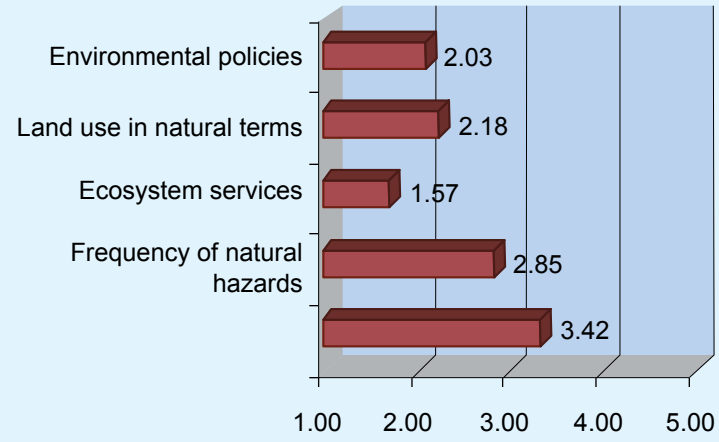
Resilience of natural dimension is assessed in terms of intensity/severity of natural hazards, frequency of natural hazards, ecosystem services, land use in natural terms and environmental policies. Figure-8 shows the CDRI scores of natural components. Ecosystem services have the lowest CDRI score (1.57) while intensity/severity of natural hazards has the highest CDRI score (3.42).The low CDRI of ecosystem services result mainly from continuous disappearance of its water bodies. Disaster resilience of the remaining components has been assessed as moderate based on their CDRI scores.

Status and Importance of Variables

Table-5 of Annex-I shows the variables under each component of the natural dimension, their scores and corresponding status/condition as well as their weights and corresponding level of importance.

The status of fifteen variables belonging to three components of the natural dimension (environmental policies, land use in natural terms and ecosystem services) has been assessed as poor. Some of the important variables such as water bodies, amount of urban green space, loss of urban green space, implementation of environmental conservation policies, etc. have received low scores indicating that natural aspects of the city have been deteriorating while implementation of the environmental conservation policies has not been satisfactory.

Figure-8: Natural Dimension



As regards importance of variables as assigned by the experts, it is observed that two variables, that is, severity of floods and use of city-level hazard maps in development activities have been given highest importance in terms of disaster resilience of the city. Fourteen of the variables are considered highly important while the rest nine variables are considered moderately important. Out of fourteen highly important variables the performance of two variables has been assessed as good, two variables as moderate and the rest ten variables as poor.

SPATIAL VARIATIONS OF CLIMATE DISASTER RESILIENCE IN DHAKA

As we have already mentioned above, the study area has been divided into seven smaller zones/ zones for the purpose of hydrologic modeling. These zones/zones are as follows:

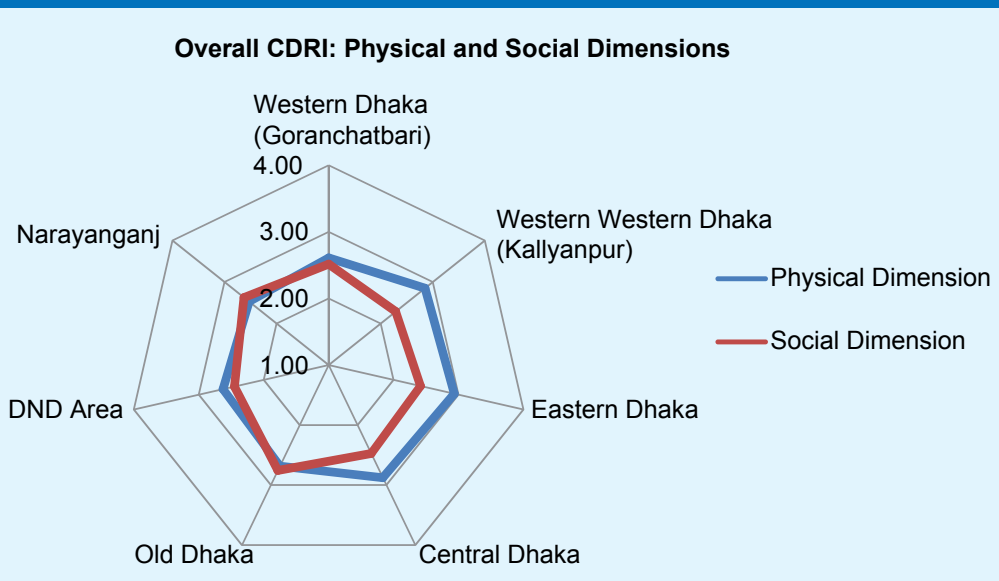
1. Western Dhaka (Goranchatbari)
2. Western Dhaka (Kallyanpur)
3. Eastern Dhaka

4. Central Dhaka
5. Old Dhaka
6. DND Area
7. Narayanganj

Overall CDRI and CDRI of various dimensions and components under each dimension have been computed for the seven zones as described above. Figure-11 presents CDRI scores of different zones. CDRI scores of different parts of the study area vary between 2.13 and 2.46 indicating moderate level of disaster resilience although there are some variations across zones at this level. Narayangaj and Central Dhaka have highest overall resilience while DND area has the lowest overall resilience as indicated by their CDRI scores. Old Dhaka, Eastern Dhaka and Western Dhaka (Goranchatbari) have very close overall CDRI scores indicating similar degree of overall resilience of these zones.

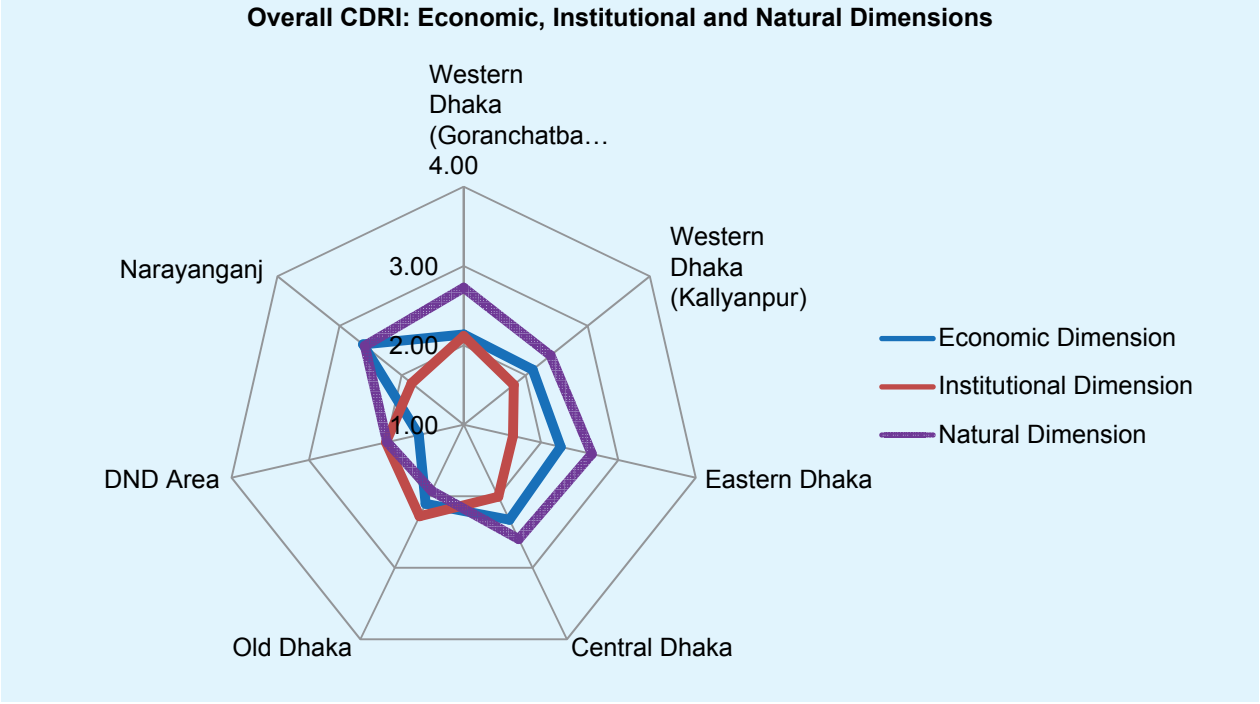
Table-1 presents CDRI scores of different study zones by various dimensions. All the zones have moderate level of climate disaster resilience in physical and social dimensions. Economic resilience is poor for DND area but moderate for all the other six zones. Institutional situation is, however, quite disappointing. Out of seven zones only two zones have moderate resilience. These are Western Dhaka (Goranchatbari) and Old Dhaka. Institutional resilience of other five zones is poor. In case of natural dimension, Old Dhaka and DND area have poor resilience while the other five zones have moderate resilience. Thus all the zones have moderate or poor resilience in various dimensions which indicates that the city is quite vulnerable to extreme events in a changing climate. Figure-9 and figure-10 make a graphical presentation of CDRI scores of seven zones in major dimensions. A comparison of five dimensions as depicted in the radar graphs indicates that institutional resilience is lowest and extremely poor in all the zones compared to other dimensions although this aspect is very critical to deal with climate change.

Figure-9: Overall CDRI of Various Zones in Physical and Social Dimensions



(Resilience Levels: Poor (1.0 – 2.0), Moderate (2.1 – 3.0), Good (3.1 – 4.0)

Figure-10: Overall CDRI of Various Zones in Economic, Institutional and Natural Dimensions



(Resilience Levels: Poor (1.0 – 2.0), Moderate (2.1 – 3.0), Good (3.1 – 4.0)

Resilience of Physical Components

Assessment of physical resilience is dependent on five components of physical dimension – electricity, water, sanitation and solid waste disposal, accessibility of roads, and housing and land use. Table-2 presents the CDRI scores and corresponding resilience levels of various physical components in seven study zones. In case of electricity overall resilience is moderate but there are variations across zones. Out of seven zones , resilience of three zones is good while that of four zones is moderate.

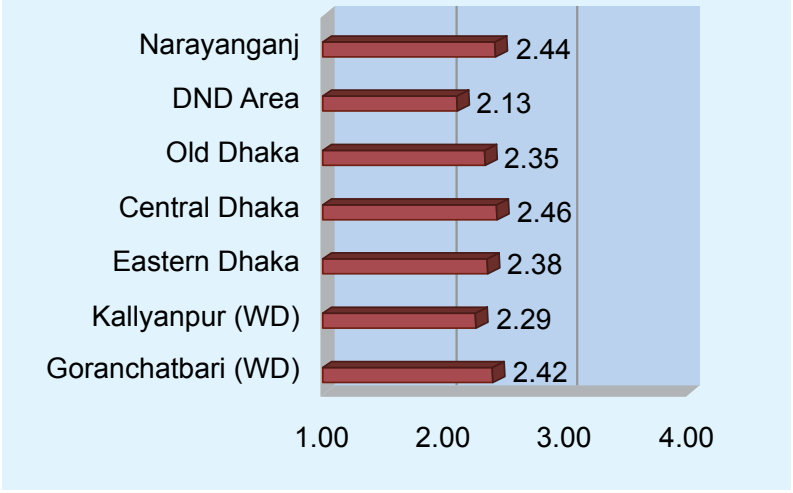
The situation with respect to water is, however, worse. Although overall resilience is moderate, the CDRI score for water is less than electricity. All seven zones have moderate resilience. In case of sanitation and solid waste disposal, the level of resilience for five zones is moderate, one area is good and one area is poor. All the seven zones have moderate level of resilience in case of accessibility of roads. CDRI scores of all the zones are close, varying between 2.84 and 3.00.

In case of housing and land use, CDRI scores vary between 2.00 and 3.10 indicating variations in levels of resilience across zones. Thus five zones have moderate, one area has good and one area has poor resilience for this component. Among the zones Eastern Dhaka performs best while Narayanganj performs worst in terms of physical resilience. Eastern Dhaka has good resilience in one component and moderate resilience in four components while DND Area has moderate resilience in four components and poor resilience in one component.

Resilience of Social Components

Five components that make up social dimension include population, health, education and awareness, social capital, and community preparedness. Table-3 presents the CDRI scores and corresponding resilience levels of various social components in different study zones. In case of population CDRI scores vary between 1.70 and 3.00 with DND Area having the lowest score and poor resilience. The rest six zones have moderate resilience for this component.

Figure-11: Overall CDRI Scores of Different Areas



Health has moderate overall resilience although there are variations across different zones. Four zones have good resilience while three zones have moderate resilience with respect to health. Old Dhaka has the highest CDRI score indicating best resilience of this area in this component.

In case of education and awareness, all the seven zones have moderate resilience although there are some variations across zones indicating spatial variations in resilience at moderate level. Thus, CDRI scores vary between 2.00 and 3.23. The situation with respect to social capital is mixed as is indicated by the variations in CDRI scores. Performance of three zones in this component is good while that of two other zones is poor. Moderate performance is observed in the remaining two zones. What is interesting to note is that although the overall resilience of this component is moderate, there are variations in the levels of resilience across different zones. Like social capital community preparedness during disaster is also an important social component and its overall level of resilience is also moderate. Unlike social capital, only one area has good performance and one area has poor performance while the remaining five zones have moderate performance with respect to this component.

Resilience of Economic Components

Table-4 presents the CDRI scores and resilience levels of five economic components – income, employment, household assets, finance and savings, and budget and subsidy by study zones. CDRI scores of both income and employment for the study area as a whole are 2.62 and 2.56 respectively. In case of income component, five zones have moderate, one area has poor and one area has good performance in terms of disaster resilience while in case of employment six zones have moderate performance and one area has poor performance. Thus the situation with respect to employment is worse than income both in terms of spatial variations across zones and the level of resilience for the city as a whole..

The resilience of the city in terms of household assets is also moderate but three zones demonstrate good performance while the performance of the remaining four zones is moderate. Performance of the city as whole is poor both in terms of finance and savings, and budget and subsidy components. When zones are compared it is found that five zones have poor performance and two zones have moderate performance in finance and savings while all seven zones have poor performance in budget and subsidy. This is not unexpected given the fact that variables represented by these components such as availability of credit facility to prevent disaster, accessibility to credits by urban poor, city's annual budget for DRR and CCA, availability of subsidy/incentive to rebuild houses etc. have poor status in all these zones.

Resilience of Institutional Components

Table-5 presents CDRI scores and resilience levels of study zones by institutional components. The situation is quite disappointing as most of the zones have poor resilience in four out of five components. Only in institutional collaboration during a disaster, all the zones have moderate performance. In case of mainstreaming of DRR and CCA, the performance of all the seven zones is poor. When city's crisis management framework is considered it is observed that only one area (Old Dhaka) has moderate performance while the performance of the remaining zones is poor.

Similar is the situation with respect to knowledge dissemination and management. Only one area, Western Dhaka (Goranchatbari), has moderate performance while the rest six zones have poor performance. Practice of good governance is observed as poor in four zones and moderate in three zones. When all the zones are compared in terms of their resilience in five components, Old Dhaka performs better than others while performances of Western Dhaka (Kallyanpur), Eastern Dhaka and Central Dhaka are worse than others.

Table -1: CDRI Scores and Resilience Levels in Study Zones by Various Dimensions

Dimensions →	Physical Dimension		Social Dimension		Economic Dimension		Institutional Dimension		Natural Dimension	
Study Zones	**CDRI**	**Resilience Level**	**CDRI**	**Resilience Level**	**CDRI**	**Resilience Level**	**CDRI**	**Resilience Level**	**CDRI**	**Resilience Level**
Western Dhaka (Goranchatbari)	2.61	Moderate	2.52	Moderate	2.14	Moderate	2.12	Moderate	2.72	Moderate
Western Dhaka (Kallyanpur)	2.85	Moderate	2.29	Moderate	2.11	Moderate	1.81	Poor	2.40	Moderate
Eastern Dhaka	2.94	Moderate	2.42	Moderate	2.25	Moderate	1.64	Poor	2.66	Moderate
Central Dhaka	2.88	Moderate	2.47	Moderate	2.33	Moderate	2.00	Poor	2.60	Moderate
Old Dhaka	2.69	Moderate	2.76	Moderate	2.11	Moderate	2.28	Moderate	1.93	Poor
DND Area	2.63	Moderate	2.45	Moderate	1.58	Poor	2.00	Poor	1.99	Poor
Narayanganj	2.53	Moderate	2.63	Moderate	2.62	Moderate	1.84	Poor	2.59	Moderate
Overall	**2.73**	**Moderate**	**2.50**	**Moderate**	**2.16**	**Moderate**	**1.96**	**Poor**	**2.41**	**Moderate**

Table- 2: CDRI Scores and C Resilience Levels of Physical Components

Components → Study Zones ↓	CDRI : Physical Components									
	Electricity		**Water**		**Sanitation and solid waste disposal**		**Accessibility of roads**		**Housing and land use**	
	CDRI	**Resilience Level**	**CDRI**	**Resilience Level**	**CDRI**	**Resilience Level**	**CDRI**	**Resilience Level**	**CDRI**	**Resilience Level**
Western Dhaka (Goranchatbari)	2.72	Moderate	2.42	Moderate	2.66	Moderate	2.84	Moderate	2.41	Moderate
Western Dhaka (Kallyanpur)	3.05	Good	2.84	Moderate	2.42	Moderate	2.84	Moderate	3.10	Good
Eastern Dhaka	2.86	Good	2.48	Moderate	2.86	Moderate	3.00	Moderate	3.00	Moderate
Central Dhaka	3.05	Good	2.84	Moderate	2.66	Moderate	3.00	Moderate	2.83	Moderate
Old Dhaka	2.81	Moderate	2.19	Moderate	3.10	Good	3.00	Moderate	2.38	Moderate
DND Area	3.00	Moderate	2.19	Moderate	2.81	Moderate	2.84	Moderate	2.00	Poor
Narayanganj	2.72	Moderate	2.66	Moderate	2.00	Poor	3.00	Moderate	2.21	Moderate
Overall	**2.89**	**Moderate**	**2.52**	**Moderate**	**2.74**	**Moderate**	**2.93**	**Moderate**	**2.57**	**Moderate**

