Damage, loss and needs assessment

An introduction for staff of the Asian Development Bank

Draft

The Guidance Notes will be finalized after pilot-testing. ADB would welcome any feedback from practitioners on the usefulness of the guidance notes. Please provide comments to disaster@adb.org.
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April 2009

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# Contents

PREFACE I
GLOSSARY OF TERMS II
ACRONYMS AND ABBREVIATIONS IV
ACKNOWLEDGEMENTS V

I RATIONALE 1
   Introduction 1
   Context 1

II PREPAREDNESS 2
   Good disaster preparedness 2
   Pre-damage, loss and needs assessment 2
   Secondary data collation 2
   Review of ADB portfolio 2

III METHODOLOGY 3
   Introduction 3
   Purpose 3
   Objectives 3
   Scope 3
   Damage and loss 4
   Macroeconomic effects 4
   Approaches 4
   Possible scenarios 4
   Clarity of roles and responsibilities 5

IV ASSESSMENT 5
   Introduction 5
   Assessment preparations 5
   Conducting an assessment 6
   Assessment teams 6

V COORDINATION 8
   Introduction 8
   Internal (ADB) 8
   External 8

VI DATA GATHERING 9
   Sector-by-sector assessment 9
   Estimation of overall impact 9
   Financial needs for recovery and reconstruction 10

VII REPORT WRITING 10
   Compilation and report writing 10
   Use of assessment report 11
   Presentation of assessment results 11

VIII SECURITY 11
   Prior to departure 11
   Upon arrival 12

IX CROSS-CUTTING ISSUES 12
   1. Disaster risk management 12
   2. Gender 15
   3. Governance 18
   4. Environment 19
   5. Vulnerable People 20
   6. Shelter and Property Rights 20

APPENDIX 1 23
PREFACE

Background

In the aftermath of major disasters, staff from the Asian Development Bank (ADB) headquarters and Resident Missions are requested often to participate in damage, loss and needs assessment (DLNA). Generally they do so jointly with colleagues from the World Bank, the United Nations (UN) systems agencies and the nongovernment sector. For some, this maybe their first experience of such an assessment.

The principle guidance material used for these types of assessments is the *Handbook for Estimating the Socio-Economic and Environmental Effects of Disasters*. This was published by the United Nations’ Economic Commission for Latin America and the Caribbean (UN-ECLAC) and the World Bank in 2003, and dates back to the early nineteen seventies.¹

In August 2007, the World Bank Global Facility for Disaster Reduction and Recovery (GFDRR) produced some “Guidance Notes for Damage and Loss Assessment after Disasters”² which provide an abridged version of the ECLAC Handbook.³

What it comprises

This introductory document serves to augment the existing ECLAC Handbook and World Bank “Guidance Notes” and links to other components of a pack of material on DLNA aimed at assisting ADB staff in future assessments. This comprises⁴

- An introduction to damage, loss and needs assessment
- A PowerPoint presentation with annotated notes
- Short handouts (tailored to suit the particular circumstances, e.g., a DLNA report format; the country disaster profile; lessons learned from similar disasters; alternative methodologies; relevant resources and references, etc.).

How to use the materials

Some sections will be more relevant to your particular circumstances than others. It is suggested that this introductory document be read in conjunction with the current version of the World Bank’s “Guidance Notes” prior to participating in a DLNA (a copy is attached as Appendix 1). The Guidance Notes are undergoing revision by World Bank staff, and when available an amended version of this introductory document will be released.

These introductory notes and other material provided in the pack are considered a “living document” and feedback and ways of improving the documentation for future use is welcome.

Who are these notes intended for

This document is provided as an introduction to a comprehensive DLNA and is designed to act as a brief guide for ADB staff prior to embarking on a DLNA mission.

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¹ This comprises a comprehensive set of four volumes: Volume I: methodological and conceptual aspects; and the social sectors (affected population; housing and human settlements; education and culture and the health sector). Volume II: infrastructure (energy; drinking water and sanitation; transport and communications). Volume III: the economic sectors (agriculture; trade and industry and tourism) Volume IV: the overall effects of damage (on the environment; the impact on women; an overview of damage; the macroeconomic effects of damage; and employment and income).

² A draft document prepared by J. Roberto Jovel, Consultant, GFDRR, as part of the Post Disaster Needs Assessment (PDNA) scheme at the World Bank.

³ In March 2009, these were in the process of revision (R. Jovel, personal communication).

⁴ All documentation is available electronically on the ADB portal under disaster risk management.
GLOSSARY OF TERMS

**Balance of trade** - Is the difference between the monetary value of exports and imports in an economy over a certain period of time. A positive balance of trade is known as a *trade surplus* and consists of exporting more than is imported; a negative balance of trade is known as a *trade deficit* or, informally, a trade gap.

**Building code** - A set of ordinances or regulations and associated standards intended to control aspects of the design, construction, materials, alteration and occupancy of structures that are necessary to ensure human safety and welfare, including resistance to collapse and damage.

*Comment:* Building codes can include both technical and functional standards. They should incorporate the lessons of international experience and should be tailored to national and local circumstances. A systematic regime of enforcement is a critical supporting requirement for effective implementation of building codes. (UN ISDR, 2009).

**Critical facilities** - The primary physical structures, technical facilities and systems which are socially, economically or operationally essential to the functioning of a society or community, both in routine circumstances and in the extreme circumstances of an emergency.

*Comment:* Critical facilities are elements of the infrastructure that support essential services in a society. They include such things as transport systems, air and sea ports, electricity, water and communications systems, hospitals and health clinics, and centres for fire, police and public administration services. (UN ISDR, 2009).

**Damage** - The monetary value of fully or partially destroyed assets, stock and property. It is initially assumed that assets will be repaired or replaced to the same condition - in quantity and quality - prior to the disaster, i.e., valued at agreed replacement (as opposed to reconstruction) costs. The assessment should consider the level of damage, i.e., whether an asset can be rehabilitated or repaired, or has been completely destroyed (modified from UN ECLAC/R. Jovel, 2007).

**Disaster risk management** - 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.

*Comment:* This term is an extension of the more general term “risk management” to address the specific issue of disaster risks. Disaster risk management aims to avoid, lessen or transfer the adverse effects of hazards through activities and measures for prevention, mitigation and preparedness (UN ISDR, 2009).

**Disaster risk reduction** - The 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 (UN ISDR, 2009).

A disaster risk reduction framework is composed of the following fields of action, as described in ISDR’s 2002 publication: Living with Risk: a global review of disaster reduction initiatives, page 23:

- Risk awareness and assessment including hazard analysis and vulnerability/capacity analysis;
- Knowledge development including education, training, research and information;
- Public commitment and institutional frameworks, including organizational, policy, legislation and community action;
- Application of measures including environmental management, land-use and urban planning, protection of critical facilities, application of science and technology, partnership and networking, and financial instruments;
- Early warning systems including forecasting, dissemination of warnings, preparedness measures and reaction capacities (UN ISDR, 2004).

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5 Or direct impact or direct damages
Early recovery - encompasses the restoration of basic services, livelihoods, shelter, governance, security and the rule of law, environment and social dimensions, including the reintegration of displaced populations leading to long-term recovery and rehabilitation. The period is one in which human security is stabilized and underlying risks that contributed to the crisis are identified. It begins early in the humanitarian response and is a multi-dimensional process, guided by development principles (modified from UNOCHA).

Gross Domestic Product (GDP) - is one of the measures of national income and output for a given country's economy. GDP is defined as the total market value of all final goods and services produced within the country in a given period of time (usually a calendar year).

Loss - changes in the flow of goods and services that will not be forthcoming until the destroyed assets are rebuilt or recovered. These losses will be quantified at the present value of such flows. Losses include the production of goods and services that will not be obtained; higher costs of operation and production; reduced income; increased expenditure and the cost of the humanitarian assistance activities. A distinction is made between private and public losses (modified from UN ECLAC/R. Jovel, 2007).

Macroeconomic effects - reflects the manner in which the disaster modifies the main economic variables of the affected country (and includes fiscal impacts, implications for Gross Domestic Product growth, the Balance of Payments, etc.) (modified from UN ECLAC/R. Jovel, 2007).

Mitigation - the lessening or limitation of the adverse impacts of hazards and related disasters (UN ISDR, 2009).

Replacement cost - the amount that an entity would have to pay, at the present time, to replace any one of its assets. In the insurance industry, "replacement cost" is a method of computing the value of an insured item. Replacement cost is not market value, but is instead the cost to replace an item or structure at its pre-loss condition (modified from UN ECLAC/R. Jovel, 2007).

Recovery - the restoration, and improvement where appropriate, of facilities, livelihoods and living conditions of disaster-affected communities, including efforts to reduce disaster risk factors.

Comment: The recovery task of rehabilitation and reconstruction begins soon after the emergency phase has ended, and should be based on pre-existing strategies and policies that facilitate clear institutional responsibilities for recovery action and enable public participation. Recovery programmes, coupled with the heightened public awareness and engagement after a disaster, afford a valuable opportunity to develop and implement disaster risk reduction measures and to apply the “build back better” principle (UN ISDR, 2009).

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.

Comment: Resilience means the ability to “resile from” or “spring back from” a shock. The resilience of a community in respect to potential hazard events is determined by the degree to which the community has the necessary resources and is capable of organizing itself both prior to and during times of need (UN ISDR, 2009).

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6 Or indirect losses, indirect costs, indirect impact or indirect damages.
7 The definition of the time period is critical. If the recovery takes longer than expected, losses might increase significantly.
8 Or secondary impacts.
9 Or replacement value.
# ACRONYMS AND ABBREVIATIONS

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>ADB</td>
<td>Asian Development Bank</td>
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<tr>
<td>COSO</td>
<td>Central Operations Services Office</td>
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<td>DMC</td>
<td>developing member country</td>
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<td>DLNA</td>
<td>damage, loss and needs assessment</td>
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<td>DRR</td>
<td>disaster risk reduction</td>
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<td>DRM</td>
<td>disaster risk management</td>
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<tr>
<td>ECLAC</td>
<td>United Nations Economic Commission for Latin America and the Caribbean</td>
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<td>FAO</td>
<td>United Nations Food and Agriculture Organization</td>
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<td>GDP</td>
<td>gross domestic product</td>
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<td>GFDRR</td>
<td>Global Facility for Disaster Reduction and Recovery</td>
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<td>IASC</td>
<td>Inter-Agency Standing Committee</td>
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<td>international nongovernment organizations</td>
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<td>MOSS</td>
<td>Minimum Operating Security Standards</td>
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<td>OAS</td>
<td>Office of Administrative Services</td>
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<td>PCR</td>
<td>project completion report</td>
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<td>RM</td>
<td>resident mission</td>
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<tr>
<td>RRP</td>
<td>Report and Recommendation to the President</td>
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<td>RSDD</td>
<td>Regional and Sustainable Development Department</td>
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<td>RSGP</td>
<td>Public Management, Governance and Participation</td>
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<td>UN</td>
<td>United Nations</td>
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<td>UNDP</td>
<td>United Nations Development Program</td>
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<td>United Nations Department for Safety and Security</td>
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<td>UNICEF</td>
<td>United Nations Children’s Fund</td>
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<td>UN ISDR</td>
<td>United Nations International Strategy for Disaster Reduction</td>
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<td>UNSMS</td>
<td>United Nations Security Management System</td>
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<td>WHO</td>
<td>World Health Organization</td>
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I RATIONALE

Introduction

- During the period 1975–2007, 37% of the world's recorded natural disasters, 57% of the deaths, 89% of people affected and 44% of property and infrastructural damage occurred in the Asia-Pacific region.10
- Since 1987, ADB has provided almost $8 billion in financial grants and loans in disaster management and post-conflict assistance to 288 projects. Of this, 43% has gone to rehabilitation and reconstruction, 15% to emergency assistance and 42% to mitigation activity.11
- While hydro-meteorological events dominate in the Asia-Pacific region, constituting 59% of ADB's natural disaster assistance over the past 20 years12 the remaining 41% of natural disaster assistance13 has been provided for geophysical events such as earthquakes, tsunami, landslides, and volcanic eruptions.
- Experience has shown that if ADB has existing sector-related activities in-country, its staff might be called on to lead a DLNA for that sector. Thus, Resident Mission (RM) and Regional Department staff should anticipate that they may be part of a DLNA team. National staff of the RM are important resource persons in their respected sectors and they are encouraged to be prepared for involvement with a post-disaster assessment.
- In the aftermath of major disasters, ADB's roles and responsibilities in joint assessments and in the recovery14 process will increase rather than lessen.

Context

- Typically, a request for assistance to undertake a joint damage, loss and needs assessment15 to identify recovery needs is initiated by the Government of a disaster-impacted country.
- The assessment can be led by the relevant Government ministries and departments or by specifically selected or created Government authorities. Under such leadership, a DLNA is typically supported jointly by the ADB and the World Bank,16 often in conjunction with UN system agencies and other international organizations.
- In general, the United Nations (UN) system agencies and some other international organizations would focus on the initial relief and early recovery phases in their assessment while the ADB and the World Bank concentrate on longer term recovery (rehabilitation and reconstruction) activities and costs.
- Since development partners are more experienced in preparing and conducting DLNA, they are in a position to advise the Government on international best practice regarding sustainable reconstruction of damaged assets and recouping losses.
- A DLNA is normally undertaken 2-8 weeks17 following impact so as not to interfere with immediate post-impact rescue and relief operations, although these activities will inevitably still be going on. Nevertheless, there is an increasing realization that DLNA should conditions of disaster-affected communities, including efforts to reduce disaster risk factors (UN ISDR, 2009).

