

DEVELOPING DISASTER IMPACT ASSESSMENT (DIA)
TOOL FOR PUBLIC INVESTMENT

DIA FRAMEWORK

SUBMITTED BY

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Table of Contents

Table of Contents.....	2
List of abbreviation.....	4
1.0 Introduction.....	5
1.1 Background.....	5
1.2 Objective and scopes.....	5
2.0 Methodology.....	7
2.1 Approach.....	7
2.2 Desk review	8
2.3 Key Informant Interviews	8
2.4 Workshops	10
2.5 Pilot test and Revision	10
2.6 Transfer of knowledge	11
3.0 Desk review	12
3.1 DIA guidelines in practice	12
3.1.1 Local Guidelines in practice	12
3.1.2 Guidelines in other countries	12
3.2 Integrated EIA and DIA.....	14
3.2.1 Local practice.....	14
3.2.2 Practices in other countries	15
3.3 Directives	18
3.3.1 Local	18
3.3.2 International	18
3.4 Practices	21
3.5 Tools	22
3.5.1 Maps.....	22
3.5.2 Building code	24
4.0 Consultations.....	26
4.1 Meetings with NRP team	26
4.2 Workshops	26
4.3 Key Informant Interviews	27
5.0 Piloting.....	30
5.1 Current practice.....	30
5.2 Outcome of piloting	32
5.3 ToC of Feasibility Study.....	32
6.0 Framework	33
6.1 Purpose.....	33
6.2 Principles.....	33

6.3 Scope.....	33
6.4 Steps of DIA	34
7.0 Conclusion & Recommendation	41
7.1 Conclusions.....	41
7.2 Recommendations.....	41
References.....	43

List of abbreviation

ADB	Asian Development Bank
BNBC	Bangladesh National Building Code
BWDB	Bangladesh Water Development Board
DAE	Department of Agriculture Extension
DDM	Department of Disaster Management
DFAT	Department of Foreign Affairs and Trade
DIA	Disaster Impact Assessment
DOE	Department of Environment
DWA	Department of Women's Affairs
DPP	Development Project Proforma
DRR	Disaster Risk Reduction
EIA	Environmental Impact Assessment
EU	European Union
FCDI	Flood Control, Drainage and Irrigation
FPCO	Flood Plan Coordination Organization
JICA	Japan International Cooperation Agency
KII	Key Informant Interview
LGED	Local Government Engineering Department
MODMR	Ministry of Disaster Management and Relief
MOEF&CC	Ministry of Environment, Forest and Climate Change
NRP	National Resilience Programme
ODI	Overseas Development Institute
R&H	Roads and Highways
TOT	Training of the Trainers
UNDP	United Nations Development Programme
UNOPS	United Nations Operation and Procurement Services
WARPO	Water Resources Planning Organization

1.0 Introduction

1.1 Background

In recent years, Bangladesh has come to be known as a disaster resilient country. Disasters like, cyclones, floods, landslides etc still cause havoc to the country. But over the years, the country has made significant progress in disaster risk management as evident by less casualties in cyclonic events and quick recovery in crop production after flood events. As a result, the effect of disaster and cyclones on economic growth has become insignificant proving improved resiliency of the country to disasters.

The country is making investment in various types of infrastructures in order to make rapid progress towards becoming an upper middle-income country. As a result, more infrastructural stocks are becoming vulnerable to disasters. In order to reduce the vulnerability so as to make the development sustainable, proper Disaster Impact Assessment (DIA) at the project feasibility stage can be very helpful.

DIA is a mainstreaming tool to integrate knowledge and information about disaster and climate related events, trends, forecasts and projections into the development planning process to minimize loss and damage caused by disasters. DIA will be used to screen DPPs prepared by different Ministries or government agencies in order to make the infrastructures disaster resilient and minimize the scope of the proposed development initiatives in aggravating any existing risk or generating new risks. There are a wide range of tool and decision support system for analysing or assessing disaster and climate related risks, however practice of using such tools for national level disaster and climate risk assessment of public and private investment in Bangladesh needs to be scaled up and mainstreamed in the project planning system.

1.2 Objective and scopes

The objective of this task is to develop DIA tools and guideline in the context of planning framework of Bangladesh for various infrastructures in order to reduce their vulnerability to disasters.

The scope of the consultancy is as follows:

- Conduct a comprehensive review of existing global practices of DIA and analyses findings in the context of Bangladesh;
- Identify the scope, opportunities and challenges of merging EIA and DIA in the context of Bangladesh;
- Support the Development Planning Specialist for consultation with NRP, Bangladesh Planning Commission, Technical Committee for DIA and key government officials,

sharing research finding and to determine the scope and parameter setting of ex-ante disaster impact assessment tool and guideline;

- Draft DIA tool and guideline and share with key national stakeholders including Bangladesh Planning Commission;
- Provide technical input to develop policy recommendations in coordination with the Development Planning Specialist;
- Design, document and report on the pilot test DIA with LGED, and its revision in light of piloting experiences.

2.0 Methodology

2.1 Approach

The development of DIA Guideline was primarily based on learning from current practices – both local and global and then contextualizing with the existing project and investment planning structure in the country. Since application of DIA is relatively new, therefore the guideline has been kept simple. Development of the entire process was participatory - a number of workshops and KIIs were conducted with stakeholders in this regard. The framework has been piloted at LGED to gather feedback from DPP practitioners. The steps that were followed in this exercise and their sequence are shown below.

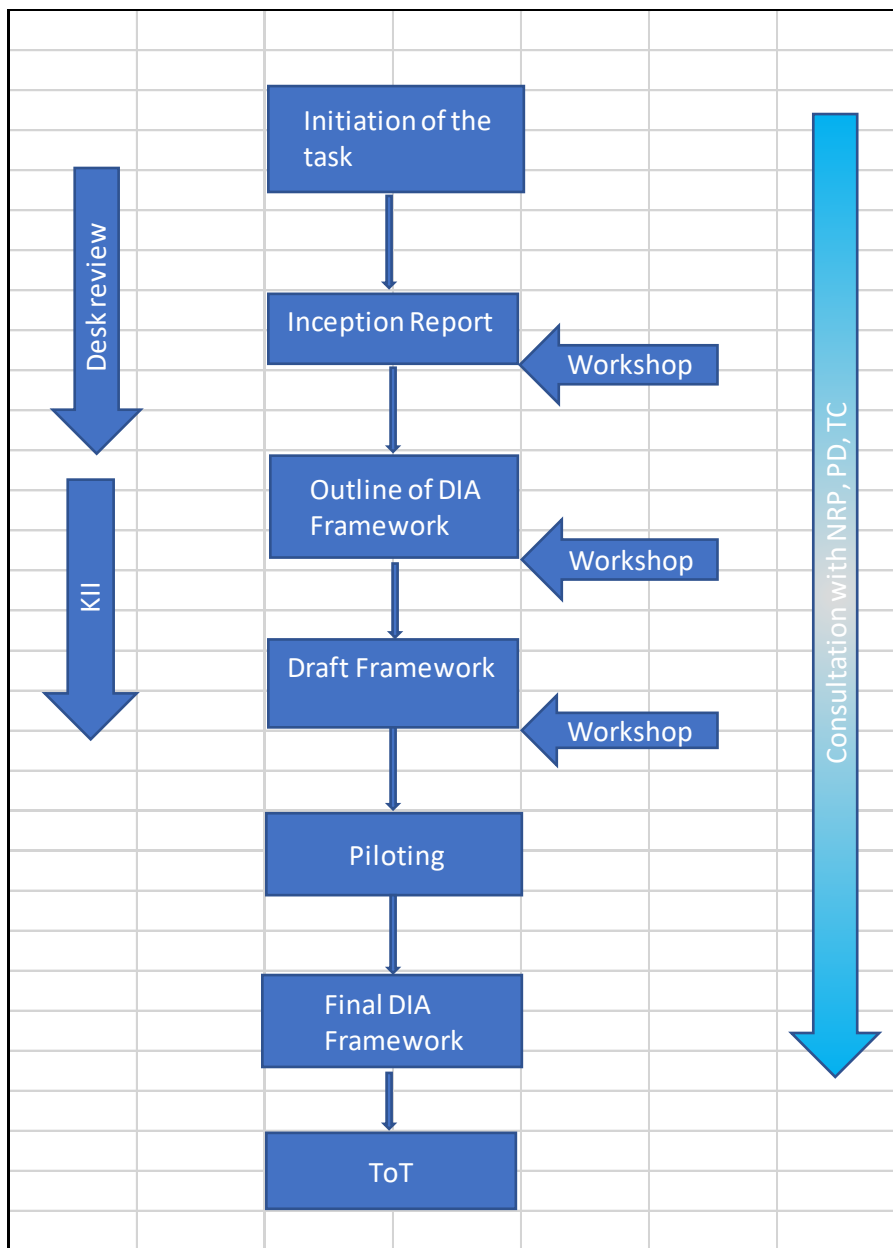


Figure 2.1: Flow chart of the exercise

2.2 Desk review

A review of local and global literature on DIA practices and guidelines have been carried out to find out best practices and to identify gaps and challenges to mainstream disaster and climate change risks in local and national development planning process. Locally, various government agencies such as DAE, LGED, BWDB, R&H etc. have been contacted to know about their practices and any guidelines that they follow. Global literatures have been downloaded after a thorough search of internet using appropriate key words. Additionally, multinational organizations in Dhaka such as UNDP, World Bank etc. have also been contacted for relevant materials. More attention has been given to guidelines and practices in developing countries.