Table- 3: CDRI Scores and Corresponding Resilience Levels of Social Components

Components → Study Zones ↓	Social Dimension									
	Population		**Health**		**Education and awareness**		**Social Capital**		**Community preparedness**	
	CDRI	**Resilience Level**	**CDRI**	**Resilience Level**	**CDRI**	**Resilience Level**	**CDRI**	**Resilience Level**	**CDRI**	**Resilience Level**
Western Dhaka (Goranchatbari)	2.21	Moderate	3.00	Moderate	1.88	Moderate	2.00	Poor	3.49	Good
Western Dhaka (Kallyanpur)	1.92	Moderate	3.00	Moderate	1.88	Moderate	2.00	Poor	2.65	Moderate
Eastern Dhaka	2.63	Moderate	3.00	Good	2.63	Moderate	2.23	Moderate	1.61	Poor
Central Dhaka	2.35	Moderate	3.00	Good	2.14	Moderate	2.23	Moderate	2.65	Moderate
Old Dhaka	2.20	Moderate	3.58	Good	2.14	Moderate	3.23	Good	2.65	Moderate
DND Area	1.70	Poor	3.00	Good	1.88	Moderate	3.03	Good	2.65	Moderate
Narayanganj	3.00	Moderate	2.15	Moderate	2.82	Moderate	2.82	Good	2.34	Moderate
Overall	**2.29**	**Moderate**	**2.96**	**Good**	**2.20**	**Moderate**	**2.50**	**Moderate**	**2.57**	**Moderate**

Table-4: CDRI Scores and Corresponding Resilience Levels of Economic Components

Components → Study Zones ↓	Economic Dimension									
	Income		**Employment**		**Household assets**		**Finance and savings**		**Budget and subsidy**	
	CDRI	**Resilience Level**	**CDRI**	**Resilience Level**	**CDRI**	**Resilience Level**	**CDRI**	**Resilience Level**	**CDRI**	**Resilience Level**
Western Dhaka (Goranchatbari)	2.48	Moderate	2.61	Moderate	2.38	Moderate	1.23	Poor	2.00	Poor
Western Dhaka (Kallyanpur)	2.92	Moderate	2.61	Moderate	2.38	Moderate	1.23	Poor	1.43	Poor
Eastern Dhaka	2.79	Moderate	2.59	Moderate	2.71	Good	1.80	Moderate	1.37	Poor
Central Dhaka	2.66	Moderate	2.61	Moderate	2.55	Good	2.00	Poor	1.83	Poor
Old Dhaka	2.26	Moderate	2.61	Moderate	2.38	Moderate	1.85	Poor	1.43	Poor
DND Area	2.00	Poor	2.00	Poor	1.69	Moderate	1.00	Poor	1.21	Poor
Narayanganj	3.21	Good	2.93	Moderate	3.71	Good	2.09	Moderate	1.17	Poor
Overall	**2.62**	**Moderate**	**2.56**	**Moderate**	**2.54**	**Moderate**	**1.60**	**Poor**	**1.49**	**Poor**

Resilience of Natural Components

CDRI scores and resilience levels of seven zones with respect to natural components are presented in table-6. Flood is of major concern for some zones of the city. Intensity of flood is felt more strongly in Eastern Dhaka, Old Dhaka and DND Area. Frequency of flood, however, poses problems for all the zones except Narayanganj. CDRI scores of Old Dhaka and DND Area indicate that these zones have poor resilience so far as frequency of flood is concerned. Serious problems also exist with respect to ecosystem services. There has been a continuous deterioration of ecosystem services, mainly due to filling up of water bodies. A reflection of this situation can be observed in the CDRI scores of different study zones. Thus five zones have poor resilience in ecosystem services while two zones have moderate resilience in this component. Similar is the situation with respect to land use in natural terms. Variables that make up this component such as amount of urban green space, settlements in hazardous grounds, area vulnerable to natural hazards etc. have poor status in different zones. That is why four zones have poor resilience in this component. The problem is particularly serious in Old Dhaka and DND Area. Poor performance of environmental policies also poses a serious problem for the city. Lack of implementation of environmental policies/regulations and use of hazard maps in development activities lead to poor performance of environmental policy component in different zones. Thus, only one area has moderate performance and the rest six zones have poor performance with respect to environmental policy.

Table-5: CDRI Scores and Corresponding Resilience Levels of Institutional Components

Components → / Study Zones ↓	Institutional Dimension									
	Mainstreaming of DRR and CCA		**Effectiveness of cities crisis management framework**		**Knowledge dissemination and management**		**Institutional collaboration during a disaster**		**Good governance**	
	CDRI	**Resilience Level**	**CDRI**	**Resilience Level**	**CDRI**	**Resilience Level**	**CDRI**	**Resilience Level**	**CDRI**	**Resilience Level**
Western Dhaka (Goranchatbari)	2.00	Poor	2.00	Poor	2.27	Moderate	2.66	Moderate	1.65	Poor
Western Dhaka (Kallyanpur)	2.00	Poor	1.86	Poor	1.27	Poor	2.25	Moderate	1.65	Poor
Eastern Dhaka	2.00	Poor	1.59	Poor	1.21	Poor	2.21	Moderate	1.18	Poor
Central Dhaka	2.00	Poor	1.86	Poor	1.68	Poor	2.66	Moderate	1.83	Poor
Old Dhaka	2.00	Poor	2.86	Moderate	1.63	Poor	2.66	Moderate	2.25	Moderate
DND Area	2.00	Poor	1.86	Poor	1.00	Poor	2.92	Moderate	2.25	Moderate
Narayanganj	1.19	Poor	1.62	Poor	1.41	Poor	2.89	Moderate	2.08	Moderate
Overall	**1.88**	**Poor**	**1.95**	**Poor**	**1.49**	**Poor**	**2.61**	**Moderate**	**1.84**	**Poor**

Table -6: CDRI Scores and Corresponding Resilience Levels of Natural Components

Components → / Study Zones ↓	Natural Dimension									
	Intensity/severity of natural hazards		**Frequency of natural hazards**		**Ecosystem services**		**Land use in natural terms**		**Environmental policies**	
	CDRI	**Resilience Level**	**CDRI**	**Resilience Level**	**CDRI**	**Resilience Level**	**CDRI**	**Resilience Level**	**CDRI**	**Resilience Level**
Western Dhaka (Goranchatbari)	4.00	Good	3.00	Moderate	2.00	Poor	2.63	Moderate	2.00	Poor
Western Dhaka (Kallyanpur)	4.00	Good	3.00	Moderate	1.00	Poor	2.00	Poor	2.00	Poor
Eastern Dhaka	2.47	Moderate	2.94	Moderate	3.00	Moderate	2.89	Moderate	1.98	Poor
Central Dhaka	4.00	Good	3.00	Moderate	2.00	Moderate	2.00	Poor	2.00	Poor
Old Dhaka	3.00	Moderate	2.00	Poor	1.00	Poor	1.63	Poor	2.00	Poor
DND Area	3.00	Moderate	2.00	Poor	1.00	Poor	1.44	Poor	2.00	poor
Narayanganj	3.53	Good	4.00	Good	1.00	Poor	2.68	Moderate	1.77	Poor
Overall	**3.43**	**Good**	**2.85**	**Moderate**	**1.57**	**Poor**	**2.18**	**Moderate**	**1.96**	**Poor**

CLIMATE DISASTER RESILIENCE OF DCC WARDS

A ward is the smallest administrative unit of a city corporation or a Pourashava. There are a total of 34 wards in DCC North and 56 wards in DCC South. For the purpose of present analysis the wards of both the city corporations have been grouped into five zones as shown below:

Name of the Area	Number of Wards
1. Western Dhaka (Kallyanpur),	15
2. Western Dhaka (Goranchatbari),	07
3. Central Dhaka	44
4. Old Dhaka	19
5. DND Area	05

In Annex-II CDRI scores and corresponding resilience levels of all the wards with respect to 25 components belonging to five major dimensions have been presented. In the following sections an analysis has been made of the distribution of wards in different zones by major dimensions and levels of climate disaster resilience.

Physical Dimension

Table-7 presents the distribution of wards by physical resilience. About 66% of the wards have moderate resilience 34% of the wards have good resilience in physical dimension. There are, however, variations across different zones. Out of 15 wards in Western Dhaka (Kallyanpur), 13 (87%) wards have moderate resilience and 2 (13%) wards have good resilience while in Western Dhaka (Goranchatbari), 6 (86%) out of 7 wards have moderate resilience and only one ward has good resilience.

Out of 19 wards in Old Dhaka, 12 (63%) wards have moderate resilience and 7 (37%) wards have good resilience while in Central Dhaka performance of 23 (52%) wards is moderate and 21 (48%) wards is good. In DND Area all the 5 wards have moderate performance in physical dimension.

Social Dimension

Distribution of wards by social resilience is presented in table-8. In Western Dhaka (Kallyanpur), 7 (47%) wards have moderate and only one ward has good social resilience while in Western Dhaka (Goranchatbari) all the 7 wards have moderate social resilience. On the other hand, in Old Dhaka performance of 5 (26%) wards is moderate and 14 (74%) wards is good while in Central Dhaka 27 (61%) wards have moderate, 7 (16%) wards have poor and 10 (23%) wards have good performance. Like physical dimension, in social dimension also all the 5 wards of DND Area perform at moderate level.

Table-7: Distribution of Wards by Physical Resilience in Study Zones within DCC (North & South)

Dimension	Physical Dimension								
Resilience Levels →	**Poor**		**Moderate**		**Good**		**Best**		**Total Number of Wards**
Study Zones within DCC (N & S)	Number of Wards	% of Wards	Number of Wards	% of Wards	Number of Wards	% of Wards	Number of Wards	% of Wards	
Western Dhaka (Kallyanpur)	00	00.00	13	86.66	02	13.34	00	00.00	15
Western Dhaka (Goranchatbari)	00	00.00	06	85.71	01	14.29	00	00.00	07
Old Dhaka	00	00.00	12	63.16	07	36.84	00	00.00	19
Central Dhaka	00	00.00	23	52.27	21	47.73	00	00.00	44
DND Area	00	00.00	05	100.00	0	00.00	00	00.00	05
Total	**00**	**00.00**	**59**	**65.56**	**31**	**34.44**	**00**	**00.00**	90

Table-8: Distribution of Wards by Social Resilience in Study Zones within DCC (North & South)

Dimension	Social Dimension								
Resilience Levels →	**Poor**		**Moderate**		**Good**		**Best**		**Total Number of Wards**
Study Zones within DCC (N & S)	Number of Wards	% of Wards	Number of Wards	% of Wards	Number of Wards	% of Wards	Number of Wards	% of Wards	
Western Dhaka (Kallyanpur)	07	46.67	07	46.67	01	06.66	00	00.00	**15**
Western Dhaka (Goranchatbari)	00	00.00	07	100.00	00	00.00	00	00.00	**07**
Old Dhaka	00	00.00	05	26.32	14	73.68	00	00.00	**19**
Central Dhaka	07	15.91	27	61.37	10	22.72	00	00.00	**44**
DND Area	00	00.00	05	100.00	00	00.00	00	00.00	**05**
Total	**14**	**15.55**	**51**	**56.67**	**25**	**27.78**	**00**	**00.00**	**90**

Table-9: Distribution of Wards by Economic Resilience in Study Zones within DCC (North & South)

Dimension	Economic Dimension								
Resilience Levels →	**Poor**		**Moderate**		**Good**		**Best**		**Total Number of Wards**
Study Zones within DCC (N & S)	Number of Wards	% of Wards	Number of Wards	% of Wards	Number of Wards	% of Wards	Number of Wards	% of Wards	
Western Dhaka (Kallyanpur)	09	60.00	06	40.00	00	00.00	00	00.00	**15**
Western Dhaka (Goranchatbari)	00	00.00	07	100.00	00	00.00	00	00.00	**07**
Old Dhaka	10	52.63	09	47.37	00	00.00	00	00.00	**19**
Central Dhaka	08	18.18	36	81.82	00	00.00	00	00.00	**44**
DND Area	05	100.00	00	00.00	00	00.00	00	00.00	**05**
Total	**32**	**35.55**	**58**	**64.44**	**00**	**00.00**	**00**	**00.00**	**90**

Table-10: Distribution of Wards by Institutional Resilience in Study Zones within DCC (North & South)

Dimension	Institutional Dimension								
Resilience Levels →	**Poor**		**Moderate**		**Good**		**Best**		**Total Number of Wards**
Study Zones within DCC (N & S)	Number of Wards	% of Wards	Number of Wards	% of Wards	Number of Wards	% of Wards	Number of Wards	% of Wards	
Western Dhaka (Kallyanpur)	09	60.00	06	40.00	00	00.00	00	00.00	**15**
Western Dhaka (Goranchatbari)	07	100.00	00	00.00	00	00.00	00	00.00	**07**
Old Dhaka	00	00.00	19	100.00	00	00.00	00	00.00	**19**
Central Dhaka	30	68.18	14	31.82	00	00.00	00	00.00	**44**
DND Area	00	00.00	05	100.00	00	00.00	00	00.00	**05**
Total	**46**	**51.11**	**44**	**48.89**	**00**	**00.00**	**00**	**00.00**	**90**

Economic Dimension

Table-9 presents the distribution of wards by economic resilience. 60% of the wards have poor economic resilience and 40% of the wards have moderate economic resilience in Western Dhaka (Kallyanpur) while all the 7 wards of western Dhaka (Goranchatbari) have moderate economic resilience. In Central Dhaka performance of 36 (82%) wards is moderate and 8 (18%) wards is poor while in Old Dhaka 9 (47%) Wards have moderate performance and 10 (53%) wards have poor performance. In DND Area economic resilience of all the 5 wards is poor.

Institutional Dimension

Institutional performance of wards is perhaps worst of all as is evident from Table-10. Out of 90 wards 46 (51%) wards have poor institutional resilience and 44 (49%) wards have moderate resilience. In central and Western Dhaka (Goranchatbari) 68% and 60% of the wards respectively have poor performance while 32% and 40% of the wards respectively have moderate performance. In Old Dhaka and DND Area all the wards perform moderately while in Western Dhaka (Goranchatbari) all the wards perform poorly in institutional dimension.

Natural Dimension

In natural dimension also poor performance is observed in significant number of wards (Table-11). Thus, about 27% of all the wards have poor natural resilience. In some zones the situation is even worse. Thus, about 53% of the wards in DND Area have poor resilience in natural dimension. Somewhat better situation is observed in Central Dhaka, Western Dhaka (Kallyanpur) and Western Dhaka (Goranchatbari). Thus, 13 out of 15 wards in Western Dhaka (Kallyanpur), all the 7 wards in Western Dhaka (Goranchatbari) and 37 out of 44 wards in Central Dhaka have moderate resilience in natural dimension. No ward has been found with good or better performance in any of the 7 zones.

Table- 12 presents the distribution of 90 wards by resilience in major dimensions and enables us to obtain an overall picture at a glance. Thus, physical resilience of wards is either moderate or good with majority of the wards (65.56 %) having moderate resilience. Economic, institutional and natural resilience of wards is either poor or moderate. In economic and natural dimensions, majority of the wards (64% and 73% respectively) have moderate resilience while in institutional dimension, majority of the wards (51%) have poor resilience. Social resilience of wards may be poor, moderate or good with majority of the wards (57%) having moderate resilience followed by 28% of the wards having good resilience. Only about 16% of the wards have poor resilience in social dimension. Only a few wards have good resilience in physical (35 wards) or social dimension (25 wards) while in economic, institutional and natural dimensions, there is no ward with good or better resilience.