11 ADB staff, 2008.
12 47% of total financial assistance.
13 33% of total financial assistance; note: the remaining 20% of financial assistance has supported health, conflict and other hazards.
14 the restoration, and improvement where appropriate, of facilities, livelihoods and living...
be undertaken as soon after the disaster as feasible to ensure better complementarities with response efforts. This can be achieved best if ADB is part of the coordination efforts from the earliest stage, including inter-agency planning meetings, when information from this period is fed into the recovery processes and financial resources are promptly channeled.

II  PREPAREDNESS

Good disaster preparedness

- Experience in highly disaster-prone countries has shown that maintaining updated socio-economic and demographic data is crucial, as this forms the basis for a comparative analysis of post-disaster impact (essential for DLNA).
- It is beneficial for a roster of pre-qualified specialists, with in-country knowledge, to be maintained jointly by the Regional Department and RM. This can be referred to at the time of a disaster to draw on the necessary expertise in a timely manner.18
- A draft ToR,19 for both ADB staff and consultants, and developed as part of normal business, can be helpful.
- It is also worthwhile for RM and Regional Department staff to review periodically ADB’s Disaster and Emergency Assistance Policy20 and the Operations Manual21 related to post-disaster support; this is particularly useful in regions where seasonal hydro-meteorological disasters are likely to occur.
- Resident Mission and Regional Department staff should anticipate that they could be called upon to be part of or lead a DLNA team. It is also important to ensure that national staff of the RM are prepared for full involvement with a post-disaster assessment and realize their importance as resource persons.

Pre-damage, loss and needs assessment

- Following a major in-country disaster, and in anticipation that a DLNA will be required, the following actions are suggested:

Secondary data collation

- The timely initiation of secondary data collation on the pre-existing situation for each sector (i.e., baseline data) by the RM has been shown to be useful.
- An inventory of all disaster related reports (both hardcopy and electronic versions) produced by the major stakeholders (viz. Government, UN agencies, the Red Cross Red Crescent Movement and major INGOs) is worthwhile when started and maintained throughout the disaster operation.

Review of ADB portfolio

- In the immediate aftermath of past disasters, action by the RM and Regional Department has proved invaluable in
  o Collecting profiles of ADB’s and other main agencies’ projects, programs and activities (ongoing and planned) in the area affected by the disaster
  o Identifying ADB projects with potential loan/grant savings and the possibilities for reformulation or change in scope for likely recovery activities in different sectors
  o Reviewing existing Memorandum of Understanding, Report and Recommendation to the President (RRP), Loan Agreements, and Project Completion Report (PCR) of previous emergency projects.
- On this basis, the use of loan savings and the reformulation of ongoing projects may be considered for potential operations by the Government and the Executing Agency (EA).22

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18 The World Bank is preparing a worldwide data bank of trained resource persons for assessments.

19 See Terms of Reference provided as a part of a package of ADB DLNA documentation.

20 See http://www.adb.org/Disaster/policies.asp

21 Operations Manual Section D7/BP and D7/OP.

22 Experience has shown that EAs are likely to resist relocation of loan proceeds if they are not involved in the implementation of the ensuing recovery project.
III METHODOLOGY

Introduction

- Over the past three decades, a damage and loss assessment methodology has been developed by the UN Economic Commission for Latin America and the Caribbean (ECLAC) and customized for application in different regions. It has subsequently been used by the ADB, the World Bank and other international organizations.
- The ECLAC methodology bases an assessment of disaster impact on the overall economy of the affected country as well as on the household level. This provides a basis for defining the needs for recovery following any disaster. It has proven to be a suitable framework to identify and quantify the socio-economic impact of disasters.
- The methodology utilizes the national accounts of the affected country as a means for valuation of the losses caused by the disaster. The methodology provides an estimate of the destruction of both private and government assets, the changes in economic flows that are caused by the temporary absence of those destroyed assets, and the modifications in the performance of the affected economy.
- It also provides the basis for assessing the negative impact on personal or household income and overall well being.
- The methodology has been adapted to suit the differing post-disaster needs in affected countries but still provides the main “backbone” of assessments conducted.
- It should be noted that the methodology does not reflect the influence of the national and local political economy on public resource and asset allocation. Its “neutrality” bears the risk to replicate a distorted distribution of assets and opportunities, which could be detrimental to the overarching goal of ADB to reduce poverty.

Purpose

- To provide a preliminary assessment of damage, loss and needs after a disaster which is used to determine the economic and financial implications and identify recovery needs.

Objectives

- An assessment of damage, loss and needs after a disaster is essential for estimating resources needed for any recovery plan. Priorities can then be set in terms of the most affected sectors of the economy, geographical areas of the country and population groups to address during the recovery process. The objectives are to
  - Estimate the overall impact of the disaster on the socio-economic development of the country and upon the environment in the affected areas (damage, loss, macroeconomic impact and livelihoods);
  - Define the resources needed for recovery of the affected areas based on the needs in all major sectors of the economy; and
  - Include disaster risk management activities associated with the proposed recovery efforts.

Scope

- A DLNA considers recovery needs and not immediate humanitarian requirements (which are covered under the United Nations Flash Appeals; by the International Federation of the Red Cross and Red Crescent Societies and international and national nongovernment organizations).
- The scope is often confined to assess the replacement costs because decision-making on policies like "building back

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23 The ECLAC methodology was first developed in the early 1970’s and has been expanded and updated over the years.

24 United Nations Flash Appeals are launched by the UN system agencies and non-governmental organizations (NGOs) in an attempt to plan and implement a strategic and coordinated response to humanitarian needs in the immediate aftermath of disaster.

25 Although increasingly such organizations are involved also with joint assessments to avoid duplication and to ensure continuity.
better\textsuperscript{26} can exceed the time horizon for the completion of the DLNA. Any improvement over the status quo ante should ideally become part of the reconstruction strategy.

**Damage and loss**

- A sector-by-sector analysis of the damage and loss is developed.\textsuperscript{27}
- Where feasible, a distinction is made between public and private sector damage and loss, and their national or external components (e.g., reduced exports, increased imports, external transfers, and national payments as generated by increased debt).
- The assessment should also analyze, in broad terms, the costs and benefits of disaster risk reduction (DRR) measures, e.g., the construction of Government infrastructure, schools and hospitals using disaster resilient designs, and the restoration of livelihoods in ways that minimize risks (see Appendices section 1, Disaster risk management).

**Macroeconomic effects**

- Macroeconomic effects describe the effects of the disaster on the functioning of the overall economy. The main macroeconomic effects include the:
  - Impact on the level and growth of the Gross Domestic Product\textsuperscript{28} of the country (region, province or district)
  - Modification of the normal pattern and structure of the balance of trade\textsuperscript{29} due to increased imports and lower exports of goods and services
  - Corresponding impact on the fiscal sector that may occur due to lower revenues and higher expenditures of the Government
  - Impact on gross investment to take into consideration the investments to be made during the recovery period
  - Possible inflation and the possible aggravation of poverty
  - Negative impacts on employment and income at the personal and household level.

**Approaches**

- Wherever possible, ADB should endeavor to take the lead role in the sectors in which it has comparative advantage. Experience has shown that the World Bank is generally better placed to quickly mobilize resources and to deploy significant numbers of staff and consultants. Usually, the World Bank is requested by the Government to coordinate the support for the assessment of the recovery needs coming from the different donor agencies.

**Possible scenarios**

- Recent ADB involvement in DLNA has highlighted several possible scenarios that are dependent upon the scale and complexity of the disaster and include:

  **Government-conducted DLNA**

- The Government conducts their own DLNA and then approaches ADB, other donors and potential implementing partners to support the needs identified. ADB or others then undertakes a process of verification/validation (normally with other donors) and reviews all the damage and proposed needs in the assessment.

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\textsuperscript{26} The term “building back better” was first coined by former US President Bill Clinton in his role as the UN Secretary-General’s Special Envoy for Tsunami Recovery in December 2006 - and means “making sure that, as you rebuild, you leave communities safer than they were before the disaster struck.”

\textsuperscript{27} Specific templates for each sector have been developed are available to ensure consistency of information, non-duplication, comparability and additionality (See Annex in ADB DLNA pack). This may be based on the government’s and/or relief agency assessments but validated by the DLNA team.

\textsuperscript{28} Gross Domestic Product (GDP) is one of the measures of national income and output for a given country's economy. GDP is defined as the total market value of all final goods and services produced within the country in a given period of time (usually a calendar year).

\textsuperscript{29} Balance of Trade is the difference between the monetary value of exports and imports in an economy over a certain period of time. A positive balance of trade is known as a trade surplus and consists of exporting more than is imported; a negative balance of trade is known as a trade deficit or, informally, a trade gap.
Verification/validation requires analysis of secondary data and field visits (e.g., meetings with local Government officials, the affected population, nongovernment organizations, civil society organizations, etc.).

A macroeconomic analysis of the impact of the disaster is necessitated.

**“Basic approach”**

- An immediate focus on damaged public sector infrastructure in “ADB” sectors and a simplified “sector” approach is undertaken for ADB’s recovery assistance.
- There is no in-depth assessment of the overall impact of the disaster on the country’s overall socio-economic condition.

**“Comprehensive” or “integrated” approach**

- The present trend is that of Government-led joint DLNA assessments supported by the World Bank, the ADB, plus UN and other agencies.
- The ECLAC methodology is used to assess the overall impact of the disaster and sector-specific needs assessments are undertaken.
- Commonly, the principle of restoring to pre-disaster conditions but with “disaster proofing” (e.g., housing and government/other important infrastructure) is adhered to.
- Humanitarian relief and recovery needs are assessed simultaneously. Increasingly, other methodologies are used in addition to, or to complement, the ECLAC methodology, e.g., the “Village Tract Assessment” methodology for humanitarian/immediate relief assessment. The DLNA for humanitarian relief and immediate recovery is then led by the UN with field surveys mainly undertaken through the Red Cross/Red Crescent Movement and nongovernment organizations with in-country presence.
- For each scenario at the time of assessment, there may be uncertainty about the possible extent of the external support for recovery. In any case, applying basic reconstruction and risk reduction principles for each sector is recommended.31
- In general, a full ECLAC methodology is considered more appropriate over the simplified, “basic” DLNA approach for exceptionally large-scale disasters that significantly affect the country’s overall socio-economic condition.

**Clarity of roles and responsibilities**

- Government ownership of activities should be a necessary pre-condition for their future engagement, which will aid in determining their potential specific roles.
- Clear roles and responsibilities of all agencies involved in the DLNA will help to avoid overlap and duplication of efforts; preferably, individual ToRs are clarified with all assessment team members in advance (i.e., within each sector) but flexibility is required during the assessment to reflect on-the-ground conditions.
- It is important to ensure that RM and regional department support staff, as well as professional staff, are appropriately trained. It is necessary to acknowledge that professional staff rely on competent support and to do this all groups must be trained in the ECLAC methodology and need to be aware of how they fit into the overall DLNA team.

**IV ASSESSMENT**

**Introduction**

- Credible DLNA are feasible where there is proactive involvement of Government officials, trained in DLNA (particularly ECLAC methodology) and when there is clear commitment from all parties (including Government) to work together.

**Assessment preparations**

- An assessment center, from which preparations will be coordinated with all

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30 Although while good in the intended results this option has been put on hold due to its relatively high costs.

31 See Appendix 1 Disaster risk management.
Damage, loss and needs assessment
An introduction for staff of the Asian Development Bank

major stakeholders, is normally established by the Government.

- These preparations consist of
  - The collection and collation of all information already available that can serve as a baseline for the assessment
  - Distribution of tasks amongst mission members; agreement on individual roles/ToRs
  - The mobilization of local and international specialists to participate in the assessment
  - An assessment of possible logistical challenges for undertaking the DLNA.

Conducting an assessment

- The main advantages of undertaking a joint DLNA for recovery include
  - Gain a consistent and systematic assessment of damage and losses
  - Ensure credibility of the final recovery assistance which the Government requests from the international donor community
  - Examine governance and institutional development concerns of the relevant Government ministries and of the Government’s financial support to the recovery process
  - Institutionalize a methodology for damage, loss and needs assessment that is comparable from hazard to hazard and can become the basis for risk management
  - Facilitate the obtaining of donor buy-in and commitments for reconstruction (development partner loans and/or grants)
  - Ensure that disaster risk reduction is included in all aspects of recovery.
  - Highlight certain issues of public resource and asset allocation, which can pose risks for the subsequent reconstruction effort
  - Introduce a “philosophy” for recovery, which, for instance, empowers affected people and the local administration.

- Once damage and losses are assessed in each sector, the results are aggregated to obtain the total amount of disaster effects (ensuring that no double accounting or gaps exist). This enables the analysis of impacts on the affected economy, using the forecasted performance for the current year—and in some cases for several subsequent years—if the disaster had not occurred.