EIA practices and guidelines have been reviewed to find out (i) the extent to which disaster issues are addressed in the EIA process; (ii) the opportunities of integrating EIA and DIA; and (iii) to develop a comprehensive framework to identify strategies for developing DIA tool and guideline. These tasks have been jointly carried out with the Development Planning Specialist.

These findings have been shared in a consultation (1st consultation on 19/12/2019) to validate the specifications and indicator settings for developing the ex-ante DIA tool and guideline.

2.3 Key Informant Interviews

In close consultation with the Technical Committee for DIA and Development Planning Specialist, interviews have been conducted with relevant key stakeholders to capture their ideas and expectations about DIA to identify future impacts of disaster and climate change related risks on development projects along with context specific measures for building resilience.

The interviewees were selected to cover following types of agencies:

- (i) Project implementing agencies such as R&H, LGED, BWDB and DAE.
- (ii) Project proposal reviewing agencies such as DoE, WARPO and DDM.
- (iii) Project approval agencies such as relevant Ministries (e.g. MoDMR) and Planning Commission;
- (iv) Development partners such as UNDP, UNOPS and UNWomen; World Bank and ADB
- (v) Civil societies such as Action Aid.

The interviews were conducted on the basis of a semi-structured questionnaire. A checklist was prepared which covered at least, the following issues

- Characteristics and trend of damages from recent disasters
- Types and design characteristics of new projects
- Project proposal preparation processes and time taken
- Integration process of EIA in the proposal
- Scope of addressing ex-ante DIA in EIA

- Methods of post-disaster damage assessment
- Current DIA practices
- Opinion regarding EIA and DIA integration
- Opinion regarding mainstreaming DIA in existing planning practices

In order to carry out the KII at UNWomen focussing more on gender issues, a separate checklist was prepared enquiring the following

- What are the important development-disaster linkages that Gender experts are concerned about?
- How these affect women differently?
- How vulnerability of the women is changing with development of the country?
- How disasters affect women and other vulnerable groups (children, aged, disabled) differently?
- What are the disaster impacts that need to be considered in DIA from gender perspective?
- What are the current global and local practices?
- What are the experiences in developing countries?
- What are the current programs and projects under DWA?
- What is the percentage of DRR and CC related projects?
- What are the indicators for monitoring the success of such projects?
- What have the gender mainstreaming works of DWA in recent past?
- How successful these efforts have been?
- How the situation can be improved?

The checklist that was followed to interview the Senior Secretary, MoDMR is as follows:

- Trend of disaster impacts
- Expected future scenario of disaster impacts
- Vulnerability of different sectors to disasters
- Current important projects under the ministry to mitigate disaster risk
- Ministry's position on upcoming 8th FYP
- Current disaster management practices
- Scope of strengthening disaster management practices
- About post-project disaster impact assessment
- Scope of disaster impact assessment (DIA) in disaster management
- Role of DIA in DPP preparation
- Potential scopes of DIA
- Steps for mainstreaming of DIA
- Role of capacity development of DIA

The checklist that was followed for the KII with World Bank and ADB is as follows.

- Global/Regional practices of DIA by the Bank and its experience
- When did the Bank started its practices related to disaster management and what was the driver?
- In which country, the Bank practices have been most successful and why?
- Does the Bank has or follow any measure of disaster impact/resilience
- Current projects of the Bank in Bangladesh
- DIA related practices in these projects
- Are hazards and vulnerabilities treated equally?
- Gender considerations
- Bank experience with DIA in Bangladesh
- Relationship between ex-ante DIA and post-disaster DIA followed by the bank
- Mainstreaming challenges experienced by the Bank in Bangladesh
- Capacity Development challenges (Department/agency wise)

2.4 Workshops

Workshops were conducted with a large consultation group of key national stakeholders including line ministries. The first workshop was held on Inception Report to share the adopted methodology. Then, on the basis of desk review, an outline of DIA framework was prepared and was shared in the second workshop. On the basis of feedback received from this workshop and the inputs received from key informants through the parallel KII exercise, the framework was firmed up and shared in third workshop.

2.5 Pilot test and Revision

With technical support and guidance of Development Planning Specialist, pilot test of developed DIA tool and guideline was conducted at LGED. DIA tool and guideline was finalized based on piloting experiences.

LGED was selected for pilot testing as they deal with varieties of projects such as roads, culverts, bridges, schools, cyclone and flood shelter etc. Pilot testing was carried out through a workshop at LGED. DIA tools and guidelines was presented to the participants and the plan was to carry out group exercises. Each group would be assigned with a particular type of project. The objective of the group exercises was to search for improvement related to operationalization of the tools and guideline.

Third consultation meeting with key national stakeholders will be held to share and validate the experiences of pilot test with LGED.

2.6 Transfer of knowledge

A training manual on DIA tool and guideline would be developed and TOT would be provided to selected participants with the support of Development Planning Specialist.

3.0 Desk review

3.1 DIA guidelines in practice

3.1.1 Local Guidelines in practice

Currently there is no DIA related guideline to be followed by different agencies in preparation of DPP. However, some agencies are taking own initiatives to make their investments safe from disasters. For example, LGED has started updating their design standards to make their infra-structures disaster resilient. Currently they are improving such standards for rural roads, a sector where 95% of their investments are being made. They have increased design wind speeds to 225 km/hour for cyclone shelter. Construction methods are improved in saline prone zones.

3.1.2 Guidelines in other countries

Sri Lanka has formulated a comprehensive manual for DIA targeted towards road sector.

Objective of DIA applications are

- The application of DIA to assess the projects stands with following key points:
 - i. It helps to assess the influences of disasters to the development actions itself
 - ii. It helps to assess the influences of disasters in the surrounded area. These disasters are caused by the development actions which had been damaged by disasters and;
 - iii. It helps to assess the influences of possible of disasters caused by development actions to the surrounded area and also, it is confirmed countermeasures.

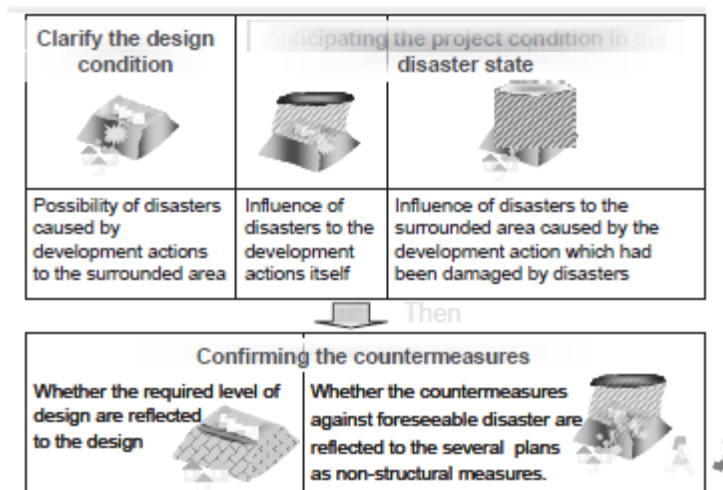


Figure 3.1: Objectives of DIA

- Natural disasters and technological disasters should be considered separately. Based on these classifications and survey results relevant to road sector, three key points for use of the checklists on road projects are focused on such as (1) which countermeasures are

considered at design stage? (2) What should be prepared against the natural disasters and (3) How to identify the hazards after in-service? Based on these three points, three types of checklists have been prepared for checkups relevant to design, disaster management and inspection at maintenance. With the purpose of keeping records of the disaster events to review the relation to damage and countermeasures, checklist forms related to disaster record have been introduced.

- Checklist Form A will be utilized to confirm whether the design conditions are checked against the hazardous considerations. Checklist Form B will be confirmed whether non-structural measures cover the deficit of insufficient structural measures, in the above normal conditions. Checklist Form C will be supported in maintenance system to identify the hazardous conditions during an in-service period of the road.
- Once a disaster event occurred, that particular event will be recorded by Checklist Form D. Based on this record, relevant organizations can arrange restoration & mitigation for the identified problematic locations. Therefore, it has high potential to contribute mitigation of disaster damages using any methods (both structural and non-structural measures).
- These checklists are one part of DIA system. It needs to add the other parts and continue improvement stepwise with improvements. It is expected to realize capacity development for disaster management through DIA Application.