Table-11: Distribution of Wards by Natural Resilience in Study Zones within DCC (North & South)

Dimension	Natural Dimension								
Resilience Levels →	**Poor**		**Moderate**		**Good**		**Best**		**Total Number of Wards**
Study Zones within DCC (N & S)	Number of Wards	% of Wards	Number of Wards	% of Wards	Number of Wards	% of Wards	Number of Wards	% of Wards	
Western Dhaka (Kallyanpur)	02	13.33	13	86.67	00	00.00	00	00.00	**15**
Western Dhaka (Goranchatbari)	00	00.00	07	100.00	00	00.00	00	00.00	**07**
Old Dhaka	10	52.63	09	47.37	00	00.00	00	00.00	**19**
Central Dhaka	07	15.91	37	84.09	00	00.00	00	00.00	**44**
DND Area	05	100.00	00	00.00	00	00.00	00	00.00	**05**
Total	**24**	**26.67**	**66**	**73.33**	**00**	**00.00**	**00**	**00.00**	**90**

Table-12: Distribution of Wards by Major Dimensions within DCC (North & South)

Resilience Levels →	Poor		Moderate		Good		Best		Total Number of Wards
Major Dimensions	Number of Wards	% of Wards	Number of Wards	% of Wards	Number of Wards	% of Wards	Number of Wards	% of Wards	
Physical	00	00.00	59	65.56	31	34.34	00	00.00	**90**
Social	14	15.55	51	56.67	25	27.78	00	00.00	**90**
Economic	32	35.55	58	64.44	00	00.00	00	00.00	**90**
Institutional	46	51.11	44	48.84	00	00.00	00	00.00	**90**
Natural	25	26.67	66	73.33	00	00.00	00	00.00	**90**

INTER-ZONAL VARIATIONS IN RESILIENCE LEVELS: EXPALNATIONS AND POLICY OPTIONS

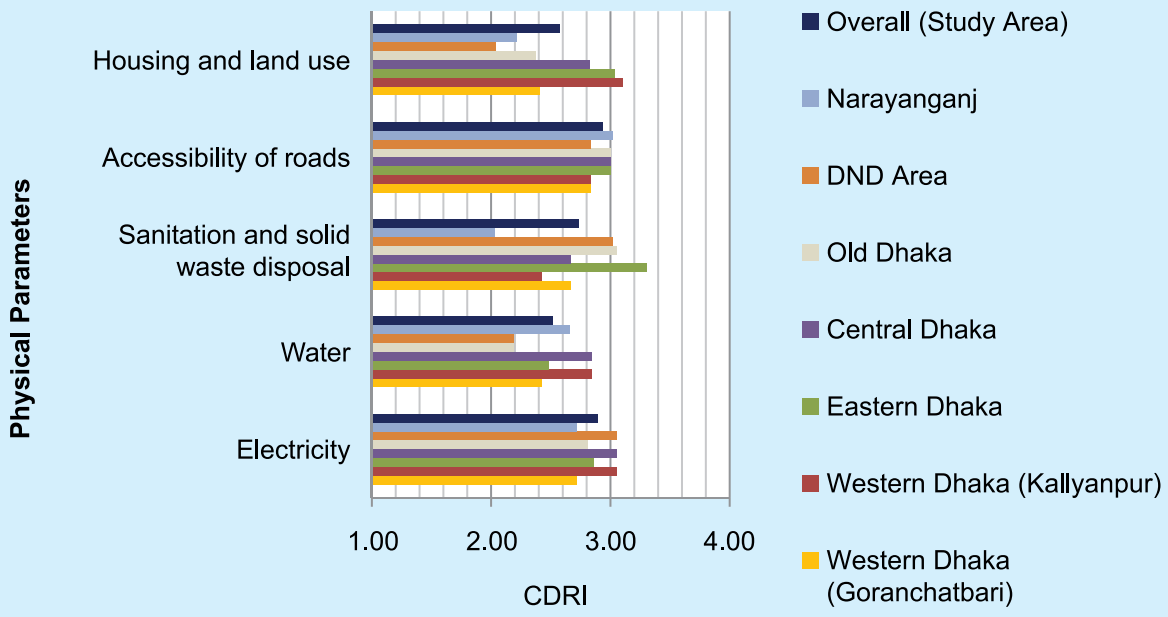
As we have already observed there has been significant variations in resilience levels of various zones in terms of various dimensions. What is important, however, is that these variations need to be explained if policies are to be formulated for enhancing resilience levels of various zones in order to address climate related disasters in future. Inter-zonal variations in resilience levels in various dimensions can be linked to the performance of parameters under each dimension which again is dependent on the status of variables associated with each parameter. In what follows, an attempt has been made to identify the variables influencing resilience levels of various zones in different parameters under each dimension.

Explaining Inter-Zonal Variations

Physical Resilience

Supply of electricity is an important parameter influencing physical resilience. Resilience levels of four zones - Narayanganj, Old Dhaka, Eastern Dhaka and Goranchatbari Area of Western Dhaka fall below the city average with respect to this physical parameter (Figure-12). This can be linked to lower level of accessibility of household to electricity and lower level of supply capacity in these zones compared to other zones. In case of water supply all the zones have moderate levels of resilience although significant differences exist in their CDRI values. Lower CDRI in some zones such as old Dhaka and DND area results mainly from lower level of accessibility to piped water supply and lack of alternative capacity. In some zones households address this problem by installing such alternative capacity as shallow/deep tube-wells.

Figure-12: Resilience Level (CDRI) of Physical Parameters in Different Zones



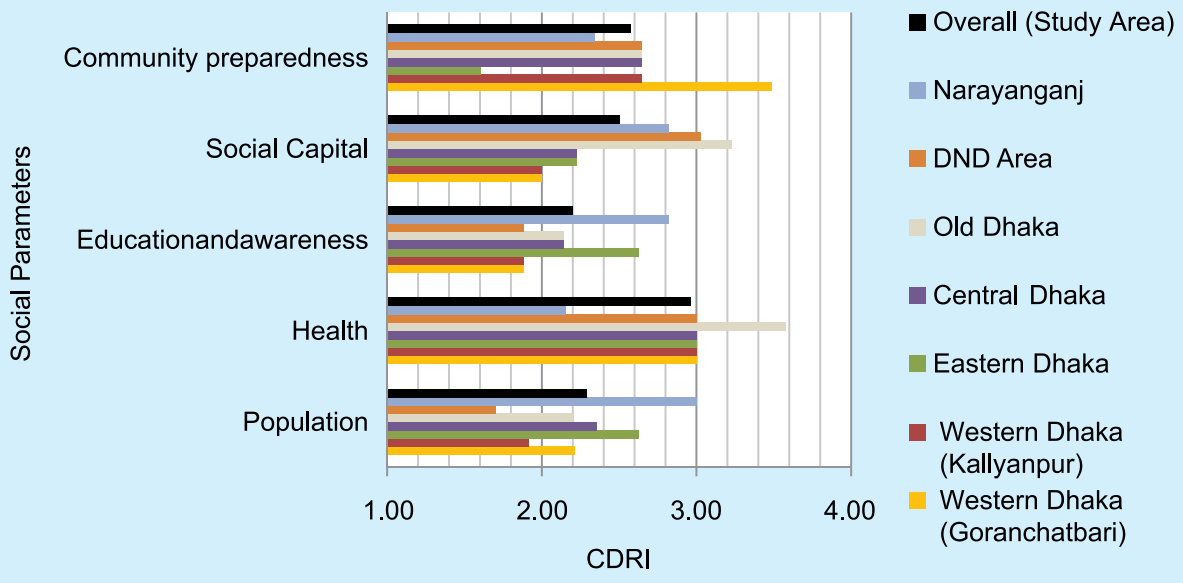
Sanitation and solid waste management have important implications for inter-zonal variations in physical resilience. Poor performance of Narayanganj, Central Dhaka, Goranchatbari and Kallyanpur of Western Dhaka in sanitation and solid waste management result mainly from poor collection of waste and lack of waste treatment and recycling facilities. Lack of access to sanitation is also a major problem and cause of lower physical resilience of Narayanganj.

Accessibility to roads does not vary significantly across zones while large interzonal variations could be observed in case of housing and land use. Poor status of this physical parameter in Narayanganj, DND Area, Old Dhaka and Goranchatbari Area of Western Dhaka compared to other zones may be linked to higher degree of non-compliance with building codes, higher percentage of population living in close proximity to polluted industries and higher percentage of buildings at risk due to water logging.

Social Resilience

In case of social parameters remarkable interzonal variations could be observed. The social parameter "Population" is influenced by such variables as growth, dependent population (population under 14 and above 64 years), population of informal settlements and population density (day and night). Figure-13 shows that four out of seven zones- Old Dhaka, DND Area, Goranchatbari and Kallyanpur Zones of Western Dhaka have CDRI values lower than the city average and this can be linked to higher density of population and larger percentage of population living in informal settlements compared to other three zones.

Figure-13: Resilience Level (CDRI) of Social Parameters in Different Zones



The city has has better resilience with respect to the social parameter "health" compared to other social parameters. The resilience levels in different zones with respect to this parameter are also more or less same except for Narayanganj which has a much lower CDRI in health. This situation in Narayanganj can be linked to lower capacity of health facilities during disaster and lower level of disaster preparedness compared to other zones.

Level of education and awareness which is very important for adaptation to climate change is quite low in five out of seven zones. These are Central Dhaka, Old Dhaka, DND Area, Goranchatbari and Kallyanpur Zones of Western Dhaka. Poor status of such variables as population's awareness about disasters, availability of public awareness programs/disaster drills and functionality of schools after disaster are mainly responsible for such a situation in these zones.

In case of social capital Old Dhaka, DND Area and Narayanganj performs better than Western Dhaka, Eastern Dhaka and Central Dhaka. Variables such as people's participation in community activities and city's decision making processes, acceptance level of community

leaders, and mixing and interlinking of social classes have important influence on social capital of various zones. Higher status of these variables in better performing zones leads to better social capital which in turn contributes to higher level of social resilience.

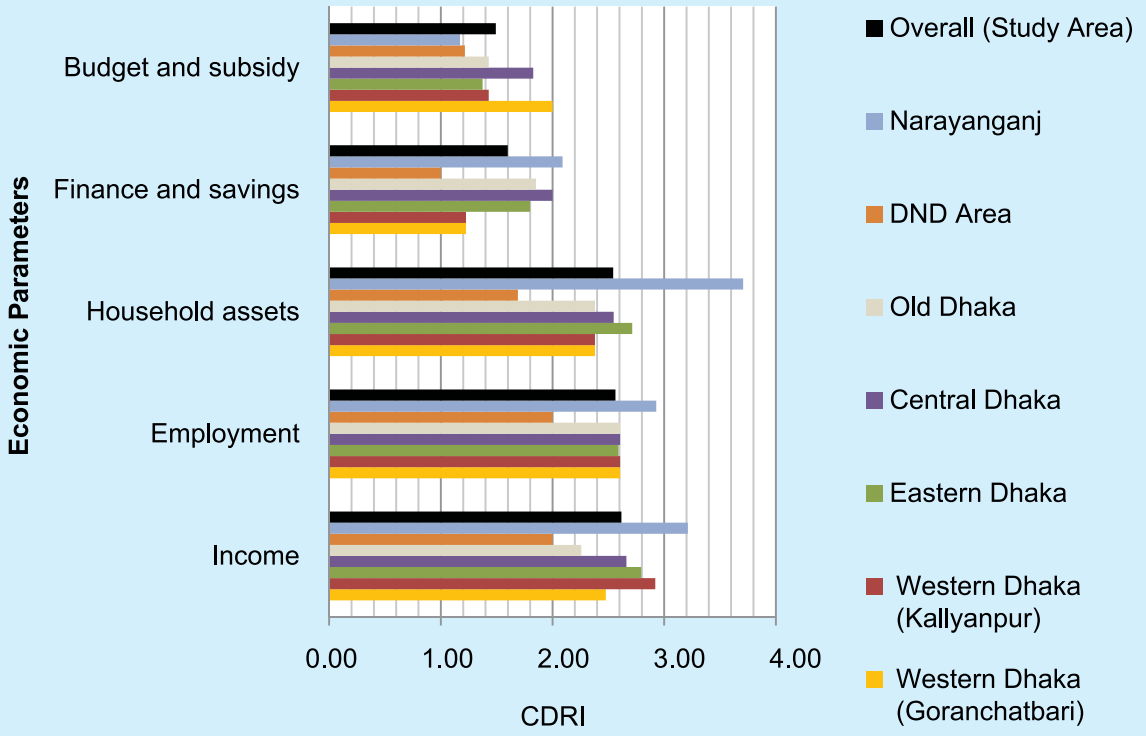
Community preparedness during disaster is an important social parameter influencing social resilience in different zones. Important variables affecting community preparedness include city authority's preparedness in terms of logistics, materials and management, provision of shelter for affected people, support from NGOs/CBOs and participation of people in relief works. Eastern Dhaka has the lowest level of community preparedness and Goranchatbari Area of Western Dhaka has the highest level of community preparedness while other zones perform at a moderate level with respect to this parameter. Differences in the status of above-mentioned variables are mainly responsible for the differences in resilience levels across various zones.

Economic Resilience

Among five economic parameters income, employment and household assets have almost same bearing on the economic resilience of the city although there are interzonal differences in terms of these parameters (figure-14). Such differences result from variables such as population below poverty line, income sources per household, income derived from informal sector, income disparity and reduction of income after a disaster. Poor status of these variables are mainly responsible for lower level of income resilience in Old Dhaka, DND Area and Goranchatbari Area of Western Dhaka compared to other zones.

Employment and household assets do not account for significant variations in economic resilience across various zones except for DND Area. Economic resilience of this area is much lower than other zones mainly because of higher unemployment among youth, higher labour unemployment, child labour and lower level of household assets such as television, mobile phone and basic furniture.

Figure-14: Resilience Level (CDRI) of Economic Parameters in Different Zones



Finance and savings, and budget and subsidy are other important economic parameters that significantly influence economic resilience of the city as well its various zones (Figure). Variables that are associated with finance and savings include credit facility to prevent disaster, accessibility of households to credit, accessibility to credit for urban poor, savings practice of households and insurance facilities for households' properties. Lower status of these variables is mainly responsible for lower resilience of the city and its various zones with respect to finance and savings.

The situation with respect to budget and subsidy is even worse. This parameter is the composite outcome of such variables as funding for city's disaster risk management, city's annual budget for DRR/CCA, availability of support/incentive to rebuild houses after disaster, alternative livelihood after disaster and healthcare facilities after disaster. All these variables have poor status in all the zones which produce lower CDRI of this parameter (budget and subsidy) and in turn lead to poor economic resilience of the city.

Institutional Resilience

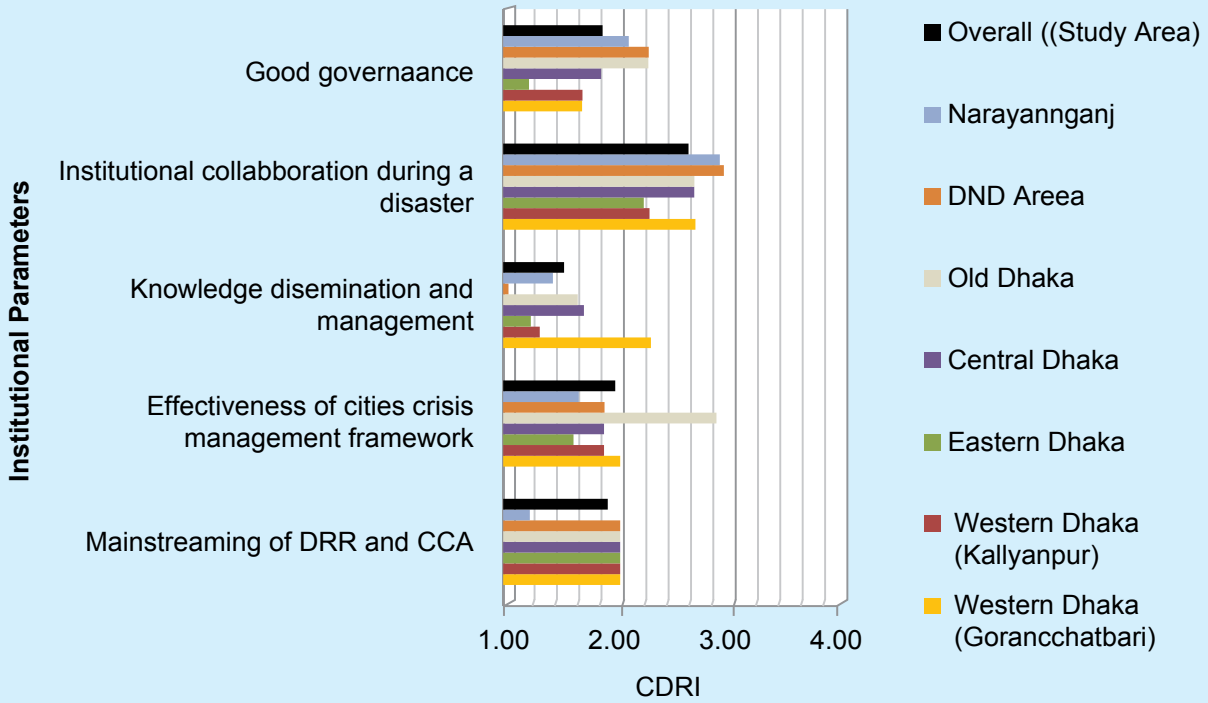
Institutional dimension exert significant influence on the adaptive capacity of a city to deal with climate change. Various parameters that impinge on institutional resilience have varying degrees of influence on institutional resilience of various zones. Mainstreaming DRR and CCA in planning and development of a city can go a long in enhancing adaptive capacity of the city. This aspect has not been given due attention in Dhaka with the result that the city's institutional capacity remains extremely weak and contributes to lower levels of institutional resilience in the city and its various

zones. Variables that are implicated for this situation include lack of ability and capacity to produce development plans, lack of people's participation in planning and development process, and poor implementation of disaster management plans by the city authority.

Crisis management framework of the city and its knowledge dissemination and management processes are also responsible for lower levels of institutional resilience of various zones of the city. Figure-15 presents the status of the city and its seven zones in terms of CDRI scores of crisis management framework of the city. It indicates that the crisis management framework of the city is not effective. The factors that are responsible for such a situation are poor status of existing disaster management plan, lack of effectiveness of emergency team, and very limited availability of evacuation centres during a disaster. As regards knowledge dissemination and management processes the influencing variables are availability of disaster training programs for emergency workers, existence of disaster awareness programs for communities, and capacity to disseminate disaster awareness programs. Poor status of these variables has a depressing.

The resilience level of the city with respect to institutional collaboration among various organizations and stakeholders is somewhat better than other parameters although there are variations across different zones (Figure). Important factors (variables) shaping city's capacity for institutional collaboration include cooperation between the city and the central government, cooperation of city's ward officials for emergency management and city's institutional collaboration with NGOs and private organizations. Interzonal differences in institutional collaboration result mainly from the performance of the ward/zone level officials/councilors in connection with these variables.