- In addition, estimates can be made of the decline in personal or household income arising from the estimated losses in all sectors that lead to poverty aggravation.

- Recovery estimates include support to rebuild or replace the private assets of all disaster-affected households (such as housing, farming tools, and fishing equipment) as well as the assets of industrial and commercial enterprises.

Assessment teams

- Normally, a joint assessment will be led by the Government with support from the ADB, the World Bank and other international development partners, including, UN system agencies, international nongovernment organizations and the Red Cross/Red Crescent Movement.\(^{32}\)

- Experience has shown that assessment team\(^{33}\) composition needs to reflect all relevant sectors of the economy and are best when they have a multi-disciplinary orientation and involve different institutions and agencies.

- A multi-agency approach not only ensures that all relevant sectors are covered, it also establishes a more inclusive approach to recovery assistance, helping to enhance the targeting as well as the quality of the overall recovery process. It also ensures joint ownership of assessment results, and avoids unnecessary discussions after assessment completion.

- It is important for the effectiveness of the assessment team that there is a good mix of international expertise and members with knowledge about the country and the specific region. Including people with specific regional know-how

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\(^{32}\) Joint assessments are generally financed by the ADB, the World Bank (through a grant from the GFDRR), the UN system agencies and other major stakeholders.

\(^{33}\) Capacity building and training for assessment team members from the Government and other agency staff in the assessment methodology is generally necessitated in situ.
and giving them a strong mandate in the team is essential.

- The RM always plays an important part in a DLNA, although its specific roles and responsibilities will depend on the country and the capacity of the RM; the level of participation is decided jointly with the Regional Department.

- Past DLNAs have often fully involved all staff of the RM from the onset of a DLNA. The establishment of a “core team” within the RM is considered a necessary first step, comprising at least one member from each of the sectors in which ADB has an in-country comparative advantage or specific regional competence, e.g., energy, transport, water, sanitation, and hygiene, health, and education. Team members may also be co-opted from ADB core sector operations (communication, education, infrastructure, energy, irrigation, agriculture, housing, etc.); in addition, it is important to have staff assigned to organize logistics, liaise with the media and cover aspects of security.

- A Secretariat for the assessment teams is best established early on to coordinate the entire assessment process. In the past, DLNA have organized the following teams to include:
  - Sector teams - consisting of technical staff of the relevant ministries and supported, where needed, by specialists from the ADB, the World Bank, UN agencies and others. Depending on the magnitude of the disaster, sector analysis and coordination can also be handled by one and the same team.
    - A logistics team - to organize travel and accommodation arrangements.
  - Recent assessments have indicated that all teams should try to adhere to the following:
    - Teams agree on a deadline for the final report submission, and then work backwards from this to determine deadlines for submission of sector data (quantified in a standardized format with agreed common criteria) and accompanying descriptive text.
    - Sector assessments each include a brief narrative of the disaster’s impact on the sector, criteria and assumptions made to establish damage and loss figures.
    - Provide clarifications as to the accuracy of available data, methodological considerations and assumptions made.
    - Each sector team should consult and exchange information with other teams to avoid duplication, share data of common interest or of interest to more than one sector, and identify information gaps.
    - The sector specialists gather information on baselines, the disaster’s impact on these (i.e., damage and loss), and also recovery needs, in the form of strategic sector responses. These can be used as input to develop an overall recovery strategy and possible project proposals.

- A coordination support team - comprising macroeconomists, environmental economists, and gender, disaster risk reduction and governance specialists drawn from Government ministries and departments, the ADB, the World Bank, UN agencies and others. Depending on the magnitude of the disaster, sector analysis and coordination can also be handled by one and the same team.

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35 Having common terms of reference (See Annex in DLNA pack).
V COORDINATION

Introduction

- Initiating coordination mechanisms with other agencies most likely to be involved in post-disaster recovery—as well as with those involved in the ongoing humanitarian operations—has proved essential in past DLNAs.

- Following the Government’s request an assessment centre or coordination mechanism needs to be established that guarantees smooth communication and information flows involving all major stakeholders. The Government has to establish a clear line of command for swift decision-making with respect to issues that can emerge during the assessment, e.g., issues of site accessibility, withholding of information by interested local parties or logistical problems.

- Depending on the national administrative and political culture, a central decision-making authority might need to be created to overcome the risk of fragmentation. However, whenever possible, it is best to utilize existing structures and systems.

- Recent experience has shown that emergency coordination mechanisms are established immediately after the disaster (within 24-48 hours) with the main stakeholders—notably the in-country UN system agencies, the Red Cross/Red Crescent Movement37 and nongovernment organizations; with the ADB and the World Bank often joining at a later stage. However, this is now changing and the “line” between relief and recovery is blurred as recovery processes start within days of a disaster impact. There is increasing likelihood that ADB will be involved at a much earlier stage in the aftermath of future disasters.

- Whilst response to immediate pressing humanitarian needs will obviously take precedence, early recovery38 and longer term recovery processes will also be initiated at this early stage. ADB will focus attention on the recovery processes and in ensuring that these link, wherever feasible, with humanitarian actions undertaken by other agencies.

Internal (ADB)

- Increasingly the trend is for the RM to take the lead role in the DLNA and for the Regional Division, supported by the Regional and Sustainable Development Department (RSDD) (specifically the Public Management Governance and Participation Division - RSGP) to provide back up and source expertise (both within and outside ADB).

External

- The cluster approach39 was proposed as a way of addressing gaps and strengthening the effectiveness of humanitarian response through building partnerships. The Inter-Agency Standing Committee (IASC) has designated global cluster leads in eleven areas of humanitarian activity.

- Whilst the ADB is not a member of the cluster system, its presence at cluster meetings directly related to potential security and the rule of law, environment and social dimensions, including the reintegration of displaced populations (see Glossary of Terms); early recovery can last as long as 2-3 years.

37 The country National Society, the International Federation of Red Cross and Crescent Societies and the International Committee of the Red Cross.

38 Early recovery - the restoration of basic services, livelihoods, shelter, governance, transformation and development.

39 Following an independent Humanitarian Response Review of the global humanitarian system (2005) to assess the humanitarian response capacities of the UN, NGOs, Red Cross/Red Crescent Movement and other humanitarian actors, the cluster approach was proposed as a way of “addressing gaps and strengthening the effectiveness of humanitarian response through building partnerships. Moreover the cluster approach ensures predictability and accountability in international responses to humanitarian emergencies, by clarifying the division of labor among organizations, and better defining their roles and responsibilities within the different sectors of the response. It is about making the international humanitarian community more structured, accountable and professional, so that it can be a better partner for host governments, local authorities and local civil society.”

sector recovery interventions, e.g., early recovery (lead: UNDP); water, sanitation and hygiene (lead: UNICEF); health (lead: WHO); education (lead: UNICEF/Save the Children UK); and agriculture (lead: FAO) is worthwhile.

- In addition, strategic-level coordination - amongst heads of agencies (viz. the World Bank, ADB, UN system agencies and major donors) and the heads of the Developing Member Country (DMC) line ministries dealing with disaster management are likely to be jointly organized; when feasible, ADB may take a lead in the facilitation of such meetings.

- Early recovery activities will need to be closely coordinated with longer term recovery (reconstruction and rehabilitation) as both are interdependent and planning is best undertaken jointly.

- Historically various permutations have existed regarding ADB’s roles and responsibilities. However, the increasing trend is towards dividing recovery responsibilities by sector and geographic areas between the World Bank, the DMC, the ADB and other major donors.

- The ADB has taken the lead in certain sectors where it is deemed (mutually) to have a comparative advantage.

### VI DATA GATHERING

#### Sector-by-sector assessment

- A list of sectors is derived from consulting the national accounts of the affected country and may change from country to country.

- All relevant sectors of the economy will need to be analyzed to ascertain the impact of the disaster. Baseline data is required, including pre-existing social and poverty conditions in the area.

- Experience has shown that data is often lacking, information sources unclear or that it has been damaged or lost in the disaster. A distinct advantage of undertaking a DLNA jointly is that others agencies and their respective networks are able to help track down information.

- Addressing the existing inter-linkages between sectors ensures that all losses to the economy are brought into the analysis, while avoiding “double counting.”

- ADB’s comparative advantage in the various sectors and past in-country experiences will be a main determinant of any subsequent ADB action.

- An assessment of the capacity of other agencies involved in each sector may accompany this analysis and ADB may need to fill sector gaps either through appropriate staff or consultants.

### Estimation of overall impact

- On the basis of the overall damage and losses, an analysis will be carried out to ascertain the impact of the disaster on the economy, environment and society:
  - At the macroeconomic level, the impact on overall economic growth, the fiscal sector and the external sector of the economy is analyzed.
  - At the microeconomic level, the impact on personal or family income and expenditure, including the impact on livelihoods in the informal sector and upon poverty aggravation, is analyzed.

- Both levels of analysis will need to include a comprehensive analysis of possible DRR measures. This quantification will allow two further results:
  - The determination of the relative size of the impact on relevant economic variables.
  - The resource gap that these recovery scenarios pose to the Government and to the affected population.

- This analysis should also include governance and institutional development issues of the relevant Government ministries, estimation by the Government of its own financial support towards the recovery efforts and the corresponding requirements for international assistance.

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40 Using macroeconomic analysis and scenario modeling under different assumptions for the reconstruction potential and needs.
Financial needs for recovery and reconstruction

- Financial needs for recovery include detailed breakdowns that take into consideration distribution and priority setting based on geopolitical divisions, sectors of the economy, and different population groups in the affected area.
- Expected contributions from different donors—including the Government and other stakeholders—should be examined and identified, an investment plan formulated and channels to distribute funding determined.

VII REPORT WRITING

Compilation and report writing

- With the inputs gathered from the sector-by-sector analysis, the coordination support team will compile all sector outputs into a final report.41
- The assessment will result in a joint, comprehensive, consolidated report which includes each sector of the economy:
  - An estimation of replacement cost of damage for physical assets that may have been totally or partially destroyed.
  - An estimation of economic losses through
    ✓ A forecast of gross production expected for the current year, before the occurrence of the disaster, plus forecasts for the next one to two years, without the occurrence of the disaster.
    ✓ The estimated annual production after the occurrence of the disaster, for the current year and the next one to two years, measured in current values.
    ✓ The estimated higher costs of operation and lower revenues for water supply, electricity, energy and transport systems, expected after the disaster.
  - An estimation of GDP, balance of payment and trade, and fiscal budget performance for the entire country in the current year, without the occurrence of the disaster, as well as projections for the next one to two years, in both current and constant values. This is done in two stages: the first, assuming no Government interventions after the disaster and the second, assuming several intervention scenarios that include possible delays in start up of post-disaster investments.
  - Estimated cost of post-disaster, multi-year inflation (arising from disaster-related scarcity or other reasons).
  - Projected transportation costs need to be carefully factored into recovery plans for each sector.
- Such a comprehensive analysis will provide a solid basis to estimate medium- and long-term financial needs and implementation strategies for recovery that will strengthen the affected population’s coping mechanisms and resilience against future disasters.
- Disaster risk reduction measures for all sectors should be incorporated into the estimated costs.
- The report should include also
  - A framework for action, including institutional roles and based on pre-existing policies or development strategies, focusing on adaptation of the latter to the needs for the recovery process, which can imply a new policy like ‘building back better’ or pioneering certain types of low cost housing.
  - A prioritized and sequenced process.
  - Defined resource gaps (to be filled from Government, private and external sources)
  - The processes in which affected populations and other stakeholders can play important roles in the recovery process, which at times require political decisions at the top of Government to overcome

41 A draft outline of an assessment report is included in the Annexes in the ADB DLNA pack.
prevailing routine top down administrative procedures.
- References to the guiding principles\(^{42}\) for the recovery program.

- In addition, the report will provide details of the geographical area affected by the disaster - normally a map - the disaster’s impact, quantified sector by sector, that is geographically specific, stratified by affected groups, and derived from information compiled immediately after the disaster.

- The report should allow easy reference, and information needs to be presented well, including photographs, figures and graphic illustrations to enhance the content.

- Before the final report is published, consultations with all stakeholders will help to address any gaps in the report and build support for the proposed recovery actions.

- The central authority in charge on the Government side needs to endorse the report.

- Although generally, such reports are considered as preliminary assessments—compiled in a timely manner, to inform urgent recovery needs—in practice, they are published and form the main tool to guide the recovery process (although some in-depth, specific sector assessments may continue during the recovery period).

Use of assessment report

- The joint report will provide direction—that is well coordinated, targeted and of good standard—to the Government, private sector and donor community to guide recovery and provide decision-makers with a quantitative basis to request funding and to design a recovery strategy.

- The quantification, given its sector-by-sector nature, allows for concrete, specific proposals for action in sectoral or geographic terms.

- It is also a tool for determining priorities (importance vs. urgency) and sequencing a timeline for the recovery process, i.e., restoring livelihood conditions while physical reconstruction of housing, production, and infrastructure proceeds.

