

# Handbook of Risk Sensitive Land Use Planning for Upazilas and Municipalities in Bangladesh

Urban Development Directorate (UDD)
Ministry of Housing and Public Works
Government of the People's Republic of Bangladesh
and
Asian Disaster Preparedness Center (ADPC), Thailand

February 2016



# Handbook of Risk Sensitive Land Use Planning for Upazilas and Municipalities in Bangladesh

Technical Guidance from















Consists of Housing and Public Works (MoHPW), Implementation Monitoring and Division (IMED), Planning Commission, Department of Disaster Management Geological Survey of Bangladesh (GSB), Housing and Building Research Institute Service and Civil Defence (FSCD), BJIDPUS BUET, DDSM Dhaka University and Bangladesh Institute of Planners (BIP)

Handbook of Risk Sensitive Land Use Planning for Upazilas and Municipalities in Bangladesh

First Published: February 2016

Published by the Urban Development Directorate (UDD) 82, Segunbagicha, Dhaka-1000 Bangladesh

Phone: (+880-2) 9562728 URL: <u>http://www.udd.gov.bd</u>

Copyright © 2016 Urban Development Directorate (UDD). All rights reserved. Opinions expressed in the book are of the respective authors.

ISBN 978-984-33-9943-4

Design & Printed at Geo-Planning for Advanced Development (GPAD) GP Ja 61, Mohakhali, Gulshan, Dhaka-1212, Bangladesh Web: www. gpadbd.com, Phone: + 88 02 9862748

## ACKNOWLEDGEMENT

Tesearch publication under the Priority Implementation Partnership (PIP)

Asian Disaster Preparedness Center (ADPC) and Urban Development Directorate

This research is an outcome of many 'formal' and 'informal' contributions. This

add not have been possible without the continuous support of Mr. Khondker

Bin Farid, Director, UDD, who gave precious time from his busy schedule

His encouragement and moral support were enormous throughout the

period UDD would like to express its appreciation to ADPC for financial and

Bangladesh for his continuous inspiration and guidance to continue between ADPC and UDD.

while to convey sincere gratitude to the Technical Working Group (TWG) whose mediation and orientation of the research team has been invaluable. The technical group's members come from:

- Manager of Housing and Public Works
- The sical Infrastructure Division, The Planning Commission
- Implementation Monitoring and Evaluation Division, Ministry of Planning
- Department of Disaster Management
- Geological Survey of Bangladesh
- Bameladesh Fire Service and Civil Defense
- · Bousing and Building Research Institute
- Sampledesh Institute of Planners
- BCET-Japan Institute of Disaster Prevention and Urban Safety, Bangladesh University
   Engineering and Technology
- Department of Disaster Science and Management, Dhaka University

Be to give heartiest gratitude to Mr. Irfan Maqbool, Head, Safer Development Implementation, ADPC, who helped the team cordially from ADPC's side.

Do would like to convey special thanks to the planning professionals & Bangladesh who extended their support during the training workshop on the handbook for sharing their experiences and suggestions which have been this final report of the handbook.

# RESEARCH TEAM

Mr. Khondker Fowze Muhammed Bin Farid, Director, UDD

Mr. Shaheen Ahmed, Senior Planner (Town Planning), UDD

Mr. Uday Sankar Das, Senior Planner (Thana Center Planning- 2), UDD

Mr. Md. Tanvir Hasan Rezaul, Planner, UDD

Ms. Fauzia Sharmin Tithi, Planner, UDD

Mr. Anisur Rahman, Senior Project Manager/Acting Head, Resilient Cities and Urban Risk Management, ADPC

Mr. Matthew D. Sarsycki, Urban Planning Officer, Resilient Cities and Urban Risk Management, ADPC

Dr. Sunil Prashar, Program Coordinator, Safer Development Planning and Implementation, ADPC

## PREAMBLE

Risk sensitive land use planning has been practiced in different countries of the world, though it is a new concept in Bangladesh. It integrates risk reduction to allow communities to find the right mix of both development and risk reduction, in other words, accepting some risk for economic gain and vice versa.

This handbook deals with four parts: i) Part-A General information, ii) Part-B Risk Sensitive Land Use Planning, iii) Part-C Data requirement for Risk Sensitive Land Use Planning in Bangladesh, and iv) Part-D Policy Recommendations and Planning Tools for risk sensitive Land Use Planning. Risk sensitive land use planning cannot be effective if the risk assessment information is not well understood and is not accurately well collected. This handbook seeks to build knowledge of urban planners in terms of understanding the key concepts and data requirement of risk sensitive land use planning, to know the methodologies for risk assessment, and to know the policy options to be considered during plan formulation and implementation.

It took eight months to produce this handbook and the process of developing the guidelines involved several rounds of rigorous consultations, meetings, and workshops, which took place between UDD, Urban Planners and ADPC. This handbook will assist urban planners as well as development practitioners in formulating and implementing risk sensitive land use plans that ensures sustainable and resilient growth of Bangladesh.

Contents	
Title	Page
Acknowledgement	i
Research Team	ii
Preamble	iii
Contents	v
Figures	vi
Tables	vii
Acronyms	Viii
Glossary of Terms	x
PART A. GENERAL INFORMATION	1
Section 1 - Introduction to the handbook	3
Section 2 - Natural hazards and disasters in Bangladesh	4
PART B. RISK SENSITIVE LAND USE PLANNING	13
Section 3 - Risk sensitive land use planning: An overview	15
Section 4 – Risk sensitive land use planning: General guidance	34
PART C. DATA REQUIREMENT FOR RISK SENSITIVE LAND USE PLANNING IN BANGLADESH	51
Section 5 - Data requirement for different types of urban and land use planning in Bangladesh	53
PART D. POLICY RECOMMENDATIONS AND PLANNING TOOLS FOR RISK-SENSITIVE LAND USE PLANNING	67
Section 6 - Policy recommendations forland use plan implementation	69
ANNEXES	79
Annex- 1 Disaster risk profile of major cities in Bangladesh	81
Annex – 2 Mymensingh Strategic Development Plan (MSDP) Project, 2011-2031	82

Annex- 3 Preparation of Urban and Land Use Plan in Bangladesh: Step and Approach	85
Annex- 4 Lists of Risk Identification Methods	106
Annex- 5 Overview of PRA techniques: Social mapping, Venn diagram, Listing and Technology of Participation (ToP)	108
Annex- 6 Procedures for Conducting Brainstorm Method	112
Annex- 7 Procedures for Conducting Consensus	113
Annex- 8 Procedures for Conducting Community Action Planning	115
Annex-9 Planning Standards for Different Facilities during Implementation	
Annex-10 List of Important Policy/ Act/ Regulation and Relevant Section for Land Use Planning and Disaster Mitigation	
Annex-11 Risk Sensitive Urban Land Use Planning Tools	126
Bibliography	129

Figures	
	Page
Fig 2.1 Exposure level of population to multi-hazards at Upazilla and Thana level	7
Figure 3.1 Addressing risk	16
Figure 4.1 Components of risk	38
Figure 4.2 Illustration showing different geographical elements through a series of map layers	39
Figure 4.3 Risk matrix analysis	40
Figure 4.4 Four Categories of risk	41
Figure 4.5 Risk mapping	42
Figure 4.6 Geological map of Bangladesh	42
Figure 4.7 Map produced by the community (left) and reproduced map by using GIS (right)	45
Figure 5.1 Types of risk information required for structure plan, urban area plan, rural area plan and detailed area plan in Bangladesh	55

Tables	
	Page
Table 2.1 Urban hazards in Bangladesh	5
Table 2.2 Serious disasters in the recent years (1998-2015)	6
Table 2.3 Estimated losses and damages of 1998 flood in Bangladesh	8
Table 2.4 Flood-affected people in Dhaka city by severity of the flood, 1998	8
Table 2.5 Cost of rehabilitation and replacement of Dhaka Water Supply System, March 1999	9
Table 3.1 Types of hazard	22
Table 3.2 Physical characteristics of hazard occurrence	22
Table 3.3 Temporal characteristics of hazard occurrence	22
Table 3.4 Hazard assessment considerations	22
Table 3.5 Growth of urban population in Bangladesh	29
Table 3.6 Core needs, policy, capacity, and investment for RSLUP	32
Table 4.1 Parameters of selected hazards	35
Table 4.2 Hazard profile of Narayanganj city	36
Table 4.3 General outline of different hazard type, related maps and data source	43
Table 4.4 Land Use Planning Options and Measures (General Overview)	49
Table 5.1 Planning Guide 1: Level of Planning Phase and Related assessments	56
Table 5.2 Planning Guide 2: Exposure Data Requirement	56
Table 5.3 Planning Guide 3: Hazard Data Requirement	56
Table 5.4 List of features and information requirement for Urban Area Plan	62
Table 5.5 List of features and information requirement for Detailed Area Plans	64
Table 5.6 List of features and information requirement for Rural Area Plan	66
Table 6.1 Areas and policy recommendations for plan formulation	69
Table 6.2 Risk sensitive land use planning tools	76
Table 6.3 Land classification uses for new urban areas	77
Table 6.4 Land classification steps for built up areas	77

# **ACRONYMS**

Asian Disaster Preparedness Centre ADPC Bangladesh Bureau of Statistics BBS Bangladesh Institute of Planners BIP

Bench Mark BM

Bangladesh National Building Code BNBC Bangladesh Water Development Board BWDB.

Climate Change Adaptation CCA Community Risk Assessment CRA

Detailed Area Plan DAP

Department of Disaster Management DDM

Digital Elevation Model DEM

Dhaka Electric Supply Authority DESA

Department of Land Records and Survey DLRS

Department of Environment DoE

Department of Public Health Engineering DPHE

Disaster Risk Assessment DRA Disaster Risk Management DRM Disaster Risk Reduction DRR

Emergency Management Australia **EMA** 

Emergency Events Database EM-DAT

Earthquakes and Megacities Initiative EMI

Environment ENV

Food and Agriculture Organization FAO

Focus Group Discussion **FGD** Fire Service and Civil Defence **FSCD** Gross Domestic Product

GDP

Geographic Information System GIS Government of Bangladesh GoB Geological Survey of Bangladesh GSB

Housing and Building Research Institute HBRI

Hyogo Framework for Action **HFA** Hazard Vulnerability Analysis HVA

Implementation Monitoring and Evaluation Division IMED

Intergovernmental Panel on Climate Change **IPCC** 

Local Government Division LGD

Local Government Engineering Department LGED

Land Use Plan/Planning LUP

Millennium Development Goal MDG

MoDMR Ministry of Disaster Management and Relief

MoHPW Ministry of Housing and Public Works

MoP Ministry of Planning
MoT Ministry of Trade
O-D Origin-Destination

PDB Power Development Board

PIP Priority Implementation Partnership

PRA Participatory Rural Appraisal
PWD Public Works Department

RHD Roads and Highway Department
SDG Sustainable Development Goal
SRDI Soil Research Development Institute

SWOT Strengths, Weaknesses, Opportunities and Threats

ToP Technology of Participation
TWG Technical Working Group

UA Urban Area

Urban Development Council
Urban Development Directorate

UN United Nations

United Nations Disaster Relief Organisation
United Nations Environment Programme

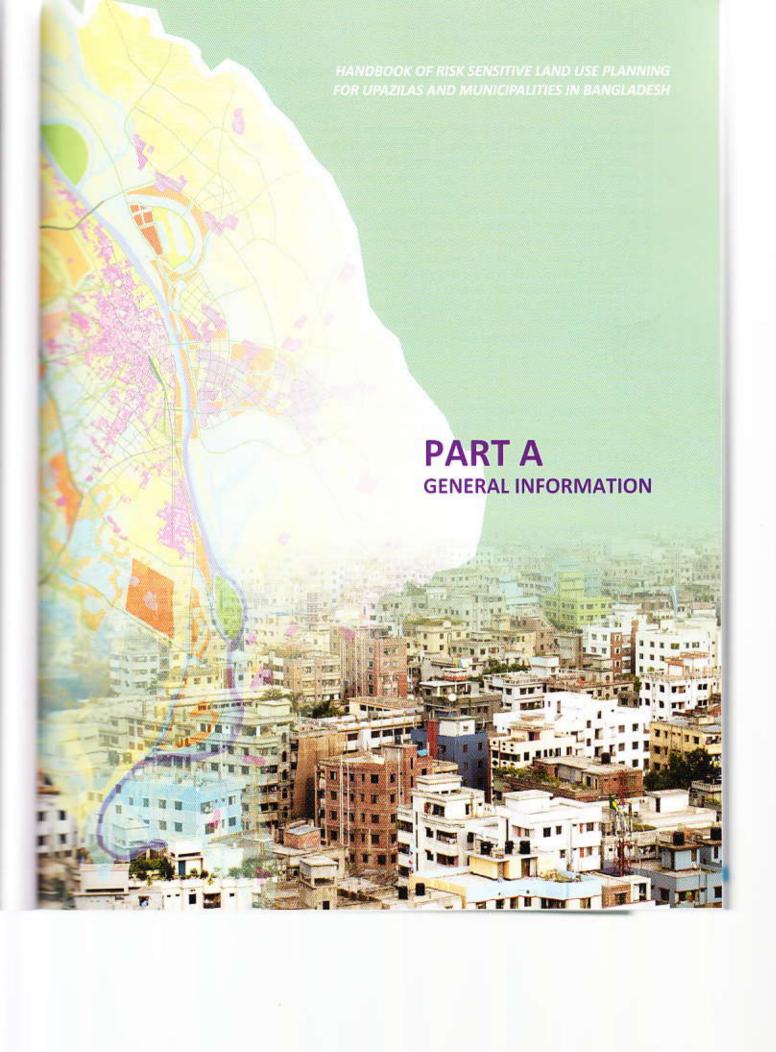
UNISDR United Nations International Strategy for Disaster Reduction

World Bank Institute

# GLOSSARY OF TERMS

Disaster	A serious disruption of the functioning of a community or society involving widespread human, material, economic or environmental losses exceeding the ability of the affected community or society to cope using its own resources.	
Disaster risk	The potential disaster losses, in lives, health status, livelihoods, assets and services, which could occur to a particular community or a society over some specified future time period.	
Disaster risk reduction	The systematic process of using administrative directives, organizations, and operational skills and capacities to implement strategies, policies and improved coping capacities in order to lessen the adverse impacts of hazards and the possibility of disaster.	
Exposure	People, property, systems, or other elements present in hazard zones that are thereby subject to potential losses.	
Geographical Information Systems (GIS)	Computer software designed to capture, manage, analyze, and display multiple forms of geographically referenced information	
Geomorphology	The science of surface landforms and their interpretation on the basis of geology and climate.	
Hazard map	A map that highlights areas that are affected by or vulnerable to a particular hazard.	
Land use	The spatial location of functions and activities.	
Land use plan	A document or set of documents which provide clear policy and strategic instruction for achieving sustainable, effective spatial development for a given area.	
Land use planning	Systematic and iterative procedure carried out in order to create an enabling environment for sustainable development of land resources which meets people's needs and demands. It assesses the physical, socio-economic, institutional and legal potentials and constraints with respect to an optimal and sustainable use of land resources, and empowers people to make decisions about how to allocate those resources.	
Liquefaction	The transformation of a soil from a solidto a liquid state as the result of increased pore pressure.	
Mahallah	Smallest identifiable area in a municipality with a settlement of a homogenous group of people. For operational convenience statistically mahallas are delineated within wards.	
Microzonation	Microzonation is a systematic way for the management of earthquake vulnerability, integrating for application the earth and engineering sciences.	

Mouza	Definite area demarcated and identified by the revenue department with a jurisdiction list number. It may be populated or unpopulated.	
Natural hazard	A dangerous natural phenomenon (such as a flood, storm or earthquake) that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage.	
Parishad	A local level council charged with governing a specific area.	
Pourashava	A municipality at local level.	
Rural	Rural refers to an area which is not an urban area or is not included within a municipality or cantonment.	
Risk	The combination of the probability of an event and its negative consequences	
Risk Assessment	A methodology to determine the nature and extent of risk by analyzing potential hazards and evaluating existing conditions of vulnerability/capacity that could pose a potential threat or harm to people, property, livelihoods -and the environment on which they depend.	
Resilience	The ability of a system, community or society exposed to hazards 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 basic structures and functions	
Shahar	Smaller urbanized area or secondary town.	
Urban	Urban refers to those areas where three-fourth of the adult male population of the area is employed in pursuits other than agriculture, and such area contains not less than fifteen thousand population and an average number of people not less than two thousand inhabitants per square mile.	
Union	Smallest local administrative (local government) unit of rural areas. A union is composed of mouzas and villages. A union has a union parishad.	
Upazila	Sub-district administrative area.	
Village	Smallest geographic unit of rural areas. A village may be a single mouza, or there may be more than one village in a mouza. It is always populated.	
Vulnerability	The characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard.	
Ward	Smallest local administrative (local government) unit of urban areas. For operational convenience, a municipality's area is divided into three or more wards. The ward boundaries are specified by gazette. A ward has a ward parishad (council).	
Zila	District administrative area.	



# SECTION 1 - INTRODUCTION TO THE HANDBOOK

# 1.1 Why the handbook has been prepared?

Under Bangladesh regulations, a number of agencies are licensed to prepare urban and land use plans at the local level. The Urban Development Directorate is the principal agency; however the Local Government Engineering Department also prepares such plans. In addition, a number of private planning consultancies prepare plans for these government agencies, as well as foreign organizations. Although, sustainable development is the aim of many of these plans, within the various plan preparation methodologies utilized by these different agencies, disaster risk and climate change are not systematically considered. This results in the production of land use and urban plans which build risk. Given the intense flood risk confronting Bangladesh, urban and land use plans need to address disaster risk and climate change if they are to foster truly sustainable long-term growth. This handbook has been prepared on the basis of "Guidelines for Mainstreaming Disaster Risk Reduction into Land Use Planning for Upazilas and Municipalities in Bangladesh" prepared jointly by UDD and ADPC to ensure that a standard method for risk sensitive urban and land use planning is available in Bangladesh, and can be utilized by all agencies engaging in plan preparation.

#### 1.2 Who should read the handbook?

The handbook has been prepared for

- urban planners in both the private and public sectors whose job is to prepare structure plans, urban area plans or detailed area plans at local levels
- consultants as well as other stakeholders involved in land use plan preparation
- decision-makers at local levels who seek a better understanding of the planning process

## 1.3 What is the purpose of this handbook?

The main purpose of this handbook is to provide planners with a step-by-step guide for undertaking risk sensitive urban and land use planning. This methodology ensures a uniform process across Bangladesh. Further, this handbook:

- provides planners with conceptual and technical information and support them in improving the quality of urban and land use plans, and facilitate implementation of these plans
- helps planners to understand the role of hazard and risk data and information during the planning process, as well as, how to manage and reduce risk through land use and urban planning

#### 1.4 Limitation

This handbook aims to deal with the natural hazard risks through advocating for risk sensitive land use planning. But, the issue of climate change, namely in how it influences the intensity and frequency of natural hazards is not covered extensively in this handbook. In addition, strengths and weaknesses of land use planning tools or standards in the context of climate change impacts have not been touched in detail, but as climate change issue is one of the highest priorities for the Government of Bangladesh (GoB) and ADPC, the climate change issue will be effectively dealt in the future through a separate handbook on climate change and risk sensitive land use planning.

## SECTION 2 - NATURAL HAZARDS AND DISASTERS IN BANGLADESH

#### Purpose

- 2.1 To familiarize the reader with the natural hazards and disasters in Bangladesh. The section gives brief overview of natural hazard risks in urban areas and highlights some common direct and indirect impacts of major urban disasters in the country. As an example, it discusses the 1998 urban flood in Dhaka.
- 2.2 To inform the reader about the key factors responsible for urban areas' vulnerability to disasters, and how such vulnerability can be reduced through land use planning.

#### Hazard1

2.3 A dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage.

#### Natural Hazard

2.4 Natural process or phenomenon that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage.

Note: Natural hazards are a sub-set of all hazards. The term is used to describe actual hazard events as well as the latent hazard conditions that may give rise to future events. Natural hazard events can be characterized by their magnitude or intensity, speed of onset, duration, and area of extent. For example, earthquakes have short durations and usually affect a relatively small region, whereas droughts are slow to develop and fade away and often affect large regions. In some cases hazards may be coupled, as in the flood caused by a hurricane or the tsunami that is created by an earthquake.

<sup>1</sup> UNISDR (2009), Terminology on DRR

2.5 Urban area of Bangladesh is vulnerable to several natural hazards as shown in table 2.1.

Table 2.1 Urban hazards in Bangladesh

Urban area (Municipal Major Hazards Corporation, Paurash or Municipalities)	ava	Remark
Tangail	Earthquake, fire, flood and water logging	
Narayanganj	Flood, fire, earthquake, water logging, building collapse	
Munshigonj	Flood, cyclone, drought, river erosion, earthquake	Earthquake and climate change are new addition to existing hazards
Dhaka	Earthquake, flood and water logging, Fire, environmental concern	Environmental concern are mainly concern with flood flow and water body
Gazipur	Fire, building collapse, earthquake, flood, water logging, tornado	City
Madhabdi	Earthquake, fire, flood & water logging, environment degradation	Environment degradation includes air and water pollution, solid waste
Barisal	Flood, water logging, salinity and cyclone	
Bogni	Earthquake, fire, and water logging	
Saghata, Sonatala, and Sariakandi	Flood, drought, sedimentation, river erosion, solid waste, and water logging	Upazila

Source: UDD (2015) Consultation Workshop (Date: 9 Sept 20 15)

For detail information on all hazards that have affected urban areas of Bangladesh, please see Annex 1.

# Direct and Indirect Impacts of Disasters

- 2.6 In the recent past, major disasters (Annex 1) have brought several direct and indirect losses and damages to the urban areas of Bangladesh. Some of them are:
  - · loss of life
  - · damage to water supply, sewerage, drainage facilities, and other utilities
  - · damage to city roads
  - damage to dwellers houses
  - environmental degradation
  - · heath and sanitation problems
  - · disruption of business and commercial activities
  - · damage to small and medium industries
  - · disruption of communication
  - · outbreak of water borne diseases
  - · loss of economic activities
  - · loss of livelihoods
- 2.7 Natural and man-made disasters have caused significant loss of lives and economic losses globally. The case of Bangladesh confirms the same as highlighted in the table 2.2 and table 2.3. Moreover, the impact is high due to the fact that a large number population is exposed to multi-hazards (figure 2.1).

# Table 2.2 Serious disasters in the recent years (1998-2015)

Event*	Impact Jackward more than 500.00
2009 Cyclone ALIA	Impact  190 dead, 7,103 injured, 4.8 million affected damaged and destroyed more than 500,00 houses, and extensive damage to more than 1,400 km of embankments and an estimated 8,800 km of road
2007 Super Cyclone SIDR	Affected – 8.92 million individuals, 30 districts, 200 upazinas, 1950 unionitation approximately damaged crop fields approximately damaged cro
2007 Flood	Inundated 32,000 sq. km, over 85,000 houses destroyed and amaged, estimated damaged approximately 1.2 million acres of crops destroyed or partially damaged, estimated damaged.
2005 Tornado	Tornado impact affected almost 50,000 population. Mainty affected was
2004 Flood	Inundated 38%, damage USS 6.6 billion, affected flearly 5.5 mass a
2004 River Bank Erosion	Affected Sirajganj and Faridpur districts eroded 281 fat. tahu, croded embankment eroded district road (320 meter), eroded upazilla road (1175 meter), eroded embankment
1998 Flood	Inundated 100,000 sq. km (66%) of the country, 1050 deads, 50 turner and inundated homeless, 20,000 schools and education facilities damaged, 16,000 km of road inundated
	4,500 km of river embankments damages.  4,500 km of river embankments damages.

<sup>\*</sup> Earthquake, drought, arsenic contamination, storm surge, salinity intrusion, tsunami, fire, infrastructure collapse and landslide, are the other natural hazards highlighted by Government of Bangladesh

Source: Disaster Management Bureau, Disaster Management & Relief Division (2010); Actionate (1999); Bangladesh Disaster Knowledge Network (2013); ADRC (2003); USAID (2009)

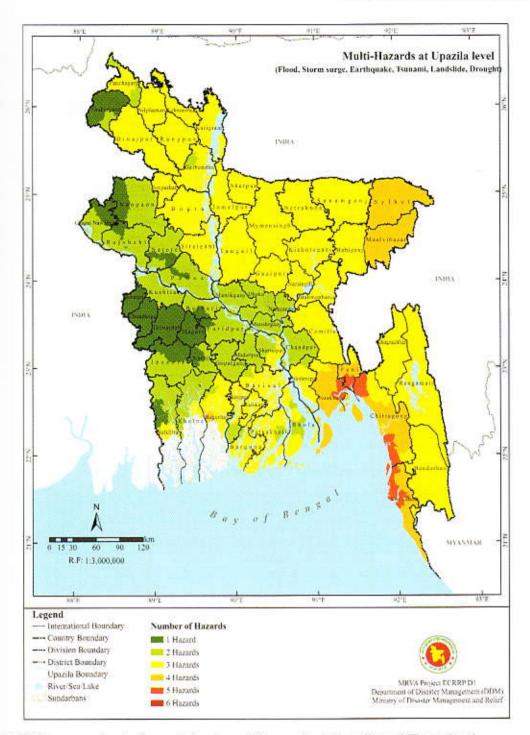


Fig 2.1 Exposure level of population to multi-hazards at Upazilla and Thana level Source: Department of Disaster Management Ministry of Disaster Management and Relief (2016)

## 1998 Urban Flood in Bangladesh

2.8 Particularly in cities, economic development and disaster preparedness have share cities' vulnerability to disasters.

"In the new urban millennium, natural and human-made disasters are likely to have their greatinpact in cities where half of humanity is expected to reside...(UN-HABITAT, 2007)"

2.9 In 1998, a major flood hit the country (Fig 2.1, Table 2.3, 2.4 and 2.5), which affected areas of Dhaka City Corporation (DCC). Around 80% of the DCC area under water at depth ranging from 0.3 to over 4.5 meters (Huq and Alam, 2003).

Table 2.3 Estimated losses and damages of 1998 flood in Bangladesh

1998	
100,250	
59	
30,916,351	
918	
2.04	
26,564	
15,927	
4,528	
6,890	
980,571	
1,718	
1,049,525	
	100,250 59 30,916,351 918 2.04 26,564 15,927 4,528 6,890 980,571 1,718

Source: Ahmed, 1999

Table 2.4 Flood-affected people in Dhaka City by severity of the flood, 1998

Severity of flood	Affected wards (no.)	Total affected households (no.)	Total affected population (millions)
Most severe	22	203,000	1.20
Severe	15	150,000	0.90
Moderate	43	409,000	2.45
Total affected	80	762,000	4.55

Source: Hye, 1999

# Table 2.5 Cost of rehabilitation and replacement of Dhaka Water Supply System (DWASA) due to 1998 Urban Flood, March 1999

Item	Rehabilitation and replacement needs	Estimated cost (million taka)	
1	Repair and cleaning of 600 kilometer water distribution mains	15	
2	Replacement of 5 deep tube wells	20	
3	Rehabilitation of pump and electrical 42 su-bstation of 42 -aff floodected DTWs	42	
4	Raising level of reconstruction of walls of 42 pump houses	10	
5	Installation of 3 low-lift pumps	15	
6	Reconstruction of 20 kilometer water mains	25	
W.		127	

Source: Ahmed, 1999

- 2.10 Rapid assessments of the affected areas by the 1998 flood showed that flooding displaced or dislocated 94% of families in most severely affected areas, 52% of families in the severely affected areas, and 50% of families in moderately affected areas (Table 3; Huq and Alam, 2003).
- 2.11 Water supply and production were severely affected during 1998 floods as shown in table 4, for instance, it was found that 44 deep tube wells were affected by floodwater; production of 13 of these was suspended, and estimated loss in water production due to the suspension was 45 million liters per day (Huq and Alam, 2003).
- 2.12 Moreover, in 1998 flood, more than 262,000 shelters (or 30%) under Dhaka Metropolitan Areas caused loss of Tk. 2,311 million. Out of these, around 30% were semi-permanent and permanent structural houses belong to rich to middle class families who were not dependent on assistance for rehabilitation and repair (Huq and Alam, 2003).
- 2.13 Similarly, there are several examples in Bangladesh, where natural disasters caused extensive loss of lives and created an enormous economic loss in the cities. For example, a 1991 cyclone in Bangladesh severely affected Chittagong and Cox Bazaar, which killed 140,000 people in these cities and nearby islands.
- 2.14 What makes a city vulnerable to such disasters and how land use planning can contribute in reducing city's vulnerability to such disasters?<sup>2</sup>

Nojavan M. et. al. (n.d.) Role of Land Use Planning in Disaster Risk Reduction. Department of engineering Management of Natural Disaster, Graduate faculty of Environment, University of Tehran

VI MUNICIPALITIES IN 18 18 18 18	
Contributions to City Vulnerability to Natural Disasters	Contribution of Land Use Planning to Reduce City's Disaster Risk
Rapid growth and inadequate planning	Restricts development of specific types on hazard prone land.  Develops regulations like set-backs, easements and building codes to ensure assets are protected.
Ecological imbalance	Restricts development of any kind on land that is considered high risk
Population density	Develops regulations like set-backs, easements and building codes to ensure assets are protected
Concentrated political, economic and other resources	
Dependency on infrastructure and services	
Inappropriate construction	a constant

STREET S

Hor. A. 174 Blood line TECN San

MD CIT Inutias i Sept 2015

EFERIN Section 1 ENT-S

CHIEF R

2.15 The Initiative has been already taken in Bangladesh on Risk Sensitive Land Use Planning of a municipality known as Mymensingh. The project title, "Strategic Development Plan of Mymensingh Town and its Surrounding Region through Mainstreaming Disaster Risk Reduction in Land Use Planning 2011-2031", is implemented by the Urban Development Directorate (UDD), Ministry of Housing and Works, Government of Bangladesh, and supported by the Comprehensive Disaster Management Program (CDMP-II). For detail, please see the Annex 2.