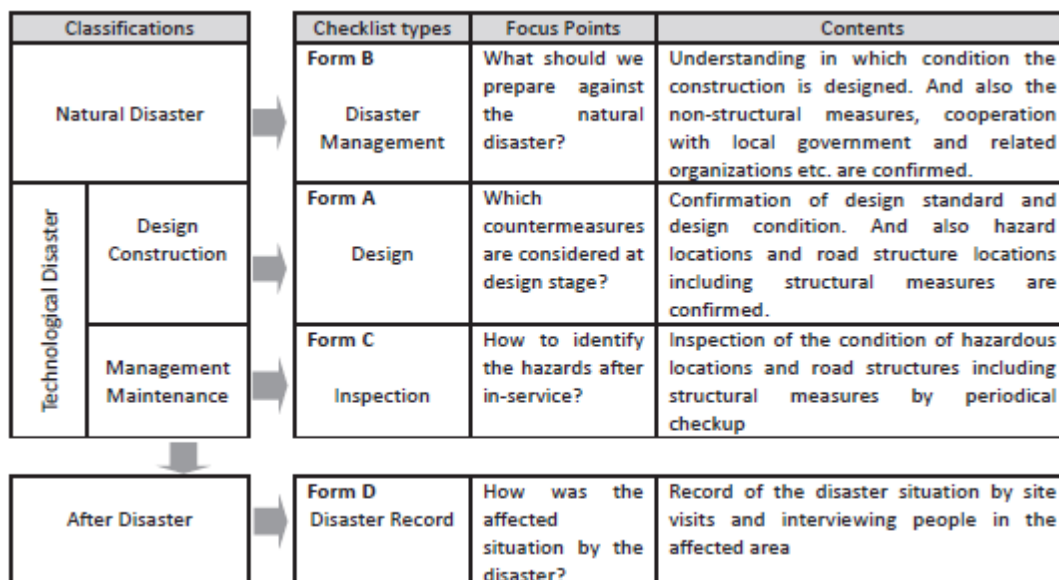


Figure 3.2: Composition of checklist

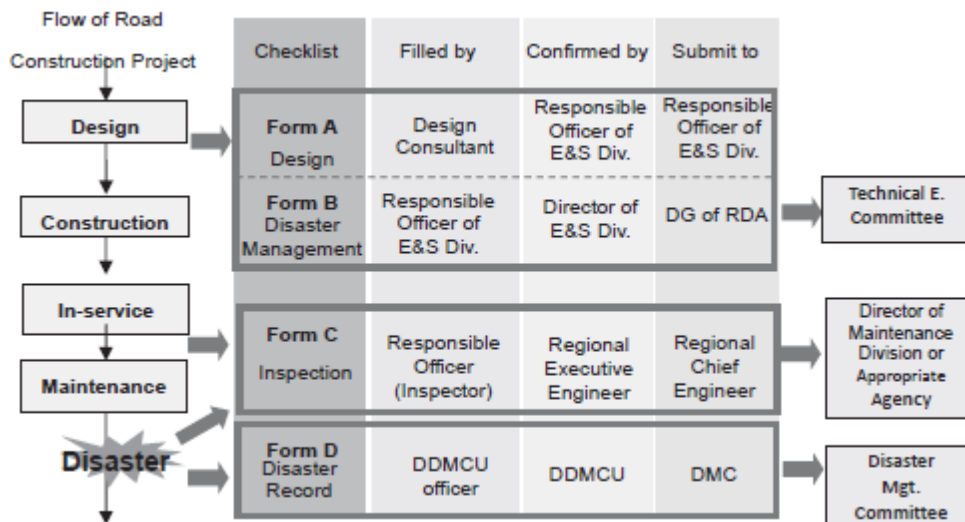


Figure 3.3: Proposed system of DIA for road sector in Sri Lanka

3.2 Integrated EIA and DIA

3.2.1 Local practice

Manual for EIA for FCDI projects (FPCO,1995) is the earliest EIA manual of the country. It provides guidelines for steps in EIA and the tools and techniques for impact assessment. For impact assessment it considers water resources, land resources, biological resources and human resources. Under human resources, it addresses Socio-economic, Public Health and Hazard and Risk Assessment.

Because water management projects and other flood loss mitigation measures are designed to reduce the adverse impacts of a natural hazard there are overlaps between the hazard and risk assessment of the EIA and other components of the appraisal of water projects. Agricultural and economic analyses in typical prefeasibility and feasibility studies are usually restricted to the economic implications of reducing flood incidence and severity, while the EIA hazard and risk assessment takes a wider perspective.

The procedures summarized in this manual include:

- reviewing the hazards faced by the study area under pre-project conditions;
- assessing the risks of hazardous events and changes in the risks associated with the proposed interventions;
- assessing the consequences of hazardous events for IECs including both the human society and economy, and the natural environment;

- ensuring the risks of project failure are assessed, and where this would involve structural failure, developing a contingency and/or emergency management plan to minimize the consequences; and
- identifying major uncertainties over the impacts (benefits and disbenefits and effectiveness of the project, as an input to the multi-criteria information presented to decision-maker.

3.2.2 Practices in other countries

Caribbean Development Bank (2015) delineates a pathway of integrating DIA with EIA. Consideration of natural hazards creates few additional requirements when undertaking any EIA and does not require any structural change to the overall EIA process. The key steps in the EIA process are presented in Figure 3.4, with natural hazard considerations are fully integrated.

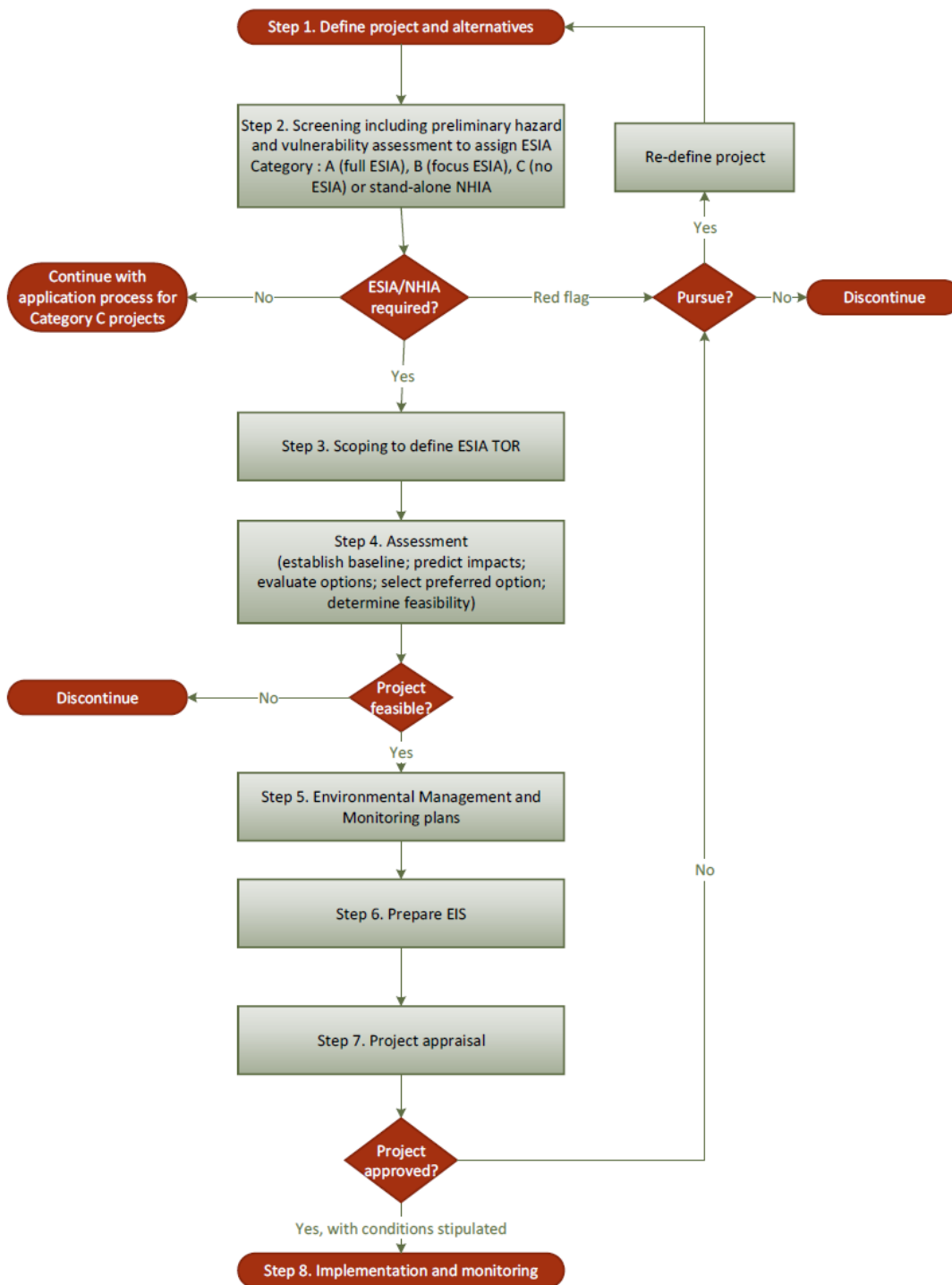


Figure 3.4 The generic EIA-NHIA process

Screening is required to determine which projects or developments require a full or partial impact EIA. The EIA Administrator assigns the proposed project to an EIA category, reflecting the potential environmental and natural hazard risks associated with the project. This

classification step determines whether an EIA is required and, if so, the level of impact assessment that must be undertaken.

The specific EIA categories and criteria for assignment of projects to these categories are defined in the EIA rules/regulations for each implementing jurisdiction. The following categories and criteria are applied by the CDB:

□ Category A (Full EIA) for significant impacts: A proposed project is classified as Category A if it is highly likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented.

Natural hazard consideration:

- Projects should also be assigned to Category A if the anticipated short- to mid-term impacts from natural hazards are highly likely to result in significant adverse social, economic, structural or environmental impacts. These impacts may affect an area broader than the site(s) or facility(s) subject to physical works.

□ Category B (Focus EIA) for limited impacts: A proposed project is classified as Category B if its potential adverse environmental impacts on human populations or environmentally important areas are present, but less adverse than those of Category A projects.

Natural hazard consideration:

- Projects should also be assigned to Category B if the anticipated short- to mid-term impacts from natural hazards are likely to result in social, economic, structural or environmental impacts less adverse than those of Category A projects. These impacts are site-specific; few if any of them are irreversible; and natural hazard mitigation and climate change adaptation measures can be designed more readily than for Category A projects.

□ Category C for minimal or no impacts: A proposed project is classified as Category C if it is likely to have minimal or no adverse environmental impacts, or minimal anticipated short, medium or long-term impacts from natural hazards. In such circumstances a detailed EIA report is seldom required.