Presentation of assessment results

- The results of an assessment are generally presented and discussed at high-level meetings with the country’s head of Government, ministers and senior officials and with development partners (the UN system agencies, the Red Cross/Red Crescent Movement and nongovernment organizations) and with diplomatic representatives of interested countries.

VIII SECURITY

Prior to departure

- All ADB personnel departing on a DLNA mission should familiarize themselves with the ADB Crisis Management System (see Administrative Order No. 418, July 2008).\(^{43}\) This “provides for a Crisis Management System (CMS) for ADB to effectively respond to crisis or emergency situations. This is intended to assist decision-makers at various levels to take appropriate action, while recognizing the uniqueness of each situation.”

- In addition, ADB assessment team members will need to familiarize themselves with the ADB Safety and Security Administrative Order.\(^{44}\)

- Security and safety is of paramount importance—in the aftermath of a disaster there is likely to be heightened risk.

- Travel to or within disaster affected areas pose particular challenges regarding the safety and security of ADB personnel involved with DLNA, especially where there is a risk of further hazardous

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\(^{42}\) See ADB DLNA pack annex

\(^{43}\) http://lnadbg1.asiandevbank.org/bpm0001p.nsf/4459ec9d49c00c06482565887002b8b45/e8aa0c0d1cd039e548256d57001d713410penDocument

\(^{44}\) Draft currently under review.
Damage, loss and needs assessment  
An introduction for staff of the Asian Development Bank

- In 2002 ADB joined the UN Security Management System (UNSMS), providing security support globally to ADB international staff. Security support from the UNSMS is provided for national staff and consultants working for the ADB through locally established cost share arrangements with the UN.

- A major obligation that ADB has under the UNSMS regulations is the requirement for all ADB staff/personnel traveling on any ADB business, to obtain a UN security clearance prior to departure to any country/area within a country where there is a UN security phase declared in effect.

- For ADB purposes, no distinction is made between staff and consultants and compliance with security requirements applies to all personnel directly contracted by the ADB. All personnel should thus access the UN Department for Safety and Security (UN DSS) website: \( \text{https://dss.un.org/dssweb/} \) and create their profile. The Integrated Security Clearance and Tracking System (ISECT) application and Travel Advisories is also accessed through the UN DSS site.

- All personnel traveling to an area to undertake a DLNA where a UN security phase is declared in effect will also be required to undertake and pass two online trainings —the Basic Security in the Field (BSITF) and the Advanced Security in the Field (ASITF). Certification of completion is a prerequisite to obtaining a UN security clearance. The certificate is valid for three years. Sufficient time should be allowed to undertake this task before departure. Once complete, ADB personnel are able to then request UN security clearance and for all destinations online.

### Upon arrival

- Once UN Security Clearance has been obtained, and upon arrival in a country where there is a UN security phase in effect, all ADB personnel must fully comply with all UN security rules and regulations. Personnel should request a specific security briefing from the Office of Administrative Services (OAS) prior to departure.

- The UN has established Minimum Operating Security Standards (MOSS) for UN operations in all of its duty stations based upon a country specific Security Risk Analysis (SRA). ADB is required to be MOSS compliant at all times and personnel should seek guidance from the OAS prior to departure.

## IX CROSS-CUTTING ISSUES

1. **Disaster risk management**

### Introduction

- Disaster risk management (DRM) is defined as “the systematic process of using administrative directives, organizations, and operational skills and capacities to implement strategies,

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45 E.g. landslides, aftershocks, fallen power lines, unearthed unexploded ordinance, etc.
46 See the UN security policy in the UN Field Security Handbook (FSH), January 2006.
47 Annex H (Security Clearance Procedures) states: “Security clearance is mandatory for all personnel travelling to an area where a security phase is in effect.” (Para H.2.1); It also states that all personnel are required to notify the UN of their arrival and departure times for travel.
48 Information on which countries, or areas within countries, that are under a UN security phase can be found in the Travel Advisory on the UN DSS website.
49 The UN DSS website is restricted to staff members of the UN Secretariat; UN agencies, funds and programs; and IGO/NGO partners that are part of the Inter Agency Security Management Network (IASMN).
50 These training events take several hours to complete but can be accomplished in modules over a period of time. Once completed, a certificate will be generated which should be uploaded to the users profile and copies provided to BPHR for personnel files.
51 ADB pays an annual subscription to the UN which allows it to participate fully in the UN Security Management System.
52 MOSS is a fundamental policy document for all UN operations which aims to ensure minimum security practices are established and maintained to enhance UN staff security and to enable UN operations through appropriate risk mitigation.
policies and improved coping capacities in order to lessen the adverse impacts of hazards and the possibility of disaster” (UN ISDR, 2009).

The term disaster risk reduction (DRR) is commonly used—often synonymously—with DRM. While DRM is focused at the strategic and policy level, DRR is tactical, aiming to decrease the community’s vulnerabilities and increase their capacities to better cope with and withstand hazards. Disaster risk reduction includes capacity building, hazard mitigation and vulnerability reduction. Reducing the risk of further disasters is an essential component within post-disaster interventions and is vital to ADB’s support in all sectors.

The recovery period is an ideal opportunity to reduce disaster risk and to prevent the reconstruction of risk. During the DLNA, the basic principle is to restore damage in the different sectors to pre-disaster conditions but allow for improvements that decrease risk, increase resilience and improve safety.

Safer, resilient communities, multi-hazard resilient designs and “building back better”

According to experiences and expertise accumulated from past recovery processes, disaster-hit communities that have been “built back better” are more resilient and sustainable for future generations.

To obtain the value of reconstruction financial needs, the following additional costs could be added to the value of estimated damage arising from the DLNA:

- Quality improvement in construction, e.g., hospitals and health facilities, educational establishments, Government buildings and housing - especially for vulnerable households
- DRR measures and activities to reduce the impact of future disasters, e.g., retrofitting buildings and construction according to higher standards of disaster resilience
  - Relocation to safer areas, if required
  - Technological improvements, when desired and needed
- This will require the development of a recovery strategy by the Government, preferably in cooperation with the affected communities and, if/when requested, with the assistance of the ADB, World Bank and others.
- This strategy should include details on the way in which reconstruction is to be undertaken, i.e., in the housing sector—utilizing salvaged materials vis-à-vis full replacement of construction materials; substantial reconstruction efforts versus individual family reconstruction, the adoption of new construction codes for disaster proofing and retrofitting, etc.
- The allocation of financial needs must be defined, focused and prioritized on the basis of the DLNA figures, duly supplemented with the information described above.
- An analysis of per capita damage figures, sector-by-sector distribution of damage, and geographical distribution of damage is required for setting priorities in this regard.
- Some specific instances of entry points for reducing risks in different sectors in the recovery process are highlighted in the following table:

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53 Disaster risk reduction “comprises a range of measures or activities aimed at reducing vulnerabilities and disaster risks; if possible, avoiding (or even preventing) such risk and limiting (through mitigation and preparedness) the adverse impacts of hazards” (UN ISDR, 2009).
Education
- Construct appropriate, multi-hazard resilient school structures, which not only adhere to safety measures but have additional features added to enable use as disaster shelters.
- Ensure, if feasible, that new schools are located outside hazard areas.
- Promote the development of curricula and the institutionalization of safety drills that provide information on DRR, particularly targeting young women and children.

Health
- Construct new hospitals or health facilities using multi-hazard resilient design.
- Ensure, if feasible, that new hospitals or health facilities are located outside hazard areas.
- Ensure the availability of and accessibility to goods and services especially in times of emergency.
- Ensure increased capacity to prepare for disasters and the outbreak of infectious diseases.
- Assess the internal and external vulnerabilities of existing hospitals and health facilities.

Agriculture
- Support activities that improve agricultural productivity through investments in soil improvement, water management, extension services, and research that will help to enhance food availability for subsistence farmers.
- Increase focus on activities that will help to mitigate the impact of hydro-meteorological variations through multiple cropping, water conservation and biological control measures.
- Include the use of hazard-resistant crops (that cope with shifts in climate patterns) as part of any recovery program in crop diversification.
- Support improvement in weather forecast, monitoring and early warning systems (which is important also for other sectors).
- Consider supplementary income-generation schemes to help ensure sustainable livelihoods.

Critical infrastructure*
- Incorporate disaster risk assessment factors into the planning process before construction starts.
- Support government organizations responsible for land-use planning and involved with infrastructure development.
- Ensure that DRR is specifically identified as a component of any infrastructure project planning.
- Identify whether critical infrastructure facilities are being constructed within hazard zones.
- Consider the implications and scope of infrastructural maintenance, as well as the heightened susceptibility to structural failure if maintenance is not factored into infrastructure project planning.

Urban development
- Ensure that construction methods comply with national building codes and land-use zoning; ascertain whether current codes are sufficient for known hazards and how climate change may require revisions; encourage compliance with building codes.
- Introduce and/or encourage good practice in multi-hazard resilient construction methods.

* The primary physical structures, technical facilities and systems which are socially, economically or operationally essential to the functioning of a society or community, both in routine circumstances and in the extreme circumstances of an emergency (UN ISDR, 2008).
Mainstreaming disaster risk reduction

- There is a need for DRM plans and strategies to be developed—in consultation with relevant Government institutions at all levels—for areas affected by the disaster. These would need to be supported by effective implementation and coordination arrangements, according to the mandated roles of these institutions. Apart from mitigation measures, such plans should include:
  o Programs for improving disaster preparedness at the community level—including effective early warning system and mitigation activities,
  o Related DRM training,
  o Hazard mapping of the affected areas,
  o Contingency planning, and
  o Improvements in coordination mechanisms.

- In planning proposed recovery projects, the Government—possibly supported by the ADB, World Bank, and others—may wish to introduce sector criteria and guidelines for assessing projects to incorporate DRM. These will allow the communities to plan their activities with reduced disaster risk and respond effectively in case of any future disaster.

2. Gender

"In a disaster, gender concerns might seem a luxury that can wait while more urgent matters are addressed. Yet the failure to address gender-based inequalities immediately after disaster and throughout the response can condemn women and girls to less aid, fewer life opportunities, ill-health, violence and even death. To reduce future suffering during disasters, aid organizations must ensure full respect for women's and girls' human rights—cultural, economic, political and social, including the prevention and prosecution of gender-based violence."


Why gender analysis is needed as part of post-disaster needs assessment

Women and girls are disproportionately affected

- Disasters do not affect people equally and have different impacts on men and women. Good assessment practice has shown the importance of the collection of gender specific data. Although different types of disasters occur globally and affect different populations, women and girls are commonly disproportionately affected, suffering more during and after disasters. Often more women die than men as the direct and indirect result of disasters.55

- In many countries the main reason why women are more vulnerable to disasters is because of their social and economic status. In DMCs where low social and economic rights exist for women, the situation is worse; whereas, in countries in which women have almost equal rights as men, similar numbers of men and women are killed by natural disasters.56

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54 Gender refers to the socially constructed stereotypes, roles, opportunities and relationships associated with being male or female. The concept of gender essentially pertains to power relations between men and women (also includes boys and girls depending upon the context). These power relations are further compounded when gender interacts with age, marital status, caste, ethnicity, religion, etc.

55 E.g., Oxfam International estimates that three times as many women than men died in the Indian Ocean tsunami in 2004—about 70-80%; 61% of deaths caused by Cyclone Nargis were women; 91% of deaths in the 1991 cyclone in Bangladesh were women.

56 Physical differences between men and women are unlikely to explain the result, e.g., women are often at an advantage in famines because they can cope better with food shortages due to their lower nutritional requirements and higher body fat. Social norms can provide some explanation. In many countries, women are supposed to look after children, the elderly and their homes, which hamper their own rescue efforts in most natural disasters. From: The Gendered Nature of Natural Disasters: The Impact of Catastrophic Events on the Gender Gap in Life Expectancy, 1981-2002; Neumayera, E. and Plümperb, T. London School of Economics and Political Science /University of Essex and Max-Planck Institute of Economics, 2007.
With existing patterns of gender discrimination, men and boys are likely to receive preferential treatment in rescue efforts and both women and girls suffer more from the shortages of food and economic resources in the aftermath of disasters.

Understanding who (men or women) died and who survived has immediate implications on the gender-differentiated needs (e.g., if more women died, then both men and public assistance need to fill in the gaps created by their absence, e.g., child care support, family welfare, contribution to household incomes, community mobilization, etc.).

Gender analyses undertaken appropriately within all sectors during a DLNA is thus essential in helping to direct aid and in planning equitable recovery.

Women are at increased risk of violence

In the confusion and societal collapse that occurs in the aftermath of a disaster, women become vulnerable to sexual abuse, including rape; domestic violence also increases. Violence can be worse in countries with prior histories of armed civil and/or social conflict.57

It is therefore important that assessment team members are cognizant of the need to ensure women’s physical safety post-crisis, e.g., by supporting recovery initiatives that create safe spaces and facilities for women and provide means for legal redress.

Targeting women’s healthcare needs

Consideration of the specific health needs of women requires particular attention during the DLNA and recovery planning.

- Diseases, such as malaria and cholera, impaired psychosocial health and other health-related issues affect women’s health and also increase their burden for care of others.
- Suitable facilities for prenatal and maternity care need to be arranged.
- Psychological counseling for post-traumatic stress could also be considered for women and girls as they cope with the loss of children and family members, and the ongoing challenges created by the disaster.