## References

Actionaid (1999) After the flood: Official Damage Statistics of Bangladesh Flood 1998. http://reliefweb.int/report/bangladesh/after-flood-official-damage-statistics-bangladesh-flood-2003.

1998 Bangladesh.Country Report Management in Disaster http://www.adrc.asia/countryreport/BGD/2003/page2.html

Ahmed F. (1999) "Impact on Water Supply Sanitation and Waste Management." In A. Nishat, M. Reazuddin, and others, (Eds.), The 1998 Flood: Impact on Environment of Dhaka City. Department of Environment in conjunction with IUCN Bangladesh profile.

Hazard Network Knowledge http://www.saarc-sadkn.org/countries/bangladesh/hazard\_profile.aspx

Department of Disaster Management Ministry of Disaster Management and Relief (2016) Draft Final Report of Multi-Hazard, Vulnerability and Risk Assessment in Bangladesh (Draft Version). Government of Bangladesh

Disaster Management Bureau, Disaster Management & Relief Division (2010) National Plan for Disaster Management 2010-2015. Government of Bangladesh

Huq S. and Alam M. (2003) Flood Management and Vulnerability of Dhaka City. In A. Kreimer, Margaret Arnold, and A. Carlin (Eds.), Building Safer Cities: The Future of Disaster Risk. Disaster Risk Management Series no. 3. (pp. 121-135). The World Bank: Washington D.C.

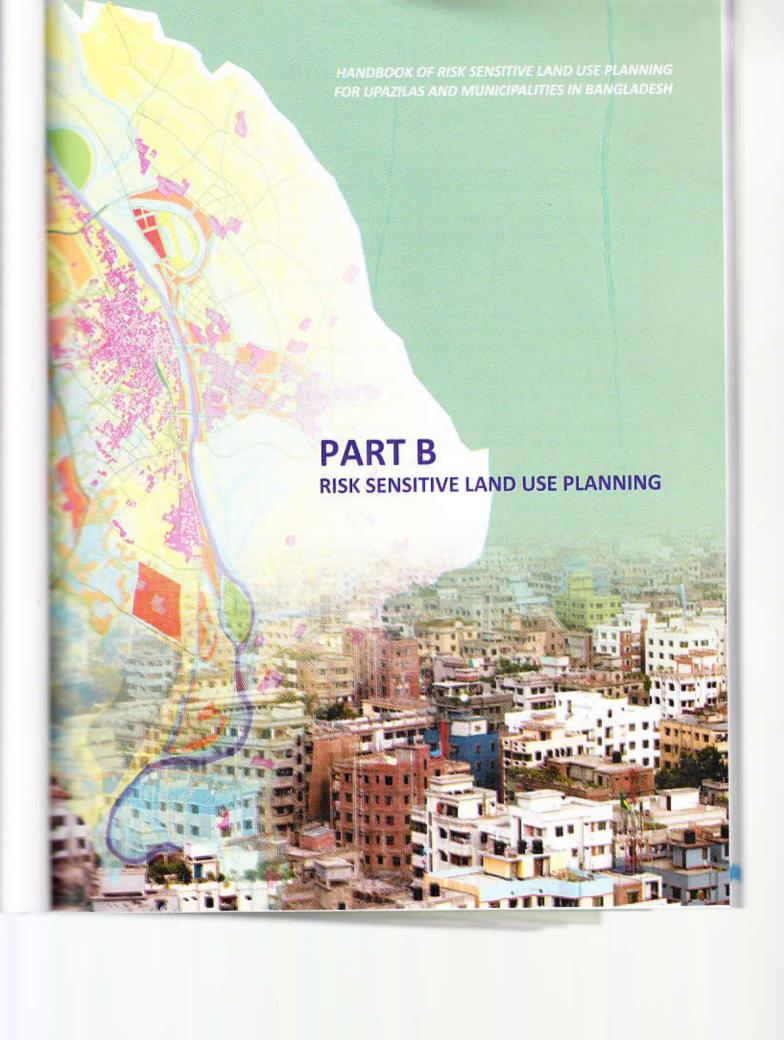
Hye A. (1999) "Effect on Livelihood." In A. Nishat, M. Reazuddin, and others (Eds.), The 1998 Flood: Impact on Environment of Dhaka City. Department of Environment in conjunction with IUCN Bangladesh

UDD (2015) Consultation Workshop on Handbook of Risk Sensitive Land Use Planning in Upazilas and Municipalities of Bangladesh. Workshop.Organized by UDD and ADPC on 9 Sept 2015, Dhaka.

UN-HABITAT (2007) Enhancing Urban Safety and Security.Global Report on Human Settlements 2007.United Nations Human Settlements Programme.UN-HABITAT. EARTHSCAN: London, Sterling, UK

UNISDR (2009) Terminology on DRR. Accessible online at http://www.unisdr.org/we/inform/terminology

USAID (2009) Bangladesh Cyclone.Fact Sheet #1, Fiscal Year (FY) 2009, http://reliefweb.int/sites/reliefweb.int/files/resources/B5DF92745EC17E35852575FC00668EAA -Full\_Report.pdf



## SECTION 3 - RISK SENSITIVE LAND USE PLANNING: AN OVERVIEW

#### PART I

#### Purpose

- 3.1 To develop a basic understanding of the reader regarding risk sensitive land use planning by discussing its definition and linkages with risk management framework.
- 3.2 To orient the reader with the preparation of urban and land use plan in Bangladesh and identify key questions that can support the incorporation of risk management into land use plan preparation in the country.

## What is Risk Sensitive Land Use Planning?

- 3.3 Risk sensitive land use planning (RSLUP) is planning that integrates risk reduction, to allow communities to find the right mix of both development and risk reduction, in other words, accepting some risk for economic gain and vice versa.<sup>3</sup>
- 3.4 In other words, it combines the risk management process (i.e. risk assessment, risk treatment, and others) with the land use planning processes (Fig. 3.1).
- 3.5 One of the most important principles of RSLUP is to avoid development in the hazard prone areas or risk prone areas or "hot spots" that are exposed to the risk of natural hazards and climate change.
- 3.6 Risk reduction or Disaster Risk Reduction (DRR) deals concept and practice of reducing disaster risks through systematic efforts to analyze and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events.

Sudmeier-Rieux, 2013

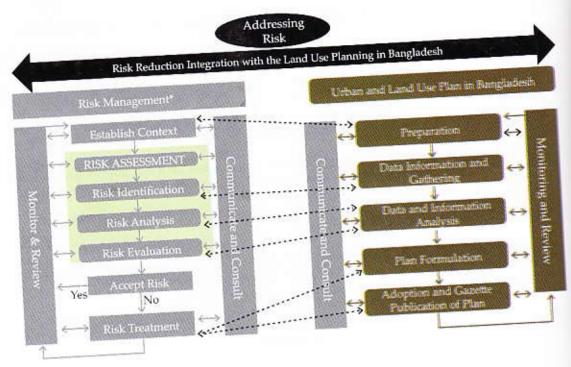


Fig 3.1 An approach to address risk

\* Adopted from (European Commission, 2010; International Electrotechnical Commission, 2009; Émergency Management Australia, 2002

# Similarities between Land Use Planning and Disaster Risk Reduction <sup>4</sup>

- Both are systematic, for example, land use planning is methodical and DRR uses risk assessment as a basis.
- Both are future-oriented, for instance, land use planning is based on long-range goals and DRR also aims at medium to long-term solutions. 3.8
- Both are decision-oriented, where land use planning prioritized projects and programs and DRR pin points high-risk populations and risks. 3.9
- 3.10 Both are proactive, for example, land use planning anticipates problems and opportunities and DRR mitigates.



<sup>4</sup> Reyes, 2007

# Urban and Land Use Plan preparation steps in Bangladesh

3.11 There are five steps to be implemented while preparing urban and land use plan in Bangladesh as shown in the box below. For the detailed description of each step, please see Annex 3.

Preparation of Urban	and Land Use Plan in Bangladesh: Steps	
Step 1 Preparation	Step II Data information and gathering	
Step III Data information and analysis	Step IV Plan formulation	
Step V Adoption and Gazette Publication of Plan		

#### Step I: Preparation

on.

isk

als

ind

ind

- 3.12 Step I: Preparation aims to establish favorable conditions for a land use planning project. It includes the following activities:
  - Assemble the team
  - · Gather basic information
  - · Undertake an initial socio-economic analysis
  - Set plan goals and objectives
  - Finalize the working methodology
  - · Determine the timeline and budget
  - Draft inception report

# 3.13 Key DRR Considerations in Step I: Preparation

- While assembling the team, ensure that members are relevant climate and disaster risks management actors to be involved in the LUP process and how shall they be involved?
- Do the natural disasters in question, cause significant direct and indirect impacts in the LUP area? Are such information reflected in the basic information of the inception report?
- Are natural hazards frequently occurring in the LUP area and how do they affect socio-economic development? What is their probability of occurrence in future?
- Is the meeting or consultation with stakeholders to develop land use plan's objectives and goals includes relevant climate and disaster risk management actors?
- Who can provide relevant risk information at various levels and who has capacity to incorporate disaster risk information into LUP process?
- Is there public awareness about climate and disaster risks among the exposed population, decision makers and technical staff?
- Is there a need to develop disaster and climate risk awareness first?
- Is the selected methodology technical and financially addresses the climate and disaster risk issues?

## Step II: Data and Information Gathering

- 3.14 Step II: Data Information and Gathering aims at collecting all relevant information and assembling them into a database, which consists of primary and secondary output. It involves the following activities: -
  - Prepare a work schedule and budget for each team
  - Prepare a base map using GIS
  - Collect secondary data
  - Undertake a topographic survey
  - Undertake field surveys and interviews
  - Integrate all data into the GIS map
- 3.15 Key DRR considerations in Step II: Data and Information Gathering Stage
  - Is risk assessment for LUP area clearly understood and highlighted in the work schedule?
  - What is current level of knowledge in regards to risk, risk management, hazard assessment, vulnerability analysis, risk identification, risk analysis, risk evaluation, and risk treatment?
  - What level of knowledge and participation is needed for a separate risk mapping and analysis?
  - What is current level of data or information available for LUP area in regards to hazard, vulnerability, exposure and capacity?
  - Are risk related questions considered in relevant sector investigations (e.g. agriculture, public infrastructure, housing, water management etc.)?
  - Are the sector experts trained or helped to answer the questions in an adequate manner?
  - Regarding secondary data collection, are the hazards and risk maps collected from relevant sources for the analysis?
  - Is hazard data collected during the topographic survey and field surveys and interviews?
  - Are future risks influenced by rapid urbanization, climate change, uncertainty, etc. considered?

# Step III: Data and Information Analysis

- 3.16 Step III: Data and Information Analysis aims at analysis of collected data to get the overall development patterns of the planning areas and also to understand the specific development options, future socio-economic growth scenarios and disaster risk. It includes the following activities: -
  - Analyze socio economic data and information
  - Analyze sectoral data and information
  - Analyze transportation data and information
  - Analyze environmental data and information
  - Undertake a SWOT analysis
  - Draft and share sectoral and analytical reports

How of the get

Key D

 What Inform

Is the

No Plan

5.08 Step I which outpu plan,

Deter
 Form

DraftCons

\* Draft

\* Iden

Key

 Is the and sust.

Are adec

Are mea resp

HavHavHav

-W-Ad

Step

gan

\* An

3.17 Key DRR considerations in Step III: Data and Information Analysis

 How can the risk analysis considering hazards and vulnerabilities best be integrated in the general baseline analysis?

- What level of knowledge and participation needed for utilizing Geographical Information System, Participatory Rapid Appraisal, Risk Matrix Analysis for risk assessment?
- Is the risk analysis used for awareness rising of the population at risk?

#### Step IV: Plan Formulation

nand

ut. It

vork

zard

tion,

and

s to

ure,

uate

rom

and

etc.

the

ific . It

- 3.18 Step IV: Plan Formulation deals mainly with the preparation of draft Land Use Plan, which is developed through consultation with relevant stakeholders. The primary output of this stage mainly includes three types of plans: structure plan, urban area plan, and detailed area plan. It includes the following activities: -
  - · Determining planning standards
  - Formulate development scenarios
  - Draft planning proposals
  - Consult all stakeholders
  - Draft the structure, urban areas and detailed area plan
  - Identify priority projects
- 3.19 Key DRR considerations in Step IV: Data and Information Analysis
  - Is the disaster risk relevant enough to be mentioned in the land use vision and policies, and is it adequately included (e.g. human security or economic/ecological sustainability)?
  - Are the actors, who are involved in the formulation, prepared to identify the most adequate risk reducing measures or should further specialists be consulted?
  - Are adequate risk management measures (structural and non-structural land use measures) identified in the LUP to prevent disasters and/or prepare effective response?
  - Have risk sensitive land use planning tools been discussed?
  - Have risk criteria for land use (e.g. zoning) been identified?
  - · Have indicators for the monitoring of disaster risk been identified?

#### Step V: Adoption and Gazette Publication of Plan

- 3.20 Step V: Adoption and Gazette Publication of Plan deals with converting the plan into legal document for implementation, in other words, to convert land use plan into gazette plan. It includes following activities: -
  - · Consult all stakeholders
  - Amend plan
  - Submit plan for approval

- 3.21 Key DRR considerations in Step V: Adoption and Gazette Publication of Plan
  - Are the adopting entities aware of the relevance and consequences that specific DRM criteria and special projects have?
  - Does the publication strategy imply the explication of the relevance and consequences of DRM criteria and measures?
  - Do the relevant actors (population at risk, private sector etc.) understand and accept the approach (ownership)?
  - Are the risk related norms (e.g. for construction or agriculture) established and
  - Are the identified specific measures concretized?
  - Is the responsible technical staff trained to assure the needed quality?
- 3.22 The below section discusses risk management components in detail and tries to answer some of key questions raised in earlier section.

#### Risk<sup>5</sup>

- 3.23 It is the expected loss from a given hazardous event for a given element of vulnerability over a specified time period. It is a function of:
  - probability of a hazard of a particular magnitude occurring
  - element susceptible to potential loss or damage (at risk)
  - nature of vulnerability of those elements
  - a specified future time period

# Equation of Risk = HAZARD X EXPOSURE X VULNERABILITY

# Risk Management

- 3.24 It is the process of analysis, which leads to the estimation of the magnitude of a given risk and the determination of how important such a risk is to matters of 'our' concern. It includes an evaluation of all the elements that are relevant to an understanding of existing or contemplated hazards and their effects on a specific environment. When this evaluation is considered in social or political terms, it enables the determination of appropriate hazard prevention, or vulnerability reduction, or mitigation strategies.
  - Risk assessment

The scientific quantification of risk determined from data and an understanding of the processes involved. Determines the magnitude of the risk.

Risk evaluation

The social, economic and political judgments of the importance of various risk faced by those exposed to them. Determines the accepted importance of the risk.

Conditional elements

<sup>&</sup>lt;sup>5</sup> ADPC, 1994; Carter, 1991a,b; Davis and Gupta, 1991; Emergency Management Australia (n.d.); Coburn, Sspence. Pomonis, 1994



 Importance of amount and type of information and a careful understanding of the nature of the hazard and its associated forces. Prevailing ignorance constitutes a major risk factor.

 There is a need to balance rigorous scientific or rational analysis against other "belief factors" of social or personal importance.

<u>People respond to risks, which they perceive</u>, which may be affected by media exposure, previous experience, or judgmental bias. Perceptions may be altered by vividness or frequency of exposure, dread or imagination.

<u>Variation of voluntary and involuntary exposure</u> and presumed ability of effective response (prevention and controllability).

 Relative costs and benefits associated with specific options of risk reduction <u>Affordable risks</u>, literal costs vs. benefit <u>Acceptable risks</u>, personal, social or political choices <u>Degree of risk over time</u>, relative probability of risk

## Policy Option for Risk Reduction<sup>5</sup>

ecific

and

and

and

s to

t of

ven

ern.

hen n of

the

ose

- 3.25 Decision-making Essential to have political commitment
  - · Priority needs of attention
  - · Time and resource allocation
  - · Decide relative effects of intervention
- 3.26 Importance of information
  - · for policy determination
  - for public knowledge
- 3.27 Hazard Prevention
  - Man-made hazards offer much potential for prevention
  - Natural hazards offer less potential for prevention
- 3.28 Vulnerability Reduction
- 3.29 Mitigation of Effects
  - Structural measures of mitigation
  - Non-structural measures of mitigation

#### Hazard Assessment<sup>6,5</sup>

3.30 It is a process of analysis, which attempts to specify the "hazard occurrence probability" of an event of a given proportion occurring in a certain area within a stated time period (type/intensity/space/time).

This series of activities is sometimes known as a risk analysis process.

3.31 The process of identifying and assessing the relative properties and direct effects of hazards with reference to time is based on the collection of historical and scientific data able to be presented in scales, maps or other means of comparison for analysis. The accuracy and degree of sophistication possible or desirable will depend on the extent of perceived risk and the detail of available information (Table 3.1, 3.2, 3.3, & 3.4), determined by human, financial, technical and temporal resources available.

# Table 3.1 Types of hazard

able 3.1 Types of mazaris		
	Earthquake	Tsunami
Flood	The second secon	Fire
Cyclone and Storm surge	Drought	Infrastructure collapse
Tornado	Arsenic contamination	Land slide
River bank erosion	Salinity intrusions	Lana viide
River pank crosion		

III Risa

EXPO

# Table 3.2 Physical characteristics of hazard occurrence

	Knowledge of hazard, its development and behavior	
Identity	Types of forces associated with the hazard	
Nature	Capacity, or potential of destructive forces, effects	
Intensity	Geographical distribution, range of impact	
Extent	Community, sectoral extent, range (s) of impact	
Scope	Consequence of physical, temporal properties	
Predictability	Consequence of primary causes, properties	
Manageability	Consequence of printary cure-ces pro-t	

# Table 3.3 Temporal characteristics of hazard occurrence

Table 5.5 Temporar	CHICAGO CONTRACTOR CON
Commencer	How often the event occurs
Frequency	Expected time of lasting impact
Duration	Rapidity of arrival of impact
Speed of onset	Time between identification/warning and impact
Forewarning	Time between identification various

# Table 3.4 Hazard assessment considerations

S.no.	Key hazard assessment considerations
1	History
2	Probability of various intensities
3	Maximum credible threat  Necessary to consider secondary hazards, or 'knock-on' effects of primary forces or main triggering  Necessary to consider secondary hazards, or 'knock-on' effects of primary forces or main triggering  Necessary to consider secondary hazards, or 'knock-on' effects of primary forces or main triggering
4	event, (e.g., earthquake causes dam burstnarkishte causes in a collapse, causes population displacement, etc.)
5	collapse, causes population displacement, etc.)  The more rare hazards are in a given area, the less historical or statistical information there is to work with. Therefore, they present a less confident opportunity for prediction or common awareness and they can be a greater liability.

3.32 Elements at Risk to the Effects of Hazards (direct consequences of the forces of hazards): Those elements, people, property or environment, processes or systems affected by the forces of a hazard if it occurs:

<sup>\*</sup> Bangladesh context

People, loss of life	Personal health, injury or disease	Damage, destruction of infrastructure, public service systems
Damage, destruction of environment	Damage, destruction of crops	Disruption, loss of production
Disruption, loss of livelihood	Disruption, loss of essential services	Disruption, loss of national infrastructure
Disruption of governmental process, systems	Loss to national, local economies	Disruption, loss of community or lifestyle
Sociological or psychological consequences		

## Vulnerability Analysis 5

ta he

4),

ng work

s of tems

- 3.33 It is a process, which results in an understanding of the types and levels of exposure of persons, property, and the environment to the effects of identified hazards at a particular time.
- 3.34 The process to identify physical, social and economic conditions susceptible to the effects of hazards of a given intensity by focusing on the types of risk to which they are exposed. Different elements vary significantly in their susceptibility to damage of disruption and vulnerability also differs according to intensity of the hazard.

## 3.35 Types of Vulnerability

 Physical Vulnerability, pertaining to matters of location, proximity, structural and infrastructural conditions, frequently including agricultural assets as representing physical 'plant'.

Building	Considering their use, site, design, shape, proximate locations, materials used, state of maintenance, construction techniques and quality.
Infrastructure	Structurally-based systems and related processes necessary for the social and economic functioning of a society or a community, which in terms of their essentiality are sometimes referred as 'lifelines'  Transportation systems and component elements  Telecommunication system (external and internal)  Public utilities services (water, electricity, drainage)  Essential public or community services and related facilities (health, public administration, emergency or security services and facilities, essential economic structures, critical civil protection systems or measures, etc.)
Agricultural	Primarily considering physical assets related, but opportunity loss potential of essential natural resources, crops, trees, livestock, fisheries, also should be recognized.

Economic Vulnerability, determined by evaluating the direct loss potential of
economic assets and processes, indirect loss potential, and consequent secondary
effects, generally derived from previous historical data applied to current conditions
affected by a variety of disaster scenarios. As the direct disaster assistance seldom
exceeds a small fraction of total assets loss, it is in terms of net opportunity cost that
economic vulnerability must be measured. Any complete assessment of economic
vulnerability must be linked to studies of physical and social vulnerability.

Direct loss potential	Damage, destruction of buildings, plant, facilities, raw material, products     Replacement costs     Loss of employment
	Crop losses     Damage to means of production
Indirect loss potential	Impact of lost production Impact of lost employment Destructions of savings Loss of markets Loss of opportunities Loss of vital services Loss to consequential income-earning activities
Secondary effects	Inflation     Indebtedness     Income disparities     Labor migration     Re-orientation of capital allocation     Frustration of developmental investment     Economic isolation of affected areas

Social Vulnerability, determined by the perception of risk and the ability of people to
take measure to reduce that risk. Social vulnerability is more difficult to measure than
either physical or economic vulnerability, but efforts can be made to identify those
elements of society or social behavior, which may reflect a great risk of adverse effect.

Critical indicators of perceived risk, ability of response	<ul> <li>Poverty, limitation of resources, reserves or options</li> <li>Degree of public awareness about the immediate social and physical environments as they relate to hazards and effects</li> <li>Prior personal experience of specific risk, consequence</li> </ul>
Demographic considerations	- Magnitudes, total population - Concentration densities - Demographic distinctions, vulnerable groups of socially disadvantage people or those requiring special attention - Children - Disabled or physically/mentally impaired people - Single parent families - Elderly people - Women, particularly if pregnant or lactating - Remotely located, isolated groups of people - Seasonal, temporary or migrant populations - Socio-political or cultural attributes affecting social vulnerability

Capab positiv prever ability

ish the

it defi nest of paran partic

mane a

or a specific

TOTAL ST. In its a

What

\* ls ti

\* 10 t

20.1



tial of ondary ditions seldom ast that

ple to e than

those effect.

aged

- Education and literacy levels
- Leadership, extent of coherent and effective governance
- Political viability, integrity, public confidence
- Extent of self-reliance, community organization capabilities
- Informed, practiced local or traditional coping mechanisms
- Nature of belief systems, people's view of themselves and their own abilities
- 3.36 Capabilities: When conducting a vulnerability analysis, special note should be taken of positive attributes able to be identified that may contribute to an enhanced ability to prevent or mitigate the effects of a disaster, or which may strengthen a community's ability to respond effectively to the hazard.

#### Establish the Context\*

3.37 It defines the basic parameters for managing risk and sets the scope and criteria for the rest of the process. Establishing the context includes considering internal and external parameters relevant to the organization as a whole, as well as the background to the particular risks being assessed.

Establishing the context, the risk assessment objectives, risk criteria, and risk assessment amogramme are determined and agreed.

For a specific risk assessment, establishing the context should include the definition of the external, internal and risk management context and classification of risk criteria.

#### Risk Identification'

- 3.38 It is a process of finding, recognizing and describing risks. This stage aims to answer following questions: -
  - What are the elements (people, livelihood, ecosystems and physical assets) at risk?
  - · What is the extent of likely losses, damage and injuries arising from the hazard?
  - Is there systematic analysis of impacts and economic loss analysis after each disaster?
     How are results of impact assessments used in risk identification?
  - To what extent is risk characterization and communication an integral part of risk assessment processes?
  - · To what extent is early warning developed as a risk reduction mechanism?

International Electro technical Commission, 2009

www.unisdr.org/files/4040\_africaguidelinesmainstreamingdrassessmentdevelopment1.pdf

3.39 Key considerations9

 It should based as much as possible on quantitative (historical, statistical) data, but qualitative information can also be useful

 Qualitative information can be collected through various methods such as expenses. opinions, intelligence, information, checklists, systematic team approaches, induction reasoning techniques, or other

 Outcome of risk identification are in the form of list of identified risks and scenarios

90000

In risk

litis i

to de

ESTE

A list of risk identification methods are enclosed in the Annex 4

#### Risk Analyses"

3.40 It is the process to comprehend the nature of risk and to determine the level of risk. For every risk and risk scenario identified in the previous risk identification stage, the rise analysis process carries out a detailed (and if possible quantitative) estimation of probability of its occurrence and the severity of the potential impacts.

3.41 Key considerations

- Risk analysis should be base on quantitative data: The assessment of the probability of event or hazard should be based, where possible, on the historical frequency of events of similar scale and available statistical data relevant for an analysis of the man drivers, which can help to pick up on accelerating trends, e.g. due to climate change
- Assessment of the level impacts should be in quantitative terms: The assessment should be as objective as possible and should recognize the uncertainty in the underlying evidence. The issue of uncertainty will be further addressed below with reference to sensitivity analysis and the precautionary principle. It is in any case important to explicitly address and reveal uncertainty in the analysis
- Risk analysis can be done for both one hazards as well as for multiple hazards
- Risk Analysis should also consider hazard analysis and vulnerability analysis

Dimensional analysis (scale,

#### Hazard analysis

3

Geog	graphical analysis (location, nt)	Temporal analysis (frequency, duration, etc.)	Dimensional analysis (scale, intensity)
Prob	pability of occurrence		
Vuln	nerability analysis		
1	Identification of elements a	entification of elements and people potentially at risk (exposure)	
2	Identification of vulnerability factors/ impacts (physical, economic, environmental, social/political)		

Analysis of self-protection capabilities reducing exposure or vulnerability 4

Assessment of likely impacts



<sup>\*</sup> European Commission, 2010

#### Elsk Evaluation"

ta, but

expert

uctive

l risk

k. For

e risk

of the

of an vents

main nge.

ment

the with case

- 3.42 It is a process of comparing the results of risk analysis with risk criteria to determine whether the risk and/or its magnitude is acceptable or tolerable.
  - Significance of risk is evaluated based on risk criteria or also known as term of reference
  - Risk criteria can include associated costs and benefits, legal requirements, socioeconomic and environmental factors, concerns of stakeholders, etc.
  - · In risk evaluation, significance of each specific risk should be accepted or treated

#### Risk Treatment"

- 3.43 It involves selecting and agreeing to one or more relevant options for changing the probability of occurrence, the effect of risks, or both, and implementing these options.
  - It is followed by a cyclical process of reassessing the new level of risk, with a view to determining its tolerability against the criteria previously set, in order to decide whether further treatment is required.
  - Land use planning is a significant risk treatment measure

#### Monitoring and Review"

3.44 It is the component of risk management. It is essential that risks and controls should be monitored and reviewed on a regular basis to verify that

Assumptions about risks remain valid	Assumptions on which the risk assessment is based, including the external and internal context, remain valid	Expected results are being achieved;
Results of risk assessment are in line with actual experience	Risk assessment techniques are being properly applied	Risk treatments are effective.

#### Risk Mapping<sup>9</sup>

- 3.45 It can support risk assessment through maps that can be important tools to show information about hazards, vulnerabilities and risks in a particular area and thereby support the risk assessment process and overall risk management strategy.
  - Maps can set priorities for risk reduction strategies
  - Dissemination of risk information to key stakeholders is critical to ensure that all
    actors have the same information
  - Risk mapping can also be useful in the broader context of land use planning

#### 3.46 Key considerations:

- Maps showing the expected spatial distribution of major hazards. The different hazards and intensities should be presented in separate maps.
- Hazard maps should be accompanied by spatial distribution maps which portray all relevant elements that need to be protected such as population, infrastructures, naturally protected areas etc.

- Separate maps for different subjects of protection can be prepared using Geographical Information Systems such information can be brought together.
- A third series of maps should show the spatial distribution of vulnerability in terms
  of susceptibility to damage for all relevant subjects of protection (in separate maps
  for different subjects of protection).
- In a second step, these maps can then provide the basis for the preparation of risk
  maps in terms of showing the combination of likelihood and impact of a certain
  event as well as for aggregated hazard maps.

#### PART II

#### Purpose

- 3.47 To familiarize the reader with the need for risk sensitive land use planning by discussing key factors that pose major challenges to conventional land use planning in Bangladesh.
- 3.48 To describe the key DRR elements of risk sensitive land use planning.
- 3.49 To develop awareness of the reader about the literature on the investment for risk sensitive land use planning, for example, policy, capacity and investment actions for risk assessment, risk reduction, and risk transfer.

#### Why need for Risk Sensitive Land Use Planning?

- 3.50 Urbanization, Risk and Uncertainty
  - · Urbanization is generally regarded as a four-dimensional process of

Geographic	Economic	
Environmental	Socio-technical	

Three major factors that contribute to urban growth are:

Urban growth factors	Natural Growth
	Rural-Urban migration
	Reclassification (i.e. expansion)

Urbanization reasons and factors

Reasons	Factors
Geographic	Natural growth
Economic	Migration (rural to urban)
Environmental	Expansion
Socio-technical	

Bangladesh is experiencing rapid pace of urbanization

angladesh is acculation g american de accid spread 2021, nearly of accident Compladesh C

Table 3.5 Gro

95%

III grajected er Binglade

angladesh's marpendence anar popula and Bank,

per recent nes in urban Daska, Chitta

with a popul

world's least lower than th largely driver

to delizins, o maniforus an memberne ca

of environme

- untrolled

The other cormak public massure, for

marie polici marie and we

mu estate de



Bangladesh is one of the world's most densely populated countries and has also faced rapid population growth throughout the last century, although the population growth rate has somewhat decreased to a moderate level in recent times. The country is going to witness a rapid spread of urbanization over the next decade (Table 3.5). According to an estimate, by 2020, nearly every other man, woman and child will live in an urban area (World Bank & Bangladesh Centre for Advanced Studies, 1998).