Figure-15: Resilience Level (CDRI) of Institutional Parameters in Different Zones



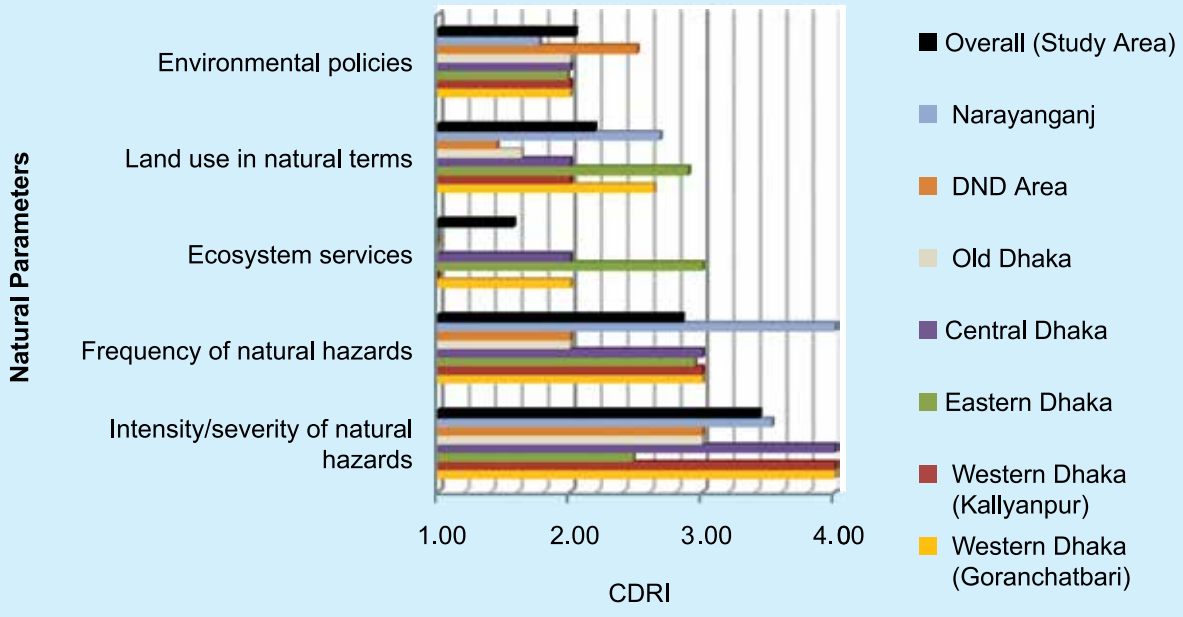
Good governance is an important institutional parameter which affects climate disaster resilience of a city to a large extent. Lack of good governance is a serious problem for Dhaka and is largely responsible for poor institutional capacity of the city to address climate change. Important variables that impinge on good governance include accountability and transparency of city government, promptness of city government to disseminate emergency information during a disaster and capability of city body to lead recovery process. Poor status of these variables are mainly responsible for lower levels of resilience of Eastern Dhaka, Central Dhaka and Western Dhaka (both Goranchatbari and Kallyanpur) compared to the city as a whole.

Natural Resilience

Present state of various parameters that define natural dimension has important implications for adaptive capacity of a city. Natural hazards, land use, ecosystem services and environmental policies play important role in shaping natural resilience of the city and its various zones. Figure-16 shows the resilience levels of these natural parameters on different zones. As a natural hazard flood affects different zones of the city differently. The effects of flood in terms of intensity and frequency are mostly felt in three zones-Eastern Dhaka, Old Dhaka and DND Area. Western Dhaka is protected from flood by the western embankment but is affected by water-logging due to rain. Central Dhaka and Narayanganj are affected when extreme flood occurs.

Ecosystem services such as water bodies and land use aspects such as settlements on hazardous grounds, area vulnerable to flood, amount of urban green space, loss of urban green space etc. are important variables that influence adaptive capacity of a city significantly. Poor status of these variables makes the city less resilient in terms of natural dimension. DND Area, Old Dhaka, Central Dhaka and Kallyanpur Area of Western Dhaka are adversely affected by one or more of such variables. In Central Dhaka and Old Dhaka

Figure-16: Resilience Level (CDRI) of Natural Parameters in Different Zones



Existence of environmental policies and their implementation have important implications for adaptive capacity of the city. The country has environment policy, environment conservation act (2010), rules and regulations but their enforcement is very weak. These are not often reflected in development plans or activities. Poor enforcement of environment policy and efficient waste management rules affect all parts of the city in terms of environmental deterioration and thus adversely affect the natural resilience of the city.

POLICY OPTIONS

In this study CDRI has been used to evaluate climate disaster resilience of Dhaka city. CDRI has been computed for 25 parameters in five major zones. Some important challenges for the city that emerge from this analysis relate to all the five dimensions of this analysis-physical, social, economic, institutional and natural. Recurrent floods and water logging are the major natural events that create havoc and disrupt socio-economic life of the city. With the changing climate the intensity of rainfall has also increased in recent years and extreme events such as floods, drainage congestions, and water logging have become a regular occurrence in the rainy season. The situation is likely to deteriorate further with increased urbanization accompanied by intense industrial and commercial activities, increases in built-up zones and consequent loss of green zones and wetlands.

The ability of a city to adapt to such extreme events depends largely on the level of its disaster resilience. The CDRI analysis has identified certain aspects of physical, social, economic, institutional and natural components of Dhaka city and its various parts that are least resilient or not capable of responding adequately in the event of a climate-related disaster.

Physical Aspects

Although most of the zones have moderate capacity in these aspects, considerable improvements would be required in various parameters. The city would remain vulnerable unless higher level of physical resilience is achieved. In case of electricity and water supply, steps are needed for improving supply capacity in different zones and making such services accessible to those households who are now outside the purview of such services. Significant improvements are also needed for facilitating access to sanitation and management of solid waste. Vigorous attempts should be made for proper enforcement of 3R (reduce, reuse and recycle) policy.

Housing and land use policies also need to be reviewed in order to address problems such as housing in flood prone zones/flood flow zones, enforcement of building codes in construction of houses, polluted industries in residential zones etc. The urban poor, and particularly those in informal settlements, are uniquely vulnerable. Informal settlements are far deficient in infrastructure, including roads, drainage, water, and sewerage. In the event of flooding, mobility is reduced, shelter is put at greater risk, and public health impacts are amplified, resulting in higher morbidity and mortality rates. Policies and action programmes should be taken up to facilitate voluntary relocation and access by all people to zones that are less disaster-prone. The local authority should draw up elaborate resettlement guidelines so as to reduce the impacts on and sufficiently compensate the livelihoods of the affected people. The guidelines should also address issues of alternative resettlement sites, service provisions, transportation facilities to workplaces, gender concerns etc. All relocation/resettlement of dwellers of slums/informal settlements should be

implemented in accordance with the guidelines as prepared. Narayanganj, Old Dhaka, Eastern Dhaka and Goranchatbari Area of Western Dhaka need special attention because of their low level of resilience with respect to physical dimension.

Social Aspects

The problem zones in social dimension are population, health, education and awareness, and community preparedness during a disaster. In case of population, growth and density of population pose some problems in some zones, especially unplanned zones. Growth and density of population, therefore, should be restricted within certain limits through planning regulations. In some zones people living in informal settlements pose serious problems as these are mostly hazard prone zones. Housing for low-income people, therefore, should be given special attention.

Health hazards such as spread of communicable diseases pose problems after a disaster and need to be tackled properly. During floods and water-logging water-borne diseases like diarrhea, dysentery, typhoid, jaundice etc. become endemic. The reduction of urban human health vulnerability can be achieved by the implementation of measures indirectly and directly related to the health sector and service. Important measures may include Intensification of IEC (Information Education Campaigns) activities to the general public regarding what they can do to protect their health from flood-related illnesses and injuries, Institutionalize linkages and partnerships among health systems and facilities for integration of CC-DRRM in their operations, policies, and plans, Improving disease surveillance and protection, Strengthen the emergency medical systems (EMS) to mainstream climate change and disaster risk reduction management (CC-DRRM) into its functions etc.

In case of education and awareness, population's awareness about disasters is important and this underlines the need for undertaking public awareness programs with particular emphasis on disadvantaged groups and people living in hazard-prone zones. Community preparedness during disaster, especially, provision of shelter for affected people, and participation of the community in city's decision making process are important social aspects that need special attention for enhancing social resilience of the city.

Economic Aspects

Economic status of the city and its various parts is extremely important from the perspective of disaster management. A city with poor economic performance is usually characterized by lower level of resilience compared to a city having a well-performing and vibrant economy. Performance or status of various economic components such as, income, employment, household assets, finance and savings, and budget and subsidy have important implications for disaster resilience of a city. Income and employment issues that are of critical importance for Dhaka and its various zones are population below poverty line, income disparity, youth unemployment, reduction of household income due to disaster, child labour etc. These are a clear manifestation of urban poverty and therefore need to be addressed through social protection policies. In order to prevent, mitigate and enhance the ability of the poor to cope with and recover from the major hazards Social Safety Net programmes should be arranged for the poor through works and income transfer programs which may include various food assisted and cash assisted programs such as VGD, FFW, old-age pension schemes, support for the female destitute etc.

Economic resilience of the city also suffers from poor accessibility to credits for the urban poor, poor saving practice of households, insufficient budget for disaster risk reduction, unavailability of subsidy/incentive for residents to rebuild houses and lack of alternative livelihood. Disaster management programs, therefore, should be integrated with the economic development programs with particular emphasis on employment generation and poverty reduction. The government should make provision of calamity fund as bridging finance to stimulate disaster management activities with emphasis on CC-DRRM both at city and community levels. Steps should also be taken for institutionalizing partnerships between city and external agencies to ensure investment of resources for social protection/DRR.

Institutional Aspects

The city faces a number institutional and governance challenges to address the climate change. In Dhaka city, institutional resilience is poor in almost all the zones. Institutional components that need special attention are mainstreaming of DRR and CCA, crisis management framework of the city, knowledge dissemination and management, and good governance. For mainstreaming DRR and CCA it is essential to enhance the capacity of the disaster management institutions to produce and implement disaster management plans with people's participation. This would require strengthening and expanding membership of City Disaster Management Committee (CDMC) involving other stakeholders such as the private sector, research institutes, national agencies and utility companies. Policies and programmes should be formulated for promoting close coordination and cooperation among national disaster management and environmental management agencies (i.e. Department of Environment (DoE), Department of Disaster Management (DoDM)), urban local bodies (City Corporations and Paurashavas), non-governmental and private sector organizations.

The city development authority should focus on preparation and implementation of integrated, environmentally-sound urban planning and management incorporating environmental and disaster related information and reflecting environmental and disaster management policies and standards. Considerations should also be given to spatial, intersectoral, inter-temporal and environmental media related factors with special attention to key aspects of land and water-use planning. This is particularly important for Eastern Dhaka and DND area.

Effectiveness of the city's crisis management framework is largely dependent on the existence of an efficient emergency team with trained workers and efficient leadership. In the area of knowledge dissemination and management, the main focus should be on preparing and implementing disaster training programs for emergency workers and disaster awareness programs for communities. Particular emphasis should be given on improving the knowledge of the community regarding threats and impacts of disasters. This can be done through regular and continuous disaster awareness programs, including emergency drills, seminars, workshops, lectures, radio and TV programs, newspaper articles etc.

Although good governance is important for strengthening disaster resilience of the city in almost all the aspects, it is of critical importance for ensuring effectiveness of early warning system, quick dissemination of emergency information and providing emergency services during disaster, and enhancing the ability of city authority to lead recovery process. More resources should be allocated

for capacity building of local government institutions. Effective disaster response requires skilled human resources and well coordinated efforts from all concerned stakeholders. Good governance in this respect can go a long way by ensuring participation of all the stakeholders, including the community at all stages of disaster preparedness and response.

Natural Aspects

Poor natural resilience poses a problem for the city in terms of disaster management planning. Weakening of city's natural resilience during the last few decades can be linked to the continuous deterioration of the city's Environment. Water and air pollution is now at an extremely high level, quality of city's biodiversity has also fallen significantly, and human settlements on hazardous grounds have become pervasive. Loss of urban green space, wetlands and natural canals have made the city more vulnerable to natural hazards. Immediate steps, therefore, should be taken to formulate policies and action plans that would:

- Create public awareness about the importance of wetlands and ponds and their role in culture fisheries, bathing and water reservoir for surface run-off during monsoon.
- Designate all ponds/water bodies in Detailed Area Plan Map and protect them according to the ecological importance and public interest.
- Avoid water bodies during planning of roads, housing and industrial estates.
- Promote plantation and gardening to increase the natural beauty of the city.
- Aware people for keeping some trees and bushes around the homesteads.
- Increase tree plantation on roadsides and homesteads.
- Restrict private land development activities in and around low-lying zones.
- Practice green architectural/engineering design during planning of housing estates, buildings and the intersections of main roads.
- Facilitate preparation of environmental bylaws that provide for green infrastructure requirements in zoning, landscaping, runoff and sediment control, parking and comprehensive rain water management.

Improvement of natural resilience of the city would require formulation and implementation of appropriate environmental policies and regulations. Use of city-level hazard maps in development activities, incorporation of environmental conservation regulations in development plans, implementation of efficient waste management system (RRR), implementation of mitigation policies to reduce air pollution and proper implementation of the Detailed Area Plan of the city are important steps that need special attention.

CONCLUDING REMARKS

Climate change is likely to have enormous impacts on Dhaka in terms of flooding and water-logging. As the population of the city grows and density of population increases, impervious areas also increase significantly (Annex-III) leading to water-logging on a large scale even during normal rainfall. The situation is likely to deteriorate with the changing climate. As the Annex-III shows, the percentage of impervious area in low-density residential areas of Dhaka varies from 18 percent to 34 percent as the population density increases from 10,000 people per km^2 to 20,000 per km^2. In high-density areas, the percentage of impervious area varies from 60 percent to 70 percent as the population density increases from 40,000 people per km^2 to 50,000 per km^2. The flow velocity of storm-water runoff is likely to be very high if the impervious area is quite big. Continuous increase in density of population is, therefore, a major challenge for Dhaka City.

Adapting to climate change will require the city to improve its capacity to address the deficiencies in the social, economic, environmental and infrastructural aspects. This would include institutional strengthening and governance improvement to address climate change. City Corporations and urban local bodies (ULBs) need to actively coordinate and mainstream adaptation and resilience into urban planning processes to prepare their cities to deal with climate risks and impacts. The reduction of vulnerability, as well as the capacity to respond to disasters is directly related to decentralized access to information, communication and decision-making, and control of resources. Thus, disaster management capabilities at the local level can be greatly improved by strengthening urban local bodies through decentralization of power and authority, and involving all the stakeholders at all stages of planning and implementation of disaster management programmes.

Thus CDRI analysis has afforded valuable information which can be fruitfully used in strategic planning or policy formulation. Analysis of seven zones by five dimensions and 25 components provides a wealth of information that can be used to identify priority zones as well as priority sectors. Moreover, the analysis provides information on such variables as can facilitate preparation of hazard and vulnerability maps in different zones. The study also identified weaknesses and potentials of different zones in various aspects. This would facilitate area-specific action planning for addressing the weaknesses and utilizing the potentials to strengthen the climate disaster resilience of the area. Since the analysis covers most of the important physical, social, economic, institutional and environmental aspects relevant for Disaster Risk Reduction (DRR) and Climate change Adaptation (CCA), it would be easier to integrate the Disaster Management Plan of the city with its Urban Development Plan.

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ANNEX-I

Tables on Importance and Status of Variables Under Major Dimensions

Table-1: Status and Importance of Variables under Physical Dimension

Parameter	Variable	Rating	Status (current condition)	Weight	Level of Importance
Electricity	Access	3.68	Good	4.50	High
	Availability	2.91	Moderate	4.25	High
	Supply capacity	2.17	Poor	3.50	Moderate
	Dependence on external supply	2.86	Moderate	2.62	Moderate
	Alternative capacity	2.85	Moderate	3.62	High
Water	Access	2.97	Moderate	4.62	Highest
	Availability	2.64	Moderate	4.62	Highest
	Supply capacity	2.15	Poor	3.62	High
	Dependence on external supply	2.05	Poor	3.12	Moderate
	Alternative capacity	2.57	Moderate	3.50	Moderate
Sanitation and solid waste disposal	Access to sanitation	2.64	Moderate	4.62	Highest
	Toilets	4.22	Good	4.00	High
	Collection of wastes	2.58	Moderate	3.75	High
	Waste treatment	2.35	Poor	3.62	High
	Recycling	1.90	Poor	3.00	Moderate
Accessibility of roads	Percentage of land transportation network	3.35	Moderate	3.75	High
	Paved roads	3.33	Moderate	3.62	High
	Accessibility during flooding	3.33	Moderate	4.25	High
	Status of interruption after intense rainfall	3.33	Moderate	3.87	High
	Roadside covered drain	2.61	Moderate	3.00	Moderate
Housing and land use	Building code	3.03	Moderate	4.37	High
	Buildings with nonpermanent structure,	3.78	Good	3.12	Moderate
	Buildings above water logging	2.79	Moderate	4.50	High
	Ownership	1.71	Poor	2.50	Low
	Population living in proximity to polluting industries	2.42	Poor	3.75	High

*Status according to Rating are: 1 - 1.5 = Worst, 1.51 – 2.5 = Poor, 2.51 – 3.5 = Moderate, 3.51 – 4.5 = Good, More than 4.5 = Best
*Importance according to Weight: 1 - 1.5 = Least, 1.51 – 2.5 = Low, 2.51 – 3.5 = Moderate, 3.51 – 4.5 = High, More than 4.5 = Highest

Table-2: Status and Importance of Variables under Social Dimension

Parameter	Variable	Rating	Status	Weight	Level of Importance
Population	Population growth	3.32	Moderate	2.75	Moderate
	Population under 14 and above 64	3.00	Moderate	4.12	High
	Population of informal settlers	2.32	Poor	4.00	High
	Population density – day	1.53	Poor	4.25	High
	Population density – night	1.53	Poor	4.25	High
Health	Population suffering from waterborne/ vector-borne diseases	3.74	Good	3.87	High
	Population suffering from waterborne diseases after a disaster	3.74	Good	4.00	High
	Access to primary health facilities	3.26	Moderate	4.37	High
	Capacity of health facilities during a disaster	3.49	Moderate	4.75	Highest
	Preparedness for disaster	3.17	Moderate	4.25	High
Education and awareness	Literacy rate	2.16	Poor	3.12	Moderate
	Population's awareness about disasters	2.71	Poor	4.37	High
	Availability of public awareness programs/ disaster drills	2.02	Poor	3.75	High
	Access to Internet	1.42	Worst	2.00	Low
	Functionality of schools after disaster	2.14	Poor	3.75	High
Social capital	Population participating in community activities/clubs,	2.41	Poor	3.62	High
	Acceptance level of community leader [in ward]	3.08	Moderate	4.37	High
	Ability of communities to build consensus	2.49	Poor	3.87	High
	Ability of communities to participate in city's decision-making process	2.74	Moderate	3.87	High
	Mixing and interlinking of social class	2.40	Poor	3.50	Moderate
Community preparedness	Preparedness [logistics, materials, and management]	3.22	Moderate	4.50	High
	Provision of shelter for affected people	3.15	Moderate	4.37	High
	Support from NGOs/CBOs	2.25	Poor	3.62	High
	Population evacuating voluntarily	2.01	Poor	3.00	Moderate
	Population participating in relief works)	3.23	Moderate	3.25	Moderate