Continued vulnerability faced by women

- In the aftermath of a disaster, women continue performing traditional roles (child care, attending to sick/injured) but those who have lost partners will also take on additional responsibility for providing income. Often, this is in the agricultural sector or informal economy, which may be hard hit by the disaster. Where women’s educational and literacy levels are low, many may become unemployed and vulnerable to impoverishment, exploitation, and forced marriages and trafficking.

Planning for recovery that helps women to become more self-sufficient, e.g., through income-generating projects and job creation for women whose livelihoods and/or main providers were lost, is vitally important and will help enable women to provide for themselves and their families.

Inclusion in the recovery process

- Women are often the first to mobilize local relief efforts (often taking on traditionally male roles) as well as establishing women’s action groups; however, they are often excluded from policy- and decision-making and go unrecognized.

- In some cases, men (or women) may need to go beyond their traditionally assigned sex roles or division of labor to fill in the gaps and that further assistance/service delivery would be needed. Gender analysis will help ascertain whether further assistance is necessary and how to support affected individuals to take on new roles.

- For recovery planning, it is important to ensure that women are involved in all decision-making processes. Recovery processes must include women’s input, and their leadership, with its unique perspective, should be encouraged.

- These efforts can both protect and advance the rights of women; in fact, the recovery period provides unique opportunities for longer term social and structural change that may help to improve women’s lives in the future.

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How should gender analysis be conducted?
- It is advisable to use participatory and democratic practices during the assessment and in recovery planning that involve both men and women to reduce risks that women and girls face in the aftermath of disasters.
- It is essential that any recovery initiatives are based upon knowledge of the differences between men and women’s roles and responsibilities in society and of the specific cultural, economic, political and sexual contexts, rather than on stereotypes or false generality.
- During the DLNA it is important to recognize that men and women have different ways in expressing their needs—women quite often have constraints in raising their needs in public, and sometimes separate focus groups of men and women are required with the use of same-sex researchers/facilitators.
- The engagement in the assessment and recovery processes with existing women’s community organizations with local knowledge, experience and networks, helps to ensure women’s participation in decision-making.

What questions to be asked?
- During the DLNA, gaining women’s views in the affected communities is important to ensure the accuracy of the assessment and the ultimate success of the recovery process. Questions regarding the perceptions and needs of women (e.g., female household heads, local women leaders and organizations) need to be addressed when undertaking the assessment and in the subsequent development of a recovery plan, e.g., how can livelihood opportunities be diversified; what are the special needs of children under five years, etc.

Possible responses/interventions
**Adequate, equitable relief and recovery and compensation for losses**
- Inadequate relief assistance, (e.g., women may be too intimidated to receive aid if it was dispersed by men) may have forced women to share food and non-food items. This will impact on the longer term recovery process and assessors will need to carefully consider the provision of safe, temporary or permanent housing and how land rights may be secured by displaced women.

**Women’s involvement in recovery processes**
- Women’s involvement in the recovery planning process in the different sectors will help to minimize the risk of further overburdening of women (who often bear heavy workloads and family responsibilities) in any new recovery initiatives. Plans need also to consider strategies for dealing with children, as in the aftermath of a disaster many are orphaned or separated from their families.

**A “window of opportunity”**
- Experience has shown the importance of gender equality and risk reduction principles in guiding the recovery processes; in addition, a “window of opportunity” exists for social change in the aftermath of disaster, e.g., practical steps to empower women include their full engagement in the assessment; consultation and involvement in reconstruction of housing and amenities; the promotion of land rights for women and property deeds being in the names of both the husband and wife.
- Activities that specifically include awareness of disaster risks, preparedness and preventive measures and that reinforce traditional coping measures undertaken by women have been shown to be vital for increasing the disaster resilience of communities.

**Research**
- Research on the degree to which women suffer the negative impacts of disasters could be undertaken, to better understand and address their specific vulnerabilities and needs.

**Education**
- In the education sector it is particularly important to protect girls’ education. The quick relocation and rebuilding of schools, and training women to be teachers, prevents girls, who are already disproportionately deprived of education, from falling behind. Similarly, temporary housing must offer access to education. ⁵⁸

⁵⁸ Some post-tsunami shelters constructed in Sri Lanka were sited so far from schools, with no transport provided, that children were unable to attend (“Caught in the Storm: The Impact of Natural Disasters on Women”, Lin, C. and
Policy development

- Natural disasters are a tragedy in their own right but in DMC with existing gender inequity, women are the worst hit. While most disasters cannot be prevented, policy makers, international and humanitarian organizations need to develop better policies to address the special needs of women and girls in the wake of large-scale disasters.

3. Governance

- Successful DRM is firmly rooted in good governance by strengthening national institutional and legislative systems to manage disaster risks in all sectors.
- Past DLNA have often overlooked governance issues in the assessment of disaster impacts on public administration; recent experience, particularly in the Pakistan earthquake response (2005) has indicated the vital importance of considering these issues at the earliest stage in the assessment process to ensure their incorporation into the recovery planning and any subsequent sector support.
- Efficiency and accountability of governance structures at central and local levels should be strengthened, encouraging more inclusive and participatory decision-making processes.
- Support should be provided also to local and national Governments to design and apply regulatory frameworks that ensure a safer environment, reduce structural vulnerabilities and guide social behavior and economic decisions towards risk reduction and disaster mitigation.

Pre-existing situation

- It is important to ascertain what the governance arrangements were prior to the disaster occurrence, e.g., What were the mandates of the sub-national public administration agencies? Who was responsible for what? What where the pre-existing facilities and personnel? What was the level of staffing (e.g., involved with civil administration, public safety, the judiciary, executive, and the main civil society organizations)?

- Of critical importance are public records (identification, land deeds and entitlements, courts, educational and health) and knowing what was there and therefore following the disaster, what was damaged or lost.
- An understanding of existing public grievance mechanisms and anti-corruption arrangements (e.g., audit) is required.
- Crucial to assessment in all sectors is an understanding of what is necessary to restore capacity of the local administration to manage recovery process.

Recovery strategy: critical issues and actions

a. Offer people-centered solutions
   - Favor in situ responses and citizen choices for primary needs where possible
   - Secure identities and entitlements
   - Special purpose actions to ensure justice for vulnerable populations
   - Anticipate that delay and dispute will deny justice
   - Engage civil society for interest articulation
   - Facilitate private sector recovery for livelihood and service delivery
   - Restore functional mandates of local elected representatives.

b. Subsidiarity and restoration of responsibility to legally mandated agencies—building on the principle of subsidiarity, by ensuring that reconstruction activity is designed and implemented by the lowest level of mandated and competent authority—is important for speed, relevance, and accountability of recovery operations.

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59 For further details see: “Governance: critical issues and actions for post-disaster assessment and recovery” in the ADB DLNA pack.

o Restore authority and resource legally mandated institutions
o Exploit existing arrangements.

c. **Prioritize district and central strategic coordination and accountability** - providing durable arrangements which assign clear responsibilities for central and localized strategic coordination is also important:
o Prioritize district coordination strategies
o Promote Central and Provincial strategic accountability
o Avoid new, multi-function, intergovernmental, single structure, institutional arrangements
o Tailor donor alignments according to sector features, scale of damage, and comparative advantage.

d. **Manage demands through technical and policy choices**—assessing needs and defining sector responses in ways that avoid unmanageable demands—will improve the speed of recovery responses:
o Consider replacement vs. extension and replacement vs. reform
o Reduce demand by technical solutions.

e. **Enhance operational capacity to respond by known institutional solutions** - creating innovative institutional arrangements through which specialized expertise can be mobilized and held accountable is beneficial:
o Seek umbrella approvals for multiple standard works and responses
o Create inventive solutions for short term augmenting of local capacity
o Develop multiple solutions, not single, privileged institutional arrangements
o Selective Government direction of private sector, but only in strategically important cases
o Provide specific technical capacities.

f. **Accountability and enforcement of standards and norms** - stipulating requirements for validation, audit, accountability and judicial arrangements which enhance the predictability of outcomes for the people, requires administrative dispute systems and full extension of supreme audit institutions backed by functioning judiciary and legal institutions:
o Reinforce arrangements which enhance predictability
o Audit, validation, interdiction
o Enhance formal justice institutions.

*For further information see “Governance: critical issues and actions for post-disaster assessment and recovery,” in the ADB DLNA pack.*

4. **Environment**

- Disasters have direct and indirect negative impacts on the environment, and ADB’s poverty reduction priorities, including the Millennium Development Goals (MDGs). Identifying and evaluating these impacts can provide an indication of threats to people’s lives and well being, e.g., the effect of saltwater intrusion on potable water and agricultural lands due to storm surge and coastal flooding.

- The full environmental or ecosystem impacts of a disaster are often difficult to quantify because impacts are not usually evident in the immediate aftermath of the disaster, and there are no rapid assessment methods available to determine consequent environmental degradation.

- Disaster-affected areas may have already faced severe environmental deterioration and vulnerability, e.g., recurrent human-induced deforestation. It is therefore important to consider support for environmental studies to obtain a detailed understanding of damage and impact, especially, on livestock and livelihoods. Generally, the environment need not be examined as a separate sector, as it is closely connected with environment-dependent infrastructure and livelihoods in vulnerable communities.

- To help minimize the negative environmental impacts of a disaster, an accurate DLNA is required to determine resource availability of an affected population during the recovery period.

- Experience has shown that engaging affected communities in assessing the impacts of a disaster on the environment (as part of the DLNA) is important to ensuring good recovery strategies and action plans in a target community.

- It is important that environmental and resource issues are an integral part of all
sector recovery (reconstruction and rehabilitation) plans and, where possible:
- Disaster risk concerns are integrated into existing environmental risk assessment tools, and planning mechanisms (environment-oriented disaster risk assessments)
- A greater compliance to existing environmental and risk management safeguards and regulations is promoted
- Integrated approaches to spatial planning are promoted
- Capacities to protect ecosystem services that reduce disaster risk (e.g., on wetlands, coastal forests, watersheds, coral reefs, etc.) are strengthened
- Potential sources of hazardous materials that could trigger an environmental emergency are identified
- Environmental impacts of any proposed post-disaster recovery plans are assessed strategically.

Note: Traditionally, impact assessments determine the impact of a given project on the localized environment. Considering the increase in intensity and frequency of climate-induced disasters, it is incumbent upon ADB task managers and stakeholders to also consider assessing the impacts of climate-induced disasters on the project, subsequent impacts of the altered project on the localized environment and anticipated downstream impacts.

5. Vulnerable People

- The poorest are often the most vulnerable to disasters because they are forced to settle on the marginal lands and have least access to mitigation, preparedness and early warning.
- It is essential that the DLNA pays particular attention to the most vulnerable groups, including the elderly, children, and women, who can be disadvantaged in recovery planning and warrant special consideration. In the aftermath of a disaster, vulnerable people are at a greater risk.
- Widows and single-headed households are particularly vulnerable as a result of dealing with their psycho-social distress as well as caring for children on their own.
- Reconstruction efforts should take into account the need to ensure that rebuilt facilities, especially education and health facilities, and public offices are accessible to people with disabilities.

6. Shelter and Property Rights

Special attention needs to be paid to shelter and property rights. Housing programs generally tend to get off to slow starts due to a combination of factors such as damaged land parcels, the volume of disaster debris, displacement of disaster victims, and scarcity of building material and skilled tradespersons. Nonetheless, caution needs to be exercised when discussing reconstruction deadlines both regarding transitional and permanent shelter with the internally displaced people (IDPs) during a DLNA operation since experience has shown that IDPs become frustrated at agencies and organizations that make encouraging promises that are not kept. Some key issues to be considered during a DLNA with specific regard for victims requiring transitional and later permanent shelters are:

1. What entitlement will be given to those who had been renting?
2. What is the best program to assist those whose homes can be rehabilitated?
3. Consider the possibility of billeting IDPs. Create a list of potential host families who, with proper incentives, may be willing to accommodate some IDPs.
4. Identify options for those who do not want a transitional shelter or a permanent house in the future. This may include survivors who have lost all their family members and may choose to move away; women who might remarry or prefer to move in with adult children; and orphans who are adopted and will not need a house of their own for a long time.
5. How actively should issues of equity with adjoining neighbors and communities be managed so that similar standards of temporary or permanent accommodation are provided? Decisions such as these will help to avoid conflicts and disputes later on when the reconstruction program commences.
Securing property rights for victims of disaster is a necessary pre-condition for the reconstruction of houses and communities. Some disasters can inflict extreme damage to land parcels, thus obliterating land boundaries. Restoring property rights involves time and money. It can require substantial investment depending on the volume of area to be covered. A strong team of trained and qualified personnel is required to survey impacted areas. The preparation of cadastral maps for adjudication of land titles should be done during or soon after the DLNA operation. Success is attainable subject to clear guidance from the central offices to the field. Lack of clear proof of land ownership leaves residents at the mercy of well organized land-grabbing groups and corrupt local government officials. There are serious potential risks to beneficiaries of the reconstruction program in the future if land tenure is not quickly addressed.