Table 3.5 Growth of urban population in Bangladesh

Year	Urban	Rural	Total
1974	6,273,603 (8.78%)	70,124,397 (91.79%)	76,398,000
1981	13,535,963 (15.05%)	76,376,037 (84.95%)	89,912,000
1991	20,872,204 (18.13%)	90,582,981 (81.27%)	111,455,185
2001	31,077,952 (23.1%)	99,444,646 (76.9%)	130,522,598
2011 (projected)	44.06 million	107.35 million	151.41 million

Source: Bangladesh Bureau of Statistics

in

sk

or

Bangladesh's urban population has been growing at a yearly average rate of 6 percent since independence, at a time when the national population growth was 2.2 percent. As a result, the urban population has grown six fold, compared with a 70 percent increase in rural population (World Bank, 2007).

As per recent UN data, approximately 25 percent of Bangladesh's current population currently lives in urban areas. Of this urban population, more than half lives in the four largest cities: Dhaka, Chittagong, Khulna and Rajshahi.

With a population of almost 12 million, Dhaka is the capital and largest city in Bangladesh. It is also the 11th largest city in the world. At the same time, it is consistently ranked as one of the world's least livable city. Although, income growth is higher, and the poverty incidence is lower than the rest of Bangladesh. The shift of human population from rural to urban areas is largely driven by economic opportunity.

Uncontrolled development often takes place in high-risk areas, such as hillside slopes, floodplains, or on subsiding land, most often putting the poor and the vulnerable into hazardous areas.

In extreme cases, vulnerable populations, living in slum settlements, tend to trade-off the value of environmental and disaster safety. They live in close proximity to economic opportunities offered by the urban environment.

The other contributing factors to urban risk are economic liberalization, urban expansion, and weak public policies (Sudmeier-Rieux et al., 2013). These factors are interlined drivers of exposure, for instance, economic liberalization, which provided private investors to intensify real estate development in exposed and risk prone areas; urban expansion, which contributed to over-development, environment degradation, and risky development investment; and weak public policies, which have led to social inequality, lack of risk information, weak planning tools and weak environmental regulations (Sudmeier-Rieux et al., 2013).

Uncertainty is the essential element of any disaster, referring to the disaster impacts that cannot be quantified or are completely unknown. The 2012 Special Report of the Inter-governmental Panel on Climate Change (IPCC) on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation indicates that long-term trends in normalized losses have not been attributed to natural or anthropogenic climate change. In the foreseeable future, population and asset growth in hazardous areas will be, by far, the biggest driver of fatalities and damages from extreme weather events.

# 3.51 Natural hazards and climate change in Bangladesh

 Geographical setting increases exposure of Bangladesh to natural hazards and climate change

It has often been pointed out that the worst disaster in the world tends to occur between the tropics of Cancer and the tropic of Capricorn; which is coincidentally the area that are poorer countries (Carter, 1991). This applies to Bangladesh.

Bangladesh is vulnerable to various natural disasters. Climate change has added an extra concern. The country can be the worst victim of the negative consequences of climate change and climate related natural hazards. It is universally acknowledged that the sea level along the Bangladesh coast is rising at about 3 millimeters a year. The sea surface temperature is also in a rising trend. It is defiantly creating a direct threat to the millions of people of the country.

Ongoing development in the country has created vulnerabilities to natural hazards

Bangladesh is a land of disaster with the prevalent poverty situation, which forces many people to live in disaster-prone areas. On the contrary, each year many people are forced to migrate to cities because of natural disasters. The people of Bangladesh lack better alternatives and the capacity to cope with natural hazards. And this is why almost all natural hazards turn into disasters.

Losses of life, decline in agriculture production, displacement of human beings, losses of valuable livestock, disruption in communication and livelihood system are the ultimate result of all sorts of disasters occurring in Bangladesh. The damages to infrastructure and property are also immense that hold back year round development progress.

# Climate change risk

Climate change poses great threat to the country's national development. According to the MoEF, the country is currently losing 1.5% of its GDP due to increased frequency and intensity of natural disasters as a result of climate change. In addition, it is predicted that a 1.0 meter sea-level rise will inundate 15-20% of Bangladesh in the coastal region, and seawater intrusion into the rivers and increased salinity will further transform land unfit for agriculture or for any other activity. Consequently, the impacts may cause the displacement of up to 30 million people by the mid-20th Century.

- Historic mean th efforts h is expos
- Land d lands a in haza areas, a residen
- Risk se identifi vulnera
- By red also bu
- From t
- by ma
   operat
- \* it can and co
  - Come
  - Acu
    - stage
  - A shi
  - grops the n
  - Apara
  - they

AND MUNICIPALITIES IN PASSULOPERS

that the sents adsin in the egest

s and

en the

extra hange ng the also in atry.

hazards

many rced to natives ds turn

esses of te result roperty

g to the intensity .0 meter intrusion in for any inillion

- 3.51 Historically, urban centers have been located in the hazard prone areas, which also mean that they are more exposed to such hazards, and in addition, land use planning efforts have not responded adequately to rapid urban growth and city expansion that is exposing more urban population to disaster risk.
- Land development in the past has hardly considered hazard characteristics of the lands and assumed that structure intervention will ensure safety. But with an increase in hazard risk and land pressures, the expansion of cities took place in hazard prone areas, and traditional system of land development is unable to ensure safe of the urban residents.
- Risk sensitive land use planning can effectively address climate and disaster risk as it identifies and mitigate the root causes of disaster risk, can modify or can reduce the vulnerability condition of people and places.<sup>4</sup>
- By reducing the vulnerability and exposure to natural hazards and climate, the RSLUP also builds urban resilience of the people and places.
- From the context of response to hazards and recovery from disasters, RSLUP is very effective in contributing toward urban resilience. For example,
  - by making provision of open spaces and well planned road network for rescue operations, the RSLUP can decrease losses by making response faster
  - it can contribute to resilient recovery by implementing "build back better" principle and controlled urban growth

# Sensitive Land Use Planning: Key elements of risk reduction<sup>10</sup>

- 3.56 Community protection or well-being is adapted as one of the major themes of planning processes.
- 357 A culture of risk reduction is adapted in the land use planning.
- 3.58 Incorporating risk management objectives and approaches at the strategic planning stage.
- Planning controls and design are site-responsive and community-responsive.
- 3.50 A shift is adapted from the impacts of disaster to managing the risk.
- 3.51 Incorporating risk management approaches when reviewing the redevelopment proposals, for example, upgrading of existing infrastructure or new infrastructure to the new standard.
- 3.62 Increase public participation in the planning processes.
- 363 Awareness-generation and capacity development of all stakeholders on RSLUP, as they participate in the land use planning processes.

Imergency Management Australia (2002)

# Investment for Risk Sensitive Land Use Planning: Policy, capacity, and investment actions

3.64 In order to bring key risk reduction elements as a part of LUP, it is important that certain key actions are taken in the area of policy, capacity, and investment (World Bank & EMI, 2014) as highlighted in the table 3.5.

First I is ex

CPC (19

Sharm

Coner WY

Deater V

Asia Asia

Table 3.6 Core needs, policy, capacity, and investment for RSLUP 11

Commende	Policy	Capacity	Investment
Core needs Assessing risk	Adopt policy to develop hazard, vulnerability, and risk assessments selected areas	Build capacity in undertaking hazard, vulnerability, and risk assessment  Train urban planners and consultants on conducting PRA for assessing the risk in the selected area	Develop risk assessment information technology platforms for data sharing Identify highly vulnerable areas
		Train engineers in rapid assessment of building vulnerability	Develop/revise standards for
Reducing risk- avoid, eliminate and reduce	Adopt policy to integrate DRM and climate change adaptation in planning	Train planners in RSLUP  Develop the capacities of	RSLUP Update planning guides for
reduce	processes  Decentralize the process	local governments to improve project planning and project execution	various government agencies and make them risk-sensitive
	of RSLUP and strengthen its linkages with local investment planning process	Establish peer-to-peer sharing programs in land use planning	Develop DRM plans site- specific and scenario-specific for vulnerable areas identified in the risk
	Adopt policy to make urban development projects risk sensitive	Develop ownership through participatory processes, training, and capacity building	sensitive land use plan Establish/improve system for prioritizing substandard infrastructure and public
	Amend planning laws and regulation to make them risk-sensitive	Develop capacities of local government staff to better enforce zoning and building	building for public action Support priority funding fo upgrade of vulnerable
	Strengthen land use control regulation to restrict and control	regulations Undertake extensive	infrastructure and housing
	development in hazardous areas	educational campaigns on RSLUP and the importance of community participation	Invest in retrofit and rehabilitation of critical facilities
	Strengthen laws and regulations related to building control and building code compliance	in the planning process  Undertake emergency drills and exercises	Seek public-private partnerships in risk-sensiti urban development programs
			Buy back land and propert in high risk areas and transform into buffer zones
Managing residual risk-sharing and transfer	Create long-term vulnerability reduction programs for highly vulnerable areas that cannot be relocated	Undertake emergency drills and exercises	Promote options for risk protection and insurance

World Bank & EMI, 2014 (adopted and modified)



#### References for Part I

ons

that Vorld

is for

mcies

sitive

pecific

em for

ng for

sing

nsitive

perty

mnes

200

## Part I is excerpted, with adaptation from:

ADPC (1994) Appendix 7: Guidelines for Hazard Assessment and Vulnerability Analysis. In VK Sharma (ed). Disaster Management.Indian Institute of Public Administration. New United Process, New Delhi. Pp. 258-264

Carter WN (1991a) Chapter 2 Disaster Threat. In ADB – Disaster Management: A Disaster Manager's Handbook. Asian Development Bank. pp. 9-23.

Carter WN (1991b) Appendix A: Vulnerability Analysis. In ADB – Disaster Management: A Disaster Manager's Handbook. Asian Development Bank. pp. 323-332

Coburn AW, Sspence RJS, Pomonis A (1994) Vulnerability and Risk Assessment. Disaster Management Training Programme. Cambridge Architectural Research Limited, UNDP

Davis I and Gupta SP (1991) "Technical Background Paper" Disaster Mitigation in Asia and the Pacific. Asian Development Bank: Manila.

Emergency Management Australia (n.d.) Australian Emergency Manual: Community Emergency Planning Guide. National Disaster Office

Emergency Management Australia (2002) Planning Safer Communities: Land Use Planning for Natural Hazards. Manual 7. Australia Emergency Manual Series. Emergency Management Australia: Australia

European Commission (2010) Risk Assessment and Mapping Guidelines for Disaster Management.Commission Staff Working Paper. European Commission, Brussels.

International Electrotechnical Commission (2009) Risk Management – Risk Assessment Techniques.FinalDraft.International Standard. IEC/FDIS 31010:2009(E)

Wehrmann B (2011) Land Use Planning: Concept, Tools and Applications. GIZ, Germany. Aksoy Print & Projektmanagement, Eppelheim

#### References for Part II

Emergency Management Australia (2002) Planning Safer Communities: Land Use Planning for Natural Hazards. Manual 7. Australia Emergency Manual Series. Emergency Management Australia: Australia

Reyes, LM. (2007). Risk-Sensitive Land Use Planning: Integrating Disaster Risk Reduction in Practice and Process of Land Use Planning

Sudmeier-Rieux, K. Fra Paleo, U. Garschagen, M. Estrella, M. Renaud, FG.Jaboyedoff, M. 2013). Opportunities, incentives and challenges to risk sensitive land use planning. Lessons Nepal, Spain and Vietnam. Background paper prepared for the Global Assessment Seport on Disaster Risk Reduction 2013

World Bank and EMI (2014) Risk-Sensitive Land Use Planning: Guidebook. Bangladesh Urban Earthquake Resilience Project, Feb 2014. EMI: Manila, Philippines.

# SECTION 4 - RISK SENSITIVE LAND USE PLANNING: GENERAL GUIDANCE

#### Purpose

- 4.1 To develop understanding of the reader about the disaster risk assessment process bediscussing hazard, exposure and vulnerability assessment.
- 4.2 To discuss briefly about the Risk Matrix Analysis, Geographical Information System and Participatory Rapid Appraisal techniques and understand how such techniques can be used to collect risk assessment information for land use planning preparation.
- 4.3 To familiarize reader with the risk treatment measures (i.e. structural and non-structural) for different land use planning options.

#### General Guidance

- 4.4 Risk sensitive land use planning (RSLUP) incorporates hazards and vulnerabilities assessment as a part of the land use planning process
- 4.5 Development should be avoid in high-risk "hot spot" that are exposed to natural hazards and climate change extremes
- 4.6 Knowledge of the relationships of development, land use and disaster risks prove planners a deeper understanding of what drives people to locate themselves in his risk areas.
- 4.7 Risk information can be helpful in planning and steering future development areas.
- 4.8 The location of residential areas, industries, critical public facilities and services important parameters that define the vulnerability of communities to hazards.
- 4.9 Through land use planning, vulnerability parameters can be modified to reduce rise
- 4.10 With its array of regulatory and non-regulatory techniques and mechanisms, land planning can become an effective tool for disaster risk reduction.

Through the use of disaster risk information in land use planning, planning units would able to identify areas-

- · That are of high risk from impacts of hazards such as flood prone areas
- · That need lessening of effects of hazardous events such as water retention areas
- Where it is necessary to ensure effectiveness of response activities such as escaperoutes



RAL

4.11 This identification would help in restricting location of human settlements and choosing suitable economic activities. For example flood prone areas might be allowed for agricultural use but not for human settlements.

ess by

4.12 Understand the area of land actually available for development (considering development is not allowed in areas prone to natural hazards) and thus find options of how to meet the demand over time and accordingly set development goals and objectives.

stem, iques tion. 4.13 Provide guidance in formulating suitable risk reduction policies and zoning regulations such as building codes.

and

bility

⊒tural

ovide

high:

away

s area

risks.

d use

IId be

scape

4.14 Provide guidance in adopting suitable risk reduction measures in the development projects in the area.

#### Hazard Assessment

- 4.15 Hazard Assessment is sometimes called Hazard Evaluation or Hazard Analysis (UNDRO, 1991). There seems to be a lack of consistency in the use of this terminology.
- 4.16 Hazard Assessment is the process of estimating, for defined areas, the probabilities of the occurrence of potentially-damaging phenomenon of given magnitude within a specified period of time.
- 4.17 Collection of information about
  - Local hazards Location & Probability
  - The extent to which they threaten local populations Severity
  - Ease with which their effects can be averted Manageability
- 4.18 The severity of a natural hazard is quantified in terms of the magnitude of occurrence, which is an event parameter. It can also be done in terms of the effect of the occurrence at a particular location. This is called a site parameter. Both parameters may be combined in certain situations. Parameters for selected hazards are listed in table 4.1 & 4.2.

#### Table 4.1 Parameters for selected hazards

Natural Hazard	Event Parameter	Site Parameter
Cyclone	Wind speed - km/h	Area affected
Earthquake	Magnitude - Richter Scale	Intensity-Modified Mercalli Scale
Flood	Area flooded- km <sup>2</sup> Volume of water- m <sup>3</sup> Speed	Depth of flood water-meters
Landslide	Volume of material dislodged Area affected	Ground displacement-meters
Tsunami	Height of wave crest	Depth of floodwater

35

# The process of collecting this information is called hazard assessment. These studies rely heavily on

- 4.19 Available scientific information, including geologic, geomorphic, and soil maps climate and hydrological data; and topographic maps, aerial photographs, and satellite imagery.
- 4.20 Historical information, both written reports and oral accounts from long-term residents. These may include myths and legends.
- 4.21 For assessment of most natural phenomenon, one cannot expect complete data required to carry out a comprehensive assessment. A municipal planner or Upazila engineer can easily prepare the hazard profile of his/her municipality/Upazila by using simple tools like conducting PRA or FGDs indifferent wards/unions and this is the starting point of planners in building urban resilience.

Table 4.2 Hazard Profile of Narayanganj City

Name of the Hazard	Frequency	Magnitude	Duration	Speed of onset
Floods	Max. every year Min . 2/3 years	Min. economic loss Max. death and economic loss	Min. 4/5 hours Max.	Min. 4/5 hours Max. one week
Fire	Max, several times in season Min, yearly	Min. economic loss Max. death and economic loss	Min. 4/5 hours Max.	suddenly
Earthquake	Max. every year Min . 2/3 years	Min. 4-5 Richter Scale Max. 6-8 Richter scale	1/2 minutes	Suddenly
Water logging	Max. every year Min . 2/3 years	Low High	Min. 4/5 hours Max. One week	3/4 hours
Building Collapse	Max. every year Min . 2/3 years	Low High		Suddenly

Courtesy: Planner, Narayangani City Corporation

4.22 Hazard maps synthesize data on natural hazards and to combine these with socioeconomic data facilitates analysis. It improves communications among participants in the hazard management process and between planners and decision-makers.



## Exposure Assessment

maps; and

-term

data

pazila Ia by

this is

with

mong

and

- 4.23 Exposure is characterized by a combination of physical characteristics (i.e. masonry apartment building with four stories), monetary value (either cost required to replace the structure or its actual market value), and spatial location (street address, latitude longitude coordinate).
- 4.24 Exposure analysis is intended to connect identified hazards with the elements at risk, which in urban infrastructure projects generally refer to human populations and infrastructure.
- 4.25 These can be combined with the specific vulnerability of the exposed elements to any particular hazard to estimate the quantitative risks associated with that hazard in the area of interest (UNISDR, 2009).
- 4.26 The detail and accuracy of the exposure data has a critical impact on the risk assessment output: location of exposure determines the type and intensity of hazard it will experience, physical characteristics influence the vulnerability and therefore the damage to the exposure, and finally monetary value coupled with the measure of damage estimate the expected losses that a community would incur during recovery.
- 4.27 Understanding the application for the risk assessment is important for exposure development. For example, the resources and tools required to assess exposure will change based on the geographic scope of the assessment: global, regional, national, municipal or site-specific.
- 4.28 Large scale assessments, such as those conducted at national level or higher, often include aggregated exposure data determined by top-down estimation of count of structures/population and assignment of typical characteristics. These aggregate methods contrast with building-specific exposure, wherein data is collected about individual structures and their exact locations are determined.
- 4.32 Vulnerability analysis must include estimates of human casualties based on distribution of population, damage, loss of assets and capacity analysis.
- 4.33 Historical data on disaster loss is vital to understand how specific disasters impactpopulations and infrastructure.
- 4.34 In many cases, necessary data may not exist; however, there are engineering-based analytical models that estimate impacts of disasters.

#### Risk Assessment

- 4.35 Quantification of risk: There are three essential components to the quantification or risk after identification of local hazards:
  - Hazard occurrence probability (p)- the probability of occurrence of a specified natural hazard at a specified severity level in a specified future time period.
  - Elements at risk an inventory of those people or things, which are exposed to the hazard.
  - iii. Expected loss (L) the degree of loss to each element, should a hazard of a given severity occur. Its accuracy and acceptability will depend on the methodology used to derive it.



Fig 4.1 Components of risk

4.36 Risk assessment: This analysis combines hazard, exposure and vulnerability analysis and provides a spatial assessment of risk based on hazards, vulnerable populations and the ability of the community to cope with disasters.

#### Methodology

4.37 There are several methodologies for Risk Assessment from High Tech computer-bases methods to pencil pushing and head scratching. Computer-based Geograph Information Systems (GIS) modeling uses many different kinds of information assess risk. However it needs sophisticated hardware, software and expertise handling them.

#### Geographical Information system

- 4.38 A Geographical Information system (GIS) is a technological tool for comprehending geography and making intelligent decisions, for example, understanding geography and people's relationship to location to make informed decisions about the way we like on our planet.<sup>12</sup>
- 4.39 In other words, it a mapping software that provides spatial information by linker locations with information about the locations, and the output determine patterns are causes of spatial phenomenon as show in figure 4.2 (Peggion et al., 2008).

<sup>17</sup> ESRI (2011)



on of

cified

nalysis lations

r-based graphic ation to ertise of

hending ography we live

 linking terns and

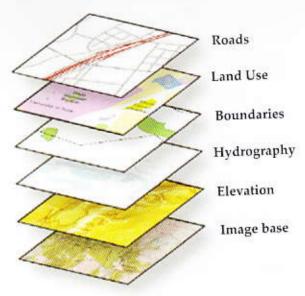


Fig 4.2 Illustration showing different geographical elements through a series of map layers

Source: Peggion et al., 2008

- 4.40 GIS has four major key components (Peggion et al., 2008): -
  - Tools for entering and manipulating geographic information
  - A database management system (DBMS)
  - Tools that create intelligent digital maps you can analyze, query for more information, or print for presentation
  - An easy-to-use graphical user interface (GUI)
- 4.41 It is a useful tool, which can be used for every field of knowledge, such as, archaeology, urban and regional planning and risk management, among others.

# GIS and Risk Assessment<sup>ra</sup>

- 4.42 GIS based risk analysiscan be very useful in all phases of emergency management preparation and planning, mitigation, preparedness, response, and recovery.
- 4.43 In the preparation and planning phase, GIS can used to develop risk assessment by identifying hazards and evaluating the possible consequences of potential disasters. The hazard data and other maps data can be combined to develop a risk assessment.

Peggion et al., 2008

- 4.44 There are two major components of risk assessment: hazards and vulnerability. In order to carryout data synthesis and mapping of spatial relationship between two components, GIS can be effectively used.
- 4.45 By displaying the potential damages that hazards can cause, GIS helps planners take preventive measures.

# Risk Matrix Analysis (5x5)

- 4.46 Risk Matrix Analysis (5x5) method gives a qualitative measure that permits the prioritization of risk among multiple hazards. It enables hazard mitigation planners classify various types of hazards into different categories of priority by locating them on a two-dimensional grid based on their probability and loss (Fig 4.3).
- 4.47 The scores on the likelihood of occurrence (scale) are multiplied with severity acconsequences (scale) as shown in fig 4.3.
- 4.48 The final scores achieved represent different level of risk with unique colors as shown in Fig 4.3 and 4.4.

				Sever	rity of Conse	quences	
			Insignificant	Minor	Moderate	Major	Catastrophic
		100000000	1	2	3	4	5
Like	Rare	1	1	2	3	4	5
lihoo	Likely	2	2	4	6	8	10
Likelihood of Occurrence	Even Chance	3	3	6	9	12	16
ccurre	Highly Likely	4	-4	8	12	16	2.0
nce	Almost Certain	5	5	10	15	2.0	25

Fig 4.3 Risk Matrix Analysis (5x5)

4.49 Fig 4.4 below represents four categories of risk; namely, low risk (Green), medium risk (Yellow), high risk (Amber), and Very high risk (Red) as shown in fig. 4.4.

CATEGORY COLOUR

LOW RISK GREEN

MEDIUM
RISK

HIGH RISK

VERY HIGH
RISK

RED

Fig. 4.4 Four Categories of risk

- 4.49 The methodology of Risk assessment involves seven steps as follows:
  - · Define the geographic area to be studied
  - Identify the type and amount of data needed to complete the risk assessment
  - Identify the potential hazard(s) within the risk area
  - · Identify vulnerability

lity. In en two

ners to

its the

ners to g them

rity of

shown

phic

m risk

- · Prepare an inventory of elements at risk
- Apply hazard specific damage functions to the inventory to determine direct damage quantitatively or rank potential damage qualitatively
- Apply loss functions to damage results to estimate level of financial, personal, or property losses quantitatively or rank potential losses qualitatively
- 4.50 Risk mapping: This is the presentation of the results of risk assessment on a map, showing the levels of expected losses, which can be anticipated in specific areas, during a particular time period, as a result of particular disaster hazards (Fig 4.5 & 4.6; UNDRO).

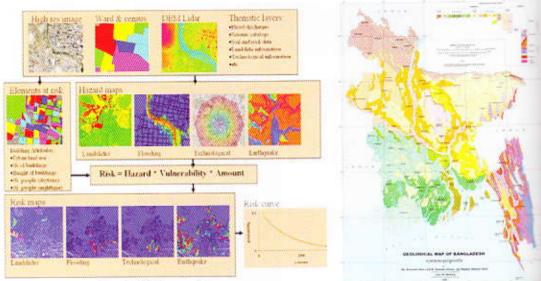


Fig 4.5 Risk maping

Fig 4.6 Geological map of Banglades

003

- 4.51 Usually qualitative terms such as 'high', 'medium' and 'low' are used to represent the level of risk.
- 4.52 The outputs of probabilistic risk assessments can have many policy applications. For instance:
  - Territorial planning to identify, for example, flood plains or geographic damage scenarios from earthquakes or tsunamis;
  - Infrastructure risk assessment for an assessment of expected damage from specific hazard scenarios;
  - · Cost benefit analysis for mitigation measures;
  - Preparedness measures for support of emergency and contingency planning for different crisis scenarios;
  - Insurance premium calculations for provision of accurate information about annual expected loss and probable maximum loss for a specific area.
  - · Data collection, assessment and application
- 4.53 Data collected could be quantitative, qualitative or geo-referenced and in map form. The most basic input for disaster risk assessment is the hazard map produced by concerned government agency the volcanology office for volcanic hazards, the meteorology office for flooding, and the geosciences office for landslides (Table 4.3).
- 4.54 Hazard maps are essential for understanding what locations are subject to hazard and the risk posed. Mapping both the physical peril and the exposure and vulnerability of people to hazards can help guide decisions about where to locate critical infrastructure and human settlement (e.g., avoid development in high risk areas) and other mitigation measures that might be appropriate.

Table 4.3: General outline of different hazard type, related maps and data source

11	Hazaro	Hazard Event		Hazard Map		Others	
Hazard	Description	Source of Information	Available	Source	Map/Data	Source	
Flood  Earthquake Tsunami Rain-induced landslide Earthquake induced landslide Liquefaction Ground rupture Cyclone Arsenic Pollution	Indicate date of particular hazard events. (e.g., June 1986)  Describe hazard event by severity e.g., magnitude or intensity for carthquake, or through time-dependent probabilistic statement such as 40-year flood.  10 deaths, \$ 2 million dollar	Members of community  Newspaper  Experts from academe, professional groups  Disaster management office  Responsible government agency (e.g., departments of public works, social welfare, agriculture, health, housing etc.)  Existing plans and reports internet	Yes	National mapping agency  Volcanology office for earthquake and volcanic hazards  Meteorological office for floods  Geosciences office for landslides	Houndary map	Mapping agency	

- 4.55 It is desirable that these maps contain information on the return period or frequency of occurrence given the magnitude. For example, in the Philippines, hazard maps define the susceptibility levels, high susceptible area (HSA), moderate susceptible area (MSA) and low susceptible area (LSA); or prone and not prone areas.
- 4.56 In the absence of hazard maps, community-based hazard mapping is utilized and reproduced GIS maps are created based on the Participatory Rapid Appraisal (PRA) methodology. Such methodology is significant way to collect and integrate risk information into land use planning processes.

azards e and locate th risk

adesh

ent the

ns. For

∍mage

pecific

ing for

about

o form.

red by

ds, the

4.3).

#### Participatory Rapid Appraisal (PRA)14

- 4.57 Participatory Rapid Appraisal (PRA) is a research technique dveloped in the late 1970s and early 1980s by researchers in international development as an alternative and complement to conventional sample surveys. PRA is a way of learning from, and with community members to investigate, analyze, and evaluate constraints and opportunities, and make informed and timely decisions regarding development projects. It is a method by which a research team can quickly and systematically collect information for:
  - the general analysis of a specific topic, question, or problem
  - needs assessments
  - · feasibility studies
  - · identifying and prioritizing projects
  - · project or program evaluations
- 4.58 The main outcome of the participatory approach is increased knowledge about the social, economic, environment, physical settings that are available both with the researcher and actors in the situation. The major advantages of participation as enumerated are efficiency, effectiveness, self-reliance.

produced

mking PRA

4.51 PRA comi

Time Needs

- mard asses

**Unerability** 

Fig

4.59 PRA tool are now used for both urban and rural areas, for example, MSDP Bangladesh incorporated this tool for both plan preparation and collection and inclusion of risk information into the plan. For detail, please see the Annex 5.

#### Outcome of PRA -GIS based Social Map15

4.60 One of the key outcomes of PRA techniques and their combination can help in producing risk information through GIS based maps. Social maps created by the community by using PRA can be transformed into GIS maps as shown in figure 4.7.

11 Theis and Grady (1991)



<sup>15</sup> UDD (2013)

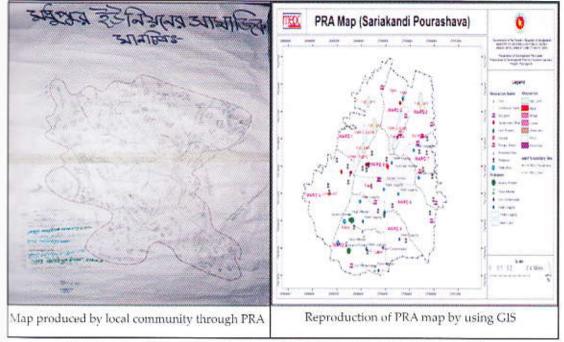


Fig 4.7 Map produced by the community (left) and reproduced map by using GIS

#### Linking PRA with Risk Assessment

1970s and with, and ment ollect

the the

lesh

risk

the

4.61 PRA techniques can be linked with risk assessment by the process of carrying out community Disaster Risk Assessment.