The Sourcebook recognizes that the impact of any single development or natural hazard event may be considered insignificant when assessed in isolation, but may be significant when evaluated in the context of the combined effect of all reasonably foreseeable future development or natural hazard events that may impact on the project/activity in question. For this reason, the explicit assessment of cumulative effects is considered essential to the integration of natural hazard considerations into the EIA process. Assessment of cumulative effects is increasingly seen as representing best practice in conducting EIAs.

The sourcebook recommends that the CEA analysis should be integrated into a number of EIA steps:

- (i) Preliminary hazard and vulnerability assessment /Scoping
- (ii) Assessment and evaluation, describing the affected environment and determining the consequences
- (iii) Development of natural hazard mitigation and climate change adaptation alternatives

3.3 Directives

3.3.1 Local

Bangladesh has taken many initiatives to mainstream disaster and climate change knowledge and information into policies and plans (e.g. 7th Five Year Plan, Perspective Plan, Delta Plan, BCCSAP, SOD), so far it is not translated into design and appraisal of projects. The section 24.3 (Future disaster management, climate change) and Section 31 (Risk Analysis and Mitigation Measures) of the DPP indicate need for data and information about disaster events in project area, climate change impacts and potential mitigation measures and climate change issues. At present there is no specific guideline for addressing disaster and climate change related hazard, exposure, vulnerability and risks. Programming Division has developed a climate and disaster risk assessment tool to identify the level of potential risks and piloted in agriculture sector projects, which leaves room for scaling up. Also, the number 02 priority area (Strengthening disaster risk governance to manage disaster risk) of the Sendai Framework for Disaster Risk Reduction (SFDRR) 2015-2030 emphasizes on integration of DRR within all sectors at the national level in order to manage disaster risks.

The National Disaster Management Council (NDMC), is the apex body to provide policy guidance towards disaster risk reduction and emergency response management in Bangladesh, headed by the Prime Minister. The 2017 meeting of NDMC had given a decision to develop DIA to address disaster related issues into development planning process and to ensure sustainability of development. Subsequently, the revised Standing Order on Disasters (SOD) of 2019 incorporates DIA as an essential tool for disaster risk reduction and makes responsible Bangladesh Planning Commission to include DIA into development project proposal for gender responsive, disability inclusive and risk informed development. In this context, DIA will be used as a tool for risk assessment considering disaster and climate risk knowledge and information during the designing and implementation of development project.

3.3.2 International

EU risk assessment and mapping guidelines for disaster management (EU, 2010) is based on a multi-hazard and multi-risk approach, covering in principle all natural and man-made disasters.

The guideline was prepared to contribute towards establishing a coherent risk management policy linking threat and risk assessments to decision making.

Three types of impacts are defined by the Guideline:

- Human impacts (number of affected people) are the number of deaths, the number of severely injured or ill people, and the number of permanently displaced people.
- Economic and environmental impacts are the sum of the costs of cure or healthcare, cost of immediate or longer-term emergency measures, costs of restoration of buildings, public transport systems and infrastructure, property, cultural heritage, etc., costs of environmental restoration and other environmental costs (or environmental damage), costs of disruption of economic activity, value of insurance pay-outs, indirect costs on the economy, indirect social costs, and other direct and indirect costs, as relevant.
- Political/social impacts are usually rated on a semi-quantitative scale and may include categories such as public outrage and anxiety, encroachment of the territory, infringement of the international position, violation of the democratic system, and social psychological impact, impact on public order and safety, political implications, psychological implications, and damage to cultural assets, and other factors considered important which cannot be measured in single units, such as certain environmental damage.

The guideline recommends that national risk analysis for member states should address the following subjects:

(1) Hazard analysis

- (a) Geographical analysis (location, extent)
- (b) Temporal analysis (frequency, duration, etc.)
- (c) Dimensional analysis (scale, intensity)
- (d) Probability of occurrence

(2) Vulnerability analysis

- (a) Identification of elements and people potentially at risk (exposure)
- (b) Identification of vulnerability factors/ impacts (physical, economic, environmental, social/political)
- (c) Assessment of likely impacts
- (d) Analysis of self-protection capabilities reducing exposure or vulnerability

The EU Guideline recognizes that maps 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. They can help set priorities for risk reduction strategies. Maps also have important roles to play to ensure that all actors in risk assessment have the same information about hazards and in the dissemination of the risk assessment results to stakeholders. Finally, risk mapping could also be useful in the broader context of land use planning (EU, 2010).

ODI (2016) prepared handbook for use by Australian Department of Foreign Affairs and Trade (DFAT) staffs for integrating disaster risk reduction, environment and climate change adaptation and mitigation into Australian aid projects, programmes and investments

This guidance is to support DFAT staff to protect new and existing development and humanitarian investments across all sectors from the risks of recurring or large-scale natural hazards and environmental impacts that could threaten development progress. This guidance shows how to integrate disaster risk reduction, environment and climate change adaptation and mitigation (DEC) into appropriate policies and programmes to achieve development outcomes that are effective and long lasting. The assessment checklist and ranking of projects proposed by ODI is as follows.

Guidance Sheet 1 – Assessment

Answer Yes (✓), No (X), or Don't know (DK) in response to each question.

	✓ X DK
1. Is the initiative located in an urban, coastal or marine area, an area susceptible to natural hazards, or any other environmentally-sensitive or protected area?	<input type="radio"/> <input type="radio"/> <input type="radio"/>
2. Does the initiative focus on tourism, agriculture, forestry, fisheries, water, energy, education or health sectors?	<input type="radio"/> <input type="radio"/> <input type="radio"/>
3. Are similar development interventions in this location already experiencing impacts due to adverse natural hazards, environment or climate change effects?	<input type="radio"/> <input type="radio"/> <input type="radio"/>
4. Is any permanent physical infrastructure created by this initiative (i.e. that cannot be adjusted periodically)?	<input type="radio"/> <input type="radio"/> <input type="radio"/>
5. Does the initiative focus on vulnerable populations and groups (e.g. elderly, young, poor, disabled and/or women) as a primary target?	<input type="radio"/> <input type="radio"/> <input type="radio"/>
6. Is disaster risk management a significant focus of the initiative?	<input type="radio"/> <input type="radio"/> <input type="radio"/>
7. Is environmental management and/or climate change a significant focus of the initiative?	<input type="radio"/> <input type="radio"/> <input type="radio"/>
8. If DEC is NOT integrated into this initiative, do you think the outcomes of the initiative will be affected negatively?	<input type="radio"/> <input type="radio"/> <input type="radio"/>
9. Might the initiative lead to or exacerbate the likelihood of local disasters (e.g. building on steep mountain sides)?	<input type="radio"/> <input type="radio"/> <input type="radio"/>
10. Are greenhouse gas emissions (carbon dioxide or equivalents) likely to increase as a result of the initiative?	<input type="radio"/> <input type="radio"/> <input type="radio"/>
11. Does the initiative negatively impact the environment?	<input type="radio"/> <input type="radio"/> <input type="radio"/>
12. Are disaster risk, climate change and/or environment a priority in the overall development strategy of the national government or DFAT country programme strategy where your initiative will be located?	<input type="radio"/> <input type="radio"/> <input type="radio"/>
TOTAL NUMBER OF TICKS	
TOTAL NUMBER OF DON'T KNOWS	

RANKING

Score on ranking (TOTAL NUMBER OF TICKS AND 'DON'T KNOWS' FROM ABOVE):

If your score is 0–4 your initiative is considered **LOW PRIORITY**

This is low priority for further assessment of the impacts of disaster risk reduction, environment and climate change adaptation and mitigation on the project outcome. You do not need to continue using this guidance on this initiative, but further information on disaster risk reduction, environment and climate change adaptation and mitigation is available on the DFAT site [here](#).

If your score is 5–8 your initiative is **MEDIUM PRIORITY**

This is medium priority for further assessment of the impacts of DEC on the project outcome. We advise progressing to Guidance Sheet 2.

If your score is 9–12 your initiative is **HIGH PRIORITY**

This is high priority for further assessment of the impacts of DEC on the project outcome. Please follow up with further screening of this project for DEC impacts using Guidance Sheet 2.

If you have answered YES to Q11 and/or Q12 please continue with Guidance Sheets 2 and 3 regardless of your total score. You may wish to seek advice from the internal environment team regarding compliance with the Environment Protection and Biodiversity Conservation Act of Australia (1999).

My initiative is (circle as appropriate):

**LOW
PRIORITY**

**MEDIUM
PRIORITY**

**HIGH
PRIORITY**

3.4 Practices

The EIAs carried out in the country covers disaster to certain extent. Especially, the water sector projects which follow EIA manual (FPCO, 1995) discussed above, commonly cover water related hazards such as drought, flood, erosion, cyclone etc. For example, BWDB (2019) in its EIA for FCDI project at Gowainghat consider impact of flash flood on local agriculture, threat of erosion to local important establishments and lack of irrigation water during rabi season. The project suggested mitigation measures but adopted a minimum intervention approach for the sake of sustainability.

The under-construction Payra Power Development project has duly considered the cyclone hazard in the coast facing the project. Accordingly, they have fixed the plinth level of the project at 0.5 meter above the storm surge level of the 1970 Bhola cyclone.