The guarantee of property rights is a prerequisite for the reconstruction of houses and communities. It is an obligation for not only ADB but also all other donor and international agencies to give comfort to the victims of the disaster that land issues will be addressed during the DLNA. Providing house ownership certificates, land titles, and building permits is a pillar of “building back better” and will assist in establishing social justice and long term stability in those areas which lost so much due to a disaster. Legally recognized land titles will safeguard the rights of the widows, orphans, and children. Property rights will provide wealth for the beneficiaries as a means livelihood to rebuild their damaged lives.
APPENDIX 1:

Guidance Notes for Damage and Loss Assessment after Disasters
The World Bank
Global Facility for Disaster Reduction and Recovery (GFDRR)

August 2007

Guidance Notes for
Damage and Loss Assessment after Disasters

Draft document prepared by J. Roberto Jovel, Consultant, GFDRR, as part of the Post Disaster Needs Assessment (PDNA) scheme at the World Bank
GUIDANCE NOTES ON POST-DISASTER DAMAGE AND LOSS ASSESSMENT

CONTENTS

Introduction
   General Considerations 1
   Conceptual Framework 1
   Uses of Damage and Loss Assessment 2
   From Damage and Losses to Needs Assessment 2
   Relation of Disaster Effects to Disaster Origin 2

Sector-by-Sector Assessment
   General 4
   Generic Procedure for Assessment 5
   Infrastructure Sectors 6
      Water Supply and Sanitation 6
      Electricity 9
      Transport and Communications 11
   Productive Sectors 6
      Agriculture
      Livestock
      Fisheries
      Industry
      Commerce
      Tourism
   Social Sectors 6
      Housing
      Education
      Health

Overall Assessment of Disaster Effects 4
   Macro-Economic Impacts 5
      Economic Performance 5
      Balance of Payments 5
      Fiscal Sector 5
   Employment and Income Impact 5
I. INTRODUCTION

A) GENERAL CONSIDERATIONS
The World Bank has been requested by member governments in recent years to assist in defining and financing economic recovery and reconstruction after disasters. To define the extent of post-disaster programs in those cases, the Bank has utilized the methodology for disaster damage and loss assessment developed by the United Nations Economic Commission for Latin America and the Caribbean (UN-ECLAC).1

The ECLAC methodology has been applied and successfully used in the Latin America and Caribbean region since 1972. After some customization, the methodology has been transferred and used in other regions of the world - most notably in Asia - to ascertain the effects of major disasters, such as the December 2004 Indian Ocean Tsunami and others.

The Bank has cooperated in the further development, updating and simplification of the ECLAC methodology, with a view to disseminate it within its Staff, to share it with other international and regional agencies, and to transfer it to government officials in high-risk countries for widespread use in disaster impact assessment and disaster risk management. The updated and simplified version of the damage and loss assessment methodology is presented herewith.

B) CONCEPTUAL FRAMEWORK
A disaster has two main types of effects on a society and economy: destruction (total or partial) of physical assets, and subsequent changes or modifications to economic flows in the affected area.

The following definitions of disaster effects have been adopted after careful consideration of the experience acquired during the past 35 years:

**Damage**: total or partial destruction of physical assets existing in the affected area.2 Damage occurs during and immediately after the disaster and is measured in physical units (i.e. square meters of housing, kilometers of roads, etcetera). Their monetary value is expressed in terms of replacement costs prevailing at the time of the event, but unaffected by scarcity or speculation.

**Losses**: changes in the economic flows arising from the destruction of assets.3 Losses occur until full economic recovery and reconstruction of assets has been achieved, in some cases over several years. Typical losses include the decline in output in productive sectors (agriculture, livestock, fisheries, industry and commerce) and the lower revenues and higher operational costs in the provision of basic services (water and sanitation, electricity, transport), as well as the unexpected expenditures to meet humanitarian needs during the post-disaster emergency phase. Losses are expressed in current values.

**Total Effects**: the addition of damage and losses for any disaster.

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2 Disasters usually damage different types of assets: buildings, infrastructure, equipment and machinery, furniture and household goods, means of transportation and storage, irrigation works, etcetera. A detailed list of possible damage to different sectors will be provided in the appropriate sections of these guidance notes.

3 Losses normally include decline in production and sales, increased operational costs and lower revenues in the provision of basic services, and unexpected expenditures to meet emergency needs. Lists of typical losses in each affected sector will be provided in the appropriate sections of these guidance notes.
To better comprehend the effects of a given disaster, the term *disaster magnitude* has been adopted, which is the ratio (or percentage) of total effects *vis a vis* the size of the affected economy, expressed in terms of its gross domestic product.

The amount of damage is used as the basis for estimating reconstruction needs - as will be described in subsequent section of these guidance notes - while the amount and type of losses will provide the means to determine the overall socio-economic impact of the disaster and the needs for economic recovery.

The socio-economic impact analysis includes the estimation of the effects of the disaster on the performance of the economy and the temporary macro-economic imbalances that may arise, as well as on temporary changes in employment, income and wellbeing of affected individuals.

In regard to the impact on the macro-economic variables, analyses are usually made of the post-disaster performance on gross domestic product (GDP), the balance of payments (BOP) and the fiscal sector. The impact on GDP refers to the negative repercussions of disaster losses on the performance of the economy, and the positive effects on the construction sector due to the initiation of the reconstruction program are also taken into consideration. The impact of disaster damage on gross investments may not necessarily occur in the same year of the disaster, but would be measured in the following years as - depending on construction sector capacity and financial resource availability - asset restoration or replacement gets underway. The impact on the balance of payments involves the estimation of the increase in imports and decline of traditional exports arising from the disaster, as well as possible reinsurance payments and relief donations from the international community. The analysis of disaster impact on public finances takes into consideration both declines in government revenues due to lower income in government-owned enterprises and to lower tax revenues caused by a decline in economic activity after the disaster, as well as increased outlays to meet the unexpected demands of the emergency and rehabilitation stages.

In regard to the impact on personal wellbeing, the analysis normally includes the estimation of employment and income decline due to the losses sustained by productive and services sectors and the increased family or personal expenditures arising from the disaster, in comparison to normal, non-disaster conditions.

**C) USES OF THE DAMAGE AND LOSS ASSESSMENT**

A damage and loss assessment following disasters can be used advantageously to determine post-disaster needs including economic recovery planning, and reconstruction program design. It may be used as well for monitoring progress of both economic recovery and reconstruction.

The assessment of damage and losses - in addition to revealing the amount of effects caused by a disaster - provides information to define effects and impacts in most affected geographical areas and sectors of the economy, as well as on overall economic performance. The value and geographical and by-sector distribution of damage may be used to estimate the requirements of reconstruction. The value and the spatial, time and by-sector distribution of losses may be used to estimate the requirements of economic recovery.

**D) FROM DAMAGE AND LOSSES TO NEEDS ASSESSMENT**

For the affected country and the international community it is essential to define the financial needs for economic recovery and reconstruction immediately after disasters. The assessment of damage and losses provides the basis for the estimation of such needs (See Graph 1-1).

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4 A good example of this post-disaster performance monitoring is the system recently put into operation by the World Bank Jakarta Office following the 2004 tsunami in the Provinces of Aceh and Nias, Indonesia.
Typical objectives of the economic recovery include the restoration of personal and family income, essential services, and production activities in the affected areas. The main objective of the reconstruction program is the replacement or repair of physical assets that were totally or partially destroyed by the disaster, under the “building back better” concept.

Graph 1-1
From Damage and Loss Assessment to Post-Disaster Needs:
Aceh Earthquake and Tsunami Disaster 2004


1. FROM PRODUCTION LOSSES TO ECONOMIC RECOVERY NEEDS
A post-disaster economic recovery program should include changes or modifications to public policies in order to mitigate or shorten the macroeconomic and individual impacts. A program of this type would normally include inter alia the following types of components:

− Income generation schemes for most affected population groups
− Special grants program for replacement of household assets and goods and for restart of micro-enterprise production, in non-creditworthy population groups
− Provision of soft-term financing to restart productive activities in micro-, small- and medium-sized enterprises, through special lines of credit
− Facilitation measures to expedite construction and reconstruction program start up and execution.

The estimated value of production losses, and their time, spatial and by-sector distribution, provides the basis to estimate disaster impact on overall macroeconomic and by-sector performance, individual and family employment and income, and on enterprise (with special reference to micro, small and medium size units) performance.

From the estimated value of production losses by sector, the number of lost employment-days can be obtained to ascertain the loss of income by individuals, and their impact on income levels including those at poverty and indigence. These figures may be used as the basis to
define an income generation program that may be initiated as soon as possible after the disaster.

Data on the estimated value of damage to household goods and machinery for home-based, micro-sized enterprises may be used to define a special grants program focusing on non-credit worthy individuals, such as women.

The estimates of production losses by sector can be used to ascertain the needs of start-up capital for micro-, small- and medium-sized enterprises that may be included in a special program of financing to entrepreneurs, to ensure that they are able to re-initiate their activities at the earliest.

The financial needs for the economic recovery program must be estimated on the basis of the spatial, by sector, and by affected population group distribution of losses as provided for in the assessment. In that regard, an analysis must be made during the assessment to ascertain the most affected sectors, geographical or political divisional units, and population groups.

2. FROM DAMAGE TO RECONSTRUCTION PROGRAM NEEDS

The Reconstruction Program after a disaster may be defined after a reconstruction strategy has been decided upon, including definitions on how to “build back better”, and the estimated value of damage provides the basis on which to ascertain reconstruction needs.

To obtain the value of reconstruction financial needs, the following data should be added to the value of estimated damage to physical assets arising from the assessment:

- Additional cost for quality improvement in housing standards, especially for the case of poor families
- Costs of mitigation works to reduce the impact of future disaster events, including retrofitting of buildings and construction according to higher standards of disaster resistance
- Cost of relocation to safer areas when required
- Costs of technological improvements, when desired and needed
- Estimated cost of post-disaster, multi-year inflation (arising from disaster-related scarcity or other reasons).

The above require the definition of a strategy for reconstruction by the affected government and community. This strategy should include definitions on inter alia the manner in which reconstruction is to be faced (i.e. utilizing salvaged materials vis a vis full replacement of construction materials, massive reconstruction efforts versus individual family reconstruction, the possible adoption of new construction codes for disaster proofing and retrofitting, etcetera).

The allocation of financial needs must be defined, focused and prioritized on the basis of the damage assessment figures, duly supplemented with the information described above. An analysis of per capita damage figures, by-sector distribution of damage, and geographical distribution of damage is required for the setting of priorities in this regard.

II. SECTOR-BY-SECTOR ASSESSMENT

A) GENERAL

The damage and loss assessment methodology is based on a sector-by-sector and a subsequent “bottom up” approach to estimate the overall effects of the disaster and their impact on the affected society and economy.
A generic procedure for the damage and loss assessment in each sector is described in this section of the guidance notes, to be followed by detailed, step-by-step procedures to take care of certain specificities of each sector.

B) GENERIC PROCEDURE FOR ASSESSMENT

A brief description of a generic, step-by-step procedure for the assessment of damage and losses is included herein. Minor variations are to be made in the case of specific, more complex sector analysis: these will be described in the appropriate sections later on.

The typical steps to be followed during an assessment of damage and losses are the following:

1. Define a pre-disaster baseline
2. Develop a post-disaster situation
3. Estimate damage and losses on a sector-by-sector fashion
4. Estimate overall amount of disaster effects
5. Estimate macro-economic impact
6. Estimate impact on personal/family employment and income

1. PRE-DISASTER BASELINE FOR ASSESSMENT

This refers to the baseline of prevailing conditions before the disaster occurs, to be used as the basis for the estimation of damage and losses. Two sets of pre-disaster baseline are required:

- A baseline on physical assets, and
- A baseline on the performance of production and sales.

The baseline of physical assets refers to the existing physical facilities before the occurrence of the disaster within the affected areas, and should include inter alia the number and type of housing units, the number and type of educational and health facilities, the extent of irrigated agricultural areas, the number and capacity of electricity, water supply and sanitation systems, the length and types of roads, etcetera. In the case of some sectors, this baseline should also include the available facilities of nearby areas that may be used on a temporary basis to provide services in the affected area.

The second baseline refers to the manner in which all economic activities perform in the affected area under non-disaster conditions, referred to the volume and value of production, sales, etcetera, of goods and services. The calendar of agricultural production activities, the value of production and sales in other sectors, the volume and value of essential (electricity, water and sanitation, and transport) services, for the current and subsequent two years, are examples of the information required.

2. DEVELOP A POST-DISASTER SITUATION

The second step to be undertaken in the damage and loss assessment is to develop a post-disaster scenario, based on the findings of both a field survey where the assessment specialists obtain a full grasp of disaster effects on each affected sector and interaction with local sector specialists (from the government and the private sectors) that can provide inputs for the assessment.

Two outputs are required in this step: a preliminary calendar or schedule for the reconstruction of physical assets, and a corresponding post-disaster, preliminary performance forecast of economic activities in each affected sector.