Core Needs	PRA Techniques	Risk as information	ssessment
Hazard assessment	- Hazard map - Historical profile or time line	- Hazard type - Force - Warning signs - Forewarning - Speed of onset - Frequency - When - Duration	
Vulnerability assessment	<ul> <li>Hazard maps</li> <li>Transect walk</li> <li>Seasonal calendar</li> <li>Livelihood analysis</li> <li>Venn diagram</li> <li>Community Drama</li> <li>Problem tree &amp; Ranking</li> </ul>	- Hazard type - Element at risk - Unsafe conditions - Dynamic pressure - Root causes	

Capacity assessment	<ul> <li>Historical profile or timeline</li> <li>Seasonal calendar</li> <li>Gendered resources mapping and Gendered benefit analysis</li> <li>Livelihood analysis</li> <li>Institutional and social network analysis</li> </ul>	- Livelihood strategies - Behavior, decision & Perception of risk - Analyses of capacities to deal with natural hazards - Identification of institutions (inside & outside), their roles in disaster response - Identify available capacities and resource people rely during disasters - Identify resources easily affected by disasters - Identify resources owned by the community or individuals
People's perception of risk	Ranking and scoring Mapping	- Perception of risk

4.62 Risk assessment information collected through PRA can be translated into maps as shown in Fig. 4.7 Such risk maps can be re-produced using GIS can used to analyze the situation other sectors in context of natural hazards.

# Techniques/Tools for Engaging or Mobilizing Community in the Land Use Planning

#### Technology of Participation (ToP)

- 4.63 TOP tools are the basic group facilitation techniques (Asia Foundation, 2008) or community development methods, which are designed by the Institute of Cultural Affairs, based in USA (Facilicom Consult, 2003).
- 4.64 Like PRA, the ToP tools aim at community development through engaging people the decision-making and implementation of activities. Such tools are also often used make land use planning process more participatory.
- 4.65 There are three methods associated with ToP; namely, the focused conversation method, the consensus workshop method, and action planning process.
- 4.66 The focused conversation method helps facilitator to conduct purposeful discussion surface new ideas and solutions, probe beneath the surface to the depth of a topic deepen understanding of diverse perspectives, and stimulate candid feedbad (Institute of Cultural Affairs,n.d.). For example, brainstorming method is often used for focused conversation. The procedure to carry out brainstorming session is described in the Annex 6.

The clintegrated field, under this visolution Constitution of the constitution of the

The a result create proce

s of In

The I for u devel

The I each I cost v affect

In ter to the

· ho

\* W

H

m

The determ

Socali

therel

Critic addre that h hand!

The go

- 4.67 The consensus workshop method enables facilitator to capture a group's best thinking, integrate diverse ideas, generate practical and creative solutions, level the playing field, hear every voice, develop a strong consensus and provide forum for people to understand each other, among others (Institute of Cultural Affairs, n.d.). In addition, this workshop method is very useful for assessing problems and needs, identifying solutions and projects, formulating project tasks and responsibilities (Facilicom Consult, 2003). The procedure is explained in the Annex 7.
- 4.68 The action planning process enables facilitators to visualize and articulate a successful result, analyze the current situation, maximize involvement and solidify commitment, create clear forms of accountability and develop an action timeline, among others. The procedure to carry out community action planning is explained in the Annex 8.

## Process of Integrating Risk assessment into Land Use Planning

E

of

& in

lable

Turce:

sters msilv

med

or

maps as lyze the

nd Use

2008) or

Cultural

people in

used to

ersation

a topic, eedback

en used

ssion is

- 4.69 The Disaster Risk Assessment (DRA) from PRA or other sources results forms the basis for understanding implications of current and future land use management and development.
- 4.70 The DRA provided information on what areas in the planning unit are susceptible to each hazard, where the higher losses and damages will occur, how much a hazard may cost were it to occur, and how the lives and quality of life in the planning unit might be affected in the aftermath of disaster.
- 4.71 In terms of land use, the following questions will determine what changes are needed to the existing land use plan.
  - Should the current development strategy remain? e.g.should residential buildings
    continue to be built in the area? If not, should current ones be retrofitted? Should
    houses not be built at all in the area?
  - Howdo the risks impact socio-economic conditions?
  - What are the alternative land use development strategies?
  - How do the physical changes interact with other areas(e.g.near by towns, municipalities, provinces, regions), physically and economically?
- 4.72 The analysis of risk impacts to land use guides planners and policy makers in determining where and what development could be further undertaken in their localities, as well as what could be done to improve current development conditions, thereby reducing risks to population and properties.
- 4.73 Critical here would understand the vulnerability of population and assets since by addressing these vulnerabilities, coping mechanisms are improved and the possibility that hazard events do not turn to disasters is improved. By reducing the vulnerability handle eventually leads to reducing risks.
- 4.74 The goals and objectives of land use plans should reflect this analysis and translate them into the planned specific programs and projects, structural and non-structural in nature.

- 4.75 The approach for integrating disaster risk information may vary depending on status of land use plans. In the preparation of new land use plans, disaster risk information can already be made part of the plan formulation process.
- 4.76 In the case of updating, enhancements on specific aspects can be done, for example, in determining the key issues and challenges to be addressed by the land use planchanges in the land use framework given disaster risk information that may alter the desired land use patterns, and in the specific land use interventions, especially new structural measures or land use controls will be implemented.
- 4.77 It is also important to note that in the aftermath of large-scale disasters, rehabilitation of affected areas should follow the principle of building back better or building back elsewhere, which have very strong land use implications. This will require a rethinking of existing land use plans, much earlier than the prescribed period of planning and updating.

# Risk Evaluation and Upgrading the standard of conventional land use planning options and measures

- 4.78 Risk evaluation can be very useful in setting the "desired state", in other words, to gather answer to following questions: what level of risk should be accepted? What level of risk should be treated? What level of risk should be transferred?
- 4.79 Treatment of risk requires desired structural and non-structural measured, which means that the convention land use planning options and measures need to upgraded such as density control, site selection and development control and design and building regulations, among others (Table 4.4).

Tunning Contacts

Jenson Control

etincion:

**Market** 

on the er risk

ple, in plan, ter the new

itation g back uire a nod of

#### ns and

rds, to What

which graded an and

## Table 4.4 Land Use Planning Options and Measures (General Overview)

Land Use Planning Options	Description	Specific Hazard Applicability	Specific Structural and Non-structural Land Use Measures
Density Control	Applying occupancy and density ceilings for allowed land	Flooding	Limit occupancy load and floor area ratios in higher population density exposed to flooding (the higher the population density, the potential for property damage is greater)
	uses	Fault	Allow only low density, single family residential land use in buffer zone (usually 5 m to the left and right of fault line)
Site selection and development controls	Site selection and development controls	Flooding	Avoiding areas where development will increase the likelihood of risk or level of impact.  Keeping development out of high-risk and extremerisk zones.  Flood proofing in medium- to high-risk areas.
		Fault	Restrict any new construction within the surface faulting zone Require geologic studies and foundation designs for proposed structures within fault zones Mandate abatement or retrofitting of existing buildings within surface zones Encourage voluntary retrofitting as one goes farther away from the fault zone
		Ground shaking	Allow only low-intensity land uses in high risk areas where there is potential for land failure due to landslide or liquefaction Restrict high-rises and high-occupancy residential buildings and offices in high risk areas underlain by soft soils Require special geological studies, site investigations and special foundation designs.
		Landslide	Slope stabilization with protective structures and natural means such as covering the slope with vegetation.  Engineered retaining walls with drainage built in front of houses.  Adequate surface drainage.
Design and building regulations	Application of appropriate building controls	Flooding	Building controls in terms of elevation (e.g., lowest floor of residential structures must be above the 100- year flood level), high foundation walls, stilts, pilings, setbacks, minimum lot size depending on risk levels.
		Ground shaking	Enact and adopt building code regulations that adequately represent the seismic hazards Building code provisions should encourage regular building shapes, which minimize torsional effects in the building. Limit building appendages or reinforce them, if constructed. Limit signs and billboards or require reinforcements, if constructed.
		Landslide	Foundations founded on bedrock should be required

#### References

ESRI (2011) GIS Best practices: GIS for urban and regional planning. ESRI.

Facilicom Consult (2003) Handbook: Steps and methods to mobilize the community. Facilicom Consult, Nijmegen, 4th January 2003

Institute of Cultural Affairs (n.d.) The Technology of Participation. Training Series.The Institute of cultural Affairs, USA.

Peggion M. Bernardini A. Masera M (2008) Geographic Information systems and Risk Assessment. JRCS cientific and Technical Reports. Join research Center, European Commission. European Communities: Italy

UDD (2013) Draft Report on Urban PRA Session. Mymensingh Strategic Development Plan (MSDP) 2011-2031. Ministry of Housing and Public Works, Government of the People's Republic of Bangladesh





# SECTION 5 – DATA REQUIREMENT FOR DIFFERENT TYPES OF URBAN AND LAND USE PLAN IN BANGLADESH

#### Purpose

- 5.1 To aware reader with the different types of risk information data require for urban and land plan preparation in Bangladesh.
- 5.2 To familiarize and develop understanding of the reader about the risk treatment measures or options required by different types of urban and land use plans in Bangladesh.

## Types of Urban and Land Use Planning in Bangladesh

- 5.3 As discussed in the previous part, PRA is one of the effective techniques to gather risk assessment data, or primary source of data collection at the community or ward level.
- 5.4 Risk assessment information collected through PRA can be useful to make land use plan risk sensitive, especially for small-scale areas. But, for large-scale areas, it is essential to first understand different types of land use plans in Bangladesh and what type of data is required for formulating land use plan including risk assessment?
- 5.5 In Bangladesh, current planning practice is to prepare three tires of plans based on duration, scale and policy. These are outlined below.

#### Structure Plan (15/20 Years)

- 5.6 Develops broad strategies for managing and promoting efficient medium- to long-term urban development. The structure plan integrates economic, physical and environmental planning objectives, providing a framework for development activities in the area.
- 5.7 Compared to the other plans, the structure plan covers a larger area of land, and a longer period of time. The plan is expressed as strategic policy for key sectors, such as the economy, housing, traffic and transportation, spatial development, land development, or the environment. Attention is also given to the institutional requirements for implementation of these strategies.
- 5.8 Plans include an analysis of the major constraints and opportunities in the area and provide major development options and policies based on these. Usually there is also some indication of the most suitable areas for development, as well as identification of priority sectors and activities for implementing the development strategy.

#### Urban Area Plan (10 Years)

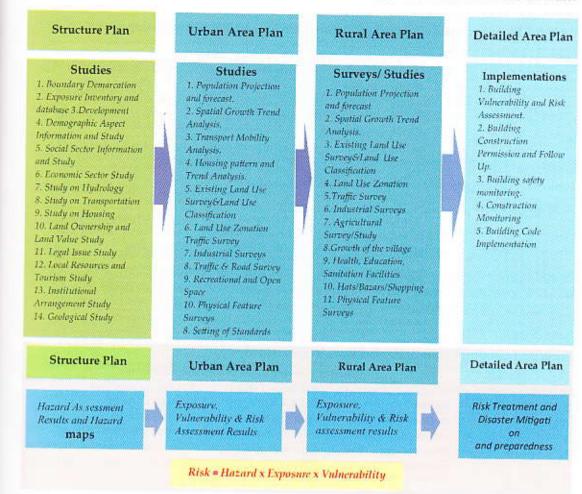
5.9 It provides a medium-term (i.e. normally ten-year) strategy for the development of the urban area. It defines the geographic boundaries of the planning area over the ten-year planning period. 5.10 Urban area plans consist of a range of elements, including planning rules for the urban area, multi-sectoral investment programs, sectoral surveys, such as traffic, population, power, water surveys, and the location of key facilities such as health and educational facilities.

#### Detailed Area Plan (3/5 Years)

- 5.11 It is a series of detailed spatial development plans of different types. DAPS includes the participatory land readjustment plans, guided land development plans and infrastructure led development plans and area improvement plans. The DAPs will be formulated for execution in a period of 3-5 years.
- 5.12 The map scale of detail area plan is 1:1000 which covers building level information detail. The detailed area plan covers issues, which require immediate attention during the early period of the structure plan (normally the first five years).
- 5.13 Within the framework set by the structure plan, the detailed area plan closely examines and provides detailed guidance on a limited number of priority activities to be implemented over the short-term.
- 5.14 The plan's formulation is highly participatory. It identifies potential projects and ranks these according to priority. For the prioritized projects, the plan provides guidance ranging over the location of the project, its goals and objectives, key actors and resources required and budget implications. The detailed area plan is reviewed every five years.

#### Rural Area Plan (20 Years)

- 5.15 Rural Area Plan (RAP) provides a long-term strategy for 20 years and covers for the development of rural areas within the project area.
- 5.16 Generally, RAP contains an explanatory report, resource maps, conservation and management report, planning rules, rural area plan and a multi-sectoral investment program etc.



ne urban

ulation, cational

ncludes

ens and

will be

mation

during

closely

ities to

d ranks midance

s and devery

for the

n and stment

 ${
m Fig}~5.1~{
m Types}$  of risk information required for structure plan, urban area plan, rural area plan and detailed area plan in Bangladesh

# Data Requirement as per different Land Use Planning Practices in Bangladesh

- 5.17 Structure Plan is the first and foremost step in the current planning practice that comprises a number of sectoral study to set overall planning outline (Fig. 6.1). As a part of disaster mitigation, hazard assessment should be carried out along with the sectoral studies during the preparation of structure plan (Fig. 6.1). Hazard assessment should be based on the prevailing hazards of the respective study area.
- 5.18 Next step is to carry out Urban Area Plan comprising few more detail study on some specific sectors. At this stage, exposure, vulnerability, and risk assessment should be carried out with a view to incorporate into implementation mechanism of planning step (Fig. 5.1).
- 5.19 Different types of risk assessment information are required for different planning phases as shown in table 5.1, 5.2, and 5.3.

Table 5.1 Planning Guide 1: Level of Planning Phase and Related assessments

Disaster Related	Level of Planning Phase			
Information	Structure Plan	Urban Area Plan	Detailed Area Plan	
/Assessment Required	(Scale=1: 20,000)	(Scale = 1: 5000 )	(Scale = 1:3960)	
Hazard Assessment	Required for both built up and non- build up areas	Required for zone bases on land use	Required at detailed level i.e, even at individual building level	
Vulnerability	Required at Gross	Required at detail level	Required at Building Detail	
Assessment	Level		Level	

#### Table 5.2 Planning Guide 2: Exposure Data Requirement

Level of Planning	Exposure data Requirement			
Phase	Land Use	Infrastructure	Lifeline/Utilities	
Structure Plan (Scale=1: 15000)	Built up and non-Built up area demarcation	Major Communication lines like river, major roads, rail lines	Power Plant, Gas Field, Major Water Bodies	
Urban Area Plan (Scale = 1: 5000)	Categorization of existing infrastructure based on use	Categorization of infrastructures like major/minor road.	Drainage network, Major Gas line, Water supply network	
Detailed Area Plan (Scale = 1:3960)	Individual structure use	Construction detail, type, category	Material type detail.	

#### Table 5.3 Planning Guide 3: Hazard Data Requirement

Types of Hazard	Level of Planning Phase and Hazard Information			
	Structure Plan (Scale=1: 20,000)	Urban Area Plan (Scale = 1: 5000 )	Detailed Area Plan (Scale = 1:3960)	
Flood	Regional Information and maps on flood prone areas Regional Drainage System Climate Change and Precipitation Maps Satellite Image	Historical Records on Flooding Topographic Maps(with spot height) Historical inundation maps Annual Rainfall Pattern	Detailed information on local level flooding and water logging Exposure inventory	
Cyclone	Historical cyclone tract, damage	Wand and precipitation data and maps	Exposure inventory Local level wind and rainfall data	
Landslide	Regional Maps of past landslide Geological Maps Regional slope map	Landslide inventory Slope Stability maps Detail topographic map	Local level maps with the sub- soil information detail, ground water level detail Exposure inventory	
Earthquake	Regional Fault Maps Regional Active Fault Study Geody namic Modeling Study	Soil Liquefaction Study Micro Zonation Maps Geo-technical survey and studies Earthquake Catalog development	Exposure inventory and Assessment	
Urban Fire	Development pattern, built up/ non built up area identification	Building Density, accessibility, firefighting capacity	Exposure inventory and Assessment	

5.20 Once the hazard information is collected in the form of Geographical Information system (GIS) maps, it is essential to overlay them with other maps produced for different studies and implementation.

#### Detailed d

Type: Bou

District Box Sources of a Bangladesh

Type: Expo

Major Infrasi Road Netwo Telecommun Land Coverag Built up area Sources of In Energy and Telecommun

Type: Demo

Trend in Population Clusternd in Population; expectation of moving, lengt Sources of Ingle Health and far

Type: Social S

Educational Se Distribution of of students by eachers by quaschools by own occupied; Probl Sources of Inform

# Health Service

ealth institutions; Type mgoing projects ources of Informations

#### Detailed data requirement for Structure Plan

#### Type: Boundary Demarcation

District Boundary, Municipality/ Upazila Boundary, Union Boundary, Ward Boundary
Sources of Information: Department of Land Records and Survey (DLRS) of Bangladesh,
Bangladesh Bureau of Statistics, Municipality office, UpazilaParishad office

#### Type: Exposure Inventory/ Base Map Preparation and Database Development

Major Infrastructure

Road Network, rail network, river network, Electricity network, Gas main network (if any), Telecommunication network

Land Coverage

Built up area, water bodies, agriculture, forest, hilly areas, marshy/beel areas
Sources of Information: Ministry of Communications, Ministry of Railways, Ministry of Power,
Energy and Mineral Resources, Ministry of Environment and Forest, Ministry of Post and
Telecommunications, Ministry of Water Resources, Ministry of land, Ministry of Agriculture

#### Type: Demographic Aspect Information and Study

Population Characteristics and Dynamics

Trend in Population Size; Age Composition; Sex Composition; Ethnic Composition; Religious Composition; Fertility (Total fertility rate, Crude birth rates); Mortality (Infant mortality rate, expectation of life at birth, crude death rates); Migration (Proportion of in-migrants, reason for moving, length of continuous residence)

Sources of Information: Ministry of Planning, Bangladesh Bureau of Statistics, Ministry of Health and family welfare.

#### Type: Social Sector Information and Study

Educational Service

Hevel

sub -

bund

nation

ed for

Distribution of school by grade level; Trends of school enrollment by grade level; Distribution of students by origin, age and sex; School age population by grade level; Distribution of teachers by qualification; Number of repeaters and dropouts by grade level; Distribution of schools by ownership; Physical condition of schools and their facilities; Location and area occupied; Problems related to educational services; and Ongoing projects and future plans. Sources of Information: Ministry of Education; Ministry of LGRD and co-operatives

#### Health Service

Existing number of health institutions by type, health personnel; Health institutions by ownership; Ten top diseases and major causes of death; Origin of patients; Facilities in the health institutions; Physical condition of health institutions; Area and location of health institutions; Type of health services rendered by existing health institutions; Future plan and ongoing projects; and Problems related to health service.

Sources of Information: Ministry of health and family welfare; Ministry of LGRD and co-operatives



#### Sport and Recreation

Number of playgrounds by neighborhood, sport fields and stadium; Availability of parks and zoo; Availability of Libraries; and Problems related to sport and recreational facilities Sources of Information: Ministry of Youth and Sports;

#### Type: Economic Sector Survey and Study

#### Unemployment

Number of economically active population; number of unemployed population Sources of Information: Ministry of Labor and Unemployment

#### **Business Sector**

Number of business establishments by type, employment, and facilities; Spatial distribution of the establishments; Number of trade licenses issued, renewed or returned; Major source of item traded & major customers; Major challenges and opportunities of the sector. Sources of Information: Ministry of Trade (MoT), Ministry of Planning (MoP)

#### Investment & Investment climate

Number of approved projects by sector (agriculture, industry, services etc.); Expected employment creation capacity of the projects; Capital of approved projects; Investment climate: availability of serviced land, infrastructure, support institutions, rules & regulations etc.; Opportunities and challenges of investment activities.

Sources of Information: Ministry of Trade (MoT)

#### Manufacturing Sector

Number of Manufacturing by type of employment and major products/outputs (time series): Spatial distribution of manufacturing activities; Major source of raw materials/inputs and market destination; Extent of inter-industrial linkage; Potentials and challenges of the sector. Sources of Information: Ministry of Trade (MoT)

#### Micro and Small Enterprise (MSEs)

Number of persons engaged (separated by sex) in MSE operation by sector (cooperatively organized individuals)- time series data; Sources of raw materials; Major products/outputs Extent of inter-sectional linkage; Available support institutions and types of support provided (credit and other technical supports); Potentials and challenges for MSE development. Sources of Information: Ministry of Trade (MoT)

#### Informal sector

Type of informal activities being conducted in the town; Size of employment, amount of capital and sources of capital; Spatial distribution of the informal activities; Major sources of input and major customers; existing linkage with the formal sector; Sources of Information: Ministry of Home Affairs.

# Data Requ

Fixed mistorical sources of

# Cyclone/ S

Board, Wa

period Secrets of In

# Earthquak

thistorical characterist Sources of In it Banglade

# Mater Logg

First records Sources of In later Resor

# Data Requi

Landslide modent inv Sources of Inj

# Implements, da Sources of Inj

Type: Enviro

Section Res



# Data Requirement for Hazard Assessment

Identification of Major Hazard in and around the Planning Area Flood

Historical Records of water level, damage, duration, period

Sources of Information: Department of Disaster Management (DDM), Water Development

Board, Water Resources Planning Organization, Department of Meteorology

# Cyclone/ Storm

Historical Records of wind speed, storm surge level, inundation level, damage, duration,

Sources of Information: Department of Meteorology

#### Earthquake

Historical Records, magnitude, damage, fault lines, geological formation, general soil characteristics and type

Sources of Information: Department of Meteorology, Department of Geology, Geological Survey of Bangladesh (GSB)

#### Water Logging

Past records, affected areas,

Sources of Information: Department of Meteorology, Water Development Board,

Water Resources Planning Organization

## Data Requirement for Hazard Assessment

#### Landslide

Incident inventory, damage and casualties,

Sources of Information: Department of Meteorology and Department of Geology

#### Urban Fire

Incidents, damage, sources

Sources of Information: Fire Service and Civil defense

#### Type: Environment and Climate Change Study

Wetland Resources (Flora & Fauna)

Sources of Information: Municipalities, Local Government Division, Department of Environment

capital out and

ks and

tion of

irce of

pected

stment lations

series);

ts and

atively utputs;

ovided

ector.

#### Solid waste

Institutional arrangement for solid waste management; Types and nature of solid waste generated; Role of different actors (NGOs, informal sector, government, MSEs); Recycling and reusing mechanisms; Budget allocated for solid waste management; Inter-municipal cooperation for solid waste management; Localized policy guidelines, strategies, rules and regulations related to solid waste management; Problems, opportunities and future plans. Sources of Information: Municipalities, Local Government Division, Department of Environment

#### Liquid Wastes

Number of toilet facilities by type; Mechanisms of collection, transportation, disposal recycling, and treatment of liquid waste; Type and composition of liquid wastes generated from different sources; Public toilets and their spatial distribution; Budget allotted for liquid waste management; Inter-municipal cooperation on waste management; Condition of the existing waste disposal site, if available;

Sources of Information: Municipalities, Local Government Division, Department of Environment

#### Air pollution

Identify major source of indoor and outdoor air pollution, Dust, Vehicles; Indoor Availability of kitchen facility, Type of energy source and use,

Sources of Information: Municipalities, Local Government Division, Department of Environment

#### Temperature

Daily, Monthly and Yearly (maximum, minimum and average)
Sources of Information: Department of Meteorology

#### Rainfall

Daily, Monthly and Yearly (maximum, minimum and average)
Sources of Information: Department of Meteorology, Department of Agriculture;

#### Type: Study on Hydrology and Drainage

Basin/watershed characteristics:

Basin size/area, slope, shape- length, width, drainage density; Surface and sub-surface geology; Depression storage information; Names of rivers, ridges, and other such physical features;

Sources of Information: Ministry of Agriculture and Water Development Board

#### then channe

marnel systems and prosistance- vomation, one bank cor marges, areas of Info

Ministry of A

dro-meteo

ereal rainf age-dischar arces of Info

#### Type: Transp

Frastructure
Road Networ
Pus terminal,
Sources of Info
Bangladesh ra

raffic Count raffic Count rassenger Surventory of Cources of Info rangladesh ra

#### Type: Housin

Number of hearted, etc.); housing units acilities; Info

#### Type: Land C

dentification Sources of Info ffice, AC lan



#### Open channel flow:

Channel system layout; Channel shape, cross-section; Channel slope, flow direction, outlet type and protection; Channel type (natural channels-meandering, braided, straight); Flow resistance- vegetation, debris/ sedimentation, solid wastes, blockages etc.; Flow bypass information, damages, causes, maintenance and structural condition, ages of system; River bed and bank conditions, protection locations, dredging records, flow characteristics, backwater information from receiving stream, historical information on channel size, form or alignment changes,

Sources of Information: Resources Planning Organization, and Ministry of water Resources, Ministry of Agriculture

#### Hydro-meteorology

General rainfall characteristics, rainfall intensity records; Water level and velocity records; Stage-discharge rating curves

Sources of Information: Department of meteorology and Water Development Board

# Type: Transport Survey and Study

Infrastructure Information & Facilities

Road Network and Types; number of lanes; Rail Network and Types; River network; airport, bus terminal, freight terminal, railway station, port, etc.

Sources of Information: Ministry of Communications (Department of Roads and Highways), Bangladesh railway, BIWTA, office of the Municipality and UpazilaParishad

#### Survey and Studies

Traffic Count Survey; O-D Survey; Rail Passenger Survey & Inventory of Railway Station; Bus Passenger Survey; Truck Operation Survey; Inventory of Air Transport; Survey of River Ghats; Inventory of Car parking spaces; Rural and Growth Centre Linkage Survey; Pedestrian Survey Sources of Information: Ministry of Communications (Department of Roads and Highways), Bangladesh railway, BIWTA, office of the Municipality and Upazila Parishad

#### Type: Housing

Number of households and housing units; Housing units by tenure status (public, private, rented, etc.); Housing units by purpose (residential, business, etc.); Physical condition of housing units; Distribution of housing units by construction material; Bathing facilities, toilet facilities; Informal housing units; Problem related to housing; and, Ongoing projects and future housing plan.

Sources of Information: Ministry of LGRD and co-operatives, Ministry of Housing and Public Works, Bangladesh Bureau of Statistics

# Type: Land Ownership and Land Value Study

Identification of land ownership pattern, land value assessment (time series data)

Sources of Information: Office of the Municipality and Upazila Parishad, Upazila Sub-registrar office, AC land office, Ministry of land

b-surface physical

d waste

ding and

unicipal ules and

ironment

disposal,

or liquid

n of the

vironment

ailability

wironment



#### Type: Legal Issue Study

Identify the acts, ordinance, rules related to all the studies being conducted under Perspective and Structure Plan

Ro

R

Fo

Lo

W

G

W

Po

Ri

5.23 To i be o

5.24 The expo

Data Requi

5.25 In o

5.26 Upg 5.5, nece

low,

thei

Sources of Information: Ministry of Housing and Public Works, Ministry of Local Government. Municipality, Upazila Parishad

#### Type: Local Resources and Tourism Study

List of tourist attraction sites; Time series data on number of tourists; Tourist seasons; existing facilities at tourist attraction sites; Number and type of tourist oriented enterprises; Tourist promotion activities; Potential tourist attraction sites.

Sources of Information: Ministry of Civil Aviation and Tourism (Bangladesh Parjatan Corporation)

#### Type: Institutional Setting Study

Name, number, category of Government, Non-Government Agencies, NGOs operating in the commend area; existing capacities of the agencies; short comings; weakness; organizational settings

Sources of Information: Ministry of LGRD and co-operatives (NGO Affairs)

5.21 Each of the study carried out under the structure plan stage (fig. 5.1) should use appropriate hazard maps (table 5.3) to generate risk maps.

# Detailed data requirement for Urban Area Plan

5.22 The Urban Area Plan will require more detailed information than that of Structure Plan. Apart from data required for UAP, a number of planning tools are to be used for decision implementation of Urban Area Plan. This stage of planning phase will analyze disaster issues more critically than the structure-planning Phase.

# Table 5.4 List of features and information requirement for Urban Area Plan

	BASIC INFORMATION AND CLASSES		
A	Major Land Use		
	Residential/ Homestead		
	Agriculture		
	Educational and Research		
	Business and Mercantile		
	Public Administration		
	Institution		
	Mixed Use		
	Industrial and Storage		



	Assembly	
B	Transportation	
	Road Alignment with width and ROW	
	Rail Alignment with ROW	
	Footpath with width	
	Water Communication	
	Location of Bus, Truck, Rail stand	
C	Utility and Service Facilities	
	Water Supply Network	
	Gas Supply Network	
	Electricity Supply network	
D	Natural Features	
	Water Body	
	Pond	
	River	

- 5.23 To integrate risk information into urban area plan, the hazard maps (table 5.3) need to be overlay on maps showing inventories based on different classes (table 5.4).
- 5.24 The outcome of this integrating will identify list of inventories and classes that are exposed to different zones of hazards with different magnitude, and declare them in low, medium, and high-risk zones.

# Data Requirements for Detailed Area Plan

ective

ment,

isting urism

rjatan

in the tional

d use

cture

d for will

- 5.25 In order to integrate hazard information into detailed area plans, list of features and their detailed specification in table 5.5 should be standardized for different hazard intensity.
- 5.26 Upgraded standard or measures can be used to analyze information collected in table 5.5, and outcome of this will inform what structural and non-structural measures are necessary for sustainable development.