Table-3: Status and Importance of Variables under Economic Dimension

Parameter	Variable	Rating	Status	Weight	Level of Importance
Income	Population below poverty line	3.05	Moderate	4.87	Highest
	Number of income sources per household	2.09	Poor	3.12	Moderate
	Income derived in informal sector	2.53	Moderate	3.50	Moderate
	Income disparity	2.28	Poor	3.25	Moderate
	Percentage of households have reduced income due to a disaster	2.70	Moderate	4.12	High
Employment	Formal sector: percentage of labor unemployed	2.83	Moderate	4.25	High
	Percentage of youth unemployed	2.32	Poor	3.62	High
	Percentage of women employed	1.97	Poor	3.37	Moderate
	Percentage of employees who come from outside the city	2.90	Moderate	3.50	Moderate
	Percentage of child labor in city	2.89	Moderate	3.00	Moderate
Household asset	Households have television	3.22	Moderate	3.12	Moderate
	Mobile phone	3.21	Moderate	4.25	High
	Motorized vehicle	1.56	Poor	2.25	Low
	Nonmotorized vehicle	1.57	Poor	2.62	Moderate
	Basic furniture	3.18	Moderate	3.50	Moderate
Finance and savings	Availability of credit facility to prevent disaster	1.77	Poor	3.87	High
	Accessibility to credits	1.96	Poor	4.12	High
	Accessibility to credits for urban poor	1.94	Poor	4.12	High
	Saving practice of households	2.08	Poor	4.37	High
	Household's properties insured	1.38	Poor	2.87	Moderate
Budget and subsidy	Funding for city's disaster risk management	1.90	Poor	4.37	High
	City's annual budget for DRR and CCA	1.86	Poor	4.37	High
	Availability of subsidy/incentive to rebuild houses	1.46	Poor	4.00	High
	Alternative livelihood	1.14	Worst	3.50	Moderate
	Health care after a disaster	1.49	Worst	4.12	High

Table-4: Status and Importance of Variables under Institutional Dimension

Parameter	Variable	Rating	Status	Weight	Level of Importance
Mainstreaming of DRR and CCA	Mainstreaming of CCA and DRR in cities development plans,	2.21	Poor	4.87	Highest
	Mainstreaming of CCA and DRR in housing and transport policies,	2.04	Poor	4.50	High
	Ability [manpower] and capacity [technical] to produce development plans,	1.82	Poor	4.00	High
	Extent of community participation in plan preparation process,	2.02	Poor	4.37	High
	Implementation of disaster management plan	2.20	Poor	4.87	Highest
Effectiveness of cities crisis management framework	Existence of disaster management plan,	2.57	Moderate	4.50	High
	Existence and effectiveness of an emergency team during a disaster	2.25	Poor	3.87	High
	Availability of evacuation centers,	2.16	Poor	3.75	High
	Efficiency of trained emergency workers during a disaster,	2.29	Poor	3.87	High
	Existence of alternative decision-making personnel	1.55	Poor	2.62	Moderate
Knowledge dissemination and management	Effectiveness to learn from previous disasters,	1.61	Poor	4.00	High
	Availability of disaster training programs for emergency workers	2.01	Poor	4.25	High
	Existence of disaster awareness programs for communities	1.50	Worst	3.87	High
	Capacity to disseminate disaster awareness programs	1.32	Worst	3.37	Moderate
	Extent of community satisfaction from disaster awareness programs	1.13	Worst	2.87	Moderate
Institutional collaboration with other organizations and stakeholders, during a disaster	Cities dependency on external institutions/support	1.95	Poor	3.12	Moderate
	Collaboration and interconnectedness with neighboring cities	2.19	Poor	3.50	High
	City's cooperation with central department for emergency management	2.50	Poor	4.00	High
	Cooperation of city's ward officials for emergency management	3.15	Moderate	5.00	Highest
	City's institutional collaboration with NGOs and private organizations	2.58	Moderate	4.12	High
Good governance	Effectiveness of early warning systems	2.27	Poor	4.62	Highest
	Accountability and transparency of city government	1.66	Poor	3.37	High
	Existence of disaster drills	1.52	Poor	3.12	High
	Promptness of city body to disseminate emergency information	1.85	Poor	3.75	High
	Capability of city body to lead recovery process	1.83	Poor	3.75	High

Table-5: Status and Importance of Variables under Natural Dimension

Parameter	Variable	Rating	Status	Weight	Level of Importance
Intensity/severity of natural hazards	Intensity/severity of natural hazards	3.59	Good	5.00	Highest
	Cyclones,	3.59	Good	4.50	High
	Heat waves,	3.60	Good	2.75	Moderate
	Droughts [water scarcity],	3.61	Good	3.25	Moderate
	Tornados	3.58	Good	3.87	High
Frequency of natural hazards	Floods,	2.73	Moderate	4.50	High
	Cyclones,	2.79	Moderate	4.00	High
	Heat waves,	2.80	Moderate	2.62	Moderate
	Droughts [water scarcity],	2.79	Moderate	3.12	Moderate
	Tornados)	2.79	Moderate	2.87	Moderate
Ecosystem services	Quality of city's biodiversity	2.18	Poor	3.50	Moderate
	Soils,	2.21	Poor	3.87	High
	Air,	1.61	Poor	3.37	Moderate
	Water bodies,	1.66	Poor	4.00	High
	Urban salinity	2.35	Poor	2.87	Moderate
Land use in natural terms	Area vulnerable to climate-related hazards,	2.31	Poor	4.50	High
	Urban morphology,	2.02	Poor	3.75	High
	Settlements on hazardous ground,	2.09	Poor	4.25	High
	Amount of Urban Green Space [UGS],	1.60	Poor	3.62	High
	Loss of UGS)	1.56	Poor	3.62	High
Environmental policies	Use of city-level hazard maps in development activities,	2.01	Poor	4.62	Highest
	Extent of environmental regulations reflected in urban plans,	1.97	Poor	4.50	High
	Extent of implementation of environmental conservation policies,	1.88	Poor	4.25	High
	Implementation of efficient waste management system [RRR],	2.05	Poor	4.25	High
	Implementation of mitigation policies to reduce air pollution)	2.03	Poor	3.50	Moderate

ANNEX-II

Tables on CDRI values and Resilience Levels of Wards for parameters under Major Dimensions

Table 1: CDRI values and Resilience Levels for components of physical dimension of central Dhaka area

Ward No.	PHYSICAL DIMENSION									
	Electricity		Water		Sanitation and solid waste disposal		Accessibility of roads		Housing and land use	
	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience
W-16	3.0	Moderate	2.6	Moderate	2.4	Moderate	2.6	Moderate	3.2	Good
W-17	3.8	Good	3.4	Good	2.8	Moderate	4.0	Good	3.2	Good
W-18	3.8	Good	3.4	Good	3.4	Good	4.0	Good	3.2	Good
W-19	3.2	Good	2.8	Moderate	2.8	Moderate	3.8	Good	3.2	Good
W-20	3.8	Good	3.2	Good	2.8	Moderate	3.8	Good	3.2	Good
W-21	3.8	Good	3.4	Good	3.0	Moderate	4.0	Good	3.2	Good
W-22	3.0	Moderate	2.6	Moderate	2.2	Moderate	2.0	Poor	2.8	Moderate
W-23	3.0	Moderate	2.6	Moderate	1.8	Poor	2.2	Moderate	2.6	Moderate
W-24	3.0	Moderate	2.6	Moderate	2.0	Poor	2.2	Moderate	2.8	Moderate
W-25	3.0	Moderate	2.8	Moderate	2.2	Moderate	1.8	Poor	2.8	Moderate
W-26	2.8	Moderate	2.6	Moderate	1.8	Poor	2.0	Poor	2.4	Moderate
W-27	3.0	Moderate	2.8	Moderate	2.0	Poor	1.8	Poor	2.8	Moderate
W-28	3.0	Moderate	2.8	Moderate	2.2	Moderate	1.8	Poor	2.8	Moderate
W-29	3.0	Moderate	2.6	Moderate	2.4	Moderate	2.4	Moderate	2.8	Moderate
W-30	3.0	Moderate	1.8	Poor	2.8	Moderate	2.8	Moderate	2.0	Poor
W-31	3.0	Moderate	2.6	Moderate	1.8	Poor	1.8	Poor	2.8	Moderate
W-32	3.0	Moderate	2.8	Moderate	2.4	Moderate	2.4	Moderate	3.0	Moderate
W-33	3.0	Moderate	2.8	Moderate	1.8	Poor	2.4	Moderate	3.0	Moderate
W-34	3.0	Moderate	2.8	Moderate	2.2	Moderate	2.4	Moderate	2.8	Moderate
W-35	3.0	Moderate	2.8	Moderate	2.2	Moderate	2.0	Poor	2.8	Moderate
W-36	3.0	Moderate	2.8	Moderate	2.6	Moderate	2.6	Moderate	3.0	Moderate
W-37	3.8	Good	3.0	Moderate	2.6	Moderate	3.4	Good	3.0	Moderate
W-38	3.8	Good	3.2	Good	3.0	Moderate	3.4	Good	3.4	Good
W-39	3.0	Moderate	2.8	Moderate	2.6	Moderate	3.6	Good	3.4	Good

Ward No.	PHYSICAL DIMENSION									
	Electricity		Water		Sanitation and solid waste disposal		Accessibility of roads		Housing and land use	
	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience
W-40	3.0	Moderate	2.8	Moderate	3.0	Moderate	3.4	Good	3.4	Good
W-44	3.0	Moderate	2.8	Moderate	3.4	Good	3.8	Good	3.6	Good
W-45	3.0	Moderate	2.8	Moderate	3.0	Moderate	3.6	Good	3.4	Good
W-49	2.4	Moderate	2.4	Moderate	3.0	Moderate	4.1	Best	3.4	Good
W-50	2.4	Moderate	2.4	Moderate	2.8	Moderate	4.2	Best	3.4	Good
W-51	2.4	Moderate	2.4	Moderate	3.0	Moderate	4.2	Best	3.4	Good
W-52	2.2	Moderate	2.4	Moderate	3.0	Moderate	4.4	Best	3.4	Good
W-53	2.4	Moderate	2.4	Moderate	2.8	Moderate	5.0	Best	3.4	Good
W-54	2.4	Moderate	2.2	Moderate	2.4	Moderate	4.6	Best	3.2	Good
W-55	2.4	Moderate	2.4	Moderate	2.6	Moderate	5.0	Best	3.0	Moderate
W-56	2.4	Moderate	2.2	Moderate	2.6	Moderate	5.0	Best	3.2	Good
W-57	2.2	Moderate	2.2	Moderate	2.8	Moderate	5.0	Best	3.4	Good
W-62	2.8	Moderate	2.0	Poor	3.3	Moderate	3.0	Moderate	2.4	Moderate
W-70	2.8	Moderate	2.6	Moderate	2.8	Moderate	4.0	Good	3.0	Moderate
W-74	2.8	Moderate	2.6	Moderate	3.0	Moderate	4.0	Good	3.0	Moderate
W-75	2.8	Moderate	2.0	Poor	3.0	Moderate	3.0	Moderate	2.4	Moderate
W-76	2.8	Moderate	2.0	Poor	2.8	Moderate	3.0	Moderate	2.2	Moderate
W-77	2.8	Moderate	2.0	Poor	3.4	Moderate	3.0	Moderate	2.4	Moderate
W-84	3.0	Moderate	2.0	Poor	2.8	Moderate	3.0	Moderate	2.2	Moderate
W-85	3.0	Moderate	2.0	Poor	2.8	Moderate	2.6	Moderate	2.0	Poor

*Resilience levels according to CDRI Scores are: 1 – 2 = Poor, 2.1 – 3.0 = Moderate, 3.1 – 4.0 = Good, 4.1 – 5.0 = Best

Table 2: CDRI values and Resilience Levels for components of social dimension of central Dhaka area

Ward No.	SOCIAL DIMENSION									
	Population		Health		Education and awareness		Social Capital		Community preparedness	
	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience
W-16	2.6	Moderate	2.0	Poor	1.4	Poor	2.2	Moderate	2.6	Moderate
W-17	2.2	Moderate	3.4	Good	2.6	Moderate	2.6	Moderate	2.6	Moderate
W-18	2.2	Moderate	3.4	Good	2.8	Moderate	2.6	Moderate	2.6	Moderate
W-19	3.2	Moderate	3.4	Good	2.4	Moderate	2.6	Moderate	2.6	Moderate
W-20	3.4	Good	3.4	Good	2.6	Moderate	2.6	Moderate	2.6	Moderate
W-21	2.2	Moderate	3.4	Good	2.8	Moderate	2.6	Moderate	2.6	Moderate
W-22	1.6	Poor	2.6	Moderate	1.6	Poor	1.6	Poor	2.6	Moderate
W-23	2.0	Poor	2.6	Moderate	1.4	Poor	1.6	Poor	2.6	Moderate
W-24	2.2	Moderate	2.6	Moderate	1.4	Poor	1.6	Poor	2.6	Moderate
W-25	1.8	Poor	2.6	Moderate	1.4	Poor	1.6	Poor	2.6	Moderate
W-26	2.0	Poor	2.6	Moderate	1.2	Poor	1.6	Poor	2.6	Moderate
W-27	2.0	Poor	2.6	Moderate	1.4	Poor	1.6	Poor	2.6	Moderate
W-28	1.8	Poor	2.6	Moderate	1.4	Poor	1.6	Poor	2.6	Moderate
W-29	1.8	Poor	2.6	Moderate	1.4	Poor	1.6	Poor	2.6	Moderate
W-30	1.4	Poor	4.0	Good	1.6	Poor	3.2	Good	2.6	Moderate
W-31	3.2	Good	2.6	Moderate	1.4	Poor	1.6	Poor	2.6	Moderate
W-32	2.6	Moderate	2.6	Moderate	1.4	Poor	1.6	Poor	2.6	Moderate
W-33	2.8	Moderate	2.6	Moderate	1.6	Poor	1.6	Poor	2.6	Moderate
W-34	2.4	Moderate	2.6	Moderate	1.4	Poor	1.6	Poor	2.6	Moderate
W-35	2.4	Moderate	2.6	Moderate	1.4	Poor	1.6	Poor	2.6	Moderate
W-36	2.6	Moderate	2.6	Moderate	1.6	Poor	1.6	Poor	2.6	Moderate
W-37	3.4	Good	3.4	Good	2.4	Moderate	2.6	Moderate	2.6	Moderate
W-38	2.0	Poor	3.4	Good	2.8	Moderate	2.6	Moderate	2.6	Moderate
W-39	1.6	Poor	3.6	Good	2.0	Poor	3.0	Moderate	3.4	Good
W-40	3.0	Moderate	3.6	Good	2.2	Moderate	3.0	Moderate	3.4	Good
W-44	2.0	Poor	3.6	Good	2.2	Moderate	3.0	Moderate	3.4	Good
W-45	1.8	Poor	3.6	Good	2.0	Poor	3.0	Moderate	3.4	Good

Ward No.	SOCIAL DIMENSION									
	Population		Health		Education and awareness		Social Capital		Community preparedness	
	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience
W-49	3.0	Moderate	4.0	Good	3.0	Moderate	3.2	Good	2.6	Moderate
W-50	2.6	Moderate	4.0	Good	3.0	Moderate	3.2	Good	2.6	Moderate
W-51	2.6	Moderate	4.0	Good	3.0	Moderate	3.2	Good	2.6	Moderate
W-52	3.8	Good	4.0	Good	3.0	Moderate	3.2	Good	2.6	Moderate
W-53	3.0	Moderate	4.0	Good	3.0	Moderate	3.2	Good	2.6	Moderate
W-54	2.4	Moderate	4.0	Good	2.8	Moderate	3.2	Good	2.6	Moderate
W-55	2.4	Moderate	4.0	Good	2.8	Moderate	3.2	Good	2.6	Moderate
W-56	4.2	Best	4.0	Good	3.0	Moderate	3.2	Good	2.6	Moderate
W-57	3.8	Good	4.0	Good	3.2	Good	3.2	Good	2.6	Moderate
W-62	3.0	Moderate	4.6	Best	2.2	Moderate	3.0	Moderate	3.4	Good
W-70	2.6	Moderate	4.4	Best	2.6	Moderate	3.2	Good	2.6	Moderate
W-74	2.6	Moderate	4.4	Best	2.8	Moderate	3.2	Good	2.6	Moderate
W-75	2.2	Moderate	4.0	Good	2.0	Poor	3.2	Good	2.6	Moderate
W-76	2.2	Moderate	4.0	Good	1.8	Poor	3.2	Good	2.6	Moderate
W-77	2.2	Moderate	4.0	Good	1.8	Poor	3.2	Good	2.6	Moderate
W-84	1.8	Poor	4.0	Good	1.8	Poor	3.2	Good	2.6	Moderate
W-85	1.8	Poor	4.0	Good	1.6	Poor	3.2	Good	2.6	Moderate

Table 3: CDRI values and Resilience Levels for components of economic dimension of central Dhaka area