To develop the preliminary calendar of reconstruction, and based on the field survey and the consultations with local specialists on the subject, the following must be done:

- Define a typology of physical assets (by size, capacity, construction materials, et cetera)
GUIDANCE NOTES ON POST-DISASTER DAMAGE AND LOSS ASSESSMENT

- Obtain unit repair and reconstruction prices for above, not affected by scarcity or speculation
- Develop a preliminary calendar of repair and replacement of physical assets, giving due consideration to the existing construction sector (including availability of skilled labor and construction equipment and materials in the affected country or area) and to the expected availability of adequate financial resources.

To develop the preliminary forecast of economic activity performance after the disaster, it is essential that a conservative estimation be made of the time period required for the reconstruction and recovery of each sector, and to take into consideration all existing linkages between all sectors. The post-disaster performance of economic activities and services must be developed on the basis of the expected, staged repair and replacement of assets and the possibilities of adopting temporary solutions to other supply problems (such as tapping alternative water or energy sources from nearby areas), as well as the expected recovery of production. The expected calendar of economic recovery should include the resulting calendar of production recovery, income or revenues, and costs.

3. ESTIMATION OF DAMAGE AND LOSSES

The estimation of damage and losses for each and every sector is to be made through a comparison of the pre-disaster and post-disaster conditions, described under the two previous sections or steps. Damage figures are to be presented in terms of the replacement value prevailing at the time of the disaster, and losses should be estimated in current values.

To determine the overall amount of disaster effects, damage and losses for all affected sectors must be added, giving due attention to avoid possible gaps and double accounting in the assessment. This requires that special care be exercised to ensure that the existing linkages between sectors are duly considered in the estimation of losses.

The overall amount of disaster effects will later on be related to main macro-economic variables in order to define the relevance of each type of effect and its impacts on the economy and society, as well as to define economic recovery and reconstruction needs.

C) INFRASTRUCTURE SECTORS

1. WATER AND SANITATION
   a) General

The water and sanitation sector includes the three separate subsystems required for the provision and treatment of drinking water for human settlements, as well as the collection, treatment and disposal of waste water and solid waste from same. As in all other sectors, the water and sanitation sector may sustain damage and losses after disasters. Damage refers to the total or partial destruction of physical assets; losses refer to the changes in economic flows in the sector that arise as a result of the interruption of normal operations in the system.

5 In this regard, the fact that full recovery of electricity, water and transport demands can only be achieved until full reconstruction of housing and industries is completed, must be taken into consideration.

6 The combination of two possible scenarios of recovery must be considered in the analysis: the decline and recovery in supply due to damage and reconstruction of physical assets; and the decline and recovery of demand.

7 Some typical cases to consider: losses in primary production must be estimated at producer prices, and not at wholesale or retail prices; farm roads should be included in the agriculture sector and not in transport; the tourism sector must not include damage to roads and service facilities.

8 A typical case is the food producing chain that links the primary production of agriculture, livestock and fishery to industry and commerce. In addition, losses in industrial production would produce subsequent losses in the trade and commerce sectors.
Damage is initially measured in physical terms and then is converted to monetary value in terms of replacement costs for the affected asset. Losses refer to the changes in operational performance of the sector enterprise(s), and usually include both a decline in revenues for the provision of services and increased operational costs for the services; they are directly expressed in current values.

Damage is usually assessed by civil or sanitary engineers; the estimation of losses usually requires the services of economists or accountants working in the water and sanitation field.

b) Baseline Information
When undertaking a damage and loss assessment after disasters, the following baseline information is a must:

- The characteristics (geographical or spatial location, and installed production, treatment, pumping, conveyance, storage, distribution and disposal capacities) of the main components of the water and sanitation systems located in the affected area itself.
- Existing similar capacities in nearby locations that may be used as alternative, temporary solutions after disasters.
- Statistical data on water supply, waste-water and solid waste demands by main users, and their seasonal variation over the year.
- Projections of above for the next three calendar years.
- Financial information on the enterprises that provide services in the sector, including monthly operational data on revenues and production costs, as well as rates charged to users.9

c) Post-Disaster Situation and Performance
The second stage of the assessment requires the undertaking of a field visit (or visits, depending on the complexity of the issues) to ascertain the effects of the disaster on the water and sanitation sector.

After the field survey and holding in-depth discussions with substantive personnel from the enterprises, the assessment specialist must be able to determine the remaining production capacity of each subsystem and its temporary performance, until the systems can be repaired and brought back to their pre-disaster levels.

d) Estimation of Damage and Losses
Damage must be estimated for each of the drinking water supply, waste water and solid waste subsystems. A further breakdown is required for the main individual components of these subsystems, including *inter alia* dams, wells, water-treatment plants, pumping stations, pipelines, storage tanks, distribution grids, sewerage facilities, latrines and septic tanks in the rural areas, and solid waste collection, treatment and disposal facilities.

The replacement value of destroyed assets must be ascertained using present construction or replacement costs, that can be obtained from private contractors presently involved in similar work in the affected country or area, as well as from the planning department of the affected utility that may have new, similar projects in the planning stage. It must be remembered that the replacement values to be adopted are those not yet affected by scarcity or inflation, as adjustments for these factors are to be dealt with later on when discussing overall reconstruction needs after the disaster.

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9 In the case of privately-owned enterprises, this information is normally available in the annual reports submitted by the enterprise to its stockholders.
In order to ascertain losses, it is essential that an objective calendar of repair and replacement of the affected assets be developed by the assessment specialists, that take into consideration the availability and delivery schedule of adequate financing, as well as replacement materials, equipment and machinery, and that will permit returning to pre-disaster conditions of service. Based on the above, a preliminary calendar or schedule of capacity recovery must be developed by the assessment specialists. Furthermore, when the demand for services has been considerably affected - i.e. when destruction of housing and industries is widespread in an urban area, for instance - projections of recovery for the demand of water supply and sanitation services must be made as well, and superimposed on the calendar of supply recovery.

Losses are then to be estimated by comparing the pre-disaster to the post-disaster performance of each subsystem, ensuring that the following issues are analyzed:

- Higher operational costs (due to use of alternative sources or means of supply and disposal, the temporary operation of damaged system components, or the temporary, more-intensive operation of undamaged system components)\(^\text{10}\).
- Lower operational revenues of the sector enterprises, until services are brought back to normal levels, due to the temporary total suspension of operations, partial supply of services while assets are under repair, and due to temporary decrease of demand from users\(^\text{11}\).

A word of caution is required here. In practice, it is quite possible that the water and sanitation systems may be repaired and reconstructed before the demand for its services recovers to pre-disaster levels in the affected area. In the case of major disasters, where destruction of entire cities has occurred, the demand of water and sanitation services will not recover to pre-disaster levels until full housing and industry reconstruction is achieved. In such cases, revenues for the service enterprises would not recover until full reconstruction of the housing sector is achieved. The water and sanitation sector assessment specialist must therefore consult with the housing and industry sector specialists to ensure that losses in his/her sector cover the entire period of reconstruction for the housing and industry sectors.

Losses should be estimated on a calendar-year basis, including those of the year in which the disaster occurred and the subsequent years of recovery and reconstruction.

The ownership of damage and losses is to be defined and broken down into public and private sector.

During the assessment, it must be remembered that losses arising in water-user sectors - such as industry, trade and tourism, for instance - as a result of the non-provision of water, are to be estimated and accounted for in each of those sectors, either as production losses and/or as higher production costs when alternative, higher-cost sources of water are chosen as interim solutions.

\(^\text{10}\) Among the items to be considered under this heading are: higher costs of chemicals to ensure quality of drinking water; higher water distribution costs when using tanker trucks to reach users; the more-intensive operation of systems to compensate for higher water losses in damaged system components (such as distribution or conveyance water mains); cleaning of sewerage systems and treatment plants after flooding; higher transport costs to collect and dispose of solid waste, etcetera.

\(^\text{11}\) The operation of the services may be fully stopped during an initial short period of time immediately after the disaster (a few hours to a few days), to be partially resumed during the period of repairs until full system reconstruction is achieved. In addition, service demand may drop due to extensive destruction in cities caused by the disaster and the subsequent overall lower economic activity. These temporary interruptions or partial operations for each subsystem would result in corresponding losses in revenue for the enterprises.
e) Macro-Economic Consequences
As part of the assessment, estimates are to be made of the impact or consequences that damage and losses will have on the macro-economic performance of the affected country or area. This refers to, first, the impact on GDP and, second, on the balance of trade and payments, and on the fiscal budget, especially when the sector enterprises are government-owned or receive subsidies from the government.

In the damage assessment, estimates are to be included to ascertain the value of assets - including equipment, machinery, parts, materials - that will require to be imported from abroad when no domestic production is available.

The impact of losses on the government budget is to be estimated in terms of increased operational costs and lower revenues. If the sector enterprises are directly owned by the government, losses will be sustained by the fiscal budget. When government subsidies are involved in the operation of a private sector enterprise, the assessment specialist should ascertain whether the subsidies are to continue uninterrupted and at the same level during the rehabilitation and reconstruction stage.

This information is to be supplied to the specialist undertaking the overall, macro-economic impact analysis.

2. Electricity
a) General
The electrical sector may sustain damage and losses as a result of disasters. Damage refers to total or partial destruction of physical assets; losses refer to changes in the economic flows of the sector that arise from the interruption, however temporary, of the supply of electricity.

In this sector, again, damage is initially measured in physical quantities or units which are later on converted into monetary value using the replacement cost of the affected assets. Losses include the decline in revenues that arise from the temporary interruption of electricity supply and the increase in operational costs until normal operations are achieved; they are expressed in current values.

The value of damage is usually estimated by civil or electrical engineers; the estimation of losses requires the services of economists or accountants working in the electrical sector field.

b) Baseline Information
The following information is required for establishing the baseline for the assessment of damage and losses after disasters:

- The characteristics - in terms of geographical or spatial location, installed capacities and operation costs - of all components of the electrical systems located in the area affected by the disaster.
- Existing idle capacities in nearby systems or areas that may be interconnected to the affected system or that may have the capacity for rapid interconnection as an alternative, temporary solution after the disaster.
- Statistical information on electricity generation and consumption by the main user sectors, and their seasonal variations over the year.
- Projections of above for the next three calendar years.
- Financial information on the enterprises that comprise the sector, including monthly operational data on revenues, production costs per type of power plant and rates charged to different user sectors\(^\text{12}\).

\(^{12}\) Such information is normally available in the annual reports issued by each electrical enterprise, whether publicly or privately owned.
c) Post-Disaster Situation and Performance

This stage of the assessment involves a field survey to ascertain the effects of the disaster on the production, transmission and distribution capacities of the affected electrical systems. In the case of disaster that cause major destruction of housing and other sectors that utilize electricity, the field survey must be used also to ascertain the characteristics and extent of the decline in electricity demand from such users.

Upon completion of the field visits and after holding extensive discussions with substantive personnel of the enterprises composing the sector in the affected area, the remaining capacity - in terms of production, transmission and distribution - and its expected temporary performance, until the system can be repaired and brought back to its full or pre-disaster capacity, must be estimated.

d) Estimation of Damage and Losses

Damage must be estimated for each of the electrical system components, including a breakdown on power generation plants, transmission subsystems, and electricity distribution grids.

Damage must be expressed in terms of the repair and replacement costs of each system component. These values may be obtained from the electrical enterprises planning departments, which usually keep them for use in their on-going development plans. As a supplement, the assessment specialist may wish to contact private building contractors that may have valid replacement costs information. The replacement or repair unit costs to be adopted must not be affected by scarcity or inflation arising after the disaster, as appropriate adjustments will be made in the final stage of overall reconstruction planning.

To estimate losses, an objective calendar or schedule of repair and reconstruction of electrical sector assets must be developed by the assessment specialists, in close coordination with the local counterparts, that will take into consideration the availability and schedule of adequate financing, as well as replacement machinery, equipment and skilled labor that will enable the return to pre-disaster conditions of electrical service supply.

On the basis of the above, the assessment specialist and local counterpart officials must prepare a preliminary calendar or schedule of electricity supply recovery, together with a similar estimation of post-disaster electrical demand performance. These should be combined in order to define the overall post-disaster performance for the sector, until full recovery of supply and demand is achieved.

In this regard, as in the case of water supply, special care must be exercised by the electrical sector specialists to ensure that the recovery of demand from all user sectors - with special reference to the residential, agricultural, commercial and industrial sectors - is given due consideration. It must be borne in mind that if widespread destruction has been caused by the disaster, the demand for electricity will not recover to pre-disaster levels until full reconstruction in the user sectors is achieved, even if electricity supply is restored ahead of time. It is therefore essential that the electrical sector specialists coordinate their actions and projections with those of other economic and social sectors that utilize electricity in their daily functioning.

Losses are then estimated by comparing the pre-disaster with the post-disaster performance for the electrical sector, ensuring that the following issues are analyzed in depth:

- Lower operational revenues arising from lower sales to electricity-user sectors, until such time as may be required to achieve pre-disaster levels of demand, due to: the initial,
temporary, total interruption of service; the partial supply of electricity while assets are being repaired or replaced; and the temporary drop in electrical demand from user sectors.\textsuperscript{13} – Higher operational costs incurred by the electrical enterprises due to use of higher unit costs of replacement power plants and/or higher costs of acquisition of electricity from nearby, idle electrical systems.\textsuperscript{14}

Losses are to be estimated on a calendar-year basis, for the year in which the disaster occurred and at least the two subsequent years.