Table 5.5 List of features and information requirement for detailed area plans

List of Features	Information Requirement
	Data Paguiraments for Urban Area Planning
Building Information	Identification number, Accessibility, Utility services availability, Accessibility,
Transportation	Type of road, construction material, width, footpath, number of lane
Utility and Service facilities	Water supply network, material of pipeline, width, water main, pump station, water source, Gas Supply Network, material of pipeline width, gas, control station; Sewage network, alignment diameter; Electricity Supply Network, cable orientation, substation, electric main station.
Natural Resources	Natural water bodies like: river, canal, pondsetc , wetland, hill, Sea beach, forest, fountain etc
	Data Provincents for Earthquake Risk Assessment
Building Information	Identification number, Accessibility, Utility services availability, Accessibility, Utility services availability, Accessibility, Dility services availability, Accessibility, Number of stories, Number of apartments. Structural type, Number of occupants, Age of the building. Presence of soft story, Presence of heavy overhangs, Shape of the building in plan view, Shape of the building in elevation view, Pounding possibility, Building in slope land, Visible ground settlement, Presence of the structure of the struc
Transportation	Type of road, construction material, width, footpath, humber of inte-
Utility and Service facilities	a third of minding width Water inding punit
	Deta Paguiraments for Flood Risk Assessment
Building Information	Identification number, Accessibility, Plinth height, Othiny services availability, Area of building footprint, Number of stories, Number of apartments, Structural type, Number of occupants, Age of the building
Transportation	Type of road, construction material, elevation, width, footpath, number of lane, road divider, Railway line, railway track and elevation
Utility and Service facilities	Water supply network, material of pipeline, width, water main, pump station, water source, Gas Supply Network, material of pipeline width, gas, control station; Sewage network, alignment, alignmen diameter; Electricity Supply Network, cable orientation, substation electric main station., Location and Elevation of all supply stations

Building Infor

	Data Requirements for Fire Risk Assessment	
Building Information	Identification number, Accessibility, Utility services availability, Area of building footprint, Number of stories, Number of apartments, construction material, Number of occupants, electric wiring of the building, distance from nearby house	
Transportation	Type of road, width, footpath, number of lane, road divider	
Utility and Service facilities	Water supply network, material of pipeline, width, water main, pump station, water source, Gas Supply Network, , material of pipeline, width, gas, control station; Sewage network, alignment, alignment diameter; Electricity Supply Network, cable orientation, substation, electric main station.	
	Data Requirements for Cyclone Risk Assessment	
Building Information	Identification number, Accessibility, Utility services availability, An of building footprint, Number of stories, Number of apartment Structural type, Number of occupants, Age of the building.	
Transportation	Type of road, construction material, elevation, width, footpath, number of lane, road divider, Railway line, railway track and elevation	
Utility and Service facilities	Water supply network, material of pipeline, width, water main, pump station, water source, Gas Supply Network, , material of pipeline, width, gas, control station; Sewage network, alignment, alignment diameter; Electricity Supply Network, cable orientation, substation, electric main station.	
	Data Requirements for Landslide Risk Assessment	
Building Information	Identification number, Accessibility, Utility services availability, Area of building footprint, Number of stories, Number of apartments, Structural type, Number of occupants, Elevation of the Building (slope in the hill /foot of the hill)	
Transportation	Type of road, construction material, elevation, width	
Utility and Service facilities	Water supply network, material of pipeline, width, water main, pump station, water source, Gas Supply Network, , material of pipeline, width, gas, control station; Sewage network, alignment, alignment diameter; Electricity Supply Network, cable orientation, substation, electric main station.	

Area ents,

lane,

eline, ment mon,

Sea

Area nents, sence lng in

nding mence fon Tane,

nump eline,

amient Melon,

thices be of if the routh.

and

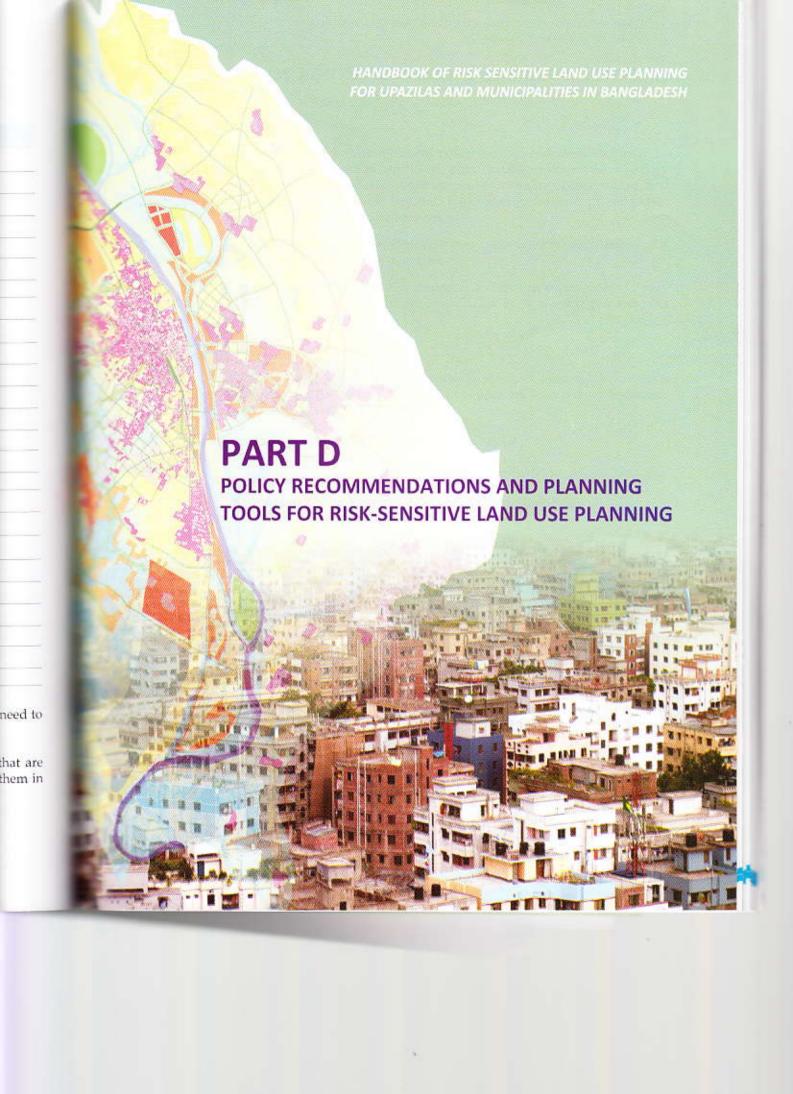
Marin.

#### Data Requirements for Rural Area Plan

#### Table 5.6 List of features and information requirement for Rural Area Plan

	BASIC INFORMATION AND CLASSES
A	Major Land Use and Surveys/ Studies
	Residential/ Homestead
	Existing Land Use Survey
	Survey of Development Activities
	Population Survey
	Traffic Survey
	Road Surveys
	Industrial Surveys
	Agricultural Survey/Study
	Power Supply
	Health, Education, Sanitation Facilities
	Hats/Bazars/Shopping
	Graveyard/Cremation Facilities
	Agriculture
	Educational and Research
$B_{-}$	Transportation
	Road Alignment with width and ROW
	Rail Alignment with ROW
	Water Communication
C	Utility and Service Facilities
	Electricity Supply network
D	Natural Features
	Water Body
	Pond
	River

- 5.27 To integrate risk information into rural area plan, the hazard maps (table 5.3) need to be overlay on maps showing inventories based on different classes (table 5.6).
- 5.28 The outcome of this integrating will identify list of inventories and classes that exposed to different zones of hazards with different magnitude, and declare them in low, medium, and high-risk zones.



## SECTION 6 - POLICY RECOMMENDATIONS FOR LAND USE PLAN IMPLEMENTATION

#### Purpose

- 6.1 To familiarize reader with the most critical policy recommendations that may be necessary to be utilized during land use plan implementation. Such policy recommendations are identified for different areas, including conservation and protection, urban areas, housing, economy and employment, infrastructure and public services, tourism and recreation, and environment.
- 6.2 To discuss in detail, policy recommendations' justification and means of implementation by concern agency or agencies.
- 6.3 To familiarize reader with the crucial risk treatment and mitigation measures for new urban areas and for built up areas that are essential for implementing risk sensitive land use plan.

#### Areas & Policy Recommendations

6.4 During the plan formulation and implementation stage, it essential to consider important policy recommendations (Table 6.1). Incorporating such recommendations ensure land use plan risk sensitive.

Table 6.1 Areas and policy recommendations for plan formulation

Areas	Policy Recommendations		
Conservation and			
rotection	Conservation of ruralagricultural land		
	Protection of water bodies and wetland		
	Flood and erosion control		
	Preservation and restoration of historical & archeological sites		
Urbanareas	Optimum use of Available Land Resources		
	Infrastructure Development in Spontaneous Areas		
	Promote Studies for Urban Fringe Area Development		
Housing	Promotion of Housing Area Development in New Urban Area		
	Promotion of Housing for the Low Income Groups and the Poor by Public Sector housing Agencies		
Economy and	Boosting of Regional Agriculture		
Employment	Promotion of PubliePrivate Joint Industrial Venture		
Infrastructure and public	Incremental Road Network Development towards Achieving the Final Network		
services	Development of Pedestrian Facilities Within the Urban Area		
Tourism and recreation	Promotion of Tourism through Infrastructure Development & Improvement		
	Promotion of Local Heritage Based Tourism		
Environment	Promotion of Recreational Open/Green Space		
	Prevention of Surface Water from Pollution		

- 6.5 These policy options should not only remain as commitment from the relevant agencies but should be implemented by the same agencies. The following section discusses these policy options in detail by describing their justification, means of implementation, and implementing agency.
  - Areas of Conservation and Protection

#### Policy CP/1: Control Hazard Prone Areas from Development

#### Justification

As per Seismic Hazard and Risk Assessment, there may be some part of the city which is susceptible to liquefaction effect. Any type of important installation in the area will be at risk in case of earthquake event. Therefore, it will be recommended to discourage development within this area

Means of Implementation

This policy can be implemented through enacting new regulations, which call for protection of this area of the city. The concerned agency/authority should take immediate steps in this regard.

Implementing Agency

Municipality/Pourashava, Upazila Parishad, UDD

#### Policy CP/2: Conservation of Rural-Agricultural Land

#### Justification

Rural and agriculture land play a vital role in producing food for urban areas and the overall region. Conservation of these areas can limit urban development onto key land resources.

Means of Implementation

This policy can be implemented through enacting new regulations, which call for protection of the rural-agriculture area. The concerned agency/authority should take immediate steps in this regard.

Implementing Agency

MoL, DoA, Municipality/Pourashava, Upazila Parishad, UDD

#### Policy CP/3: Protection of Water body and Wetland

#### Justification

Natural Water bodies and wetlands play a vital role for a city/town. Therefore, it is important to protect natural water bodies and wetlands in and around of the city/Municipality/Upazila

Means of Implementation

This policy can be implemented through enforcing environmental policies, laws and acts or enacting new regulations (if required), which call for protection natural water bodies. This policy also need to consider Wetland Conservation Act. The concerned agency/authority should take immediate steps in this regard.

Means of Ir

Policy CP/4

Municipality property. The erosion alon

Means of Ir This policy of prone areas.

> Implementi EWDB, Mur

> Policy CP/5

There are so some areas protect these

Means of In This policy historical pl

Implementi Ministry of Corporation

Policy UA/1

Justification
Dense gro
Pourashava,
land uses sh
promoted a
within the ex
Pourashava,

Means of In This policy identification agency/auth

#### Means of Implementation

DoE, Municipality/Upazila Parishad

#### Policy CP/4: Flood and Erosion Control

#### Justification

int

on

all

ant

Municipality/Upazila experiencing flooding needs control measures to protect man and property. They have to take measures to control unplanned development which contributes to erosion along riverbanks.

#### Means of Implementation

This policy can be through enacting new regulations, which call for protection of the at hazard prone areas. The concerned agency/authority should take immediate steps in this regard.

#### Implementing Agency

BWDB, Municipality/UpazilaParishad

#### Policy CP/5: Preservation and Restoration of Historical & Archeological Sites

#### **Justification**

There are some sites which known as Historical & Archeological heritage and there are also some areas which have the potentiality to become heritage. They have to take measures to protect these places and also ensure that those places shouldn't be use for another purpose.

#### Means of Implementation

This policy can be through enacting new regulations, which call for protection of theat historical place. The concerned agency/authority should take immediate steps in this regard.

#### Implementing Agency

Ministry of Cultural Affairs, Zila and Upazila Parishad, Pourashava/ Municipality, City Corporation,

#### Urban Areas

#### Policy UA/1: Optimum use of Available Land Resources

#### Justification

Dense growth within the established urban area should be promoted in Pourashava/Municipality and Upazila Sadar. Land lying vacant Land amid all categories of land uses should be identified within built area and beyond. Infilling of this land should be promoted and encouraged to optimize use of land. Keeping large land areas of vacant land within the existing built up area it is not logical to go for extension of physical boundary of the Pourashava/Municipality and Upazila Sadar.

#### Means of Implementation

This policy can be implemented through enacting new regulations, which calls for identification and process for development of the vacant land in urban areas. The concerned agency/authority should take immediate steps in this regard.



#### Implementing Agency

Pourashava/Municipality and Upazila Sadar

## Policy UA/2: Infrastructure Development in Spontaneous Areas

Infrastructure needs to be provided in order to allow spontaneous growth of existing and new urban areas by public sector development agencies. Haphazard development takes place along the urban fringe is beyond development control of the Pourashava/Municipality and Upazila Sadar. Therefore, it requires development of roads and other infrastructures to guide the development in a systematic manner.

This policy can be implemented through enacting new regulations, which call for development Means of Implementation planning along the urban fringe. The concerned agency/authority should take immediate steps in this regard.

#### Implementing Agency

LGED, RHD, Pourashava/Municipality and Upazila Sadar

## Policy UA/3: Promote Studies for Urban Fringe Area Development

Because development along the urban fringe often occurs in an unplanned fashion, it is necessary to conduct further disaster risk assessments and environmental impact studies ensure that appropriate infrastructure planning is implemented to accommodate future growth along these areas.

This policy can be implemented through enacting new regulations, which call for planning initiatives within this area. The concerned agency/authority should take immediate steps this regard.

DDM, Disaster Science and Management Faculties of Universities, UDD, ADPC

#### Housing

Policy HO/2: Promotion of Housing for the Low Income Groups and the Poor by Public Sector housing Agencies

## Policy HO/1: Promotion of Housing Area Development in New Urban Area

If Pourashava/Municipality and Upazila Sadar's population is projected to have repopulation growth over the next several decades, there will be requirement of new house options in areas that are experiencing new development.

Implement DDM, Disa

Means of I This policy at housing Tike immed

Implement MHA, UDD

Means of Ir s policy o manning alo this regar

plementin MHA, UDD,

.

#### astification

De to natur wime landles who are lows critical to urashava/!

#### Means of Im

s policy ca low risk a sould take in

### mplementin

HA, MoL, U

Phlicy EC/1: E

• E

stification

anculture is acounding r

### means of Imp

spolicy car - tural ar Implementing Agency

DDM, Disaster Science and Management Faculties of Universities, UDD, ADPC

Means of Implementation

This policy can be implemented through enacting new regulations, which calls for the location of housing in low risk areas of Municipality/Upazila. The concerned agency/authority should take immediate steps in this regard.

Implementing Agency

ng

ila

the

ent

eps

it is

es to

uture

nning

eps in

Public

e rapid

NHA, UDD, Pourashava/Municipality and Upazila Sadar

Means of Implementation

This policy can be implemented through enacting new regulations, which call for development planning along the urban fringe. The concerned agency/authority should take immediate steps in this regard.

Implementing Agency

NHA, UDD, Pourashava/Municipality and UpazilaSadar

Housing

#### Justification

Due to natural hazards like tsunami, floods, river-bank erosion and poverty, there are always some landless people and new migrants in each Pourashava/Municipality and Upazila Sadar who are low-income and often result to informal means for their housing choices. Therefore, it is critical to provide affordable housing options in low risk areas throughout the Pourashava/Municipality and Upazila Sadar.

Means of Implementation

This policy can be implemented through enacting new regulations, which call for identification of low risk areas to provide affordable housing options. The concerned agency/authority should take immediate steps in this regard.

Implementing Agency

NHA, MoL, UDD, Pourashava/Municipality and Upazila Sadar

Economy and Employment

Policy EC/1: Boosting of Regional Agriculture

#### Justification

Agriculture is critical to provide food and additional resources to urban areas and the surrounding rural environment.

Means of Implementation

This policy can be implemented through enacting new regulations, which call for protecting of agricultural areas. Concerned agency/authority should take immediate steps in this regard.

#### Policy Ec/2: Promotion of Public-Private Joint Industrial Venture

Iustification

Small and medium scale industry in and around Pourashava/Municipality and Upazila Sadar can gain access to greater financial and knowledge based resources throughout active joint ventures and partnerships with public authorities.

Means of Implementation

This policy can be implemented through erecting new Act to strengthen public private partnerships and joint ventures in Pourashava/Municipality and UpazilaSadar. The concerned agency/authority should take immediate steps in this regard

Implementing Agency

Ministry of Industry, Chamber of Business & Commerce, UDD, Pourashava/Municipality and Upazila Sadar

Infrastructure and Municipal Services

Policy TR/1: Incremental Road Network Development towards Achieving the Final Network

**Justification** 

This section should justify the current traffic congestions and road development throughout Pourashava/Municipality and Upazila Sadar in order to limit future traffic congestion.

Means of Implementation

This policy can be implemented through enacting new regulations, which call for road network and related transportation infrastructure development informed by disaster risk assessments. The concerned agency/authority should take immediate steps in this regard.

Implementing Agency

RHD, LGED, Pourashava/Municipality and Upazila Sadar

#### Policy TR/2: Development of Pedestrian Facilities Within the Urban Area

Justification

Pedestrian Facilities such as sidewalks , crosswalks, and signals are needed to ensure pedestrian safety in future urban development

Means of Implementation

This policy can be implemented through enacting new regulations, which call for development of pedestrian facilities. The concerned agency/authority should take immediate steps in this regard

Implementing Agency

LGED, Pourashava/Municipality and Upazila Sadar

Policy Tour/

ustification Facilities asso the tourism i

Means of Im This policy ca tourism facili

Implementin Ministry of C

Policy Tour/2

Justification Local heritag enhance trad

Means of Im This policy ca peritage sites

Implementin Ministry of C

Policy ENV/1

astification Open spaces cromote safet

Means of Imp This policy of protection of =ke immedia

mplementing DoE& Forest,

#### · Tourism and Recreation

### Policy Tour/1: Promotion of Tourism through Infrastructure Development & Improvement

#### Justification

Facilities associated with current and future tourism should be enhanced to promote growth in the tourism industry.

#### Means of Implementation

This policy can be implemented through enacting new regulations, which call for protection of tourism facilities. The concerned agency/authority should take immediate steps in this regard.

#### Implementing Agency

Ministry of Civil Aviation and Tourism, Pourashava/Municipality and Upazila Sadar

### Policy Tour/2: Promotion of Local Heritage Based Tourism

#### Justification

Local heritage sites should be preserved and maintained in order to bolster tourism and enhance traditional culture and knowledge.

#### Means of Implementation

This policy can be implemented through enacting new regulations, which call for protection of heritage sites. The concerned agency/authority should take immediate steps in this regard.

#### Implementing Agency

Ministry of Civil Aviation and Tourism, Pourashava/Municipality and Upazila Sadar

#### Environment

### Policy ENV/1: Promotion of Recreational Open/Green Space

#### Justification

Open spaces and playground facilities should be maintained and expanded in order to promote safety and public health within Pourashava/Municipality and Upazila Sadar

#### Means of Implementation

This policy can be implemented through enacting new regulations, which call for the protection of green space like parks and playgrounds. The concerned agency/authority should take immediate steps in this regard.

#### Implementing Agency

DoE& Forest, Pourashava/Municipality and Upazila Sadar

#### Policy ENV/2: Prevention of Surface Water from Pollution

#### Iustification

Water Pollution in and around the Pourashava/Municipality and Upazila Sadar is currently always a concern for public health and more purification and sanitation facilities should be provided in order to prevent contamination and outbreak of communicable disease.

Means of Implementation

This policy can be implemented through enacting new regulations, which call for additional water purification and sanitation facilities to be located on low risk land. The concerned agency/authority should take immediate steps in this regard.

Implementing Agency

DoE& Forest, MoH, Pourashava/Municipality and Upazila Sadar

6.6 In addition, to support the implementing agencies, relevant planning standards (Annex-9), relevant policy/Act/Regulation of land use planning and disaster mitigation in Bangladesh (Annex-10) are attached and their applicability for the respective areas needs to be considered.

#### Risk Sensitive Urban Land Use Planning Tools

- 6.7 Land use planning contributes to various benefits, such as, avoiding land use conflicts sustainable use of natural resources management, protection of biodiversity, national park and buffer zone management, food security, disaster risk management and adaptation to and mitigation of climate change, among others.
- 6.8 If land use planning is risk sensitive, it can successfully benefit to the objectives and disaster risk management.
- 6.9 There are several tools for risk sensitive land use planning as shown in the table 62 and detail explanation of each tool is described in Annex 11.

#### Table 6.2 Risk sensitive land use planning tools

Regulatory tools	Restriction tools	Engineering tools	Natural protection tools
	Exa	mples	
Building codes	Land Acquisition	Property specific design	Coastal wetland creater or restoration
	Transfer of development rights	Area wise hard protection	Dune building or rehabilitation
	Conservation Easement		Natural soil nourish
			Natural windbreaks

su mi Fo

6.10 TI

too

Table 6.3 I

Zone Residential

Commercial

Industrial

Educational

\* griculture

Open Space Recognized for Areas)

Developme
Line (Hazard
Line Area)
Line Reserve
Risk Prone Are

area in instand

6.4 Land

Zime

migh Risk Zone

m Risk Zor

Risk Zone

6.10 The tools can be also applied to classify new urban areas into different classified zones, such as, residential, commercial, industrial, educational, agriculture, open space mixed use and no development zone (hazard prone area), among others (Table 6.3). For example, to make any hazard prone land into no development zone, restriction tools are very often utilized for such transformation.

#### Table 6.3 Land classification uses for new urban areas

Zone	Permitted Use	Conditional Use	Restricted Use
Residential	Residence	Small business shops like confessionary	Commercial Activities; Any type of Industry; Polluting Activities
Commercial	General Merchandise store; Food Market; Books and Office Suppliesetc.	Light industries with limited manpower/ types	Residence; academic like school/ college
Industrial	Heavy, medium and light industries	Commercial activities with limited categories	Residence; academic like school/ college
Educational	School; college; university	Student Dormitory	No urban use like commercial, industrial, residential
Agriculture	Agriculture, forestry; gardening	Fisheries; livestock	No urban use like commercial, industrial, residential
Open Space (Recognized formal Aroas)	Park; play ground; lake; zoo;	Temporary structure (to be specified) with light activities	No urban use like commercial, industrial, residential
Mixed Use	Combination of Residential, Commercial, offices etc.	Special type of activities (specify)	Any type of Industrial Use
No Development Zone (Hazard Prone Area)	Temporary use like Agriculture, gardening, forestry	Temporary structure (to be specified) with light activities	Power plant; heavy structure; industry;
Urban Reserve (Risk Prone Area)	Existing infrastrudures without further extension	Improvement of existing infrastructures	Any type of new construction

6.11 In addition, these tools can be also applied to the built up areas by classifying urban area into different zones, namely, high risk, medium risk, and low risk (Table 6.4). For instance, restriction tools can be used to stop permission of all types of new development or to take initiatives for relocation of all installations.

#### Table 6.4 Land classification steps for built up areas

Zone	Immediate Step	Medium Term Step	Long Term Step
High Risk Zone	Stop permission of all types of new developments	Important installations should be shifted	Initiatives for relocation of all installations
Medium Risk Zone	Stop permission of all types of new developments	Initiatives for improvement of the installations	Discourage any type of important installations
Low Risk Zone	Development is permitted in accordance with Building Code and other regulations	Development is permitted in accordance with Building Code and other regulations	Development is permitted in accordance with Building Code and other regulations

tional

erned

ently

ld be

dards saster or the

nflicts, ational nt and

ives of able 6.2

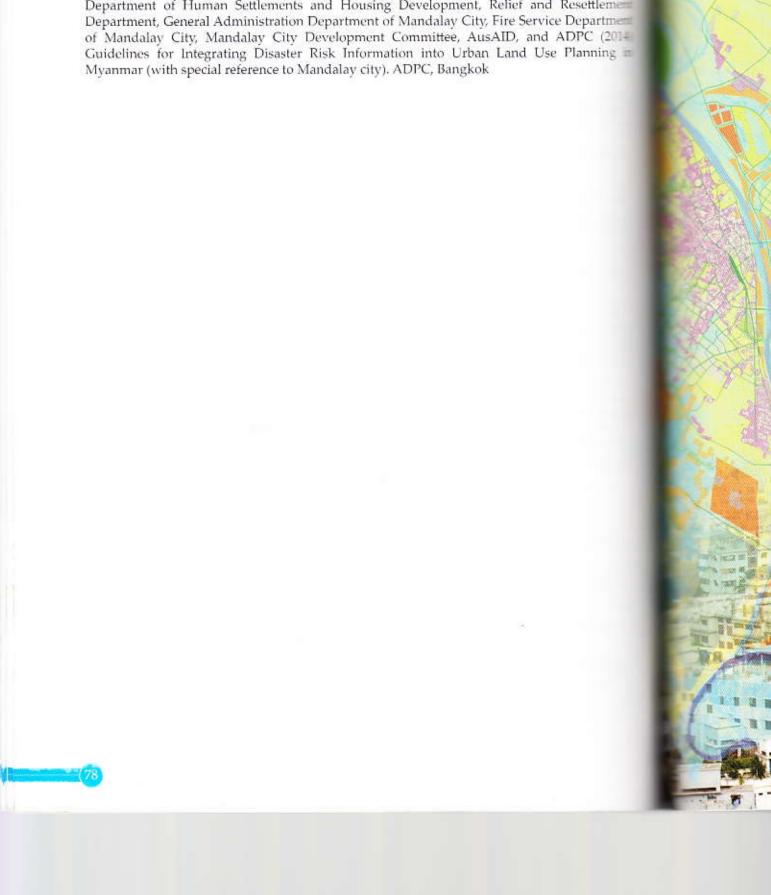
n tools

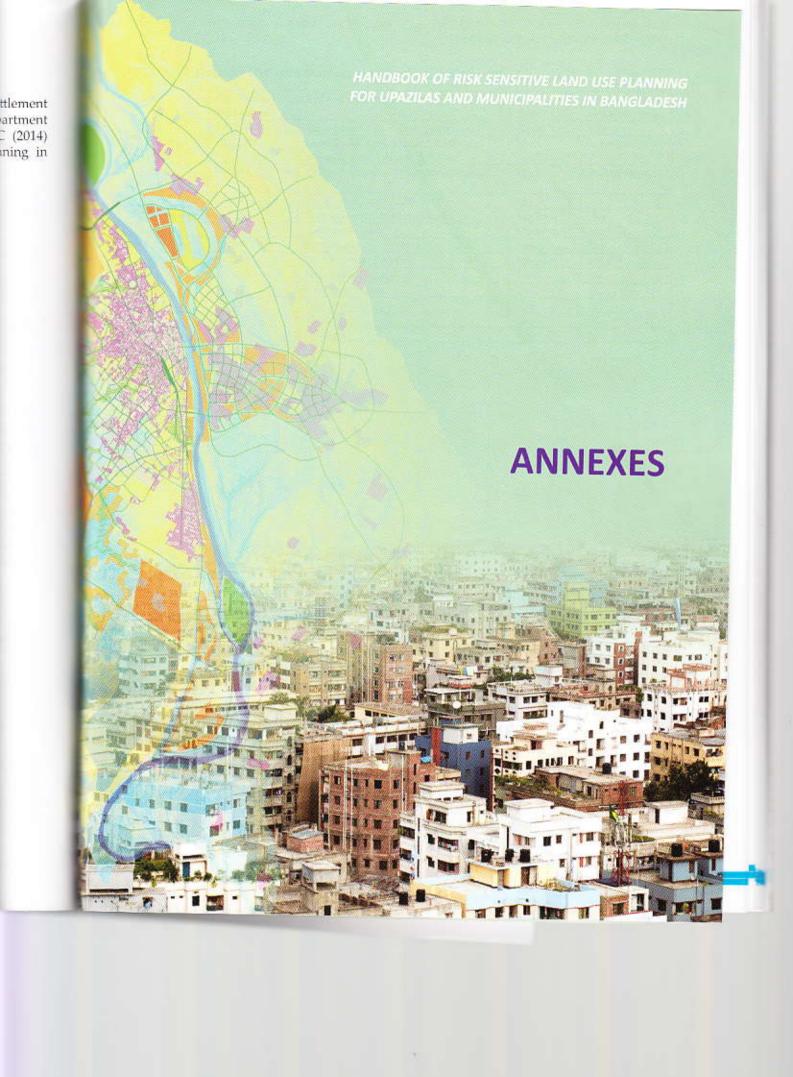
creation

rishment aks

#### References:

Department of Human Settlements and Housing Development, Relief and Resettlement





#### HANDBOOK OF RISK SENSITIVE LAND USE PLANNING FOR UPAZILAS AND MUNICIPALITIES IN BANGLADESH

### ANNEX - 1 Disaster risk profile of major cities in Bangladesh<sup>16</sup>

Name	Population in 2001 Census	Type of Disaster	Degree of	Major Disaster
Dhaka	6,482,877	Earthquake, fire, water-logging, flood	Risk	in Last 5 years
Chittagong	2,202,637	Earthquake, tidal flooding, landslide, water-logging, cyclone, fire	High High	Fire Landslide
Khulna	884,445	Cyclone, tidal flooding, water-logging, salinity, fire	High	Water-logging
Rajshahi	388,811	Flood, erosion, drought, fire	Low	**
Narayanganj	241,393	Fire, industrial accident, flood	100000	No
Rangpur	241,310	Earthquake, fire	Medium	Fire
Mymensingh	227,201	Earthquake	Medium	No
Barisal	192,810	Cyclone, tidal flooding	Low	No
lessore	176,655		Medium	No
Comilla	166,519	Fire, water logging	Low	Nσ
Dinajpur	157,914	Fire, Earthquake	Low	No
Bogra	The state of the s	Fire, drought	Low	No
	154,807	Fire	Low	No
Nawabganj	152,223	Drought	Low	No

Source: Newspaper scan of last 15 years (Ittefaq, Prothomalo)

Rashid Mamunur AKM, Shahjlal, Islam T, Sakib MH, Nahar N, Das BK, Rahman C, Islam R, Azzad S, Newaz S (2013) Mainstreaming Disaster Risk Reduction in Urbanization in Bangladesh: A Scoping Study Oxfam GB and Development Frontiers.