Ward No.	ECONOMIC DIMENSION									
	Income		Employment		Households assets		Finance and savings		Budget and subsidy	
	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience
W-16	2.8	Moderate	1.8	Poor	2.2	Moderate	1.0	Poor	1.4	Poor
W-17	3.2	Good	3.6	Good	3.2	Good	2.0	Poor	1.2	Poor
W-18	3.2	Good	3.6	Good	3.2	Good	2.0	Poor	1.2	Poor
W-19	3.2	Good	3.6	Good	3.2	Good	2.0	Poor	1.2	Poor
W-20	3.2	Good	3.6	Good	3.2	Good	2.0	Poor	1.2	Poor
W-21	3.2	Good	3.6	Good	3.2	Good	2.0	Poor	1.2	Poor
W-22	1.8	Poor	1.8	Poor	2.6	Moderate	2.8	Moderate	1.8	Poor
W-23	1.8	Poor	1.8	Poor	2.6	Moderate	2.8	Moderate	1.8	Poor
W-24	1.8	Poor	1.8	Poor	2.6	Moderate	2.8	Moderate	1.8	Poor
W-25	1.8	Poor	1.8	Poor	2.6	Moderate	2.8	Moderate	1.8	Poor
W-26	1.8	Poor	1.8	Poor	2.6	Moderate	2.8	Moderate	1.8	Poor
W-27	1.8	Poor	1.8	Poor	2.6	Moderate	2.8	Moderate	1.8	Poor
W-28	1.8	Poor	1.8	Poor	2.6	Moderate	2.8	Moderate	1.8	Poor
W-29	1.8	Poor	1.8	Poor	2.6	Moderate	2.8	Moderate	1.8	Poor
W-30	2.0	Poor	2.0	Poor	1.6	Poor	1.0	Poor	1.4	Poor
W-31	1.8	Poor	1.8	Poor	2.6	Moderate	2.8	Moderate	1.8	Poor
W-32	1.8	Poor	1.8	Poor	2.6	Moderate	2.8	Moderate	1.8	Poor
W-33	1.8	Poor	1.8	Poor	2.6	Moderate	2.8	Moderate	1.8	Poor
W-34	1.8	Poor	1.8	Poor	2.6	Moderate	2.8	Moderate	1.8	Poor
W-35	1.8	Poor	1.8	Poor	2.6	Moderate	2.8	Moderate	1.8	Poor
W-36	1.8	Poor	1.8	Poor	2.6	Moderate	2.8	Moderate	1.8	Poor
W-37	3.2	Good	3.6	Good	3.2	Good	2.0	Poor	1.2	Poor
W-38	3.2	Good	3.6	Good	3.2	Good	2.0	Poor	1.2	Poor
W-39	2.8	Moderate	3.6	Good	3.2	Good	1.8	Poor	1.4	Poor
W-40	2.8	Moderate	3.6	Good	3.2	Good	1.8	Poor	1.4	Poor
W-44	2.8	Moderate	3.6	Good	3.2	Good	1.8	Poor	1.4	Poor

Ward No.	ECONOMIC DIMENSION									
	Income		Employment		Households assets		Finance and savings		Budget and subsidy	
	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience
W-45	2.8	Moderate	3.6	Good	3.2	Good	1.8	Poor	1.4	Poor
W-49	3.4	Good	3.4	Good	3.2	Good	1.8	Poor	1.8	Poor
W-50	3.4	Good	3.4	Good	3.2	Good	1.8	Poor	1.8	Poor
W-51	3.4	Good	3.4	Good	3.2	Good	1.8	Poor	1.8	Poor
W-52	3.4	Good	3.4	Good	3.2	Good	1.8	Poor	1.8	Poor
W-53	3.4	Good	3.4	Good	3.2	Good	1.8	Poor	1.8	Poor
W-54	3.4	Good	3.4	Good	3.2	Good	1.8	Poor	1.8	Poor
W-55	3.4	Good	3.4	Good	3.2	Good	1.8	Poor	1.8	Poor
W-56	3.4	Good	3.4	Good	3.2	Good	1.8	Poor	1.8	Poor
W-57	3.4	Good	3.4	Good	3.2	Good	1.8	Poor	1.8	Poor
W-62	2.0	Poor	2.6	Moderate	1.6	Poor	1.8	Poor	1.4	Poor
W-70	2.8	Moderate	2.6	Moderate	3.2	Good	2.6	Moderate	1.8	Poor
W-74	2.8	Moderate	2.6	Moderate	3.2	Good	2.6	Moderate	1.8	Poor
W-75	2.0	Poor	2.0	Poor	1.6	Poor	1.0	Poor	1.4	Poor
W-76	2.0	Poor	2.0	Poor	1.6	Poor	1.0	Poor	1.4	Poor
W-77	2.0	Poor	2.0	Poor	1.6	Poor	1.0	Poor	1.4	Poor
W-84	2.0	Poor	2.0	Poor	1.6	Poor	1.0	Poor	1.4	Poor
W-85	2.0	Poor	2.0	Poor	1.6	Poor	1.0	Poor	1.4	Poor

Table 4: CDRI values and Resilience Levels for components of institutional dimension of central Dhaka area

Ward No.	INSTITUTIONAL DIMENSION									
	Mainstreaming of DRR and CCA		Effectiveness		Knowledge dissemination and management		Institutional collaboration		Good governance	
	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience
W-16	1.5	Poor	1.5	Poor	1.0	Poor	2.2	Moderate	1.5	Poor
W-17	2.2	Moderate	1.9	Poor	1.0	Poor	2.9	Moderate	2.3	Moderate
W-18	2.2	Moderate	1.9	Poor	1.0	Poor	2.9	Moderate	2.3	Moderate
W-19	2.2	Moderate	1.9	Poor	1.0	Poor	2.9	Moderate	2.3	Moderate
W-20	2.2	Moderate	1.9	Poor	1.0	Poor	2.9	Moderate	2.3	Moderate
W-21	2.2	Moderate	1.9	Poor	1.0	Poor	2.9	Moderate	2.3	Moderate
W-22	2.2	Moderate	1.5	Poor	1.9	Poor	2.5	Moderate	1.4	Poor
W-23	2.2	Moderate	1.5	Poor	1.9	Poor	2.5	Moderate	1.4	Poor
W-24	2.2	Moderate	1.5	Poor	1.9	Poor	2.5	Moderate	1.4	Poor
W-25	2.2	Moderate	1.5	Poor	1.9	Poor	2.5	Moderate	1.4	Poor
W-26	2.2	Moderate	1.5	Poor	1.9	Poor	2.5	Moderate	1.4	Poor
W-27	2.2	Moderate	1.5	Poor	1.9	Poor	2.5	Moderate	1.4	Poor
W-28	2.2	Moderate	1.5	Poor	1.9	Poor	2.5	Moderate	1.4	Poor
W-29	2.2	Moderate	1.5	Poor	1.9	Poor	2.5	Moderate	1.4	Poor
W-30	2.0	Poor	2.2	Moderate	1.0	Poor	2.8	Moderate	2.3	Moderate
W-31	2.2	Moderate	1.5	Poor	1.9	Poor	2.5	Moderate	1.4	Poor
W-32	2.2	Moderate	1.5	Poor	1.9	Poor	2.5	Moderate	1.4	Poor
W-33	2.2	Moderate	1.5	Poor	1.9	Poor	2.5	Moderate	1.4	Poor
W-34	2.2	Moderate	1.5	Poor	1.9	Poor	2.5	Moderate	1.4	Poor
W-35	2.2	Moderate	1.5	Poor	1.9	Poor	2.5	Moderate	1.4	Poor
W-36	2.2	Moderate	1.5	Poor	1.9	Poor	2.5	Moderate	1.4	Poor
W-37	2.2	Moderate	1.9	Poor	1.0	Poor	2.9	Moderate	2.3	Moderate
W-38	2.2	Moderate	1.9	Poor	1.0	Poor	2.9	Moderate	2.3	Moderate
W-39	2.8	Moderate	2.8	Moderate	1.8	Poor	2.3	Moderate	1.7	Poor
W-40	2.8	Moderate	2.8	Moderate	1.8	Poor	2.3	Moderate	1.7	Poor

Ward No.	INSTITUTIONAL DIMENSION									
	Mainstreaming of DRR and CCA		Effectiveness		Knowledge dissemination and management		Institutional collaboration		Good governance	
	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience
W-44	2.8	Moderate	2.8	Moderate	1.8	Poor	2.3	Moderate	1.7	Poor
W-45	2.8	Moderate	2.8	Moderate	1.8	Poor	2.3	Moderate	1.7	Poor
W-49	2.0	Poor	2.2	Moderate	2.1	Moderate	2.2	Moderate	1.9	Poor
W-50	2.0	Poor	2.2	Moderate	2.1	Moderate	2.2	Moderate	1.9	Poor
W-51	2.0	Poor	2.2	Moderate	2.1	Moderate	2.2	Moderate	1.9	Poor
W-52	2.0	Poor	2.2	Moderate	2.1	Moderate	2.2	Moderate	1.9	Poor
W-53	2.0	Poor	2.2	Moderate	2.1	Moderate	2.2	Moderate	1.9	Poor
W-54	2.0	Poor	2.2	Moderate	2.1	Moderate	2.2	Moderate	1.9	Poor
W-55	2.0	Poor	2.2	Moderate	2.1	Moderate	2.2	Moderate	1.9	Poor
W-56	2.0	Poor	2.2	Moderate	2.1	Moderate	2.2	Moderate	1.9	Poor
W-57	2.0	Poor	2.2	Moderate	2.1	Moderate	2.2	Moderate	1.9	Poor
W-62	2.0	Poor	2.4	Moderate	1.0	Poor	2.6	Moderate	2.8	Moderate
W-70	2.4	Moderate	3.4	Good	2.1	Moderate	2.3	Moderate	1.8	Poor
W-74	2.4	Moderate	3.4	Good	2.1	Moderate	2.3	Moderate	1.8	Poor
W-75	2.0	Poor	2.2	Moderate	1.0	Poor	2.8	Moderate	2.3	Moderate
W-76	2.0	Poor	2.2	Moderate	1.0	Poor	2.8	Moderate	2.3	Moderate
W-77	2.0	Poor	2.2	Moderate	1.0	Poor	2.8	Moderate	2.3	Moderate
W-84	2.0	Poor	2.2	Moderate	1.0	Poor	2.8	Moderate	2.3	Moderate
W-85	2.0	Poor	2.2	Moderate	1.0	Poor	2.8	Moderate	2.3	Moderate

Table 5: CDRI values and Resilience Levels for components of natural dimension of central Dhaka area

Ward No.	NATURAL DIMENSION									
	Intensity of natural hazards		Frequency of natural hazards		Ecosystem services		Land use in natural terms		Environmental policies	
	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience
W-16	5.0	Best	4.0	Good	1.6	Poor	2.0	Poor	1.0	Poor
W-17	3.0	Moderate	2.0	Poor	2.0	Poor	2.6	Moderate	2.0	Poor
W-18	3.0	Moderate	2.0	Poor	2.0	Poor	2.6	Moderate	2.0	Poor
W-19	3.0	Moderate	2.0	Poor	2.0	Poor	2.6	Moderate	2.0	Poor
W-20	3.0	Moderate	2.0	Poor	2.0	Poor	2.6	Moderate	2.0	Poor
W-21	3.0	Moderate	2.0	Poor	2.0	Poor	2.6	Moderate	2.0	Poor
W-22	4.0	Good	3.0	Moderate	2.6	Moderate	1.6	Poor	2.0	Poor
W-23	4.0	Good	3.0	Moderate	2.6	Moderate	1.6	Poor	2.0	Poor
W-24	4.0	Good	3.0	Moderate	2.6	Moderate	1.6	Poor	2.0	Poor
W-25	4.0	Good	3.0	Moderate	2.6	Moderate	1.6	Poor	2.0	Poor
W-26	4.0	Good	3.0	Moderate	2.6	Moderate	1.6	Poor	2.0	Poor
W-27	4.0	Good	3.0	Moderate	2.6	Moderate	1.6	Poor	2.0	Poor
W-28	4.0	Good	3.0	Moderate	2.6	Moderate	1.6	Poor	2.0	Poor
W-29	4.0	Good	3.0	Moderate	2.6	Moderate	1.6	Poor	2.0	Poor
W-30	3.0	Moderate	2.0	Poor	1.0	Poor	1.0	Poor	2.2	Moderate
W-31	4.0	Good	3.0	Moderate	2.6	Moderate	1.6	Poor	2.0	Poor
W-32	4.0	Good	3.0	Moderate	2.6	Moderate	1.6	Poor	2.0	Poor
W-33	4.0	Good	3.0	Moderate	2.6	Moderate	1.6	Poor	2.0	Poor
W-34	4.0	Good	3.0	Moderate	2.6	Moderate	1.6	Poor	2.0	Poor
W-35	4.0	Good	3.0	Moderate	2.6	Moderate	1.6	Poor	2.0	Poor
W-36	4.0	Good	3.0	Moderate	2.6	Moderate	1.6	Poor	2.0	Poor
W-37	3.0	Moderate	2.0	Poor	2.2	Moderate	2.0	Poor	2.0	Poor
W-38	3.0	Moderate	2.0	Poor	2.2	Moderate	2.0	Poor	2.0	Poor
W-39	4.0	Good	4.0	Good	2.6	Moderate	2.2	Moderate	2.0	Poor
W-40	4.0	Good	4.0	Good	2.6	Moderate	2.2	Moderate	2.0	Poor
W-44	4.0	Good	4.0	Good	2.6	Moderate	2.2	Moderate	2.0	Poor

Ward No.	NATURAL DIMENSION									
	Intensity of natural hazards		Frequency of natural hazards		Ecosystem services		Land use in natural terms		Environmental policies	
	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience
W-45	4.0	Good	4.0	Good	2.6	Moderate	2.2	Moderate	2.0	Poor
W-49	3.0	Moderate	2.0	Poor	2.6	Moderate	2.2	Moderate	2.0	Poor
W-50	3.0	Moderate	2.0	Poor	2.6	Moderate	2.2	Moderate	2.0	Poor
W-51	3.0	Moderate	2.0	Poor	2.6	Moderate	2.2	Moderate	2.0	Poor
W-52	3.0	Moderate	2.0	Poor	2.6	Moderate	2.2	Moderate	2.0	Poor
W-53	3.0	Moderate	2.0	Poor	2.6	Moderate	2.2	Moderate	2.0	Poor
W-54	3.0	Moderate	2.0	Poor	2.6	Moderate	2.2	Moderate	2.0	Poor
W-55	3.0	Moderate	2.0	Poor	2.6	Moderate	2.2	Moderate	2.0	Poor
W-56	3.0	Moderate	2.0	Poor	2.6	Moderate	2.2	Moderate	2.0	Poor
W-57	3.0	Moderate	2.0	Poor	2.6	Moderate	2.2	Moderate	2.0	Poor
W-62	3.0	Moderate	2.0	Poor	1.0	Poor	1.6	Poor	2.0	Poor
W-70	4.0	Good	3.0	Moderate	2.6	Moderate	2.0	Poor	2.0	Poor
W-74	4.0	Good	3.0	Moderate	2.6	Moderate	2.0	Poor	2.0	Poor
W-75	3.0	Moderate	2.0	Poor	1.0	Poor	1.0	Poor	2.6	Moderate
W-76	3.0	Moderate	2.0	Poor	1.0	Poor	1.0	Poor	2.6	Moderate
W-77	3.0	Moderate	2.0	Poor	1.0	Poor	1.0	Poor	2.6	Moderate
W-84	3.0	Moderate	2.0	Poor	1.0	Poor	1.0	Poor	2.6	Moderate
W-85	3.0	Moderate	2.0	Poor	1.0	Poor	1.0	Poor	2.6	Moderate

Table 6: CDRI values and Resilience Levels for components of physical dimension of DND area

Ward No./ Region	PHYSICAL DIMENSION									
	Electricity		Water		Sanitation and solid waste disposal		Accessibility of roads		Housing and land use	
	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience
Outside DCC (South) Area	3.0	Moderate	2.0	Poor	1.8	Poor	2.4	Moderate	3.2	Good
W-86	3.0	Moderate	2.0	Poor	3.2	Good	2.6	Moderate	2.0	Poor
W-87	3.0	Moderate	2.0	Poor	2.8	Moderate	2.8	Moderate	1.8	Poor
W-88	3.0	Moderate	2.0	Poor	3.0	Moderate	2.6	Moderate	1.8	Poor
W-89	3.0	Moderate	2.2	Moderate	3.2	Good	3.4	Good	2.0	Poor
W-90	2.8	Moderate	2.0	Poor	2.8	Moderate	3.0	Moderate	1.8	Poor

Table 7: CDRI values and Resilience Levels for components of social dimension of DND area

Ward No./ Region	SOCIAL DIMENSION									
	Population		Health		Education and awareness		Social Capital		Community preparedness	
	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience
Outside DCC (South) Area	3.2	Good	2.2	Moderate	2.4	Moderate	2.8	Moderate	2.4	Moderate
W-86	2.0	Poor	4.0	Good	1.8	Poor	3.2	Good	2.6	Moderate
W-87	1.8	Poor	4.0	Good	1.6	Poor	3.2	Good	2.6	Moderate
W-88	1.8	Poor	4.0	Good	1.6	Poor	3.2	Good	2.6	Moderate
W-89	2.0	Poor	4.0	Good	1.8	Poor	3.2	Good	2.6	Moderate
W-90	1.8	Poor	4.0	Good	1.6	Poor	3.2	Good	2.6	Moderate

Table 8: CDRI values and Resilience Levels for components of economic dimension of DND area

Ward No./ Region	ECONOMIC DIMENSION									
	Income		Employment		Households assets		Finance and savings		Budget and subsidy	
	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience
Outside DCC (South) Area	3.2	Good	2.6	Moderate	3.0	Moderate	2.0	Poor	1.2	Poor
W-86	2.0	Poor	2.0	Poor	1.6	Poor	1.0	Poor	1.2	Poor
W-87	2.0	Poor	2.0	Poor	1.6	Poor	1.0	Poor	1.2	Poor
W-88	2.0	Poor	2.0	Poor	1.6	Poor	1.0	Poor	1.2	Poor
W-89	2.0	Poor	2.0	Poor	1.6	Poor	1.0	Poor	1.2	Poor
W-90	2.0	Poor	2.0	Poor	1.6	Poor	1.0	Poor	1.2	Poor