3.5 Tools

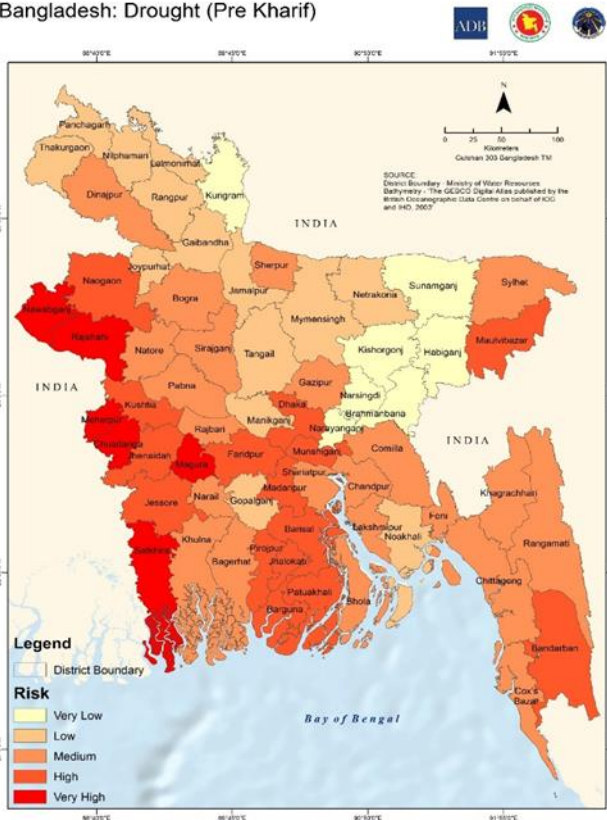
3.5.1 Maps

For Bangladesh, to assist in the budgeting process of development projects, a climate risk screening tool has been developed under a project (Planning Commission, 2018), which can help Planning Commission officials to ascertain the impact of climate change in a development project, its economic losses and adaptation need.

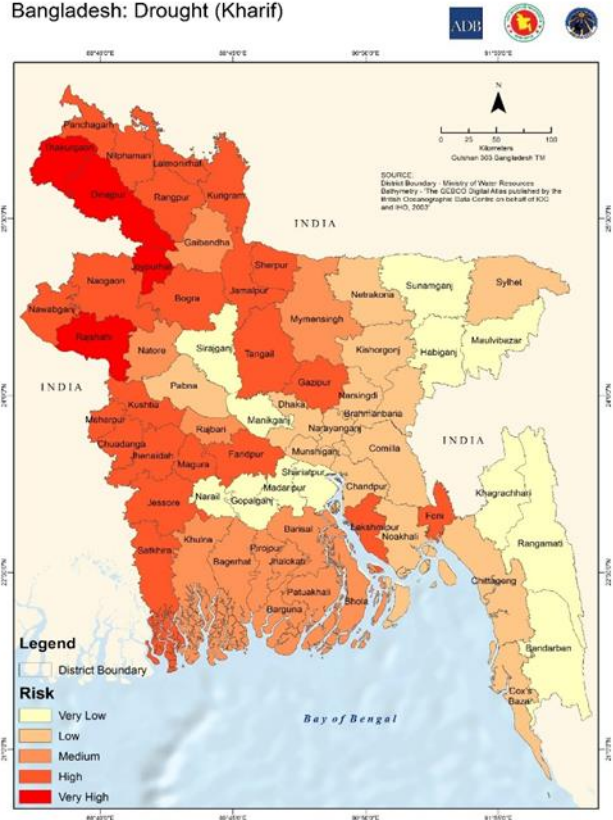
First task of the project was HEVR study, i.e. assessing Risk (R) of a development project considering its relevance to hazard (H), Exposure (E) and Vulnerability (V). An extensive collection of data for H, E and V components has been made from different sources including both Govt. agencies and autonomous bodies. It was a major challenging part of the study.

Based on the H, E and V data set - an appropriate methodology has been developed for the Risk assessment and risk maps are prepared. Example of such maps are shown as follows.

Bangladesh: Drought (Pre Kharif)



Bangladesh: Drought (Kharif)



Bangladesh: Salinity



Bangladesh: Erosion

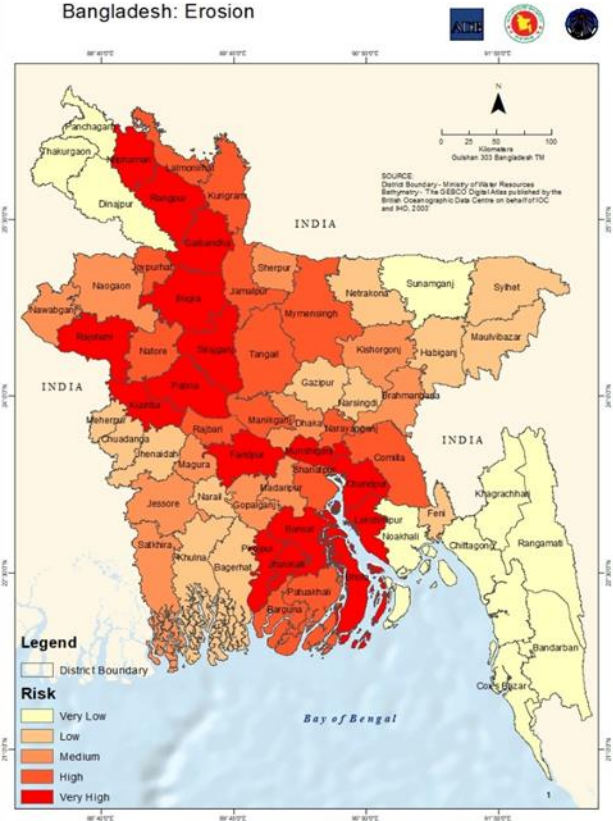


Figure 3.5: Sample of risk maps generated by Planning Commission (2018)

3.5.2 Building code

The Bangladesh National Building Code (BNBC) provides directives to safeguard buildings and building occupants from various manmade and natural hazards. For the purpose of these provisions, buildings, structures and related equipment shall be classified into five structure importance categories as listed in the following table, based on the level of necessity of remaining safe and functional during any post disaster period e.g. after a cyclone, or an earthquake. Each building or structure shall be placed in one of the structure importance categories and provided with a structure importance coefficient for design against wind and earthquake induced forces.

**Table 6.1.1
Structure Importance Categories**

Structure Importance Category	Occupancy Type or Functions of Structure	
	General	Particular
I	Essential Facilities	<ol style="list-style-type: none"> 1. Hospital and other medical facilities having surgery and emergency treatment area. 2. Fire and police stations. 3. Tanks or other structures containing, housing or supporting water or other fire-suppression materials or equipment required for the protection of essential or hazardous facilities, or special occupancy structures. 4. Emergency vehicle shelters and garages. 5. Structures and equipment in emergency-preparedness centres, including cyclone and flood shelters. 6. Standby power-generating equipment for essential facilities. 7. Structures and equipment in government communication centres and other facilities required for emergency response.
II	Hazardous Facilities	Structures housing, supporting or containing sufficient quantities of toxic or explosive substances to be dangerous to the safety of the general public if released.
III	Special Occupancy Structures	<ol style="list-style-type: none"> 1. Covered structures whose primary occupancy is public assembly with capacity > 300 persons. 2. Buildings for schools through secondary or day-care centres with capacity > 250 students. 3. Buildings for colleges or adult education schools with capacity > 500 students. 4. Medical facilities with 50 or more resident incapacitated patients, not included above. 5. Jails and detention facilities. 6. All structures with occupancy > 5,000 persons. 7. Structures and equipment in power-generating stations and other public utility facilities not included above, and required for continued operation.
IV	Standard Occupancy Structures	All structures having occupancies or functions not listed above.
V	Low Risk Structures	Buildings and Structures that exhibit a low risk to human life and property in the event of failure, such as agricultural buildings, minor storage facilities, temporary facilities, construction facilities, and boundary walls.

4.0 Consultations

A series of consultations have been carried in formulating the framework. This includes regular meeting with NRP team, three workshops to date and key informant interviews with relevant stakeholders. These activities are reported as follows.

4.1 Meetings with NRP team

Time to time meeting with the NRP team including Project Director, Dr. Nurun Nahar, Dr. S M Morshed, Project Manager and Mr. Jahedul Huq, Planning Specialist, have been held to keep the project team abreast of the activities and to receive feedback and guidance. A technical committee has been formed under this project to guide the study. The members of the committee are as follows:

1. Joint Chief (Agriculture and Coordination)	Chairperson
2. Representative, MoDMR	Member
3. Representative, DDM	”
4. Representative, DOE	”
5. Project Director – NRP – LGED part	”
6. Representative, Disaster Science and Management Department, Dhaka Univ.	”
7. Representative, Institute of Water and Flood Management, BUET	”
8. Representative, Center for Policy Dialogue	”
9. Mr. Arif Abdullah Khan, UNDP	”
10. Mr. A K M Mamunur Rashid, UNDP	”
11. Project Director, NRP (Programming Division Part)	Member Secretary

There have been two meetings with the Technical Committee where progress of the study was reviewed and feedback were provided regarding future direction of the study.

4.2 Workshops

So far, three workshops have been held – first one on Inception Report on 14/10/2019; second workshop on Review of DIA Practices on 19/12/2019 and the third workshop on DIA Framework scheduled on 27/02/2020. All the relevant stakeholders were invited and the workshops were well attended. The purpose of these workshops is to disseminate the outcomes of this study after each milestone and to gather valuable feedback from the stakeholders.