### ANNEX - 2 Mymensingh Strategic Development Plan (MSDP) Project, 2011-2031

#### An Overview17

Bangladesh is one of the most climate vulnerable countries in the world and will become even more so as a result of climate change. Floods, tropical cyclones, earth quack, storm surges and droughts are likely to become more frequent and severe in the coming years. These changes will threaten the significant achievements of Bangladesh which has made over the last 20 years in increasing incomes and reducing poverty, and will make it more difficult to achieve the MDGs. While acknowledging the level and magnitude of risks and vulnerabilities, Bangladesh has also received equal global recognition for its risk reduction, preparedness and emergency management skills and efforts which had helped the country to maintain declining trends in terms of human causalities and economic loss. During the last two decades the country has invested a significant amount of its own resource and resources of its development partners in creating the foundation for achieving the Government of Bangladesh Disaster Management Vision of "reducing the risk of people, especially the poor and the disadvantaged, from the effects of natural, environmental and human induced hazards, to a manageable and acceptable humanitarian level, and to have in place an efficient emergency response system capable of handling large scale disasters".

Realizing the necessity for a paradigm shift in disaster management from its conventional response and relief management approach to a more comprehensive risk reduction culture, the Government of Bangladesh along with its development partners designed and implemented the Comprehensive Disaster Management Programme (CDMP) Phase-I during 2003-2009. The goal of CDMP-I was to strengthen the capacity of the Bangladesh disaster management system to reduce unacceptable risks and improve response and recovery activities. CDMP-I followed a all hazard, all risk and all sector approach and the elements of CDMP-I were implemented through strategic, technical and implementation partnership arrangements with different 100 entities or organizations. After successful completion of CDMP-I, the phase-II has been launched.

CDMP-II (2010-2014) is a vertical and horizontal expansion of its Phase-I activities designed based on the achievements, lessons learned and the strong foundation laid during CDMP-I by continuing the processes initiated, deriving actions from the lessons learned, utilizing knowledge resources generated and knowledge products published. The approach of CDMP-II is to channel support through government and development partners, civil society and NGOs into a people-oriented disaster management and risk reduction partnership. That partnership will promote cooperation, provide coordination, rank priority programmes and projects, and allocate resources to disaster management activities, risk reduction activities and climate change adaptation activities in Bangladesh.

Considering above-mentioned conceptual frame-work of CDMP-II, a pilot project on preparing a module for mainstreaming disaster risk preventive measures into comprehensive Land Use development planning and management for Mymensingh (Municipality) Strategic Development Planning (MSDP Area for twenty years (2011-2031) time-span has been formed between CDMP-II and Urban Development Directorate (UDD).

A Memorandum of Understanding (MoU) was signed on 21 March, 2011 between the authorities of Comprehensive Disaster Management Programme (CDMP-II) of the Disaster Management & Relie Division (DMRD), Ministry of Food and Disaster Management (MoFDM) and Urban Development Directorate (UDD), Ministry of Housing and Public Works (MoHPW) at the presence of concerned Ministers. The area of collaboration is to prepare an integrated development plan covering Structure Plan, Urban/Rural Area Plan and Action Area Plans, and subsequent training module for Mymensing (Municipality) Strategic Development Planning (MSDP) Area by including disaster (both natural and management).

Project Goal, Objectives and Outcomes of Mymensingh Strategic Development Project Goal of Mymensingh Strategic Development Project

\*\*Excerpted and adopted from MSDP teebsite: http://www.msdp.gov.bd/index.php?skylark-61&news\_id=326

The ov anthropogen climate chan assistance in channel sup people-orient cooperation, disaster man Bangladesh.

CDMP in disaster risk in general stakel operational on Under this op between CDM integrated deviabsequent in Physical/Struct

Objectives of Me The object acquiring know earthquake to it The specific obj

- A Pilo into C (Munic
- Equips Labora office.
- Advoca (URDA UDD).

Dutcomes of the A

The project which might have planned to be core of Mymensingly preparation of Upreparation of Russing relevant daying relevant daying relevant daying relevant daying change in land

CDMP II is design planning package 031

so as ely to ficant ucing I and is risk itry to cades oment ement

cts of

level,

se and ent of ensive vas to ks and broach station ion of

on the ng the erated irough isaster rovide ement

nodule pment MSDP) pment ities of

Relief opment icerned ructure ensingh ral and The overall goal of CDMP-II is to further reduce country's vulnerability to adverse natural and anthropogenic events – including cyclones, hurricanes, floods, tidal surges, earthquakes, tsunamis, climate change and variability, avian flu, fire, toxic chemical/gas/pollutant leaks – through technical assistance in risk reduction and comprehensive disaster management activities. The approach is to channel support through government and development partners, civil society and NGOs into a people-oriented disaster management and risk reduction partnership. That partnership will promote cooperation, provide coordination, rank priority programmes and projects, and allocate resources to disaster management activities, risk reduction activities and climate change adaptation activities in Bangladesh.

CDMP II offers an outstanding opportunity to improve linkages with, and synergies between, disaster risk reduction and adaptation to climate change. This applies both at the national and at the general stakeholder level. The linkages are clearly expressed in many of the activities outlined in the operational outcomes of the project design, as well as through strengthened institutional capacities. Under this opportunity, a Memorandum of Understanding (MoU) delineated the area of collaboration between CDMP-II and Urban Development Directorate (UDD). The area of collaboration is to prepare an integrated development plan covering structure plan, urban/rural area plan and action area plans, and subsequent training module through the integration of disaster risk information with the Physical/Structural/Land use plan of the township area.

Objectives of MoU between CDMP II and UDD:

The objective of this MoU is to enhance the technical capacity of the relevant professionals for acquiring knowledge on the appropriate disaster risk reduction measures technique particularly earthquake to incorporate them into comprehensive land use development planning and management. The specific objectives of this MoU are:

 A Pilot Project on Preparing a Module for Mainstreaming Disaster Risk Reduction Measures into Comprehensive Land Use Development Planning and Management for Mymensingh (Municipality) Strategic Development Planning Area.

 Equipment's support to develop a permanent "Geographic Information System (GIS) Laboratory", under "Urban Research and Development Application Centre (URDAC)" in UDD

office.

 Advocacy support to institutionalize the Urban Research and Development Application Centre (URDAC) through appropriate institutional approach (reforming organizational structure of UDD).

Outcomes of the Mymensingh Strategic Development Plan Project:

The project planning area will cover Mymensingh (Municipality) Strategic Development Area, which might have potential for development within the next 20 years up to year, 2031 A.D. The project is planned to be completed in three stages/tiers. In the first stage, there will be preparation of Structure Plan for Mymensingh municipality and surrounding grater hinterland area. The second stage will be preparation of Urban Area Plan incorporating necessary data of urban (municipality) area and also preparation of Rural Area Plan for said hinterland area for assessing problems or opportunities, which need immediate intervention. The third stage will be preparation of Action Area Plan/Detailed Area Plan using relevant data from detailed CDMP physical feature survey in the form of sectoral projects and programs for immediate intervention based on local need. The current project would also emphasize over the change in land category, land use and livelihood pattern.

CDMP II is designed around the following six interrelated outcomes which will be related with proposed planning package (3-stages) described below:

#### Table: Outcome of CDMP and correlation with planning package

Outcome of CDMP	Relation with planning package
Outcome 1: Development of strong, well-managed and professional institutions in Bangladesh that is able to implement a comprehensive range of risk reduction programmes and interventions at the national level, as well as contributing to regional actions, international learning and best practice.	It will be identified at the structure planes stage through appropriate institution
Outcome 2: Reduced risk to rural populations through structural and non-structural interventions, empowerment of rural communities and improved awareness of and planning for, natural hazard events, including the likely impacts of climate change.	It will be incorporated within strate planning stage.
Outcome 3: Reduced risk to urban populations through structural and non-structural interventions, improved awareness of natural hazard events and the piloting of urban community risk reduction methodologies targeting the extreme poor.	It will be incorporated within Urban and Plan under structure planning gandels through appropriate action plan.
Outcome 4: Improved overall effectiveness and timeliness of disaster preparedness and response in Bangladesh by strengthening management capacity and coordination as well as networking facilities at all levels.	It will be incorporated within Structure and Urban Area Plan and Dissert Management Plan
Outcome 5: Better disaster-proofing of development funding across thirteen ministries. This will achieved by generating increased awareness of hazard risks and the provision of technical information, advisory services and resources to stimulate positive changes in planning and investment decisions over the longterm.	It will be incorporated at the each three of planning package.
Outcome 6: Community-level adaptation to disaster risks from a changing climate is effectively managed.	Action Area Plan/Urban Area Plan School Plan and Disaster Management Plan

### Approa

Import
that has promigation mea
to of Ris
topalities i

are five ste

- = Step 1
- Step 2
   Step 3
- \* Step 4
- Step 5

starting p

#### 1 - PRE

imponents immodal res

#### 11111-A

mists, engi mists, engi on or land use disciplinary

#### Example

#### Core Team

Turner (Dep

nui Plannet

grammetry Exp

maily invite the

### ANNEX - 3 Preparation of Urban and Land Use Plan in Bangladesh: Step and Approach

Importance of risk information and land use planning has been discussed in section, which has provided substantial evidence to incorporate risk identification and required mitigation measures into land use/ urban planning process. This section provides step wise process of Risk Sensitive Land Use Planning with specific reference to Upzilla and municipalities in Bangladesh. However, the same process can be replicated at other city/ town or city corporation with necessary modifications.

#### Steps and Activities

There are five steps in the urban and land use planning process in Bangladesh, each step consisting of several activities:

Step 1 – Preparation

nning

tional

icture

deline

Plan

stage

acture

- Step 2 Data and information gathering
- Step 3 Data and information analysis
- Step 4 Plan formulation
- Step 5 Plan adoption and gazetting

Your starting point is the receipt of an official letter requesting your planning agency to prepare or revise a structure plan, urban area plan or detailed area plan.

#### STEP 1 - PREPARATION

Objective: To establish the conditions of the urban or land use planning project, including the key components and objectives, its time-frame and methodology, and the human, technical and financial resources needed to undertake the project.

Output: Inception Report

#### ACTIVITY 1 - ASSEMBLE THE TEAM

A multidisciplinary planning team is assembled including planners, environmental specialists, economists, engineers, geographers, and researchers. The team formulates the concept of the urban or land use plan.

Multidisciplinary teams can be of different types and composition:

Table-4: Examples of multidisciplinary planning teams

Core Team	Technical Team	Non-technical Team
Team leader Urban Planner (Deputy Team Leader) Regional Planner Rural Planner GIS Expert Photogrammetry Expert Transport Planner	Hydrologist Architect Civil Engineer Agriculture Scientist Environmental Specialist Geologist Survey Expert Surveyors GIS Operators	Sociologist Geographer Economist PRA Expert Statistician Legal Expert Financial Analyst

Formally invite the team members, and remember to submit the names of the team members to the relevant department.



### ACTIVITY 2 - GATHER BASIC INFORMATION

Start to gather and read information about socio-economic conditions in the general area of the urban or land use plan, so that background knowledge of the municipality or upazila is acquired. Basic information includes data on:

- history
- regional settings and locations
- communication and transport facilities
- important places and structures including location of government agencies
- tour guides and maps
- Safety conditions.

If the project involves revising an existing plan, then the existing plan should be thoroughly read.

Use existing available maps to identify the boundary of the area to be covered by the plan. Existing maps could include:

- Topographic maps
- Administrative maps
- Google Earth and Google Maps
- Aerial photographs and satellite imagery
- Geological Map local and Bangladesh
- LGED Upazila Map

Further to the basic information collected, the planning team also need to undertake a preliminary survey (reconnaissance survey) of the area. The planning team leader should prepare a schedule of tasks for this survey which outlines the tasks, time required and budget for the survey. Preliminary surveys are usually rapidly executed and relatively low cost. This is conducted prior to mapping in detail and with greater accuracy.

Make use of existing maps when undertaking the preliminary survey. During the survey collect data on:

- Administrative boundaries (upazila, municipality or union boundaries etc.)
- Road network, road conditions and connectivity with the surrounding area
- Housing conditions
- Cultural and historic sites
- Economic conditions, and main sites of economic growth
- Agricultural land
- Government and non-government organizations
- Structure of the municipal or upazila authority
- Responsible authorities for planning and development
- Environmental conditions including the location of environmentally sensitive areas such as rivers, ponds, public spaces, planting areas and forests
- Natural hazards such as landslides, floods, earthquake issues
- Urban areas including residential and industrial zones
- Main sites of public utilities such as water and electricity
- Markets
- Public transportation network such as buses and ports

Note caref may requi recent floo extent of d

It is importa urban or la boundaries. administration

#### ACTIVITY 3

A socio-econo environmenta present and p area.

Seek to gather

- Ct ur
- Pr Pr
- Ty
- Ma

Gather and r socio-economi

lesed on this is akeholder Li

- Military and security services
- LGED Maps

the

a is

hly

an.

ıld zet

nis

ey,

- Geological Maps
- Shelter information
- Location of Fire Service
- Education facilities
- Religious facilities

Note carefully the main locations for any natural hazards which are or have occurred. This may require talking with local communities and government leaders about the location of recent floods, landslides, erosion, earthquake and other hazards. Remember to find out the extent of damage caused by the hazard, and especially the spatial area the hazard affects.

It is important at this stage to identify the outer boundary of the area to be covered by the urban or land use plan. This outer boundary should follow existing administrative boundaries. This boundary area should be agreed through consultation with the local

## ACTIVITY 3 - UNDERTAKE AN INITIAL SOCIO-ECONOMIC ANALYSIS

A socio-economic analysis is required to understand the demographic, socio-economic, and environmental trends and conditions of the plan area. This includes a study of all relevant present and past plans and projects, as well as projected changes, trends and issues for the plan

Seek to gather and analysis information relating to:

- Current population in terms of density, age distribution, percentage rural and
- Projections of population, household, and dwellings for the next five years
- Proposals for investments infrastructure and local facilities
- Types and degree of natural resources present
- Main economic activities of the municipality or upazila

Gather and read this information and seek to acquire a sound understanding of the socio-economic conditions of the plan area.

Based on this information, the planning team can assemble a list of stakeholders in the area (see



Table-5: List of Stakeholders

For a Municipality	For a Upazila
Mayor	Upazila Chairman
UpazilaNirbahi officer	Upazila Vice-Chairman
Ward Councillors	UpazilaNirbahi officer
Executive Engineer of Municipality	Upazila Engineer
Town Planner of Municipality	Upazila Education officer
Civil Society of the Municipality	Upazila Agriculture officer
Local Religious leader	Upazila Health officer
Local Teachers	Upazila Project implementation office
Upazila Engineer	Upazila social welfare officer
Upazila Education officer	Upazila Livestock and Fisheries office
Upazila Agriculture officer	Civil Society of the Upazila
Upazila Health officer	Local Religious leader
Upazila Project implementation officer	Local Teachers
Upazila social welfare officer	Local media
Local media	Local Chamber
Local Chamber	Chairmen of the Union level
Executive Engineer, PWD	Members of the Union level
Executive Engineer, LGED	Executive Engineer, PWD
	Executive Engineer, LGED
	Executive Engineer, DPHE
	Executive Engineer, RHD
	Executive Engineer, PDB
	Executive Engineer, Water Board

Source: UDD

Based on consultation with these stakeholders the planning team can identify the main goals and objectives for the plan. These consultations should include all the main stakeholders, as well as representatives of the main sectoral agencies at local level. At the meeting discuss the proposed boundary for the plan. Request feedback on the main goals and objectives of the plan.

#### ACTIVITY 4

Identify the g individuals th

### ACTIVITY 5 -

This handbook plans in Bangla variables, the m on a case-by-cas

Figure-6: Schen plan



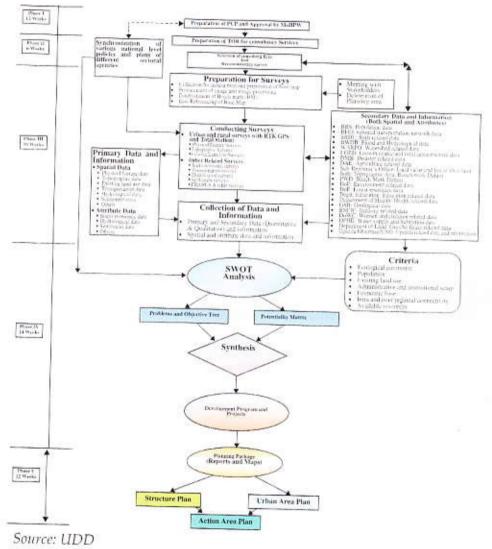
### ACTIVITY 4 - SET PLAN GOALS AND OBJECTIVES

Identify the goals and objectives of the different stakeholders. Stakeholders groups and individuals that have interest and direct or indirect involvement in the planning project.

### ACTIVITY 5 - FINALISE THE WORKING METHODOLOTY

This handbook sets out a clear methodology for preparing risk-sensitive urban and land use plans in Bangladesh. However, due to restrictions on budget, human resources, time or other variables, the methodology may need to be revised and should be assessment and agreed upon on a case-by-case basis. The broad methodology should look some like the following:

Figure-6: Schematic diagram of methodology for preparing a risk-sensitive urban land use plan





#### ACTIVITY 6 - DETERMINE THE TIMELINE AND BUDGET

Establish a timeline for the plan preparation process indicating important dates and milestones. This timeline can be formulated using bar charts, Gantt charts as well as software like Microsoft Project and Microsoft Excel.

Prepare a budget based on the methodology and timeline. Arrange financial and human resources to carry out the planning project, as well as associated logistics.

#### ACTIVITY 7- DRAFT THE INCEPTION REPORT

The inception report is the result and accumulation of all data and information collected from activity 1 to 6 of Step 1. The report is generally composed of:

- introduction
- background of the plan project
- objectives of the project
- description of the study area
- methodology of the project
- work schedule
- possible outcome(s)
- limitation and challenges of the project
- next steps.

Once the inception report is drafted in should be submitted to the municipality and upazila for review and information. Formal approval of the report is required from the UDD before proceeding further with the plan preparing process.

#### STEP 2- DATA AND INFORMATION GATHERING

Objective: To gather comprehensive data (spatial and non-spatial) of the planning area and to assemble this into a database.

Primary Output: Sectoral database for the planning area.

Secondary Output: This step involves the production of a broad range of secondary outputs, including:

- Sectoral maps and reports such as demographic, industrial, hydrological, geological, agricultural, transport, environmental, hazard, metrological etc;
- Participatory planning documents such as a problem tree, objective trees and participatory rapid appraisal maps.

Time Required: 20-24 weeks.

#### ACTIVI

Prepare the worl budget c

#### ACTIVIT SYSTEM

A base n marks, ac the base i includes structure.

The qualit a geo-refe available, map may

#### ACTIVIT

In order t should co cooperatio

The plant governmen and if poss is paper-ba work on pa

#### Table-6: T

Demograph

Communica and Transpo

Hydrologica

#### ACTIVITY 1 - PREPARE A WORK SCHEDULE AND BUDGET FOR EACH TEAM

Prepare a work schedule and a budget for internal purposes before going into the field. Plan the work schedule by making use of existing available maps, and the broad timeframe and budget decided upon in Step 1. The budget for each field survey should include:

- · Transport costs
- · Food and accommodation
- · Equipment costs to undertake the field survey
- Stationary and associated office equipment for recording the results once the survey team returns to the office.

### ACTIVITY 2 - PREPARE A BASE MAP USING GEOGRAPHIC INFORMATION SYSTEMS (GIS)

A base map is a map which shows background reference information such as roads, land marks, administrative boundaries etc. Other thematic information can be superimposed on to the base map at a later date. Planners use the base map as a location reference, and it often includes geodetic control networks (a system of geospatial reference points) as part of its structure.

The quality of a base map depends on the quality of the data available. Wherever possible, use a geo-referenced high-resolution satellite image or aerial photograph. But if no such image is available, a base map derived from existing GIS data or a hard copy (paper based) topographic map may be used instead.

#### ACTIVITY 3- COLLECT SECONDARY DATA

In order to strengthen the GIS base map with additional layers of data, the planning team should coordinate with a range of different agencies. For this, it helps if a relationship of cooperation and collaboration needs to be in place.

The planning team collects secondary data, which is usually sectoral, from different government departments and institutions. Ideally, data should be given in electronic format, and if possible, can be directly integrated into the GIS base map. If not, for example, if the data is paper-based tables, maps etc., this data will have to be digitized, unless the team prefers to work on paper.

Table-6: Types and sources of secondary data

Data type	Example	Source
Demographic	Population; density; gender; age distribution; employment; urban and rural information	Bangladesh Bureau of Statistics
Communication and Transportation	regional connectivity/setting; mode of transport; road network; type of roads	Department of Roads and Highways Local Government Engineering Department
Hydrological	water table and aquifer; water quality; floodwater level; flood plain	Water Board

Geological		Department of Disaster Management, Geological Survey of Bangladesh	
Meteorological	Rainfall; sunshine hours; temperature and humidity; storm and cyclone; wind speeds and direction, climate hazards	Meteorological Department	
Natural hazards	Hazard maps (allhazards); risk maps	Department of Disaster Management, Geological Survey of Bangladesh	
Energy	Power; gas; wind speeds and direction; electrical production; sunshine hours	Power Development Board	
Agricultural	Cropping pattern; cropping intensity	Department of Agricultural Extension	
Tourism	Main tourist destinations; facilities	Bangladesh Parjaton Corporation	
Environmental	Vegetation types; fauna; land cover types; forestry	Department of Environment	
Land administration	Administrative boundaries; mouza maps; khas land; land values	Directorate of Land Records and Survey, A.C. Land Office.	
Legislative	Relevant laws and acts	Government of Bangladesh	
Institutional	Government and NGOs	Bangladesh Bureau of Statistics, government websites	
Historical	Events; monuments; regime	Government websites, Department of Archaeology	
Facilities/Utilities	Water supply and sewerage; electricity; gas; health; graveyard; market; religious centres	WASA, DESA, Titas, City Corporation, Pourashava, UpazilaParishad	
Amenities	Park, open space, play ground, community centre library, cultural academy, religious festival location	City Corporation, Pourashava, UpazilaParishad	

Source HDD

#### ACTIVITY 4 - UNDERTAKE A TOPOGRAPHIC SURVEY

It is necessary to inform Agency X bodies of the upcoming topographic and field surveys, and interviews. Approval should be obtained from Agency X prior to arriving at the survey site. For this, the team should:

- Contact Agency X about the field surveys
- 2. Inform Agency X of the names of the members of each survey team
- 3. Request the name of the representative from Agency X who will join each survey team
- 4. Reach agreement with Agency X on the dates of each field survey
- Inform the local Agency X and the local administration of the surveys once everything is arranged with the central office.

Once on site, and prior to beginning of the survey, the team should hold a meeting with Agency X, in order to discuss the topographic survey. Similarly, meet with the provincial office of Agency X and the local administration. Confirm the planning area, and the main reference points for the survey.

Following much dep digitized the base is supply, E Contour I

Ensure the hydrologic It is import dominant natural hat these (fiel

After the the survey

#### ACTIVIT

The plann questionn socio-culti characteri water sup ensure that extensive available a

The plann a number

- Agrice
   Indus
- Energ
- Educa
- Health

The local of collection uses, the lo

It is import when back

The follow interview of Following the discussion, undertake the survey. The requirements of the survey will very much depend on the quality of the base map – i.e. on the number of features that can be digitized on the computer. Possible features which may have to be surveyed (depending on the base map) are as- Road network, Road widths, Electricity lines, Sewerage system, Water supply, Buildings, Rivers/water bodies, Rivers/water bodies, Natural hazards, Land use, Contour lines, New features etc.

Ensure that hazard data is collected during relevant surveys. For example, waterways and hydrological surveys should consider rainfall, flood, and water drainage patterns for the area. It is important to change the survey pattern in different geographical areas to reflect the dominant hazards in that area. The secondary data review should give an idea of the main natural hazards in the area – otherwise discussion with the local administration should reveal these (field surveys and interviews are also key tools to gather hazard and risk information).

After the topographic survey, the team should meet again with Agency X/MHPW to wrap up the survey.

#### ACTIVITY 5 - UNDERTAKE FIELD SURVEYS AND INTERVIEWS

The planning team should collect data and information from the local administration using a questionnaire. These data include the physical, demographic, socio-economic, economic, socio-cultural, infrastructural (road numbers, electricity lines etc.) and environmental characteristics of the area (including natural hazards, and traditional issues like sanitation and water supply). Field surveys are time consuming and costly, so before undertaking them, ensure that the secondary data collection (Activity 3 above) has been completed and has been extensive and systematic. It is important to check and now what data and information is available at national and local levels before getting underway on field surveys.

The planning team can collect information from the following departments or offices based on a number of questionnaire forms. Keen the completed questionnaires for future reference:

- · Agriculture and Forestry ·
- Industry and Commerce
- Energy
- Education
- Health

- Information and Culture .
- Planning
- Investment and Finance
- Environment
- Disaster Management
- Land Office
- Tourism Office
- Telecommunications and Post
- Urban Development
- Village administrations
  - Water Resources

The local office of the MHPW as well as the local administration may be able to help in the collection of local data. The planning team should undertake field surveys of existing land uses, the location of public buildings and services, and types of housing.

It is important to keep accurate records of interviews and surveys while in the field so that when back in the office these can be developed into a report/key findings of the sectors etc.

The following is a list of sectors and key data to be collected either through field survey, interview or purchase.

#### Table-7: Primary Data Collection

Data type	Key Data	Source	
Socio-economic	Economic situation, water supply, heritage sites, social facilities, settlement type	Field surveys and purchase	
Transportation	Existing road condition and connectivity with surrounding area (O-D survey); Road type; Right of Way	Field surveys and purchase	
Settlements	Housing (formal and informal); structure type; land use; water bodies and wetland; sretention ponds and flood walls	Field surveys and purchase, GIS datasheets, aerial photographs	
Environmental	Main natural resources, natural hazards (flood, land slide, erosion etc.), weather patterns, hydrology.	Field surveys and outsourcing/ procurement, BBS, SRDI, Dept. of Agricultural Extension etc.	
Topographic	Topographic Map, DEM, High Resolution Satellite Image, Aerial photography, Benchmarking (BM), elevation, slope and gradient	Field surveys and purchase, aerial photographs, Survey of Bangladesh	
Geological	Geomorphology, Geotechnical data, borehole data, subsurface data	Field surveys and outsourcing/ procurement, GSB	
Air-borne	Noise, air pollution	Field surveys and outsourcing/ Procurement, DoE	
Participatory data	Potentiality matrix stakeholder and institutional mapping problem tree, objective tree	Field survey	

Source: UDD

Ensure that the planning team pay attention to the natural hazards in the area. Ask people about recent disaster events, even small ones and try to understand the local disaster and hazard context. It may be necessary to conduct a risk assessment, or hazard assessment.

#### ACTIVITY 6 - INTEGRATE ALL DATA INTO THE GIS MAP

Once the team is back in the office, it is important to undertake the following:

- · Combine the base map with the data surveyed
- Check the data from the field work
- Identify existing land uses based on satellite imagery and field surveys in combination with GIS.

This should form a full, organized GIS map of the area, with all of the data loaded into the map as different layers.

#### STEP 3- DATA AND INFORMATION ANALYSIS

Objective: To analyse the collected data in order to gather a clear understanding of the overall development patterns of the planning area, as well as specific Sectoral development options future socio-economic growth scenarios and disaster risk.

Primary output: Sectoral analytical reports

Secondary outputs: Report of Strengths, Weaknesses, Opportunities and Threats (SWOT)
Participatory Rapid Appraisal Report; priority matrix, seasonal calendar for disasters etc.

Time Required: 16-20 weeks

#### ACTIVITY

Analyse the

The analys Consider th

- Wh
- Wh
  - Ho
     Wh
- It should als DemProj is

#### ACTIVITY :

Another opt

The team she sectoral data

For the sector

- Ident trans servi
- Class empl
- Identi sector
- Analy activity
- Dema as arra
   Deline
- marke catchn

The sector repo

- access
- housin
- comme
- other so
  - availab

### ACTIVITY 1 - ANALYZE SOCIO-ECONOMIC DATA AND INFORMATION

Analyse the information and data gathered through the field survey and interviews, including the secondary information gathered. Start with the socio-economic data and information.

The analysis should identify the characteristics of the population (age, gender, income etc.). Consider the following questions:

- What is the main source of income in the area?
- What is the main occupation of residents?
- How much tax is the local authority generating?
- What are the development projects in the area?

It should also reveal migration trends and projected population trends for the next 20 years. DemProj is a good model for making population projections using the SPECTRUM software. Another option is RAPID where a spread sheet model is used to prepare projections.

#### ACTIVITY 2 - ANALYSE SECTORAL DATA AND INFORMATION

The team should draft sectoral reports based on the socio-economic analysis undertaken and sectoral data and information gathered through the field surveys and interviews.

For the sectoral reports, the team may consider:

- Identifying the important sectors for employment (agriculture, industry, utilities, transport, construction, trade and commerce, governmental services and other services etc.)
- · Classifying different sectors based on the number of employees, conditions of employment, and production size of the sector
- Identifying the types of products manufactured and storage locations for different
- Analysing the level of concentration of big and small enterprises, as well as informal activities
- Demarcating the noxious industries and indicating the reasons for noxiousness as well as arrangements of any environmental practices
- Delineating the land use map so to report the location of each commercial area, market/hat, bazar within the pourashava area and indicate the approximate catchment area.