Table 9: CDRI values and Resilience Levels for components of institutional dimension of DND area

Ward No./ Region	INSTITUTIONAL DIMENSION									
	Mainstreaming of DRR and CCA		Effectiveness		Knowledge dissemination and management		Institutional collaboration		Good governance	
	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience
Outside DCC (South) Area	1.2	Poor	1.6	Poor	1.4	Poor	1.8	Poor	1.6	Poor
W-86	2.0	Poor	2.2	Moderate	1.0	Poor	2.8	Moderate	2.3	Moderate
W-87	2.0	Poor	2.2	Moderate	1.0	Poor	2.8	Moderate	2.3	Moderate
W-88	2.0	Poor	2.2	Moderate	1.0	Poor	2.8	Moderate	2.3	Moderate
W-89	2.0	Poor	2.2	Moderate	1.0	Poor	2.8	Moderate	2.3	Moderate
W-90	2.0	Poor	2.2	Moderate	1.0	Poor	2.8	Moderate	2.3	Moderate

Table 10: CDRI values and Resilience Levels for components of natural dimension of DND area

Ward No./ Region	NATURAL DIMENSION									
	Intensity of natural hazards		Frequency of natural hazards		Ecosystem services		Land use in natural terms		Environmental policies	
	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience
Outside DCC (South) Area	3.6	Good	4.0	Good	2.6	Moderate	2.6	Moderate	1.6	Poor
W-86	3.0	Moderate	2.0	Poor	1.0	Poor	1.0	Poor	2.6	Moderate
W-87	3.0	Moderate	2.0	Poor	1.0	Poor	1.0	Poor	2.6	Moderate
W-88	3.0	Moderate	2.0	Poor	1.0	Poor	1.0	Poor	2.6	Moderate
W-89	3.0	Moderate	2.0	Poor	1.0	Poor	1.0	Poor	2.6	Moderate
W-90	3.0	Moderate	2.0	Poor	1.0	Poor	1.0	Poor	2.6	Moderate

Table 11: CDRI values and Resilience Levels for components of physical dimension of Eastern Dhaka area

Region	PHYSICAL DIMENSION									
	Electricity		Water		Sanitation and solid waste disposal		Accessibility of roads		Housing and land use	
	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience
Badda (Outside DCC North)	3.4	Good	3.4	Good	2.6	Moderate	2.0	Poor	2.2	Moderate
Khilgao (Outside DCC North)	3.0	Moderate	3.4	Good	3.4	Good	3.8	Good	3.2	Good

Table 12: CDRI values and Resilience Levels for components of social dimension of Eastern Dhaka area

Region	SOCIAL DIMENSION									
	Population		Health		Education and awareness		Social Capital		Community preparedness	
	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience
Badda (Outside DCC North)	2.4	Moderate	2.6	Moderate	3.0	Moderate	2.2	Moderate	1.6	Poor
Khilgao (Outside DCC North)	2.2	Moderate	2.8	Moderate	2.0	Poor	2.2	Moderate	1.2	Poor

Table 13: CDRI values and Resilience Levels for components of economic dimension of Eastern Dhaka area

Region	ECONOMIC DIMENSION									
	Income		Employment		Households assets		Finance and savings		Budget and subsidy	
	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience
Badda (Outside DCC North)	2.8	Moderate	2.8	Moderate	3.2	Good	1.8	Poor	1.6	Poor
Khilgao (Outside DCC North)	2.6	Moderate	2.8	Moderate	3.6	Good	2.2	Moderate	1.0	Poor

Table 14: CDRI values and Resilience Levels for components of institutional dimension of Eastern Dhaka area

Region	INSTITUTIONAL DIMENSION									
	Mainstreaming of DRR and CCA		Effectiveness		Knowledge dissemination and management		Institutional collaboration		Good governance	
	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience
Badda (Outside DCC North)	1.6	Poor	1.0	Poor	1.2	Poor	2.4	Moderate	1.2	Poor
Khilgao (Outside DCC North)	2.0	Poor	1.6	Poor	1.0	Poor	1.4	Poor	1.0	Poor

Table 15: CDRI values and Resilience Levels for components of natural dimension of Eastern Dhaka area

Region	NATURAL DIMENSION									
	Intensity of natural hazards		Frequency of natural hazards		Ecosystem services		Land use in natural terms		Environmental policies	
	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience
Badda (Outside DCC North)	1.8	Poor	3.6	Good	3.0	Moderate	3.0	Moderate	2.0	Poor
Khilgao (Outside DCC North)	2.0	Poor	3.2	Good	1.2	Poor	2.0	Poor	1.6	Poor

Table 16: CDRI values and Resilience Levels for components of physical dimension of Narayanganj area

Region	PHYSICAL DIMENSION									
	Electricity		Water		Sanitation and solid waste disposal		Accessibility of roads		Housing and land use	
	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience
Outside DCC (South) Area_ Narayanganj pourashava	3.0	Moderate	3.0	Moderate	2.2	Moderate	3.6	Good	2.6	Moderate
Outside DCC (South) Area_ Narayanganj sadar	2.8	Moderate	2.0	Poor	1.6	Poor	2.2	Moderate	1.8	Poor

Table 17: CDRI values and Resilience Levels for components of social dimension of Narayanganj area

Region	SOCIAL DIMENSION									
	Population		Health		Education and awareness		Social Capital		Community preparedness	
	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience
Outside DCC (South) Area_ Narayanganj pourashava	3.2	Good	2.4	Moderate	3.4	Good	3.0	Moderate	2.2	Moderate
Outside DCC (South) Area_ Narayanganj sadar	2.8	Moderate	2.0	Poor	2.4	Moderate	3.0	Moderate	2.4	Moderate

Table 18: CDRI values and Resilience Levels for components of economic dimension of Narayanganj area

Region	ECONOMIC DIMENSION									
	Income		Employment		Households assets		Finance and savings		Budget and subsidy	
	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience
Outside DCC (South) Area_ Narayanganj pourashava	3.0	Moderate	3.0	Moderate	3.2	Good	2	Poor	1.2	Poor
Outside DCC (South) Area_ Narayanganj sadar	3.0	Moderate	3.0	Moderate	3.2	Good	2	Poor	1.2	Poor

Table 19: CDRI values and Resilience Levels for components of institutional dimension of Narayanganj area

Region	INSTITUTIONAL DIMENSION									
	Mainstreaming of DRR and CCA		Effectiveness		Knowledge dissemination and management		Institutional collaboration		Good governance	
	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience
Outside DCC (South) Area_ Narayanganj pourashava	1.2	Poor	1.6	Poor	1.2	Poor	2.8	Moderate	1.8	Poor
Outside DCC (South) Area_ Narayanganj sadar	1.2	Poor	1.4	Poor	1.4	Poor	2.4	Moderate	1.8	Poor

Table 20: CDRI values and Resilience Levels for components of natural dimension of Narayanganj area

Region	NATURAL DIMENSION									
	Intensity of natural hazards		Frequency of natural hazards		Ecosystem services		Land use in natural terms		Environmental policies	
	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience
Outside DCC (South) Area_ Narayanganj pourashava	3.8	Good	4.2	Best	2.6	Moderate	2.8	Moderate	1.6	Poor
Outside DCC (South) Area_ Narayanganj sadar	3.6	Good	4.0	Good	2.4	Moderate	2.2	Moderate	1.6	Poor

Table 21: CDRI values and Resilience Levels for components of physical dimension of Old Dhaka area

Ward No.	PHYSICAL DIMENSION									
	Electricity		Water		Sanitation and solid waste disposal		Accessibility of roads		Housing and land use	
	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience
W-59	2.8	Moderate	2.0	Poor	3.1	Good	3.0	Moderate	2.2	Moderate
W-60	2.8	Moderate	2.0	Poor	2.9	Moderate	3.0	Moderate	2.0	Poor
W-61	2.8	Moderate	2.0	Poor	3.3	Good	3.0	Moderate	2.2	Moderate
W-63	2.8	Moderate	2.0	Poor	3.3	Good	3.0	Moderate	2.4	Moderate
W-64	2.8	Moderate	2.0	Poor	2.7	Moderate	3.0	Moderate	2.4	Moderate
W-65	2.8	Moderate	2.0	Poor	2.9	Moderate	3.0	Moderate	2.2	Moderate
W-66	2.8	Moderate	2.6	Moderate	3.2	Good	4.0	Good	2.8	Moderate
W-67	2.8	Moderate	2.6	Moderate	3.0	Good	4.0	Good	3.0	Moderate
W-68	2.8	Moderate	2.6	Moderate	3.2	Good	4.0	Good	3.0	Moderate
W-69	2.8	Moderate	2.6	Moderate	3.2	Good	4.0	Good	3.0	Moderate
W-71	2.8	Moderate	2.6	Moderate	2.8	Moderate	4.0	Good	3.0	Moderate
W-72	2.8	Moderate	2.6	Moderate	2.8	Moderate	4.0	Good	3.0	Moderate
W-73	2.8	Moderate	2.6	Moderate	3.0	Good	4.0	Good	3.0	Moderate
W-78	2.8	Moderate	2.6	Moderate	3.4	Good	4.0	Good	3.0	Moderate
W-79	2.8	Moderate	2.6	Moderate	3.4	Good	4.0	Good	3.0	Moderate
W-80	2.8	Moderate	2.0	Poor	3.2	Good	3.0	Moderate	2.4	Moderate
W-81	2.8	Moderate	2.0	Poor	3.4	Good	3.0	Moderate	2.2	Moderate
W-82	2.8	Moderate	2.0	Poor	3.2	Good	3.0	Moderate	2.2	Moderate
W-83	2.8	Moderate	2.0	Poor	3.0	Good	3.0	Moderate	2.2	Moderate

Table 22: CDRI values and Resilience Levels for components of social dimension of Old Dhaka area

Ward No.	SOCIAL DIMENSION									
	Population		Health		Education and awareness		Social Capital		Community preparedness	
	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience
W-59	2.2	Moderate	4.6	Best	2.2	Moderate	3.0	Moderate	3.4	Good
W-60	2.0	Poor	4.6	Best	1.8	Poor	3.0	Moderate	3.4	Good
W-61	2.2	Moderate	4.6	Best	2.2	Moderate	3.0	Moderate	3.4	Good
W-63	2.4	Moderate	4.6	Best	2.0	Poor	3.0	Moderate	3.4	Good
W-64	2.4	Moderate	4.6	Best	2.0	Poor	3.0	Moderate	3.4	Good
W-65	2.4	Moderate	4.6	Best	1.8	Poor	3.0	Moderate	3.4	Good
W-66	2.8	Moderate	4.4	Best	2.6	Moderate	3.2	Good	2.6	Moderate
W-67	2.6	Moderate	4.4	Best	2.8	Moderate	3.2	Good	2.6	Moderate
W-68	2.6	Moderate	4.4	Best	2.8	Moderate	3.2	Good	2.6	Moderate
W-69	2.4	Moderate	4.4	Best	2.8	Moderate	3.2	Good	2.6	Moderate
W-71	2.6	Moderate	4.4	Best	2.8	Moderate	3.2	Good	2.6	Moderate
W-72	2.6	Moderate	4.4	Best	2.8	Moderate	3.2	Good	2.6	Moderate
W-73	3.2	Good	4.4	Best	2.6	Moderate	3.2	Good	2.6	Moderate
W-78	2.4	Moderate	4.4	Best	3.0	Moderate	3.2	Good	2.6	Moderate
W-79	2.6	Moderate	4.4	Best	3.0	Moderate	3.2	Good	2.6	Moderate
W-80	2.4	Moderate	4.0	Good	1.8	Poor	3.2	Good	2.6	Moderate
W-81	2.2	Moderate	4.0	Good	1.8	Poor	3.2	Good	2.6	Moderate
W-82	2.2	Moderate	4.0	Good	1.8	Poor	3.2	Good	2.6	Moderate
W-83	2.0	Poor	4.0	Good	1.8	Poor	3.2	Good	2.6	Moderate

Table 23: CDRI values and Resilience Levels for components of economic dimension of Old Dhaka area

Ward No.	ECONOMIC DIMENSION									
	Income		Employment		Households assets		Finance and savings		Budget and subsidy	
	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience
W-59	2.0	Poor	2.6	Moderate	1.6	Poor	2	Poor	1.4	Poor
W-60	2.0	Poor	2.6	Moderate	1.6	Poor	2	Poor	1.4	Poor
W-61	2.0	Poor	2.6	Moderate	1.6	Poor	2	Poor	1.4	Poor
W-63	2.0	Poor	2.6	Moderate	1.6	Poor	2	Poor	1.4	Poor
W-64	2.0	Poor	2.6	Moderate	1.6	Poor	2	Poor	1.4	Poor
W-65	2.0	Poor	2.6	Moderate	1.6	Poor	2	Poor	1.4	Poor
W-66	2.8	Moderate	2.6	Moderate	3.2	Good	3	Moderate	1.8	Poor
W-67	2.8	Moderate	2.6	Moderate	3.2	Good	3	Moderate	1.8	Poor
W-68	2.8	Moderate	2.6	Moderate	3.2	Good	3	Moderate	1.8	Poor
W-69	2.8	Moderate	2.6	Moderate	3.2	Good	3	Moderate	1.8	Poor
W-71	2.8	Moderate	2.6	Moderate	3.2	Good	3	Moderate	1.8	Poor
W-72	2.8	Moderate	2.6	Moderate	3.2	Good	3	Moderate	1.8	Poor
W-73	2.8	Moderate	2.6	Moderate	3.2	Good	3	Moderate	1.8	Poor
W-78	2.8	Moderate	2.6	Moderate	3.2	Good	3	Moderate	1.8	Poor
W-79	2.8	Moderate	2.6	Moderate	3.2	Good	3	Moderate	1.8	Poor
W-80	2.0	Poor	2.0	Poor	1.6	Poor	1	Poor	1.4	Poor
W-81	2.0	Poor	2.0	Poor	1.6	Poor	1	Poor	1.4	Poor
W-82	2.0	Poor	2.0	Poor	1.6	Poor	1	Poor	1.4	Poor
W-83	2.0	Poor	2.0	Poor	1.6	Poor	1	Poor	1.4	Poor

Table 24: CDRI values and Resilience Levels for components of institutional dimension of Old Dhaka area

Ward No.	INSTITUTIONAL DIMENSION									
	Mainstreaming of DRR and CCA		Effectiveness		Knowledge dissemination and management		Institutional collaboration		Good governance	
	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience
W-59	2.0	Poor	2.4	Moderate	1.0	Poor	2.6	Moderate	2.8	Moderate
W-60	2.0	Poor	2.4	Moderate	1.0	Poor	2.6	Moderate	2.8	Moderate
W-61	2.0	Poor	2.4	Moderate	1.0	Poor	2.6	Moderate	2.8	Moderate
W-63	2.0	Poor	2.4	Moderate	1.0	Poor	2.6	Moderate	2.8	Moderate
W-64	2.0	Poor	2.4	Moderate	1.0	Poor	2.6	Moderate	2.8	Moderate
W-65	2.0	Poor	2.4	Moderate	1.0	Poor	2.6	Moderate	2.8	Moderate
W-66	2.4	Moderate	3.4	Good	2.1	Moderate	2.3	Moderate	1.8	Poor
W-67	2.4	Moderate	3.4	Good	2.1	Moderate	2.3	Moderate	1.8	Poor
W-68	2.4	Moderate	3.4	Good	2.1	Moderate	2.3	Moderate	1.8	Poor
W-69	2.4	Moderate	3.4	Good	2.1	Moderate	2.3	Moderate	1.8	Poor
W-71	2.4	Moderate	3.4	Good	2.1	Moderate	2.3	Moderate	1.8	Poor
W-72	2.4	Moderate	3.4	Good	2.1	Moderate	2.3	Moderate	1.8	Poor
W-73	2.4	Moderate	3.4	Good	2.1	Moderate	2.3	Moderate	1.8	Poor
W-78	2.4	Moderate	3.4	Good	2.1	Moderate	2.3	Moderate	1.8	Poor
W-79	2.4	Moderate	3.4	Good	2.1	Moderate	2.3	Moderate	1.8	Poor
W-80	2.0	Poor	2.2	Moderate	1.0	Poor	2.8	Moderate	2.3	Moderate
W-81	2.0	Poor	2.2	Moderate	1.0	Poor	2.8	Moderate	2.3	Moderate
W-82	2.0	Poor	2.2	Moderate	1.0	Poor	2.8	Moderate	2.3	Moderate
W-83	2.0	Poor	2.2	Moderate	1.0	Poor	2.8	Moderate	2.3	Moderate

Table 25: CDRI values and Resilience Levels for components of natural dimension of Old Dhaka area