Following recommendations were made in the Inception workshop

- DIA should be a separate tool and need not to merge with EIA;
- DIA tools should be simple and user-friendly;

- Risk data and information need to be available for DIA by the host ministries /agencies;
- Inclusion of NGOs/INGOs for KII;
- DIA experience from other countries need to be captured, particularly the sectoral experience;
- Categorizing project based on DIA requirements;
- Identify monitoring process of DIA implication and
- Suggest clearing / approval agency if required
- Design preparatory work for DIA piloting with LGED.

After an open discussion, the following recommendations were made in the 1st consultation Workshop:

- DIA tool should be as simple as possible.
- NRP-PD should collect/provide necessary data and information to carry out DIA.
- Capacity building support and mainstreaming the developed DIA tool should be given importance.

After an open discussion, the following recommendations were made in the 2nd consultation Workshop:

- Feasibility studies for all projects should be carried out rigorously
- Countermeasures for disaster mitigation themselves may create new disasters. Proper safeguards need to be in place.
- Indicators should be developed for categorization of projects under the DIA process.
- There should be guideline for estimating the cost of DRR.

4.3 Key Informant Interviews

In coordination with the Development Planning Specialist, a total of 21 key informant interviews (KII) have been conducted to supplement the findings of desk review. The KIIs have been carried out according to the following schedule.

Sl.	Agency	Key Informant	Date of interview
1	DOE	Dr. Showkat Mirza Director, Climate change	18/11/2019
2	DOE	Mr. Nazmul Islam Director, Environmental Clearance	18/11/2019
3	LGED	Mr. Jashim Uddin Executive Engineer	18/11/2019
4	UNDP	Mr. Khurshid Alam Assistant Resident Representative	26/11/2019
5	UNOPS	Mr. Iftekhar Ahmed Infrastructure Advisor	26/11/2019
6	WARPO	Mr. Mahmudul Islam Director General	27/11/2019
7	ActionAid	Ms. Farah Kabir Country Representative	1/12/2019
8	Planning Commission	Mr. Zakir Akand Member, Agriculture, Water Resources and Rural Institution	3/1/2019
9	Planning Commission	Mr. Nurul Amin Secretary	3/1/2019
10	UNWomen	Ms Dilruba Haider Programme Specialist	4/12/2019
11	Planning Commission	Ms. Shahin Ahmed Chowdhury, Member, Industry and Energy Division	6/1/2020
12	Planning Commission	Ms. Shamima Nargis, Member (Infrastructure)	7/1/2020
13	Planning Commission	Mr. Mofidul Hoque, Divisional Chief, GED	7/1/2020
14	DAE	Krishibid Chandi Das Kundu, Director, Field Services Wing	15/1/2020
15	BWDB	Mr. Golam Faruque Ahmed, Deputy Chief (Economics)	19/1/2020

16	PWD	Mr. Md.Parvez Khadem, SE (Project Circle -2)	19/1/2020
17	DDM	Mr. Md. Mohsin, DG	29/1/2020
18	RHD	Mr. Bulbul Hossain, ExEn (Road Design and Standard Division)	2/2/2020
19	MODMR	Mr. Md. Shah Kamal, Senior Secretary	4/2/2020
20	World Bank	Ms. Swarna Kazi, Sr. Disaster Risk Management Specialist	20/2/2020
21	ADB	Dr. Farhat Jahan Chowdhury, Sr. Project Officer (Environment)	20/2/2020

Important outcomes of the consultation can be summarized as follows:

- Disaster impact assessments need to be simple at this stage.
- Projects may be categorized like for EIA (e.g. red, yellow, green)
- Disaster impacts are gradually being taken into consideration in planning practices. Such as updating of design parameters by LGED.
- Disaster impact assessment can be carried out at three levels – policy, plans and projects.
- Impacts of disasters on projects should be seen on infrastructural parts only but also the impact on services they provide.
- Not only infrastructure projects, disaster impacts on social projects should also be addressed
- Conceptual framework should cover the following issues
 - o Pre/post/during disaster situation
 - o Resilience – robustness, readiness etc.
 - o DRR livelihood linkage
 - o Rural/urban
 - o Man-made/natural
 - o Public/private
 - o Addressing gender responsiveness and social inclusion

5.0 Piloting

The draft framework was presented before a group of LGED engineers over a virtual platform. In-person presentation was not possible due to government restriction on account of prevailing COVID19 situation. Group work on various types of infrastructures, as originally planned was not practical as the participants were attending the session off-station. Still the exercise proved to be very fruitful due to excellent engagement from the designated staffs of LGED.

5.1 Current practice

A rolling DPP was taken as an example for discussion. The important features of the DPP as per its format are as follows:

1.0	Title of the project	Construction of Farm Access Road in Haor Area
2.2	Implementing agency	LGED
3.0	Objective of the project	To facilitate harvesting and marketing of crops produced in Haors by constructing submergible roads in Haor areas and to facilitate communication of villagers to village market, health centers, educational institutions and other service providing agencies and thereby to improve quality of life.
4.0	Period of implementation	July/2020 - June/2025
5.1	Cost	350,000.00 lac taka
7.0	Project area	Netrokona, Kishoreganj, Brahmanbaria, Habiganj, Moulavibazar, Sylhet, Sunamganj
18.2	Lessons learnt from similar projects	Lack of qualified contractors in distant areas; Actual working days in haor area is only 120-140 days during which construction work has to be suspended for 30 days due to lack of labor engaged in boro harvesting and crop transportation; Construction works has to be frequently suspended due to intense rainfall.
24.3	Disaster management, climate adaptation and risk mitigation	Only RCC submergible road and earthen killa will be constructed under the proposed project. Harvesting crops in distant haor areas will be easier due to construction of submergible roads. Farmers will get temporary facility for thrashing and storing of their crops on Killas. As a result, risk of crop loss will reduce from flash flood and heavy rainfall. Capable and experienced firms will be engaged in this project as consultant. Vulnerability of infrastructures to hazards and climate change will be lessened by

		ensuring implementation of the projects under their direct supervision.
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The following observations can be made on the DPP

- The DPP is well composed and professionally done.
- The project area (Section 7.0) encompasses the high-risk area for flash flood as can be seen from Figure 5.1.
- Considering this flood risk, the project proposes to build submergible roads (Section 3.0) in order to make the roads less vulnerable to on-rushing flood flow and also not to disrupt the natural flood flow in the haor area. The project concept itself is novel from disaster risk management point of view.

Bangladesh: Flash Flood Hazard Index

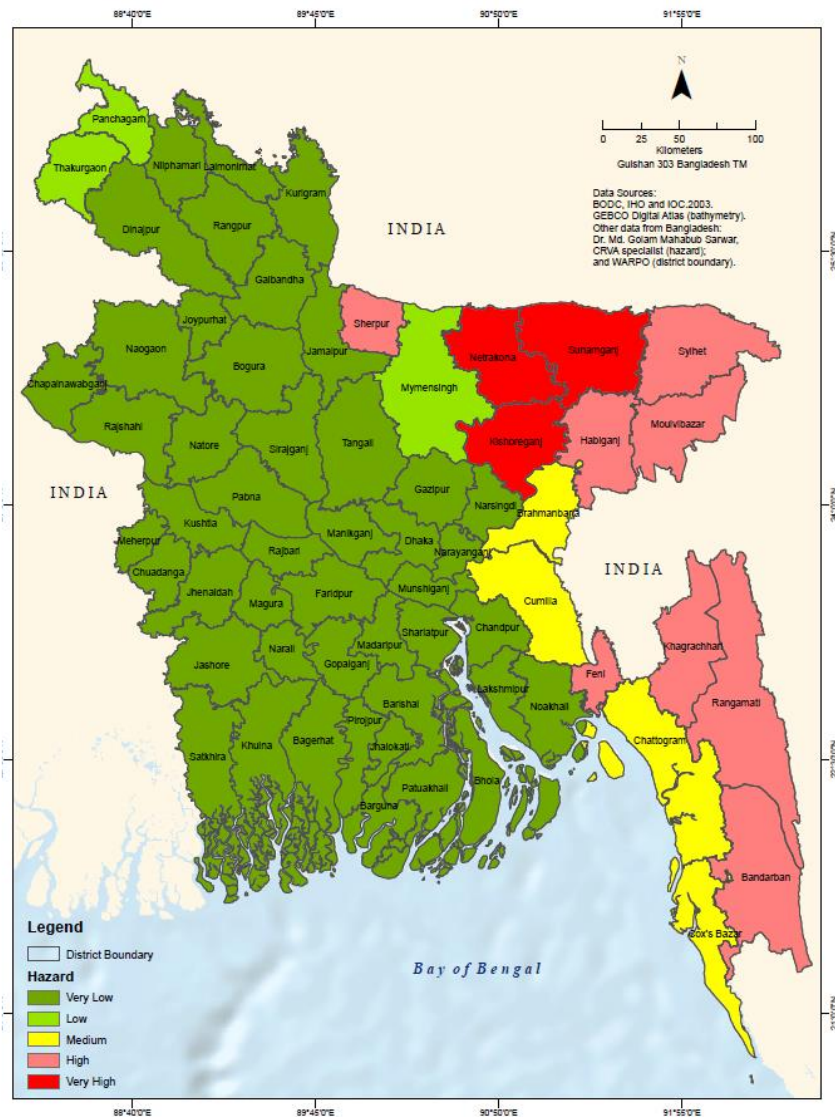


Figure 5.1: Hazard index map for flash flood.

- The project tries to learn from past experiences with similar projects as can be seen from Section 18.2 of the DPP. Past performance shows construction works are frequently disrupted due to intense rainfall hazard.
- In Section 24.3 of the DPP, which is of most important for this exercise, it is seen that the responses to the query related to disaster management are qualitative in nature. It raises the need of a guideline to quantify impacts of disaster to aid decision making process.