The sector reports should also cover issues such as:

- access to utilities (electricity, telephone connections)
- · housing
- commerce
- other socio-economic activities
- availability of sources of energy (i.e. wood, dung, water material, petrol stations)

#### ACTIVITY 3 - ANALYSE TRANSPORTATION DATA AND INFORMATION

Analyse all the transportation data and information collected. Consider the following points:

- The origin and destination of the different trips within the examined area
- · The time, purpose and mode of the trips
- · The number of trips made per zone of origin or destination
- · The land uses of the zones of origin and destination
- · The household characteristics of the trip-making family

Based on this information, the team can development trip generation and distribution models, as well as determine the degree of appropriateness of current road networks and transportation facilities. The team should consider the road conditions of the arterial and main roads, and begin to think about future opportunities and needs for further road development.

#### ACTIVITY 4 - ANALYSE ENVIRONMENTAL DATA AND INFORMATION

Analyse the environmental data and information collected through secondary sources, field surveys and interviews. The team should consider:

- · The main land uses in the area
- · The presence or not of waterways such as rivers, marshes, wetlands
- · The presence or not of any environmentally protected areas
- The main natural hazards which are present for example floods, erosions or storms as well as the degree of impact that these hazards regularly have
- · The degree of environmental health in the area

In terms of natural hazards, the team may have to commission a risk assessment to be undertaken by risk assessment specialists. A GIS-based risk assessment can be integrated directly into the GIS map which the team is developing. The other option is for the team to undertake a community-based risk assessment.

Whichever way the team decides to assess risk, an analysis of the results must take place. For that, the team should read the risk assessment report and consider:

- · Which zones in the area are must exposed to different hazards
- What are the main assets which are exposed? For example, houses, power lines, power stations, croplands, office buildings, roads and infrastructure etc.
- · Which zones in the area most often experience damage or loss due to natural hazards
- · Whether changing weather patterns can be observed in the area

Based on this information, the team can compile an environmental report, which considers disaster risk.

#### ACTIV

A SWC the plan particu team to issues b

SWOT a

#### Table-8: Sadar U

- > Wel
- Imp qual - Less
- use
- Com
   Suffi.
- Suffiand o differ

#### ACTIVIT

Take the d transportation the office

This may re long - 2-3 p

Sharing the consensus ( address, as feedback or necessary.



#### ACTIVITY 5 - UNDERTAKE A SWOT ANALYSIS

A SWOT analysis examines the Strengths; Weaknesses, Opportunities and Threats (SWOT) of the planning area. This will provide the planning team with more detailed information about particular problems and opportunities in the town or upazila. The SWOT analysis requires the team to use all the different field surveys and interviews and their understanding of the main issues based on their time in the field.

SWOT analyses are often constructed according to major theme – for example housing, land management, governance, infrastructure, environment or climate change.

Table-8: Example of SWOT analysis for the infrastructure and basic services of Faridpur Sadar Upazila, Faridpur, Bangladesh

Strengths	Weaknesses	Opportunities	Threats
<ul> <li>Well drainage system</li> <li>Improved environment quality</li> <li>Less incompatible land use</li> <li>Compact development</li> <li>Sufficient water bodies and openspaces of different sizes</li> </ul>	<ul> <li>The eastern part of the Upazila is under constant threat due to river erosion</li> <li>Congestion due to poor accessibility (most of the ROW is below standard).</li> <li>Inadequate waste management system</li> <li>Improper location of education institutons.</li> <li>Insufficient utility facilities (such) as water, electricity etc.)</li> <li>Haphazard development</li> <li>Poor socioeconomic condition</li> </ul>	Will increase employment opportunity of Bangabandhu Airport	<ul> <li>People from outside commute to this area daily which is causing traffic and on street parking</li> <li>No proper facility for pedestrians may increase the rate of accidents</li> <li>Poor connectivity with capital city, Dhaka because of having no bridge over Padma Rive.</li> <li>Existing of this area is at dangerous due to embankment erosion of Padma River</li> </ul>

### ACTIVITY 6 - DRAFT AND SHARE SECTORAL AND ANALYTICAL REPORTS

Take the draft socio-economic reports and sectoral reports developed so far, as well as the transportation, environmental and SWOT analyses and prepare to share them with colleagues in the office, and in the local administration.

This may require further analysis and drafting of the reports. Each report does not need to be  $\log - 2-3$  pages is sometimes sufficient.

Sharing the draft reports with colleagues and stakeholders is useful because it helps to build consensus on the main problems, issues and themes which the urban or land use plan will address, as well as clarifying the main issues and characteristics. If stakeholders provide feedback or suggestions on the draft reports, ensure to address these and revise the report if necessary.



#### STEP 4- PLAN FORMULATION

Objective: To prepare the draft LUP in consultation with stakeholders

Primary outputs: Structure Plan, Urban Area Plan, Detailed Area Plan

Secondary outputs: Sectoral Action Plans

Time Required: 12-16 weeks

#### ACTIVITY 1 - DETERMINE PLANNING STANDARDS

UDD sets planning standards for Bangladesh in accordance with local needs and international best practice. (Ref:Formulation of Planning Standard for Small Towns of Bangladesh, UDD, 2013)

#### ACTIVITY 2 - FORMULATE DEVELOPMENT SCENARIOS

#### In this activity, the teams objective are:

- To develop spatial proposals based on socio-economic development
- To identify land where future development can and should take place
- To work towards agreement on the preferred development option for the town or upazila

A scenario is a quantitative method of forecasting and formulating predictions of conditions and outcomes in the planning area. Many scenarios stretch over 10-20 years, but some are shorter (five years).

Developing scenarios requires that all the analytical reports (sectors, SWOT, environmental risk assessments etc.) have been prepared successfully. When preparing scenarios, consider:

How the population and economy is likely to change?

How the industrial and agricultural sectors are likely to develop?

 How the land is used and the way the settlement is distributed across the area likely to change as a result of the above changes?

How will these changes impact on the inhabitants of the town in terms of facilities like schools, hospitals, housing and infrastructure?

How will industrial and population changes impact on the natural environment?

How climate change is likely to affect the area?

The limits and challenges to growth in the area?

Also, consider the comments and suggestions which the team encountered during field surveys and interviews. Often, the local communities and administration will have a clear idea of what needs to happen in the town or upazila.

To develop a scenario, this process can be followed:

 The team develops a checklist of key questions which each scenario must address (these can be similar to the questions above) •

:

Based on

#### ACTIVIT

Planning based on differents

These are developm for future

#### ACTIVIT

The team administra

In line with the difference of this can be the first stand preserve.

- Th
- Th
- Th

Make sure

Following to organization under discu

The team m arising in th

### PLANS

Following of

### HANDBOOK OF RISK SENSITIVE LAND USE PLANNING FOR UPAZILAS AND MUNICIPALITIES IN BANGLADESH

- Separately, each person on the team writes a draft scenario based on his or her views
- These draft scenarios are reviewed by all the other team members
- Following discussion and analysis of the scenarios, some outcomes or predictions will prove to be preferred and these can be selected to present to colleagues and the public.

Based on the common scenarios, maps can be prepared.

### ACTIVITY 3 - DRAFT PLANNING PROPOSALS

Planning proposals outline alternatives for the development of the town or upazila. These are based on the analyses undertaken in Step 3 - Data and Information Analysis, as well as the

These are draft policies on certain components or aspects of the planning area (spatial development, infrastructure, environment, roads etc.). Their role is to provide clear guidance for future development of the area.

### ACTIVITY 4 - CONSULT ALL STAKEHOLDERS

The team's objective here is to obtain feedback on the team's planning ideas from the local administration, relevant sectors, civil society organizations, private sector and the public.

In line with principles of participatory planning, it is important to consult with stakeholders on the different development scenarios and planning proposals which the team has prepared. This can be done through a range of meetings and focus group discussions. The first step is to hold a meeting with the MoHPW/LGED (prior to any wider consultations)

- · Existing information from the sectoral reports, environmental and transportation The team's analysis of problems faced in the area
- The team's ideas about how the town or upazila should develop in the future
- The different planning proposals and scenarios which the team has developed.

Make sure that the comments and suggestions made during the meeting are recorded.

ellowing this, hold a meeting with the local administration, all relevant sectors, civil society ganizations and the private sector. Present the teams planning ideas and planning options eder discussion. Record the suggestions made during each meeting.

team may need to make additional field visits regarding certain areas of concern which are

# THVITY 5 - DRAFT THE STRUCTURE, URBBAN AREA AND DETAILED AREA

leaving consultations, the team may need to amend its planning proposals and ideas



Firstly, the team should prepare the structure plan. For this task, the team has the following objectives:

- To map the extent and location of future urban growth
- To nominate growth centres in the town

When preparing the structure plan, the team should consider:

- How to provide an overall structure to the town's development
- The limits of the core urban area, and the area where future growth will be concentrated
- The limits of the urban area
- How this will affect transportation and land use
- How projected growth should be distributed across the town

The urban area plan is more detailed version of the structure plan focusing on the urban area only, and building off the details in the road and land use plans.

Secondly, the team should start on the road network plan. For this task, the team has the following objectives:

- To plan the road system
- To relate land use to movement
- To make provision for public and private transport
- To promote road safety and the free flow of traffic
- To improve access to markets
- To provide a reference point for the provision of other infrastructure such as electricity and water supply

The team needs to consider several factors when planning the road network and the hierarchy of primary, secondary, distributor and access roads:

- Feedback from the planning consultations
- Road standards set out by UDD/LGED (above) and any road standards set out by the Department of Roads and Highways
- The existing land uses and activities that the roads are serving (i.e. markets, shops residential areas, schools, mosques, parks, commercial and industrial areas)
- The topography of the area
- The high risk areas (floods, marches, river deltas etc)
- Proposed land uses

The road network plans should provide options for future road development. These options will be discussed at the next consultation meeting.

Thirdly, the team should prepare a proposed land use plan. For this task, the team has the following objective:

- Prepare a proposed land use plan (with zones, notations and colours)
- Prepare land use regulations to manage change in the town or upazila

On the proposed land use plan, the team should show a number of land uses based on notations and colours specified under international practice/government decree/regulation. The number of land use zones which will need to be identified will depend on the level of town for which the land use is being prepared. Larger towns will require more land use zones. As a guide, the team can adopt the 8 land use zones and notation:

#### Table-9:

1	
2	
3	
4	

5

6

#### The prop

0 T

E P

C

T C

T

#### Fourthly, team has t

To ap

> To To

#### The team s

- Sp Ro
- Lo
- Lo
- Loc He
- Str
- Tot
- Fro
- Fen
- San
- Ince

### Table-9: International land use zones and colours

1	Low rise residential uses such as family homes and town houses	Yellows
2	High rise residential uses such as apartment blocks, condominiums	Browns
3	Retail and commercial uses	Reds
4	Industrial uses	Purples and greys
5	Institutional and public facilities	
6	Recreational uses, park lands and greenbelts	Blues
	Fund funds and greenbens	Greens

#### The proposed land use plan should be based on:

- The existing situation as shown by the topographic report and the planning team's survey report
- The team's analysis of data (sectoral, transportation etc.) and the environmental profile of the area
- The results of the disaster risk assessment
- Existing road connections especially secondary and distributor roads
- Plans for the proposed road network
- Comments and opinions made during the consultations
- The location of existing and proposed offices of local administrations
- Commercial centres
- The location of public buildings, infrastructure and services (markets, shops, restaurants, schools etc.) and public transport services.

#### Fourthly, the team should prepare regulations governing the use of land. For this task, the team has the following objectives:

- To provide a regulatory tool with which the appropriate administration can assess and application for a building permit
- To manage existing land uses and control new urban development
- To provide regulations that everybody must follow.

#### The team should consider:

- Land and buildings permitted in each land use zone
- Special cases that can be permitted
- Road access
- Location of building from front boundary
- Location of building in relation to side boundaries
- Location of more than one building on the site
- Heights of buildings
- Structure of buildings
- Total floor space in relation to the plot area
- Front elevation of building
- Fences and walls
- Sanctions for buildings which break regulations
- Incentives for encouraging that people follow regulation

Fifthly, the team should prepare a drainage plan. For this task, the team has the following objective:

- · Provide a clean and secure urban environment
- To avoid flooding from heavy rain, river overflow, or sea incursion
- · To manage storm water and waste water from households and other buildings

The drainage plan can be based on the following:

- Existing situation in terms of irrigation, recent rain fall amounts, storm frequency and duration, projected future storm and cyclone frequency and duration (this is changing due to climate change), population density
- · Future development, for the proposed road network and the proposed land use plan
- Design considerations for drainage such as the likely location of future waste water treatment plants, calculations regarding the required storm water storage area, likely location of storm water storage areas, possibility of using lakes, marshes, ponds and other waterways to store storm water.

#### This may require the input from drainage experts within the organization.

Lastly, the team should begin to arrange maps, reports and proposals into the three different plan types which make up the UDD planning package. These are the structure plan, urban area plan and detailed area plan.

The contents of these different plans are indicated in Table-10 below:

Plan type	Related Studies	Report	Regulations	Maps and Plans
Structure Plan	1. Boundary Demarcation 2. Exposure Inventory and database Development 3. Demographic Aspect Information and Study 4. Social Sector Information and Study 5. Economic Sector Study 6. Study on Hydrology 7. Study on Transportation 8. Study on Housing 9. Land Ownership and Land Value Study 10. Legal Issue Study 11. Local Resources and Tourism Study 12. Institutional Arrangement Study 13. Institutional Arrangement	Background Population Economy Spatial Development Strategy Housing and Slum Community Facilities Traffic and Transportation Infrastructure Environment Institutions	Drainage     Policy     Land     Developme     nt Policy     Waste     Manageme     nt     Regulations	Project Area Map Structure Plan Map Elevation Model Parks Road Network Map Surface Drainage Protected Area Map Water Supply Map Land Uses Ma
Urban Area Plan	Population Projection and forecast.     Spatial Growth Trend Analysis.     Transport Mobility Analysis.     Housing pattern and Trend Analysis.     Land Use Classification.     Land Use Zonation     Setting of Standards	Background     Development     Promotion     Development     Coordination     Development     Control	Urban Area Guidelines     Traffic Regulations     Industrial Guidelines     Guidelines for Parks and Environme nt	Core Urban Area Map Existing Urban Area Map New Urban Area Map Roads Hierarchy Ma Parks Map Master Plan Map

Rural Area Plan

#### ACTIVITY 6

# The objecti To gu

- To try
- develo
- To ide focuse

The plan for pr

- The experience
   Prefer
- The pr
- The pr
- Short-

### STEP 5- PLA

Objective: To c

Primary outpu

Secondary outp

Time Required

Rural Area Plan	1. Population Projection and foreast 2. Spatial Crowth Trend Analysis. 3. Existing Land Use Survey & Land Use Classification 4. Land Use Zonation 5. Traffic Survey 6. Industrial Surveys 7. Agricultural Survey/Study 8. Growth of the village 9. Health, Education, Sanitation Facilities 10. Hats/Bazars/Shopping 11. Physical Feature Surveys	Background     Population     Economy     Spatial     Development     Strategy     Traffic and     Transportation     Environment     Institutions     Development     Promotion     Development     Coordination     Development     Control		Detailed Guidelines for Existing Rural Settlement Area Detailed Guidelines for New Settlement Area Guidelines for Environme nt	•	Project Area Map Elevation Model Road Network Map Surface Drainage Land Uses Map Existing Rural Settlement Area Map New Rural Settlement Area Map Roads Hierarchy Map Master Plan Map
--------------------	---	---	--	--	---	---

#### ACTIVITY 6 - IDENTIFY PRIORITY PROJECTS

#### The objectives of prioritizing projects are:

- To guide implementation
- To try to influence the content of other local development plans (socio-economic development plans, for instance)
- To identify projects for which public, private or international funding should be focused

#### The plan for priority projects should be based on:

- The existing socio-economic plans for the area
- · Preferences for projects expressed during consultation with local administration
- The preferred planning options
- The proposed road network, drainage and land use plan
- Short-term, medium-term and long-term horizons

#### STEP 5- PLAN ADOPTION AND GAZETTING

Objective: To convert the plans into legal documents for implementation.

Primary output: Gazetted plans

Secondary outputs: Leaflet, poster, advertisement about the plan

Time Required: 12-16 weeks



#### ACTIVITY 1 - CONSULT ALL STAKEHOLDERS

It should be recognized that consultation does not replace decision-making.

The team should organize meetings with MHPW and local administrations along with all other stakeholders. The objectives of these consultations are to:

- To raise awareness of the draft plans (structure plan, urban area plan, detailed area plan)
- To explain the content of the draft plan to stakeholders and receive their views
- · To reach agreement on the content of the plan

The team should first meet with MHPW, and local offices of MHPW as required. Following comments and suggestions from the MHPW (which may mean some revisions to the draft plans), the team can meet with stakeholders.

In addition to key stakeholders, the meeting with the local administration should be open to interested residents (i.e. the general public) of the planning area. For this, the consultation needs to be advertised to the public.

The team should explain clearly and in detail how proposals in the draft plans are likely to affect the town and individual villages. Remind any community representatives who attend the meeting that they need to inform their communities of the contents of the draft plans and gather their feedback and views.

The following documents should be presented at these meetings:

- · The base maps showing existing information
- The provincial and district socio-economic development plans
- · The proposed planning options
- The proposed structure plan and urban area plan
- The proposed road network plan
- · The proposed structure plan
- · The proposed land use plan
- The list of participants

#### ACTIVITY 2 - AMEND THE PLANS

If it was agreed during the meetings that specific changes had to be made to the plans, these should be made as soon as possible. If agreement was not reached, there will be further discussion required to come to consensus.

The planning team should correct any errors of fact that were found in the draft plans. Following this a further consultation should be help with the relevant groups who requested the change. In this meeting, the planning team should present the amended plans and outline the changes.

With some plans, there can be several rounds of consultation and amendment before the plan is accepted.

#### ACTIVI

Once all are finali to compl

In the evi

After me prepared versions formal ac

# ACTIVITY 3 - SUBMIT THE PLANS FOR APPROVAL

Once all the comments and suggestions from the consultations have been addressed, the plans are finalized and submitted to MoHPW/LGD for final approval. The planning team will need to complete Forms to accompany the plans.

In the event that the MoHPW/LGD does not approve the finalized plans, it will give clear instructions for required changes in order to meet approval criteria.

After meeting up all queries of MoHPW/LGD, they make Gazette Notification of the plan prepared. Following approval/ Gazette Notification by MoHPW/LGD, printed hard-copy versions of the plans are sent by MoHPW/LGD to the municipality or UpazilaParishad for their formal adoption. At this point, the documents become legally binding.



### ANNEX - 4 Lists of Risk Identification Methods9

Table 2 Outline of risk assessment tools (ISO 31010, Annex, A, p. 23-27)

Risk assessment techniques	Description	Resources and capacities	Nature and degree of uncertainties	Complexity	Quantitative output?
Check-lists	Listing of typical uncertainties	Low	Low	Low	No
Preliminary hazard analysis	Hazards and hazardous situations and events identification	Low	High	Medium	No
Structured interview and brainstorming	Collection and evaluation of ideas	Low	Low	Low	No
Delphi technique	Combination of different expert opinions on identification, probability and consequence Estimation and risk evaluation (+ Voting by experts)	Medium	Medium	Medium	No
SWIFT Structured "what if"	Risk identification by a team (workshop)	Medium	Medium	Any	No
Human reliability analysis (HRA)	Human impact on system performance (evaluation of human error influences)	Medium	Medium	Medium	Yes
Root cause analysis (single loss analysis)	Analysis of a single loss and its contributory causes as well as identification of future improvements of the system or process	Medium	Low	Medium	No
Scenarios analysis	Qualitative or quantitative identification of possible future scenarios based on present or different risks	Medium	High	Medium	No
Toxicological risk assessment	Identification and analysis of hazards and exposure.  Combination of the level of exposure and the nature of harm to measure probability of the harm occurrence	High	High	Medium	Yes
Business Impact analysis	Analysis of the effect of key disruption risks on an organization's operation and the way to manage them (identification and quantification of capacities)	Medium	Medium	Medium	No
Fault tree analysis	A graphical deter mination of all the ways an undesired event could occur (a logical tree diagram) and consideration of reducing/eliminating potential causes	High	High	Medium	Yes

Event tree and Cause/ conseq analysis Cause-and-effe analysis FMEA (FMEC Reliability cen maintenance Sneak analysis circuit analysis HAZOP Hazar operability stu HACCP Hazar analysis and cr control points LOPA (Layers protection anal Bow tie analysi Markov analys Monte Carlo an Bayesian analys

### HANDBOOK OF RISK SENSITIVE LAND USE PLANNING FOR UPAZILAS AND MUNICIPALITIES IN BANGLADESH

Event tree analysis	Inductive reasoning for the translation of probabilities of initiating vents to possible outcomes	Medium	Medium	Medium	Yes
Cause/consequence analysis	A combination of fault and event tree analysis to include time delays (causes and consequences are considered)	High	Medium	High	Yes
Cause and effect analysis	Identification of contributory factors of an effect through brainstorming (tree structure or fishbone diagram)	Low	Low	Medium	No
FMEA (FMECA)	Failure mode and effect analysis (+ criticality analysis)	Medium	Medium	Medium	Yes
Reliability centered maintenance	Identification of policies to be implemented to manage failures in a more efficient and effective manner	Medium	Medium	Medium	Yes
Sneak analysis (sneak circuit analysis)	Identification of design errors	Medium	Medium	Medium	No
HAZOP Hazard and operability studies	Definition and assessment of possible deviations from the expected or intended performance	Medium	High	High	No
HACCP Hazard analysis and critical control points	Measurement and monitoring of specific characteristics required to be within defined limits	Medium	Medium	Medium	No
LOPA (Layers of protection analysis)	Evaluation of controls and their effectiveness (barrier analysis)	Medium	Medium	Medium	Yes
Bow tie analysis	Description and analysis of risk pathways from hazards to outcomes and review of controls	Medium	High	Medium	Yes
Markov analysis	Analysis of repairable complex systems	High	Low	High	Yes
Monte Carlo analysis	Establishment of the aggregate variation in a system resulting from variations in the system for a number of inputs (triangular obeta distributions)	High	Low	High	Yes
Bayesian analysis	Assessment of the probability of a result by utilizing prior distribution data	High	Low	High	Yes

# ANNEX - 5 Overview of PRA techniques: Social mapping, Venn diagram, Listing, and Technology of Participation (ToP)18

#### Objectives of PRA

The broad objective of PRA is to involve local people in the planning process. The specific objectives are as follows-

- To attain first hand participatory information on disaster and coping mechanism of the study area
- To gain in depth knowledge of the study area
- To make target people active rather than passive in planning process
- To develop 'we' feeling regarding the project

#### Principles of PRA

This diversity and complexity is strength. Despite the different ways in which these approaches are used, there are important common principles uniting most of them. These are as follows:

- A defined methodology and systematic learning process
- Multiple perspectives
- Group inquiry process
- Context specific
- Facilitating experts and stakeholders
- Leading to sustained action

# of DD A

Group and Team Dynamic Methods	Sampling Methods	Interviewing and Dialogue Methods	Visualization and Diagramming Methods
Team contacts Team reviews and discussions Interview guides and checklists Rapid report writing Energizers Work sharing (taking part in local activities) Villager and shared Presentations Process notes and personal diaries	Transect walks Wealth ranking and well-being ranking Social maps Interview maps	Semi-structured interviews Direct observation Focus groups Key informants Ethno histories and biographies Oral histories Local stories, portraits and studies	Mapping and modeling Social maps and wealth rankingsTransects Mobility mapsSeasonal calendarsDaily routines and activity profilesHistorical profilesTrend analyses and timelines Matrix scoring Preference or pair wise ranking Venn diagramsNetwork diagramsSystems diagramsFlow diagramsPie diagrams

UDD (2013) Draft Report on Urban PRA Session. Mymensingh Strategic Development Plan (MSDP) 2011-2031. Ministry of Housing and Public Works, Government of the People's Republic of Bangladesh

# Social Maj

#### Objectives

- Du
- Ver Par

# PRA Team

- Fac
- Co-
- Rap

#### Material: Po used (if nece

### Procedure o

- The easy
- The the p map parti
- The
- The ' with
- Diffe schoo Surro
- also p North
- Signa
- Nece:
- Venn Diagrai

#### Objectives: To

- Durat
  - Venue
  - Partic

#### PRA Team Me Facilit

- Co-Fa
- Rappo

# HANDBOOK OF RISK SENSITIVE LAND USE PLANNING FOR UPAZILAS AND MUNICIPALITIES IN BANGLADESH

# Social Mapping

Objectives: Social mapping shall be prepared according to resource base of the area

Venue: Calm and quiet environment

Participants': 10 to 15 persons

### PRA Team Members:

 Facilitator: 01 (one) Person Co-Facilitator: 01 (one) Person Rapporteur: 01 (one) Person

Material: Poster Paper, Marker Pen, Sign Pen, Sticker, Table or Floor and Color Paper may be

# Procedure of Social Mapping:

The facilitator shall explain the procedure of social mapping to the participants in an

The facilitator shall elect a person for mapping on the basis of discussion made with the participants' and request the other participants' to the person involved in social mapping. Generally, the "Gate Keeper" is assigned for mapping among the

The poster or paper is placed on the table, floor or board.

The boundary of the area is drawn cautiously, and then the map is drawn collectively with the help of marker of sign pen.

Different types of resources such as road, pond, agricultural land, river, homesteads, school etc. are located on the map by using marker or sign pen.

Surrounding unions and important areas or establishments around the boundary are

North direction is shown in the map

Signature of the participants' is taken on the map drawn by themselves.

Necessary correction is made by displaying the map just drawn.

### Venn Diagram

Objectives: To identify the problems of the area

Duration: 30 minutes

Venue: Calm and quiet environment

Participants': 10 to 15 persons

### RA Team Members:

Facilitator: 01 (one) Person

Co-Facilitator: 01 (one) Person

Rapporteur: 01 (one) Person

Material: Poster Paper (white and colour), Sign Pen, Scissors, Glue stick, Masking tape, Wall or Black Board

#### Procedure of Venn Diagram:

- The facilitator shall select a person among the participants' for assistance, who would cut the paper into circular form of different size for Venn diagram and stick them on poster paper.
- The facilitator shall identify the problems of the basis of their severity e.g., 1,2,3... with the help of participants'.
- Colour poster paper is cut into circular form according the severity of the problems and would stick them on the white colour poster paper.
- The biggest circular sized paper would indicate the most severe problem i.e., no. 01 problem and the size of the circle would reduce according to descending order.
- The mane of area shall be stacked at the centre of the poster paper.
- The problems would be arranged according their importance for aesthetics.
- Signature of all the participants' would be taken on the venn diagram.
- Necessary correction would be by displaying the venn diagram.

#### Listing

Objectives: To identify probable solution to the problems of the area

- Duration: 30 minutes
- Venue: Calm and quiet environment
- · Participants': 10 to 15 persons

#### PRA Team Members:

- Facilitator: 01 (one) Person
- Co-Facilitator: 01 (one) Person
- Rapporteur: 01 (one) Person

Material: Poster Paper (white), Marker Pen, Sign Pen, Glue stick, Masking tape, Wall or Black

#### Procedure of Venn diagram:

- The facilitator shall select a person among the participants' for assistance having good hand writing.
- The facilitator would explain the procedure clearly and may use the 'Gate Keeper' if
- To find out the probable solution to the problems by arranging them according to priority, which have been identified from venn diagram.
- Determination of timeframe for solution to the problems (e.g., 5-year, 10-year, 20-year).
- Obtaining signature of all the participants'.
- · Necessary correction by displaying the listing.

#### Technolog

Objectives

- the view of
  - Di Ve
  - Pa

#### PRA Team

- Fac
- Co
- Rap
- · Los Material: N Wall, Table

#### Procedure of

- · The Soc rele whi
- The (thr
- Part
- · The Clu each with
- The clus pass part facili
- The cons
- Final imm area,

# Technology of Participation (ToP) Consensus Workshop

Objectives: To identify immediate, mid-term and long-term development needs according to Duration: 2 hours

Venue: Calm and quiet environment

Participants': 15 to 20 persons

### PRA Team Members:

Facilitator: 01 (one) Person

 Co-Facilitator: 01 (one) Person Rapporteur: 01 (one) Person

Logistic Officer: 01 (one) Person

Material: Meta Card, Poster Paper, Marker Pen, Sign Pen, Glue stick, Masking Paper, Sticky Wall, Table or floor, Banners and Colour paper may be used if necessary.

#### Procedure of ToP:

 The facilitator discusses the Context of the ToP session through Pointed out Displayed Social map, Problems Venn diagrams, Potentials Venn diagram, Causes, effects and relevant potentials of major problems along with available Union risk and assets map which have been developed in earlier PRA sessions.

 The facilitator then motivates the participants to dream about a focus question in 3 (three) minutes "what is the hope for our long term future (20 years)?"

Participants then Brainstorm ideas, write notes and mark 3-5 key ideas on meta cards

 The facilitator picks up Meta cards and Post them on sticky wall. Then he makes Clusters by arranging them in columns. He invites the participants to look at ideas in each column and then ask the participants to give a short name. The naming is done with consensus of all the participants and it is the key measure of success.

The facilitator then checks the major sectors. Afterwards, he read out the names of the clusters loudly and invites participants to think about which of these are most passionate about. He also tells them to recall the findings of Venn diagrams. Thus, the participants identify key prioritized development needs by major sectors. The facilitator uses the pairing tool in this regard.

The facilitator then asks the participants to make time frame of each clustered ideas considering the problems, potentials and available resources of the locality.

Finally the facilitator invites participants to put these under the headings of immediate, medium, and long-term needs (or 5 tiers : Sub-regional, structural, urban area, rural area, action area).

### ANNEX - 6 Procedures for Conducting Brainstorm Method 19

Brainstorming is a group creativity technique designed to generate a large number of ideas on a given subject or a problem to be resolved. There are four basic rules in brainstorming (described below). These are intended to reduce the social inhibitions that occur in groups and therefore stimulate the generation of new ideas. The expected result is a dynamic synergy that will increase the creativity of the group.