Ward No.	NATURAL DIMENSION									
	Intensity of natural hazards		Frequency of natural hazards		Ecosystem services		Land use in natural terms		Environmental policies	
	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience
W-59	3.0	Moderate	2.0	Poor	1.0	Poor	1.6	Poor	2.0	Poor
W-60	3.0	Moderate	2.0	Poor	1.0	Poor	1.6	Poor	2.0	Poor
W-61	3.0	Moderate	2.0	Poor	1.0	Poor	1.6	Poor	2.0	Poor
W-63	3.0	Moderate	2.0	Poor	1.0	Poor	1.6	Poor	2.0	Poor
W-64	3.0	Moderate	2.0	Poor	1.0	Poor	1.6	Poor	2.0	Poor
W-65	3.0	Moderate	2.0	Poor	1.0	Poor	1.6	Poor	2.0	Poor
W-66	4.0	Good	3.0	Moderate	2.6	Moderate	2.0	Poor	2.0	Poor
W-67	4.0	Good	3.0	Moderate	2.6	Moderate	2.0	Poor	2.0	Poor
W-68	4.0	Good	3.0	Moderate	2.6	Moderate	2.0	Poor	2.0	Poor
W-69	4.0	Good	3.0	Moderate	2.6	Moderate	2.0	Poor	2.0	Poor
W-71	4.0	Good	3.0	Moderate	2.6	Moderate	2.0	Poor	2.0	Poor
W-72	4.0	Good	3.0	Moderate	2.6	Moderate	2.0	Poor	2.0	Poor
W-73	4.0	Good	3.0	Moderate	2.6	Moderate	2.0	Poor	2.0	Poor
W-78	4.0	Good	3.0	Moderate	2.6	Moderate	2.0	Poor	2.0	Poor
W-79	4.0	Good	3.0	Moderate	2.6	Moderate	2.0	Poor	2.0	Poor
W-80	3.0	Moderate	2.0	Poor	1.0	Poor	1.0	Poor	2.6	Moderate
W-81	3.0	Moderate	2.0	Poor	1.0	Poor	1.0	Poor	2.6	Moderate
W-82	3.0	Moderate	2.0	Poor	1.0	Poor	1.0	Poor	2.6	Moderate
W-83	3.0	Moderate	2.0	Poor	1.0	Poor	1.0	Poor	2.6	Moderate

Table 26: CDRI values and Resilience Levels for components of physical dimension of Western Dhaka (Goranchatbari)

Ward No./ Region	PHYSICAL DIMENSION									
	Electricity		Water		Sanitation and solid waste disposal		Accessibility of roads		Housing and land use	
	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience
Uttara	3.6	Good	3.4	Good	3.8	Good	3.8	Good	3.4	Good
W-01	3.8	Good	2.6	Moderate	2.6	Moderate	4.0	Good	3.4	Good
W-02	2.4	Moderate	2.0	Poor	2.4	Moderate	2.8	Moderate	2.2	Moderate
W-03	2.4	Moderate	2.4	Moderate	2.6	Moderate	2.6	Moderate	2.2	Moderate
W-04	2.4	Moderate	2.4	Moderate	2.4	Moderate	2.6	Moderate	2.2	Moderate
W-05	2.4	Moderate	2.2	Moderate	2.4	Moderate	2.6	Moderate	2.2	Moderate
W-06	2.4	Moderate	2.2	Moderate	2.6	Moderate	2.8	Moderate	2.2	Moderate
W-15	2.0	Poor	2.0	Poor	2.4	Moderate	3.0	Moderate	2.2	Moderate

Table 27: CDRI values and Resilience Levels for components of social dimension of Western Dhaka (Goranchatbari)

Ward No./ Region	SOCIAL DIMENSION									
	Population		Health		Education and awareness		Social Capital		Community preparedness	
	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience
Uttara	3.2	Good	3.2	Good	3.2	Good	3.4	Good	3.0	Moderate
W-01	3.0	Moderate	3.6	Good	1.8	Poor	2.0	Poor	2.6	Moderate
W-02	1.8	Poor	3.0	Moderate	1.6	Poor	1.8	Poor	3.4	Good
W-03	1.4	Poor	3.0	Moderate	1.8	Poor	1.8	Poor	3.4	Good
W-04	1.6	Poor	3.0	Moderate	1.8	Poor	1.8	Poor	3.4	Good
W-05	1.4	Poor	3.0	Moderate	1.6	Poor	1.8	Poor	3.4	Good
W-06	1.8	Poor	3.0	Moderate	1.8	Poor	1.8	Poor	3.4	Good
W-15	2.0	Poor	3.0	Moderate	1.8	Poor	1.8	Poor	3.4	Good

Table 28: CDRI values and Resilience Levels for components of economic dimension of Western Dhaka (Goranchatbari)

Ward No./ Region	ECONOMIC DIMENSION									
	Income		Employment		Households assets		Finance and savings		Budget and subsidy	
	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience
Uttara	3.2	Good	3.2	Good	3.4	Good	3	Moderate	2.2	Moderate
W-01	3.2	Good	3.4	Good	3.2	Good	1	Poor	1.2	Poor
W-02	2.4	Moderate	2.6	Moderate	2.2	Moderate	1	Poor	2.0	Poor
W-03	2.4	Moderate	2.6	Moderate	2.2	Moderate	1	Poor	2.0	Poor
W-04	2.4	Moderate	2.6	Moderate	2.2	Moderate	1	Poor	2.0	Poor
W-05	2.4	Moderate	2.6	Moderate	2.2	Moderate	1	Poor	2.0	Poor
W-06	2.4	Moderate	2.6	Moderate	2.2	Moderate	1	Poor	2.0	Poor
W-15	2.6	Moderate	2.6	Moderate	2.2	Moderate	1	Poor	2.0	Poor

Table 29: CDRI values and Resilience Levels for components of institutional dimension of Western Dhaka (Goranchatbari)

Ward No./ Region	INSTITUTIONAL DIMENSION									
	Mainstreaming of DRR and CCA		Effectiveness		Knowledge dissemination and management		Institutional collaboration		Good governance	
	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience
Uttara	3.6	Good	2.6	Moderate	3.2	Good	3.8	Good	2.6	Moderate
W-01	1.2	Poor	1.4	Poor	1.0	Poor	2.6	Moderate	2.2	Moderate
W-02	1.8	Poor	2.2	Moderate	2.1	Moderate	2.3	Moderate	1.3	Poor
W-03	1.8	Poor	2.2	Moderate	2.1	Moderate	2.3	Moderate	1.3	Poor
W-04	1.8	Poor	2.2	Moderate	2.1	Moderate	2.3	Moderate	1.3	Poor
W-05	1.8	Poor	2.2	Moderate	2.1	Moderate	2.3	Moderate	1.3	Poor
W-06	1.8	Poor	2.2	Moderate	2.1	Moderate	2.3	Moderate	1.3	Poor
W-15	1.8	Poor	2.2	Moderate	2.1	Moderate	2.3	Moderate	1.3	Poor

Table 30: CDRI values and Resilience Levels for components of natural dimension of Western Dhaka (Goranchatbari)

Ward No./ Region	NATURAL DIMENSION									
	Intensity of natural hazards		Frequency of natural hazards		Ecosystem services		Land use in natural terms		Environmental policies	
	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience
Uttara	3.6	Good	4.0	Good	2.6	Moderate	3.0	Moderate	2.8	Moderate
W-01	4.0	Good	3.0	Moderate	2.6	Moderate	3.6	Good	1.0	Poor
W-02	4.0	Good	3.0	Moderate	1.8	Poor	2.6	Moderate	2.0	Poor
W-03	4.0	Good	3.0	Moderate	1.8	Poor	2.6	Moderate	2.0	Poor
W-04	4.0	Good	3.0	Moderate	1.8	Poor	2.6	Moderate	2.0	Poor
W-05	4.0	Good	3.0	Moderate	1.8	Poor	2.6	Moderate	2.0	Poor
W-06	4.0	Good	3.0	Moderate	1.8	Poor	2.6	Moderate	2.0	Poor
W-15	4.0	Good	3.0	Moderate	1.8	Poor	2.6	Moderate	2.0	Poor

Table 31: CDRI values and Resilience Levels for components of physical dimension of Western Dhaka (Kallyanpur)

Ward No.	PHYSICAL DIMENSION									
	Electricity		Water		Sanitation and solid waste disposal		Accessibility of roads		Housing and land use	
	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience
W-07	2.4	Moderate	2.4	Moderate	2.4	Moderate	2.6	Moderate	2.2	Moderate
W-08	2.4	Moderate	2.2	Moderate	2.4	Moderate	2.8	Moderate	2.2	Moderate
W-09	2.8	Moderate	2.2	Moderate	2.4	Moderate	2.6	Moderate	2.8	Moderate
W-10	2.8	Moderate	2.6	Moderate	2.2	Moderate	2.6	Moderate	2.8	Moderate
W-11	3.0	Moderate	2.6	Moderate	2.8	Moderate	2.6	Moderate	2.8	Moderate
W-12	3.0	Moderate	2.6	Moderate	2.8	Moderate	2.6	Moderate	3.2	Good
W-13	3.0	Moderate	2.6	Moderate	2.4	Moderate	2.6	Moderate	3.2	Good
W-14	3.0	Moderate	2.6	Moderate	2.4	Moderate	2.8	Moderate	3.2	Good
W-41	3.0	Moderate	2.2	Moderate	2.4	Moderate	2.6	Moderate	3.0	Moderate
W-42	3.0	Moderate	2.8	Moderate	3.0	Good	3.6	Good	3.4	Good
W-43	3.0	Moderate	2.8	Moderate	2.8	Moderate	3.6	Good	3.2	Good
W-46	3.0	Moderate	2.4	Moderate	2.8	Moderate	3.6	Good	3.4	Good
W-47	3.0	Moderate	2.2	Moderate	2.4	Moderate	4.6	Best	3.0	Moderate
W-48	3.0	Moderate	2.2	Moderate	3.1	Good	2.8	Moderate	2.2	Moderate
W-58	3.0	Moderate	2.4	Moderate	3.3	Good	2.8	Moderate	2.0	Poor

Table 32: CDRI values and Resilience Levels for components of social dimension of Western Dhaka (Kallyanpur)

Ward No.	SOCIAL DIMENSION									
	Population		Health		Education and awareness		Social Capital		Community preparedness	
	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience
W-07	1.6	Poor	3.0	Moderate	1.8	Poor	1.8	Poor	3.4	Good
W-08	1.6	Poor	3.0	Moderate	1.8	Poor	1.8	Poor	3.4	Good
W-09	1.6	Poor	2.0	Poor	1.2	Poor	2.0	Poor	2.6	Moderate
W-10	2.4	Moderate	2.0	Poor	1.2	Poor	2.0	Poor	2.6	Moderate
W-11	2.0	Poor	2.0	Poor	1.4	Poor	2.0	Poor	2.6	Moderate
W-12	2.0	Poor	2.0	Poor	1.6	Poor	2.0	Poor	2.6	Moderate
W-13	1.6	Poor	2.0	Poor	1.4	Poor	2.0	Poor	2.6	Moderate
W-14	1.8	Poor	2.0	Poor	1.6	Poor	2.0	Poor	2.6	Moderate
W-41	2.4	Moderate	2.0	Poor	1.4	Poor	2.0	Poor	2.6	Moderate
W-42	2.4	Moderate	3.6	Good	2.2	Moderate	2.8	Moderate	3.4	Good
W-43	1.6	Poor	3.6	Good	1.8	Poor	2.8	Moderate	3.4	Good
W-46	2.6	Moderate	3.6	Good	2.0	Poor	2.8	Moderate	3.4	Good
W-47	2.2	Moderate	4.0	Good	2.6	Moderate	3.0	Moderate	2.6	Moderate
W-48	3.0	Moderate	4.6	Best	2.0	Poor	2.8	Moderate	3.4	Good
W-58	2.0	Poor	4.6	Best	1.8	Poor	2.8	Moderate	3.4	Good

Table 33: CDRI values and Resilience Levels for components of economic dimension of Western Dhaka (Kallyanpur)

Ward No.	ECONOMIC DIMENSION									
	Income		Employment		Households assets		Finance and savings		Budget and subsidy	
	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience
W-07	2.4	Moderate	2.6	Moderate	2.2	Moderate	1.2	Poor	2.0	Poor
W-08	2.4	Moderate	2.6	Moderate	2.2	Moderate	1.2	Poor	2.0	Poor
W-09	2.8	Moderate	1.8	Poor	2.2	Moderate	1.0	Poor	1.4	Poor
W-10	2.8	Moderate	1.8	Poor	2.2	Moderate	1.0	Poor	1.4	Poor
W-11	2.8	Moderate	1.8	Poor	2.2	Moderate	1.0	Poor	1.4	Poor
W-12	2.8	Moderate	1.8	Poor	2.2	Moderate	1.0	Poor	1.4	Poor
W-13	2.8	Moderate	1.8	Poor	2.2	Moderate	1.0	Poor	1.4	Poor
W-14	2.8	Moderate	1.8	Poor	2.2	Moderate	1.0	Poor	1.4	Poor
W-41	2.8	Moderate	1.8	Poor	2.2	Moderate	1.0	Poor	1.4	Poor
W-42	2.8	Moderate	3.6	Good	3.2	Good	1.8	Poor	1.4	Poor
W-43	2.8	Moderate	3.6	Good	3.2	Good	1.8	Poor	1.4	Poor
W-46	2.8	Moderate	3.6	Good	3.2	Good	1.8	Poor	1.4	Poor
W-47	3.4	Good	3.4	Good	3.2	Good	1.8	Poor	1.8	Poor
W-48	2.2	Moderate	2.8	Moderate	1.6	Poor	1.8	Poor	1.4	Poor
W-58	2.0	Poor	2.6	Moderate	1.6	Poor	1.8	Poor	1.4	Poor

Table 34: CDRI values and Resilience Levels for components of institutional dimension of Western Dhaka (Kallyanpur)

Ward No.	INSTITUTIONAL DIMENSION									
	Mainstreaming of DRR and CCA		Effectiveness		Knowledge dissemination and management		Institutional collaboration		Good governance	
	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience
W-07	1.8	Poor	2.2	Moderate	2.1	Moderate	2.3	Moderate	1.3	Poor
W-08	1.8	Poor	2.2	Moderate	2.1	Moderate	2.3	Moderate	1.3	Poor
W-09	1.5	Poor	1.5	Poor	1.0	Poor	2.2	Moderate	1.5	Poor
W-10	1.5	Poor	1.5	Poor	1.0	Poor	2.2	Moderate	1.5	Poor
W-11	1.5	Poor	1.5	Poor	1.0	Poor	2.2	Moderate	1.5	Poor
W-12	1.5	Poor	1.5	Poor	1.0	Poor	2.2	Moderate	1.5	Poor
W-13	1.5	Poor	1.5	Poor	1.0	Poor	2.2	Moderate	1.5	Poor
W-14	1.5	Poor	1.5	Poor	1.0	Poor	2.2	Moderate	1.5	Poor
W-41	1.5	Poor	1.5	Poor	1.0	Poor	2.2	Moderate	1.5	Poor
W-42	2.8	Moderate	2.8	Moderate	1.8	Poor	2.3	Moderate	1.7	Poor
W-43	2.8	Moderate	2.8	Moderate	1.8	Poor	2.3	Moderate	1.7	Poor
W-46	2.8	Moderate	2.8	Moderate	1.8	Poor	2.3	Moderate	1.7	Poor
W-47	2.0	Poor	2.2	Moderate	2.1	Moderate	2.2	Moderate	1.9	Poor
W-48	2.0	Poor	2.4	Moderate	1.0	Poor	2.6	Moderate	2.8	Moderate
W-58	2.0	Poor	2.4	Moderate	1.0	Poor	2.6	Moderate	2.8	Moderate

Table 35: CDRI values and Resilience Levels for components of natural dimension of Western Dhaka (Kallyanpur)

Ward No.	NATURAL DIMENSION									
	Intensity of natural hazards		Frequency of natural hazards		Ecosystem services		Land use in natural terms		Environmental policies	
	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience	CDRI	Level of resilience
W-07	4.0	Good	3.0	Moderate	1.8	Poor	2.6	Moderate	2.0	Poor
W-08	4.0	Good	3.0	Moderate	1.8	Poor	2.6	Moderate	2.0	Poor
W-09	5.0	Best	4.0	Good	1.6	Poor	2.0	Poor	1.0	Poor
W-10	5.0	Best	4.0	Good	1.6	Poor	2.0	Poor	1.0	Poor
W-11	5.0	Best	4.0	Good	1.6	Poor	2.0	Poor	1.0	Poor
W-12	5.0	Best	4.0	Good	1.6	Poor	2.0	Poor	1.0	Poor
W-13	5.0	Best	4.0	Good	1.6	Poor	2.0	Poor	1.0	Poor
W-14	5.0	Best	4.0	Good	1.6	Poor	2.0	Poor	1.0	Poor
W-41	5.0	Best	4.0	Good	2.0	Poor	2.0	Poor	1.0	Poor
W-42	4.0	Good	4.0	Good	2.6	Moderate	2.2	Moderate	2.0	Poor
W-43	4.0	Good	4.0	Good	2.6	Moderate	2.2	Moderate	2.0	Poor
W-46	4.0	Good	4.0	Good	2.6	Moderate	2.2	Moderate	2.0	Poor
W-47	3.0	Moderate	2.0	Poor	2.6	Moderate	2.2	Moderate	2.0	Poor
W-48	3.0	Moderate	2.0	Poor	1.0	Poor	1.6	Poor	2.0	Poor
W-58	3.0	Moderate	2.0	Poor	1.0	Poor	1.6	Poor	2.0	Poor

ANNEX-III

Table on Percentage of Impervious Area for Various Land Uses in Dhaka City

DAP land type	Population density (thousand people/km^2)								
	10	15	20	25	30	35	40	45	50
	Low density			Moderate density			High density		
	Impervious area by land type (%)								
Agriculture	0	1	1	1	1	1	1	1	1
Circulation network	2	3	4	4	5	6	6	7	7
Commercial activity	19	27	35	44	50	56	63	68	73
Community service	21	30	39	48	55	62	69	74	80
Diplomatic	9	14	18	22	25	28	31	34	36
Education and research	11	16	21	26	30	34	38	41	44
Governmental services	9	14	18	22	25	28	31	34	36
Manufacturing and processing activity	15	22	28	35	40	45	50	54	58
Mixed use	21	30	39	48	55	62	69	74	80
Recreational facilities	4	5	7	9	10	11	13	14	15
Residential	18	26	34	42	48	54	60	65	70
Restricted area	2	3	4	4	5	6	6	7	7
Service activity	9	14	18	22	25	28	31	34	36
Transport and communication	8	11	14	18	20	23	25	27	29
Vacant land	2	3	4	4	5	6	6	7	7
Water body not connected to drains	0	1	1	1	1	1	1	1	1
Water body connected to drains	100	100	100	100	100	100	100	100	100

Source: Author's calculation