5.2 Outcome of piloting

A lively discussion followed on various aspects of DIA guideline. In general, the framework was vetted by the attending engineers as workable. Summary of their comments on the framework are as follows:

- The DIA guideline will be very helpful in preparation of DPP.
- The guideline should address different types of hazards such as flood, cyclone earthquake etc.
- The guideline should have scope to make use of lessons learnt from performance of past projects.
- There should be on-line facilities for locating the projects on various risk maps.
- Sometimes external factors make a project vulnerable to disasters. One example may be unplanned sand excavation in a river makes nearby bridge piers vulnerable to collapse. There needs to be guideline to protect infrastructures from such external factors
- The infrastructures need to be treated in an integrated manner during DIA. For example, in a polder, construction of rural roads need to be aligned with the hydrological functioning of the polders.
- Categorization of projects is very important for DIA. It will be helpful if the categorization can be done on-line as it will standardize the process and eliminate subjectivities.
- There should be guidance in measuring resilience of the projects.
- It will be better if DIA process can be included in the feasibility study itself.

5.3 ToC of Feasibility Study

Planning Commission has taken an initiative to prepare a standard TOC for feasibility studies of the projects that are submitted to the commission. A draft TOC has already been prepared and circulated for comments. From this exercise, comments have been provided on the TOC. The main idea behind these comments is that the information that are required for the framework such as cost of DRR can be readily abstracted from the feasibility study.

6.0 Framework

6.1 Purpose

While conducting the Key Informant Interviews, it became apparent that the respondents were of the opinion that DIA should not be integrated with EIA as the purposes are different. On the other hand, it also came out that DIA itself need not be an overwhelming exercise like a full-fledged EIA, at least, at this early stage. Considering these viewpoints, a simple format is being proposed here which will be used to address Section 24.3 of DPP. This is a simple tool to help both proponent and appraiser to assess whether disaster issues have been adequately considered in DPP in order to make the project sustainable.

6.2 Principles

The principles behind this framework are as follows:

Simple yet comprehensive: i.e. the format should be easily understandable and workable yet it needs to cover major issues related to DIA.

It is a living document: i.e. it is not static rather dynamic. It is expected that the manual will be updated with time with better knowledge base and experience.

No new analysis: The format will use information already available from Feasibility Report. Such information will be presented in a DIA format.

6.3 Scope

The scope of this manual is as follows:

Applicable for DIA at project level only: DIA can be carried out at policy and programme level which are equally needed. However, this format is applicable for preparation of DPP for projects only.

Applicable for infrastructure projects: At this stage, the DIA format has been prepared considering infrastructure projects. This is because, these types of projects are more vulnerable to hazards, may create more hazards and need to be resilient most.

Consideration of service: This format encourages to consider not only the physical damage to the infrastructure itself but the services that these infrastructures provide.

Consideration of chain of hazards: One hazard may lead to other hazards such as from damage to a building during earthquake may generate fire hazard.

Gender consideration: The countermeasures need to duly consider gender aspects.

The infrastructures and the hazards that they might face which have been considered in formulation of the framework are as follows:

Infrastructures	Hazards
<ul style="list-style-type: none"> • Road • Bridge • Shelter • Embankment • Buildings (including schools, hospitals etc.) • WASH facilities • Town protection • Dredging • Power plant • etc 	<ul style="list-style-type: none"> • <u>Natural</u> • Flood • Drought • Cyclone • Earthquake • Erosion • Tornado • Landslide • Lightning • Salinity • etc. • <u>Manmade</u> • Fire • Water logging • etc.

6.4 Steps of DIA

The proposed DIA format has six steps as below:

1. Classifying the project
2. Identification of impact of hazards
3. Proposing counter measures
4. Assessment of resilience
5. Estimating cost of DRR
6. Reporting residual risk

The steps are described as follows.

1. Classifying the project

First, the site of the project should be located on maps of hazards that the project is facing. Districts facing different types of hazards have been identified by Planning Commission (2018) as given below.

Table 1: List of districts and respective exposure to types of hazards. Planning Commission (2018)

Division	District	Potential Hazards	Note
Barisal	1. Barisal	C, Er, F, SS	<i>C = Cyclone</i> <i>D = Drought</i> <i>Eq = Earthquake</i> <i>Er = Erosion</i> <i>F = Flood</i> <i>FF = Flash flood</i> <i>S = Salinity</i> <i>SLR = Sea-level Rise</i> <i>L= landslides</i> <i>SS= Storm Surge</i>
	2. Bhola	C, Er, F, S, SLR, SS	
	3. Barguna	C, Er, F, FF,S, SLR, SS	
	4. Jhalokati	S, Er, F, S	
	5. Patuakhali	C, Er, F, S, SS	
	6. Pirojpur	C, Er, FF,S, SLR	
Chattogram	7. Bandarban	Er, Eq, FF, L	
	8. Brahmanbaria	Er, F, FF,S, SLR	
	9. Chandpur	Er, F	
	10. Chattogram	C, FF, SLR, Eq, L	
	11. Cumilla	Er, F	
	12. Cox'z Bazar	C, Er, FF, S, SLR, L	
	13. Feni	C, Er, F, S, SLR	
	14. Khagrachhori	C, Er, F, FF, Eq, L	
	15. Lakshmipur	C, Er, F,S, SLR	
	16. Noakhali	C, Er, F, FF,S, SLR	
Dhaka	17. Rangamati	C, FF,S, SLR, Eq, L	
	18. Dhaka	F	
	19. Faridpur	Er, F	
	20. Gazipur	F	
	21. Gopalganj	Er, F, S	
	22. Kishoreganj	Er, F, FF	
	23. Madaripur	Er, F	
	24. Manikganj	Er, F, Eq	
	25. Munshiganj	Er, F	
	26. Narayonganj	Er, F,	
	27. Narsingdi	F	
Khulna	28. Rajbari	Er, F	
	29. Shariatpur	Er, F	
	30. Tangail	Er, F	
	31. Bagerhat	C, Er, F, FF,S, SLR	
	32. Chuadanga	Er, F	
	33. Jashore	Er, F	
	34. Jhenaidah	F, S,	
	35. Khulna	C, Er, F, S, SLR, SS	
	36. Kustia	F, Er, S	
	37. Magura	Er, F, S, D	
	38. Meherpur	Er, F, D, S	
	39. Narail	Er, S, F	
	40. Satkhira	Er, S, SLR, F	
Rajshahi	41. Bogura	C, Er, F, D	
	42. Joypurhat	Er, F, D	
	43. Naogaon	Er, F, D, S	
	44. Natore	Dr, F	
	45. Nawabganj	C, Er, F, D	
	46. Pabna	Er, F, D	
	47. Rajshahi	Er, F, D	
	48. Sirajganj	Er, F, D	
Rangpur	49. Dinajpur	Dr, Er, F	
	50. Gaibandha	Er, F	
	51. Kurigram	C, Er, F, D	
	52. Lalmonirhat	Er, F, D	
	53. Nilphamari	Er, F, D	

	54. Panchagarh	Er, F, D	
	55. Rangpur	Er, F, D, Eq	
	56. Thakurgaon	Er, F, D	
Sylhet	57. Habiganj	Er, FF, F, FF	
	58. Moulvibazar	Er, F, FF	
	59. Sunamganj	Er, F, FF	
	60. Sylhet	Er, F, FF	
Mymensingh	61. Jamalpur	Er, F	
	62. Mymensingh	Er, Eq, F	
	63. Netrokona	Eq, Er, F, FF	
	64. Sherpur	Er, F, Eq	

The maps for different hazards have been prepared by the Planning Commission as shown in Figure 5.1 for flash flood. There are other examples such as earthquake zone map prepared by BNBC (Figure 6.1). Based on the severity of the probable intensity of seismic ground motion and damages, Bangladesh has been divided into three seismic zones, i.e. Zone 1, Zone 2 and Zone 3 as shown in the figure with Zone 3 being the most severe. Seismic zone for a building site shall be determined based on the location of the site on the Seismic Zoning Map. Each building or structure shall be assigned a Seismic Zone Coefficient, Z corresponding to the seismic zone of the site and respective design parameters are provided in the BNBC.

Such maps can be used to classify the projects into different categories such as red, yellow and green according to the severity of the hazard that they are facing. Respective design guidelines can be used accordingly to make the infrastructures resilient.