#### Focus on Quantity

This rule is a means of enhancing divergent production of ideas, aiming to facilitate problem solving through the maxim, quantity breeds quality. The assumption is that the greater the number of ideas generated, the greater the chance of producing a radical and effective solution.

#### No Criticism

It is often emphasized that in-group brainstorming; criticism should be put 'on hold'. Instead of immediately stating what might be wrong with an idea, the participants focus on extending or adding to it, reserving criticism for a later 'critical stage' of the process. By suspending judgment, one creates a supportive atmosphere where participants feel free to generate unusual ideas.

#### Unusual Ideas are Welcome

To develop a good and long list of ideas, unusual ideas are welcomed. They may open new ways of thinking and provide better solutions than regular ideas. They can be generated by looking from another perspective or setting aside assumptions.

#### Combine and Improve Ideas

Good ideas can be combined to form a single very good idea. This approach is assumed to lead to better and more complete ideas than merely generating new ideas alone. It is believed to stimulate the building of ideas by a process of association.

#### The following steps are recommended.

- Explain the purpose of brainstorming and invite participants in a friendly manner to
  express their ideas and perspectives on the vision, objectives and what needs to be
  done in order to realize them.
- · Begin brainstorming in the larger group pulling out one idea at a time.
- Ask probing questions to trigger new ideas.
- If someone is not willing to talk but nevertheless able to write, provide him/her with some idea cards and a marker pen.
- All ideas need to be recorded and grouped into different subject or problem areas.
- After the plenary discussion, set up small groups for each subject area and ask the groups to further refine the ideas and make presentations.
- Eventually, a common consensus may be reached on the priority needs, key activities and major responsibilities.

#### Annex -

#### I. Design a

90

Fill

#### Rational

[What we achieve w regards to

#### II. Context

- · High
- Expl
- Expl

# III Warm up

- Can
- What
- · What
- WhatWhat

Repeat the Fo

переас

• Can s

# IV Brainstorn

- Indivi
- Highl
  - Form
     6 10
  - a) Wri
- S 1853

As a facilitator the size of the

<sup>&</sup>lt;sup>19</sup> Facilicom Consult (2003) Handbook: Steps and methods to mobilize the community. Facilicom Consult. Nijmegen, 4th January 2003

<sup>&</sup>lt;sup>19</sup> Facilicom Consu 4th January 2003

# Annex - 7 Procedures for Conducting Consensus Workshop<sup>19</sup>

# I. Design a Focus Question

Fill in the following matrix

Rational Objective	Topic	Experimental Objective
[What would you like to achieve with the group in regards to content]		(Describe what you would like to experience with the group during the process)
	Focus Question	
	Formulate out of the topic and the rational objective a focus question.	
	Mostly the question starts with What steps can we take? Or How can we? Etc.	

#### II. Context

- Highlight the focus question;
- Explain the purpose/objective and product of the workshop?
- Explain the workshop process

# III Warm up questions

- Can you mention an occasion from the past (related to the topic)?
- What was going well? What was nice?
- What was difficult?
- What have you learned from that?
- What are some things that need to be improved?

Repeat the Focus question

Can somebody give an example? (2 times)

### IV Brainstorm

- Individual brainstorm (at least 10)
- Highlight the 5 most important ones
- Form sub-groups
- 6 10 ideas per group
- a) Write big, b) one idea per card, c) 3 5 words per card

As a facilitator you have to estimate for around 30 cards at a maximum. This is not related to he size of the group.

Facilicom Consult (2003) Handbook: Steps and methods to mobilize the community. Facilicom Consult, Nijmegen,

#### V Organize

- Two most effective ideas?
- One creative idea?
- Which cards are similar or have the same intention?
- · Most difficult idea?
- · Are there cards/ ideas, which are different?
- · Place the symbols
- Collect the remaining cards with the symbol in the right hand corner?
- · Is there a card, which is not there? Please look at the notes of your individual brainstorm.
  - o Write these on cards?

#### VI Naming

- Read the focus question?
- Read the result from each column? Start with the biggest?
- Summarize each column or cluster in one to five words?
- Go from the biggest to the smallest column?

#### VII Evaluation

- Read the focus question and the results
- Which outcome is the nicest?
- Which one is the most difficult to realize?
- Which is the most important to work on?
- What will be our next step?
- Where are you going to work in the next step?

# NNEX – 8 Procedures for Conducting Community Action Planning19

#### Preparation

ep a. Decide about which project or topic you would like to do a Community Action anning

ep b. Decide how long the workshop will take?

cide about the process you will go through?

- Context and decide about Parameters (What, When, How?) 10 % of time
- Victory (Visualize the future by brainstorming on a flipchart) 10 % of time
- · Current Reality / 10 % of time
- Decide about Key Actions and Divide tasks / 30 % of time
- Time planning, presentations and decide about next steps / 30 % of time

p c. Decide about who will facilitate what?

p d. Prepare your materials and setting of the room

· Prepare materials such as 1) flipcharts, 2) objectives and What, When, How chart, 3) Questions you will ask, 4) Setting of the room.

#### Implementation

ntext

Check with the group on: What kind of Project, they would like to make an Action Planning.

Explain the process.

- Context
- Victory
- Current Reality (Strengths, Weakness, Benefits, Dangers)
- Commitment/ Goals
- Key Actions and divide tasks
- Time planning

Show these steps on a flipchart.

If a decision has been made about the project, check the following:

- Who will implement the project? How will the people in the group name themselves?
  - What will be implemented?
- When will it be implemented and completed?
- What is the reason, why it will be implemented? What is the objective?
- How? Who will finance or provide the contributions and how much will be
- Where? Where will the final celebration or opening of the project or completion date of the project take place?

N	Take an empty flipchart and fill this
Wh	0?
Wh	at?
Wh	en?
Wh	y?
Ho	w is it financed?
Wh	en?
, (	Theck with the group on what experience they already having done similar projects?
	Share experiences:
	• What went well?
	- What was going difficult?
	What did you learn from that?  What did you learn from that?  What did you learn from that?
	What did you learn from that: What should be improved when we are going to do this project?
Vict	ory (15-20 min.)
J	Ask the group to imagine it is the day after the completion date of the project. Ask the to visualize and dream what they see, hear, smell, feel and taste on the completion detection of the completion detection detection.
	of the project.  Give people one minute to think for themselves.  Give people one minute to think for themselves.
	Give people one minute to think for themselves.  After that, list down all the ideas of the group members in a Symbolic Egg on a Flipd
Cui	rent Reality (10 min.)
0	Ask the group to come back to the date of today.  Analyse the strengths, weaknesses in the group. And analyse the opportunities which the project can benefit. And the dangers that can be encountered.
	Make a matrix on a hipchart.
	Fill the flipchart.
1000	Fill the flipchart.     What strengths do we have in the group to accomplish our victory?
1	What weaknesses (or capacities we not have)  What opportunities from which we will benefit in this project?  What opportunities from which we make the project?
	What opportunities from which we will octobe the project?     What are dangers or threats we can encounter during the project?
C	ommitment (15 min.)
St	ep 1: Give the group 2 minutes to look at the Victory and the Current Reality ep 2: Formulation conditions/ limitations/ requirements ep 2: Formulation conditions/ limitations/ limitations they would have the
Si	t I the group inder which conditions
F	xample: a halanced budget?
-	
	We want to have the involvement of a posters     Ask the group, and put each conditions on a posters
	and the project
110	Step 3: Formulation minimal completed things in project  Ask the group, the things they would like at least to be completed in the project.

# HANDBOOK OF RISK SENSITIVE LAND USE PLANNING FOR UPAZILAS AND MUNICIPALITIES IN BANGLADESH

#### ample:

- A school with a capacity for at least 100 children
- At least 6 capable teachers present

Ask the group and put these on posters

### p 4: Check the consensus

Check for each posters if there is a consensus on this. The consensus should be. Are we willing to put our time, energy and resources in accomplishing this? If not, than the posters should be takenaway.

# 5: Make a statement and build consensus

Make a statement and build consensus on what the group wants to work for.

Out of the results from step 2 and 3 make a statement.

### kable statement could be:

want to complete the ....... project within the next .... months and it should have at least; er the following conditions/limitations

## Actions Workshop (30-50 min.)

#### Context

- Introduction. Have somebody from the group to read the commitment
- Show the workshop question:
- What key activities do we have to take to accomplish our commitment?
- Explain the purpose and process of the workshop
- Ask for an example of a Key Action?

#### e are criteria.

ctions should be actions, which can be implemented by the group and are realistic.

sas: Assign a co-ordinator, time planning, divide tasks are not allowed. ns should be practical.

#### rainstorm

Individual brainstorm. Brainstorm at least 10 key actions? (Ask people to look at the Victory, Current Reality and Commitment)

Highlight the 5 most important?

Form subgroups

Ask 7 or 8 ideas per group (1 idea per card, write big, 3 - 5 words per card)

#### rganize

Collect the 3 most important actions?

Are there any questions of clarity?

Cluster the cards on similarity?

Collect ideas which are different?

Again recluster?

Place symbols

Collect remaining cards

Check if there are any Actions missing. Check individual brainstorm. Collect newcards



#### □ Naming

- Read focus question. Have the group to summarize each cluster in 1 5 words. Write the summarized in 1 – 5 words?
- · Start with the biggest cluster and go to the smallest?

#### ¬ Reflection

- Have the group to read the workshop question and the outcomes?
- Which Action do you like the most?
- · Which one is the most difficult to implement?
- · Which is the most difficult to implement?
- · Check with the group if all actions are covering the commitment?
- Ask which activities can be done by a same working group? Try to narrow down
  theactions to three working groups
- Indicate what is in Group 1, 2 and 3
- · Ask people to sign up in which working group they would like to work on?

#### Time Planning, presentation, and reflection

Prepare flipcharts on the following way

Time Plan:	Key Activ		Key Activities
Names of the memb	ers in the working group:		
Final result of the ac	tivity:		
Activities	Deadlines Starting date -Ending date	Responsible person(s)	Budget & working days or other resources
Stages of implementation 1. 2. 3. 4.			
5. 6. 7. 8.			

#### MAKE SURE THIS IS PREPARED IN ADVANDCE. IT MAKES EXPLANATION EASIER.

Instruction of the working groups

- Formulate for your own working group the final results you would like to achieve in the coming time period
- Formulate Actions or stages of implementation, your working group is going to complete and implement. Indicate starting and ending dates.

For

Ma
 Wor

Wh

J PUT TI

☐ Each gr

☐ Ideas si

□ Present

If the are ;

2 – 3

☐ Final re Ask as a faci

Whi

Whi

Whi
 Whi

Wha

How

Wha

What

What action

Who

When

• What

Who will doc

Formulate the first or starting activity for your working group

 Make an estimation of your costs and amount of working days you need for your working group?

Who will be the coordinator or responsible person(s) of your working group?

# PUT THESE INSTRUCTIONS ON A FLIPCHART FOR EXPLANATION

Each group gets 20 – 40 minutes to complete their calendar. Ideas should be written on cards with a marker.

Presentations (5 minutes each group)

- If the working groups are ready, they get five minutes to present their plan. Flipcharts are put on the wall
- $2-\hat{3}$  minutes will be given to the other participants to ask questions of clarification.

Final reflection and next steps

a facilitator the following questions:

Which activity are you looking forward to work on?

Which is the most important?

- Which is the most easily to implement?
- Which is the most difficult to implement?
- What difficulties can we expect?
- How can we deal with that?
- What activities need to be co-ordinated or linked?
- What things of this plan need to be reviewed?
- What are the first actions we are going to do in the coming month? Write the actionson a flipchart.
- Who will be the final responsible person for each working group?
- When will be the next meeting? Where will it take place?
- What will be the agenda?

will document the workshop results and outcomes of this meeting?

# ANNEX-9 Planning Standards for Different Facilities during Implementation

Plan Component	Standard	Remarks
	General Land Use	
Residential Density		
Private / General	100-150 persons/acre	
Public/Government	150-200 persons/acre	
Administrative		
Upazila Complex	10 acres	
Paurashava Office	3 acre	
Ward Councilor's Of fice	0.10 Acres	For each ward
Jail/Sub-Jail	10Acres	
Commercial		
Wholesale Market	3-5 Acre	1 in each Pourashava
Retail or Neighbourhood shops	0-5 acre/10,000 pop.	
Shopping Complex	0.5 acre/20,000 pop	
Cattle Market /Hat	1.0-1.5 acre	1 in each population
Slaughter House		
Education		
Nursery/Elementary	2 acre/10,000 Population	
Primary School	5 Acre/5,000 Pop	
Secondary School	10 Acre/20,000 pop	
College/University	5-10 acre/20,000 pop	
Vocational Training Center	5 Acre	1 in each Pourasham
Others	0.5 acre/20,000 pop.	1 in each Pourasham
Community and social Servi	ces	
Eidgah	2 acre/20,000 pop	
Graveyard	1 acre /20,000 pop	
Cremation Ground	0.5 acre/20,000 Population	
Mosque/Temple/Church	0.5 acre/20,000 pop	
Community Center/Auditorium	0.5 acre/20,000 pop	

	The state of the s
Standard	Remarks
0.10 acre	Optional
0.10 acre	Optional
	10.4
3-5 acre	1 in each Pourashava
0.5 acre/Box	a m cach i odrastiava
0.5 acre/20,000 Population	
0.5 acre	Optional
1 acre/20,000 pop	Optional
2-5 acre / 10,000 pop	
10-15 acre	As per Local requirement, 1 in each Pourashaya
	Tourasnaya
5-10 acre	1 in each Pourashava
1 Acre / 10,000 pop	i ii each Pourasnava
3 acre/20,000pop	
5-10 acre	Optional 1 in each Pourashava
3 Acre/20,000 pop	Tourasnava
1 Acre	Optional 1 in each Pourashava
nd Physical Infrastructure Faci	
5 Acre/50 bed Hospital	1 in each Pourashava
1 Acre	1 in each Pourashava
	- m each rourasnava
1.4	
	0.10 acre  0.10 acre  3-5 acre  0.5 acre/Box  0.5 acre/20,000 Population  0.5 acre  1 acre/20,000 pop  0.25 acre/20, 000 pop  2-5 acre / 10,000 pop  10-15 acre  5-10 acre  1 Acre / 10,000 pop  3 acre/20,000 pop  5-10 acre  3 Acre/20,000 pop  1 Acre  1 Acre  1 Acre/20,000 pop  5-10 acre

Plan Component	Standard	Remarks
Water Supply, Sewerage and	Garbage Disposal	
Water Supply Station with Treatment Plant	1 Acre/20,000 pop	
Waste Disposal Ground	2-3 Acre	
West Collection Point		As per Local Requirement
Sewerage Treatment Point		As per Local Requirement
Electrification		
Electric sub-station	1acre/20,000 pop	1 in each Pourashava
Gas		
Supply Station	1 acre	1 in each Pourashava
Transportation and Commun	ication Infrastructure	
Bus Terminal	1 acre	1 in each Pourashava
Bus Stand	0.5 acre /20,2000 population	
Track Terminal	1acre	1 in each Pourashava
Launch/Steamer Terminal	1 acre	1 in each Pourashava
Motor Cycle/ Bicycle Stand		As per local requirement
Water Transport Stand		As per local requirement
Rickshaw/Van/Tempo Stand	0.25 acre/station	
Fuel/Filling Station	0.5 acre /20,2000 population	
Railway Station	4 acre	
Circulation Network		
Primary road	60-100 feet	
Secondary road	30-40 feet	
Local/Connector road	Minimum 20 feet	
Walkway/Footpath	5-8 feet	
Primary drain		As per local requirement
Secondary drain		As per local requirement
Household drain	tandard for Small Towns of Banglad	As per local requirement

Source: Formulation of Planning Standard for Small Towns of Bangladesh, UDD, 2013

# ANNEX-10 List of Important Policy/ Act/ Regulation and Relevant Section for Land Use Planning and Disaster Mitigation

Name of Act/ Policy/ Regulation	Section Brief
National Land-use Policy, 2001	Clause number 17.4, 17.5, and 17.6 of the National Land-use Policy instruct city corporations, pourashava and upazila's to prepare land use zoning maps and implement them accordingly to ensure a healthy and sustainable living environment for the citizen. Clause 17.7 indicates restriction in making any changes in the zoning plan.
Local Government (Pourashava) (Amended) Act, 2010	Clause 32 of the document identify mandate for the preparation of a master plan for Pourashava. Such plans should be prepared within five years from the establishment of the municipality. That means all Pourashava should have a master plan by the year 2014 but very few of them currently have their master plan. Those plans have been prepared by Urban Development Directorate (UDD) and in most cases finalised master plans have not been implemented due to lack of skill manpower and equipment.
Building Construction Act, 1952	This act has been enacted to control haphazard construction of buildings, hence ensuring planned urbanization in Bangladesh. Section A of the Act directs that use of the existing building must be consistent with the land use zone of that area proposed by the Master Plan. To get the benefit of this section the act should mandate to submit a no objection certificate, issued according to the RSLUP, with the application during the time of building approval.
Bangladesh National Building Code (BNBC), 2006	To attain the successful execution of the Building Construction Act, 1952 (BC Act) Bangladesh National Building Code (BNBC) has been prepared in 1993, and has been enacted in 2006. The objective of the BNBC is to set a minimum standard for design and construction of building as well as to set a standard for building materials to be used during construction and also put a direction on the use and maintenance of buildings to ensure safety and public welfare.

Name of Act/ Policy/ Regulation	Section Brief
	By the proper and rigorous implementation of BNBC it is possible to achieve a safe living environment as it provides direction and restriction on the building designs and heights in the Risk sensitive areas. For Instance, it refers what will the civil engineering precaution and set back rule to build a residential house to a flood plan or earthquake risk areas. That means if a RSLUP is designed properly with the exact classification of disaster risk sensitivity through land use zoning and regulations then it is possible to bridge the gap between plan and implementation accordingly.
The Acquisition and Requisition of Immovable Property Ordinance of Bangladesh, 1982	This Ordinance consolidates and amends the law relating to acquisition and requisition of land or any other immovable private property in the public interest. It is edict regarding compensation for acquired property. In the law, the Acquisition and Requisition of Immovable Property Ordinance, 1982, property means any structures on land or any right over such property, property which is used for religious worship or as a graveyard, cremation ground, orphanage, hospital or public library is prohibited.
Disaster Management Act, 2012	The Disaster Management Act of 2012 was enacted on September 24, 2012 to fulfill the following objectives:  • To mitigate the overall disaster;  • To conduct post disaster rescue and rehabilitation programs with more skills;  • To provide emergency humanitarian aid to vulnerable community by bringing the harmful effect of disaster to a tolerable level through adopting disaster risk reduction programs;  • To enact rules to create effective disaster management infrastructure to fight disaster; and  • To make the activities of concerned public and private organizations more coordinated, object oriented and strengthened to face the disasters.

Play Nam Com

Name of Act/ Policy/ Regulation	Section Brief
National Plan for Disaste Management, 2010- 2015	The National Plan for Disaster Managemen 2010-2015 has been developed on the basis of the GoB Vision and MoDMR mission to reduce the vulnerability of the poor to the effects of natural environmental and human induced hazards to a manageable and acceptable humanitarian level by bringing a paradigm shift in disaster management and Strengthening the capacity of the Bangladesh disaster management system. The Plan is indicative to what the relevant regional and sectoral plans would consider to address the key issues like risk reduction, capacity building, climate change adaptation, livelihood security, gender mainstreaming, community empowerment and response and recovery management. The plan also will act as basic guideline for all relevant agencies in strengthening better working relations and enhancing mutual cooperation.
	This act is applicable to mega city, Divisional Town and District Town's municipal areas The aim of act is to conserve, regulate, protect and to reduce the misuse and illegal encroachment of playground, open space, park and natural water reservoir of the country. Along with the conservation of playground, open space, park and natural water reservoir, it also put emphasis on mass publication of the master plan. The act has been directed to hang the plan for one month at the Head office and branch offices, if it exists, in such a way so that it may notice the inhabitants of the area (clause 4). The aim is to make the plan familiar to the citizen and also to inform them about zoning, restricted water bodies, open spaces, and play grounds that would change their uses.

### ANNEX 11 - Risk Sensitive Urban Land Use Planning Tools 20

#### A. Regulatory Tools

Regulatory measures like building codes and land use planning, when implemented with DRI can reduce risk in urban areas.

Building codes ensure that new development does not occur unless structures are designed and built to withstand the impact of hazards. Historical data relating to past disasters, along with future hazard projections and scenarios inform decision makers about the necessary restrictions to place on building construction material, seismic bearing loads, and intended use of the structure. This tool can be drafted at the local level, using National Building Codes as a model and shaped towards local conditions. The Development Committee, working with the PLMD or GAD would decide on the proper regulations of the code. Following approval, a building inspector or other appointed local government representative to ensure that a building can be safely used for its intended purpose. These codes can also ensure that old buildings are retrofitted properly in order to withstand reduce risk.

Data needed: historical disaster data, hazard scenario maps, and building database

- Land use can be regulated through the establishment of appropriate zoning measures within areas subject to, or potentially subject to hazards. City Development Committees and districts (for smaller towns and urban areas) can now draft land use plans. DHSHD has assisted in the past in conducting prospective plans and could serve as an advisory role in this as well. Examples of land use regulations include:
  - o Determine land use, density, building placement, and servicing standards
  - Designation of land as hazard prone, like identification of a floodplain establishes that development is limited, or will not occur in a hazardous location
- O Minimum building elevations & setbacks for land in hazard prone areas Data needed: Map of urban area with current land use, hazard map, building database, and population data.

#### **B. Restriction Tools**

Comprehensive land use plans are not the only way to change or restrict land use. A variety of ordinances aimed at specific hazard prone areas of a city or even a specific development site can be enacted to reduce risk.

Land Acquisition is a process where government can gain ownership of land for the primary purpose of addressing public safety through purchase or expropriation. This has been done in other cases for means of economic development but here it is recommended for environmental preservation or protection. Land can be acquired for a variety of purposes including protection works (dike, mangrove/coral reef restoration, and no build zones). Land acquisition can also be done to prevent the development or to hold it in public ownership for exclusive public use like parks or other green space.

Hazard I

Diette team

CHECK

**TEXABLE** 

Service To the

**amilia** 

5×159

275.78

CTOL BY

Ďemilio.

DE SE

AT STREET

OF ROWN

Department of Human Settlements and Housing Development, Relief and Resettlement Department, General Administration Department of Mandalay City, Fire Service Department of Mandalay City, Mandalay Development Committee, AusAID, and ADPC (2014) Guidelines for Integrating Disaster Risk Information into Urband Use Planning in Myanmar (with special reference to Mandalay city). ADPC, Bangkok

Data needed: Hazard map, infrastructure map, property ownership/land titles, and building database

Transfer of Development Rights is a that tool refers to the transfer of a property's development potential under current zoning provisions from one site or property to another. If a parcel is considered at risk, the development potential can be relocated to another area of land or parcel not at risk. Density transfer is primarily a voluntary, market-concept in which the transfer of development potential is used to offer protection for sensitive coastal resources and remove it from hazardous areas. The tool is used to direct development away from the area at risk by designating the development ideas to an area where development or increased density can be safely accommodated.

Data needed: Map or urban area with current land use, Hazard map, building database, population data, development plans

Conservation Easement is a legal agreement in which one property owner or leaser grants the use of some real property rights to a public or private entity for a specific purpose. It represents an interest in land but not the right of exclusive possession. The easement is typically used to preserve a particular portion of land on the property that is prone to hazards. Conservation easements are usually enacted to restrict development on fault lines, natural wildlife habitat, or low-lying areas including riverbanks and coastal areas.

Data needed: Map of urban area with current land use, Property maps with hazardous areas, Hazard maps.

#### C. Engineering tools

Property Specific design is a tool used to protect individual buildings that are found in hazard prone areas. This method of disaster risk reduction can be implemented in new development projects but is also advantageous because many existing structures can be retrofitted and updated with the necessary intervention. Approaches can include:

- Reinforcing building foundations to withstand seismic activity, floodwater, or fire.
- Structural elevation can be achieved in several ways including: raising the ground level below a building with the placement of fill; raising the habitable areas within a building; or raising the entire building by using stilts, foundation walls or similar elevating structures.
- Wet flood proofing consists of providing protective measures against flooding and allows water to enter and exit a structure with minimum damage. This tool employs the use of flood resistant materials, the elevation of electrical and mechanical services and the use of openings for drainage.

Data needed: Historical disaster data, Map of urban area with current land use, building database, Hazard maps, Site survey, Engineering schematic

Area wide hard protection like dikes can provide benefits to entire districts and urban areas. Dikes prevent the inundation of lowland area from storm surge, riverine flood, or high rainfall.

Data needed: Historical disaster data, Historic rainfall, Map of urban area with current land use, Hazard Maps, Site survey, Engineering schematic

#### F. Natural Protection Tools

Coastal Wetland Creation or Restoration utilizes the natural functions of wetlands and mangroves to help create of a buffer to reduce wave energy, which can greatly reduce the impact of cyclones, storm surge, and flooding.

Data needed: Historic rainfall, historic disaster data, hazard maps, map of urban area with current land use, and ecological survey

Dune Building or Rehabilitation Natural sand dunes provide an effective defense against coastal erosion and flooding by dissipating floodwaters from coastal or riverine sources. Dunes form a barrier similar in function to a seawall but are more dynamic, and can adjust in response to changes in wind and wave climate or sea level. Both natural and artificial dunes can be stabilized through vegetation planting; vegetation roots help stabilize the dune.

Data needed: Historic rainfall, historic disaster data, hazard maps, map of urban area with current land use, and ecological survey

Natural Soil Nourishment refers to the addition of sand or other similar sediment material to satisfy the erosional forces in and around coastal and riverine areas. Soil nourishment reduces the detrimental effects of erosion by providing sediment to satisfy the natural forces of erosion.

Data needed: Historic rainfall, historic disaster data, hazard maps, map of urban area with current land use, and ecological survey

Natural windbreaks like trees can withstand high-speed winds from cyclones and other storms. Planting and maintenance of urban green space can serve as a useful method to reduce the effect of high-speed winds on buildings and other infrastructure.

Data needed: Historic storm data with average wind speed, historic disaster data, hazard maps, map of urban area with current land use, and ecological survey

### Bibliography

- L Asian Development Bank 2013, "Moving from Risk to Resilience: Sustainable urban development in the pacific". Philippines
- 2 Annual Report of Ministry of Environment & Forest, 2012-2013, Bangladesh
- 3. The World Bank and Bangladesh Centre for Advanced Studies, 1998, "Bangladesh, 2020: A long run perspective study", University Press Limited, Dhaka
- 4 Burby, R.J. et.al. 1999, Unleashing the powerofplanningtocreatedisaster-resistant communities, Journal of American Planning Association, page 247–258.
- Carter, Nick, W. 1991, "Disaster Management: A Disaster Manager's handbook" Asian Development Bank
- 6. Department of Human Settlements and Housing Development 2014 "Guidelines forIntegrating Disaster Risk Information into Urban Land Use Planning in Myanmar" Nay PyiTaw, Myanmar.
- Deutsche GesellschaftfürInternationaleZusammenarbeit 2012, "Land Use Planning: Concepts, tools and applications". Bonn, Germany
- Khan, H., 2008, Challenges for Sustainable Development: Rapid Urbanization, Poverty and Capabilities in Bangladesh, GSIS, University of Denver, Colorado, USA.
- Minhaz A. U. 2008, "Climate change and natural disaster in Bangladesh: Will it be neglected?", Available (http://www.scribd.com/doc/17188736/Climate-Change-and-Natural-Disasterin-Bangladesh#scribd accessed on 10 February 2015)
- GoB (2012), Rio+20: National Report on Sustainable Development, Ministry of Environment and Forest, Government of the People's Republic of Bangladesh
- Regional Consultative Committee (RCC)on Disaster Management Program on Mainstreaming Disaster Risk Reduction into Development (MDRD) 2011, "Promoting Use of Disaster Risk Information in Land-use Planning". RCC Guideline 3.2 Bangkok, Thailand
- Report on Bangladesh: State of Environment 2001, Conducted by UNEP in collaboration with GoB, DoE, BCAS, SACEP, NORAD
- Sudmeier-Ricux, K. et al, 2013, Opportunities, incentives and challenges to risk sensitive land use planning. Lessons from Nepal, Spain and Victnam, Background Paper prepared for the Global Assessment Report on Disaster Risk Reduction, Geneva, Switzerland
- UNISDR, 2009, "Terminologyon Disaster Risk Reduction". Geneva, Switzerland
- UNISDR, 2012, "How to make cities more resilient: A Handbook for local Government leaders: A Contribution to the global campaign 2010-2015; Making cities resilient-My city is getting ready".
- UNISDR, 2013, "Making Cities Resilient: Summary for policy makers-A global snapshot of how local sovernments reduce disaster risk".



- 17. Urbanization in India: Dynamics & Consequences) http://iussp2009.princeton.edu/papers/91026
- 18. UNDRO.1991," Bangladesh-Cyclone UNDRO information Report"
- 19. World Bank 2012, "Building Urban Resilience: Principles, tools and practices". Washington, DC.
- World Bank and EMI, 2013, Risk Sensitive Land Use Planning Guidebook, Bangladesh Urban Earthquake Resilience Project 3.
- 21. World Bank (2007), Bangladesh Strategy for Sustained Growth
- Zaman A.K.M.H et al 2010, "Urbanization in Dhaka: Present Status and Policy Implications", ASA University review, Vol. 4, no. 2, pp. 1-2.





# **Asian Disaster Preparedness center**

http://www.adpc.net

adpc@adpc.net

Head Office SM Tower, 24th Floor, 979/69 Paholyothin Road SamsenNai, Phayathai, Bangkok 10400, Thailand Bangladesh Office House # 477 (3rd Floor), Road # 32 New DOHS Mohakhali, Dhaka