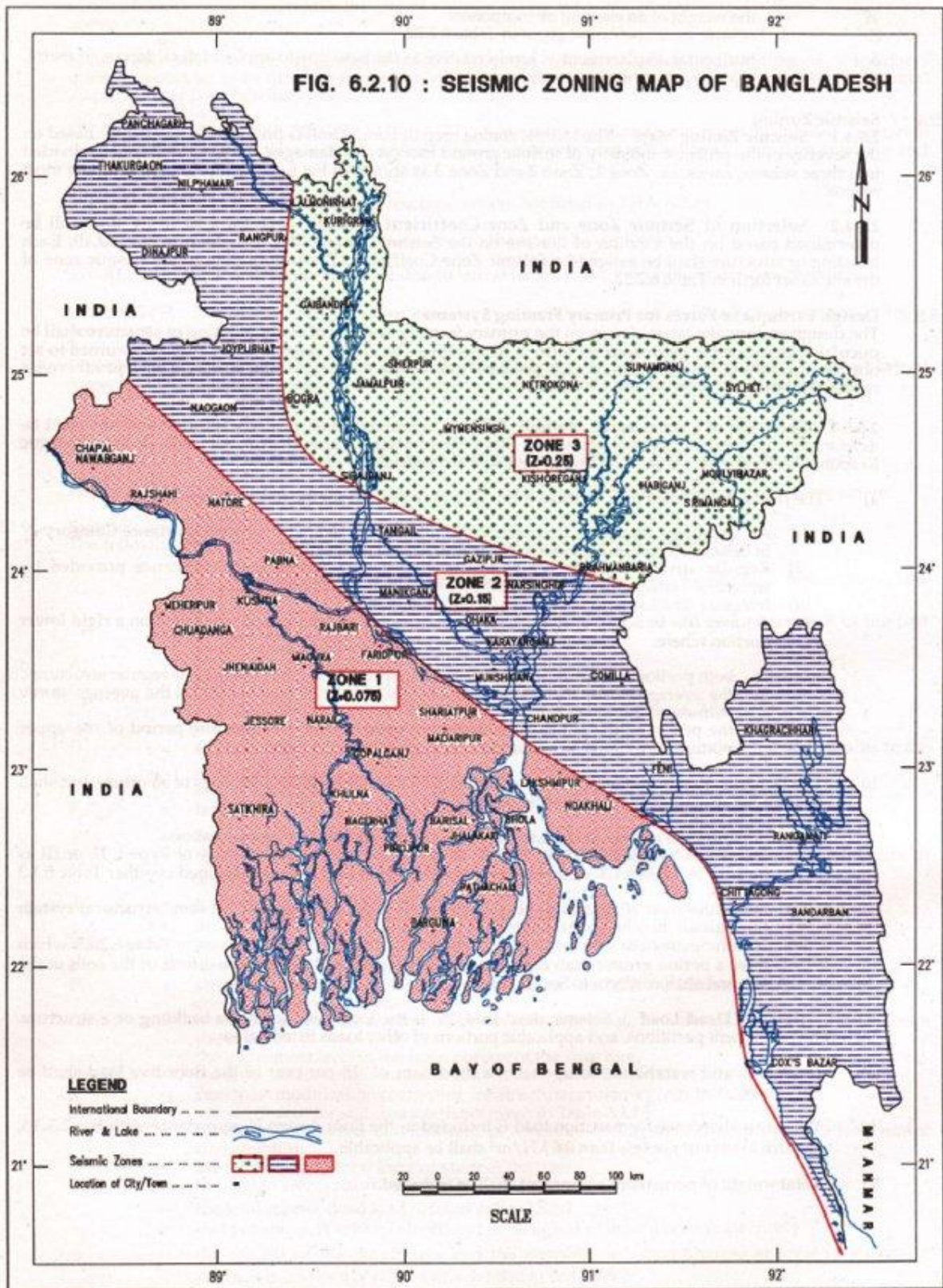


Figure 6.1: Earthquake zones according to Building Code

2. Impact of hazards

Then the impact of hazards on the structure (including the services they provide) will be reported. Example of impacts for major infrastructures are as follows:

- Cyclone shelter will be exposed to wind hazard, storm surge and salinity.
- Embankments may be breached or overtopped by storm surges leading to water logging.
- Increase of salinity, water logging has negative impact on women’s reproductive health and hygiene practice.
- Roads through a floodplain may be submerged by flood disrupting communication.
- Damage of infrastructure specifically to road communication can cut off supply of goods and services that make negative impact on economic life of people.
- Bridges may be subject to river erosion.
- Buildings may be damaged by earthquake and then creating fire hazard.
- Collapsed or damaged infrastructure might cause injury and bring challenges for women, adolescent girls, person with disability and aged people for equal access and safety.

Sometimes the projects itself create new hazards. Such will also need to be reported here.

Examples of such transfer of risks are as follows:

- Embankment can raise flood level in the unprotected area
- Roads may lead to water congestion

3. Counter-measures

This section will report the countermeasures that have been taken against the impacts noted in the previous section. Countermeasures should address both hazard and vulnerability. An example is provided below.

Project	Risk reduction	Measures
Cyclone shelter	Hazard	
	Wind	Max wind speed considered as per BNBC
	Storm surge	Plinth level above historically highest surge level
	Salinity	Thicker covering; modular construction
	Vulnerability	
	River erosion	Sufficient set back distance has been maintained
	Access to shelter	Roads and culverts have been provided; Roads and other communication are accessible, safe and secured for women, adolescent girls and person with disability

	Safety at shelter	Separate areas for men and women with separate WASH facilities with sufficient light; Emergency lighting facilities in place.
	Services afterwards	Plan for resuming normal operation is in place

4. Assessment of resilience

The resilience can be assessed by the following indicators:

- 1) Whether the project has an Emergency disaster management plan – All projects are subject to fail and therefore need to have emergency/contingency plan. For example, if a building collapses during earthquake, then there needs to be an evacuation plan and arrangement for automatic shutdown of utilities such as electricity, gas etc. to prevent fire.
- 2) Service continuity plan – Important installations such as hospitals, schools, power plants etc need to have service continuity plan for immediate aftermath of a disaster. For example, a school need to resume schooling as soon as possible after a flood when large number of people took shelter in that school building; community health services including provision of reproductive health services to women need to continue even after a hospital is lost to river erosion; mobile network needs to resume operation quickly after a cyclone even if there is loss of few transmission towers.
- 3) Time of recovery – If a project fails, then it may require considerable period of time for rehabilitation if this issue is not considered during project planning and design. For example, many polders damaged after cyclone Aila and Sidr in later part of 2000s still await full rehabilitation prolonging the sufferings of the inhabitants especially as seen during recent cyclone Amphan.

5. Cost of DRR

Cost of DRR will be reported in this section. The percentage of DRR cost compared to the total project cost will also be reported.

Some projects are entirely DRR projects such as cyclone shelter, embankments etc. Here entire project cost is the DRR cost. On the other hand, in some projects cost of DRR is incremental cost. For example, a sea-side road may need protection from sea erosion. In this case, cost of DRR is only the cost of erosion protection.

Costs should also be reported unit-wise. For example, in case of cyclone shelter, in addition to total cost, cost for sheltering each person would be reported.

6. Residual Risk

Risk cannot be absolutely eliminated. In this regard, it is important for the appraiser to judge the residual risk with respect to cost incurred for DRR and the total cost of project.

In this section, the remaining risk after the intervention will be reported. This is to facilitate comparison of residual risk with the cost of DRR. If a road is designed above 1 in 100 year flood it should be reported that there is likelihood that the road will be flooded once in 100 year. If a building is designed to withstand earthquake with a magnitude of 7 in Richter scale then the probability of earthquake above 7 need to be reported.

7.0 Conclusion & Recommendation

7.1 Conclusions

From the review of local and global practices it is apparent that despite the fact that disasters and their impacts are increasing everywhere, disaster impact assessment is still not widespread in practice, locally or globally. It is common though to carry out disaster impact assessment as part of environmental impact assessment. Such practices, however, cannot capture full dimension of disaster impacts especially the secondary and tertiary impacts.

In this report, a six-step framework of DIA to address section 24.3 of DPP has been proposed. The proposed format has been kept simple, but it is comprehensive in nature. This is a simple tool to help both proponent and appraiser to assess whether disaster issues have been adequately considered in DPP so that the project is sustainable.

The framework has been piloted at LGED. But rigorous piloting could not be carried out due to prevailing pandemic situation. It was still a useful exercise.

7.2 Recommendations

More piloting is needed to firm up the framework. A full-fledged exercise as envisaged in section 2.5 needs to be carried out at LGED once current pandemic situation eases. Additionally, pilot exercises also need to be carried out at other organizations such as BWDB, R&H, PWD etc to test the framework against large projects.

The DIA framework has been kept simple so that practitioners first get used to the idea of DIA. The framework however covers all the aspects of DIA which needs to be gradually made rigorous. DDM is best placed to take this responsibility and carry out the task on a regular basis.

In order to better operationalize the framework, the following improvements are suggested:

- Preparation of hazard and risk maps for other hazards which have not been covered in Planning Commission (2018), such as hazard maps for lightning.
- Preparing list of potential measures and countermeasures for each type of infrastructures against each type of hazard.
- A data base of above information which will be available on-line.
- Improving departmental design manuals to consider all types of hazards; for example, BWDB manuals consider flood and erosion hazard while designing embankments but does not consider earthquake hazard which may cause considerable damage to embankments in Sylhet region by liquefaction.

If the suggested modifications are incorporated in the proposed TOC of feasibility study being prepared by Planning Commission then issues related to DIA can be taken care of in a holistic manner and the information for DIA can be gathered easily for fulfilling the requirements of section 24.3 of DPP.

References

- BWDB (2019). EIA of Gowainghat FCDI project. Bangladesh Water Development Board.
- Caribbean Development Bank (2015). Updated Sourcebook on the Integration of Natural Hazards into the Environmental Impact Assessment Process. Incorporating Disaster and Climate Risk Reduction into the Project Cycle,
- DMC & JICA DiMCEP (2012). Disaster Impact Assessment – Checklist System for Road Sector. Sri Lanka
- EU (2010). Risk Assessment and Mapping Guidelines for Disaster Management. Brussels.
- FPCO (1995). Manual for EIA. Flood Action Plan. Ministry of Water Resources.
- ODI (2014). A how-to Handbook- Integrating disaster risk reduction, environment and climate change adaptation and mitigation into Australian aid projects, programmes and investments.
- Planning Commission (2018). Establishing a Climate Risk Screening System for Mainstreaming Climate Change Adaptation into National Development Budgeting Activities