Ownership of the damage and losses is to be defined and broken down by public and private sector, as their impact must be dealt with differently in the overall analysis of disaster impact.

e) Macro-Economic Consequences
The overall assessment of disaster impact requires that the consequences of the damage and losses on the macro-economic performance of the affected country or area be defined. The impact of the disaster on the country’s gross domestic product, balance of payments and trade, and the fiscal budget is to be estimated. The latter is of special relevance in the case when electrical enterprises are owned by the government or when they receive subsidies for their operation.

The damage assessment should include estimations of the value of repair and reconstruction items that must be imported from abroad - including equipment, machinery, construction materials and skilled labor - due to absence of domestic production.

The impact of losses on the balance of payment when exports of electricity to other countries must be interrupted must be estimated. In addition, the impact of losses on the government budget must be ascertained in terms of increased operational costs and lower revenues when the electrical enterprises are directly owned by the government. Whenever subsidies from the government are involved in the provision of electricity by a private sector enterprise, the assessment should include the determination of whether the subsidies are to be maintained despite electricity service interruption or whether their level is modified during the rehabilitation or reconstruction stages.

In addition, whenever insurance of assets and sales are involved, the conditions of said insurance are to be ascertained to enable the determination of the net effects of the disaster on the functioning of the affected enterprise - whether public or privately owned - and on the macro-economic performance of the country.

The above information is to be supplied to the specialist in charge of the overall macro-economic impact analysis.

3. TRANSPORT AND COMMUNICATIONS
a) General
The transport and communications sector, and its many sub-sectors, sustain damage and losses after disasters. Damage refers to the total or partial destruction of physical assets, and losses

\textsuperscript{13} In this regard, it must be remembered that the provision of electricity may be stopped during an initial short period of time immediately following the disaster (from a few hours to a few days): that electricity supply will be resumed on a partial basis during the period of repairs, until full system reconstruction is achieved. Furthermore, that electrical demand from various user sectors may drop due to extensive damage and destruction of housing, agriculture, mining, industries and commercial establishments and the subsequent overall decline in economic activity in the affected area.

\textsuperscript{14} This is typical of the case when damaged hydropower plant production is substituted temporarily by thermal power units that have a higher unit cost of operation, or when having to purchase electricity from nearby unaffected systems at unit prices higher than the affected enterprise’s own production price levels.
refer to changes in the economic flows of the sector that arise as a result of the interruption or modification of transport and communications flows.

As in other sectors of the economy, damage is measured in physical quantities or units, to be later converted into monetary value using the rehabilitation or reconstruction cost of the affected assets. Losses include the higher operational costs to be incurred upon by the users when adopting different means or modes of transport.

The most frequent case of losses in this sector occurs in the case of vehicular traffic that must utilize alternative, longer physical routes that result in higher costs of operation. Other usual losses are incurred upon when users are required to use alternative ports or airports that have higher operational costs than the ones used under normal conditions. In addition, losses may be incurred upon when certain products cannot reach the intended markets opportunistically due to damage in the normal routes of transport for the goods. That is the typical case of perishable agricultural and fishery products that do not reach the markets in time; however, these losses refer to the value of the production that does not reach the market rather than to higher transport costs, and should be accounted for under the primary production sector and not under infrastructure.

Special care must be exercised then in separating the damage and losses caused within the transport and communications sector and those caused in other sectors that make use of the transport and communications infrastructure and services. While the assessment of damage in this sector must be made by civil or transport engineers, the estimation of losses requires the services of transport economists.

The following sub-sectors are to be addressed separately when undertaking an assessment of damage and losses:

- Road transport
- Water transport (including maritime, river and lake navigation) and ports
- Air transport and airports
- Railroad transport
- Multimodal transport
- Communications

b) Baseline Information
The following information is essential for the undertaking of a damage and loss assessment:

- Location and capacities of each of the transport sub-systems as listed above, and their main individual components;
- Number and capacities of the vehicular stock available in each of the subs-systems;
- Most recent origin and destination surveys in the affected and nearby areas;
- Operating costs in each of the transport modes, and
- Annual reports of performance of (private or public) communications enterprises.

This type of information is normally available from the ministries of public works or transport, in the respective departments of roads, ports and airports; from private enterprises that operate roads, railways, ports and airports under concession arrangements; from building contractors and associations, civil defense institutions and insurance companies.

c) Post-Disaster Situation and Performance
A field visit to directly observe the effects of the disaster on the entire transport and communications sector is essential. In many cases, an initial aerial survey can provide the necessary overview on which to base subsequent, detailed field visits by road, boat or foot to
key points of the transport and communications system. During the field visits, the specialist assessing the effects of the disaster must draw its own conclusions in regard to the post-disaster status of the entire system, the requirements for rehabilitation and reconstruction, and the manner in which the system may function or perform under abnormal, post-disaster conditions.

Needless to say, the specialist entrusted with the assessment must have previous experience in analyzing post-disaster situations and scenarios in the transport and communications sector, on which to base the assessment.

**d) Estimation of damage and losses**

Detailed procedures for the estimation of damage and losses in the road transport sector are to be described here only, as the effects on other sub-sectors of transport may be estimated following similar procedures.\(^{15}\)

When undertaking the assessment, it must be remembered that the transport and communications sector is usually one of the most affected in terms of damage and losses, frequently surpassing the values of housing and agriculture, depending on the type and extent of the natural phenomena that cause the disaster. In addition, one should bear in mind that damage is not only sustained by road surfaces or structure, but by associated bridges, culverts and other drainage works. Then too, in cases of earthquakes, damage is caused not only by the initial earth tremor but by after shocks as well. Floods may cause both the collapse of structures and the erosion of road surfaces and earth fills.

Another consideration to be kept in mind during an assessment is that not all damage is evident immediately after the disaster; other damage may become obvious only after the initial disaster. This is usually the case after long-term flooding when, after water subsides, the road surfaces may seem to be undamaged. Generally water seeps through porosities in the pavement surface and erode the base and sub-base of the road, which is condition is aggravated by the continued traffic using the road and leads to subsidence that may cause serious accidents. Another misleading case is that of structures that may seem to keep their verticality after earthquakes, but their construction materials may have lost their elasticity and structural capacity. In both cases, the affected structures must be demolished and substituted promptly.

Other types of natural hazards that may cause damage to road transport are landslides and mudslides, which may destroy the road carpeting and impede vehicular traffic.

**Damage** in this sector can be estimated as the value of investment and expenditure required for the emergency, rehabilitation and reconstruction stages after a disaster. In this sector the emergency stage involves the setting up of provisional works to enable vehicular traffic wherever possible. A typical example is the installation of a temporary bridge structure to substitute a permanent bridge that may have collapsed; the construction of alternative sections of road to substitute those that have been destroyed. These are in fact cheap structures or works that enable the early “normalization” of traffic.

There are two possible ways to estimate the value of damage. The first one involves the estimation of the cost required to bring the road to its pre-disaster conditions (rehabilitation), since it may have been in bad state of repair and maintenance, with roughness coefficients ranging from average to high, out of date design criteria, insufficient drainage facilities, and little useful life remaining. The second one involves the estimation of the replacement cost for the asset through its full reconstruction or through extensive repairs. The decision to

\(^{15}\) In due time, detailed notes for the other sub-sectors will be developed and added in the guidance notes.
rehabilitate or to reconstruct depends on a number of factors that fall beyond the scope of the present guidance notes, but as a rule of thumb it may be indicated that full reconstruction would only be justified when changing the design criteria, location and route is required to ensure the continuing functionality of the road in case of future disasters.

In the case of rehabilitation, repair works are undertaken in affected sections of the road that have sustained non structural damage to promptly restore pre-disaster traffic capacities. In the design and execution of rehabilitation works, modern methodologies are normally used which differ from the ones used in the original design of the affected works, in order to increase design capacity and to reduce vulnerability. Rehabilitation works, however, do not imply changes in the original route followed by the road, or increases in the original traffic capacity.

Reconstruction on the other hand usually involve adopting a different route than the pre-disaster one with the purpose of reducing vulnerability, as well as using significant changes in design, construction and technologies to be able to meet present and future traffic demands.

In order to reduce vulnerability in both rehabilitation and reconstruction works, the height and span of bridges must be increased to be able to absorb the highest feasible expected river stage; approaches to bridges must be duly protected from flood erosion; other drainage works must be designed with sufficient capacity to withstand the different actions of nature; and adequate slope protection works must be included to avoid landslides.

During the field surveys, the transport specialist must ascertain the extent and cost of rehabilitation or reconstruction of road transport works, based on the type and severity of damage. The physical and traffic absorption characteristics of each affected component must be combined with the unit cost of rehabilitation or reconstruction, as may be required.

Unit costs for rehabilitation, duly taking into consideration the required design modifications to reduce vulnerability, may be obtained from the Study and Design and Maintenance Departments or Units in the Transport or Public Works ministry or agency, in the cases where they would be entrusted with the task. In the case where rehabilitation will be entrusted to private contractors, unit costs may be obtained from several private enterprises that work in the sector.

Unit costs for reconstruction can only be obtained after a detailed design of the new infrastructure has been completed. However, preliminary estimations may be obtained from Planning and Design Departments of the Public Works ministry or agency that may have recently developed similar new projects for construction.

As an aid to the specialist involved in the assessment of disaster damage, Table 3-1 shows the range of costs for rehabilitation and reconstruction of different types of roads16. Special care must be exercised by the specialist when applying these figures, to give due consideration to local conditions.

16 This table has been developed by the Economic Commission for Latin America and the Caribbean for use within the LAC region. Similar values may be used in other developing worlds located in different regions.
Table 3-1
Ranges in the cost of rehabilitation and reconstruction of two-way roads
(US Dollars per kilometer)

<table>
<thead>
<tr>
<th>Type of work</th>
<th>Range in Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rehabilitation</td>
<td></td>
</tr>
<tr>
<td>Dirt road, flat terrain</td>
<td>4,000 - 5,000</td>
</tr>
<tr>
<td>Dirt road, undulating terrain</td>
<td>5,000 - 6,000</td>
</tr>
<tr>
<td>Dirt road, mountainous terrain</td>
<td>6,000 - 8,000+</td>
</tr>
<tr>
<td>Gravel road, flat terrain</td>
<td>12,000 - 14,000</td>
</tr>
<tr>
<td>Gravel road, undulating terrain</td>
<td>15,000 - 18,000</td>
</tr>
<tr>
<td>Gravel road, mountainous terrain</td>
<td>18,000 - 21,000+</td>
</tr>
<tr>
<td>Paved road, flat terrain</td>
<td>22,000 - 25,000</td>
</tr>
<tr>
<td>Paved road, undulating terrain</td>
<td>25,000 - 28,000</td>
</tr>
<tr>
<td>Paved road, mountainous terrain</td>
<td>28,000 - 32,000+</td>
</tr>
<tr>
<td>Reconstruction</td>
<td></td>
</tr>
<tr>
<td>Dirt road, flat terrain</td>
<td>8,000 - 10,000</td>
</tr>
<tr>
<td>Dirt road, undulating terrain</td>
<td>10,000 - 18,000</td>
</tr>
<tr>
<td>Dirt road, mountainous terrain</td>
<td>18,000 - 25,000+</td>
</tr>
<tr>
<td>Gravel road, flat terrain</td>
<td>45,000 - 50,000</td>
</tr>
<tr>
<td>Gravel road, undulating terrain</td>
<td>50,000 - 65,000</td>
</tr>
<tr>
<td>Gravel road, mountainous terrain</td>
<td>65,000 - 80,000+</td>
</tr>
<tr>
<td>Paved road, flat terrain</td>
<td>100,000 - 150,000</td>
</tr>
<tr>
<td>Paved road, undulating terrain</td>
<td>150,000 - 180,000</td>
</tr>
<tr>
<td>Paved road, mountainous terrain</td>
<td>180,000 - 250,000+</td>
</tr>
</tbody>
</table>

Source: ECLAC

Damage to vehicle stock - including automobiles, buses, trucks and other smaller vehicles - must also be estimated during the assessment for the transport sector. In addition, the construction and maintenance equipment of the sector must be duly included, but tractors and other equipment in the agricultural sector must be accounted for under same.

For the estimation of damage to vehicles, the following simple classification may be adopted to facilitate calculations:

- light vehicle
- Medium-sized bus
- Large bus
- Rigid, 2-3 axle truck
- Flexible truck (4 or more axle)

The number of destroyed vehicles is usually estimated during the emergency phase or may be estimated through consultations with transport enterprise associations and insurance company representatives. Their monetary value may be estimated on the basis of information given in the Highway Design Model (HDM) used by the World Bank. When vehicles have only been partially destroyed, simple assumptions on their repair value must be made in comparison to their full value, to facilitate estimations; consultations with local repair shops may be required to ascertain typical unit costs under assumed conditions.

Losses are also sustained in the transport sector after disasters, over the time that is required for the rehabilitation and reconstruction of transport works: their value may exceed that of damage and in some cases may lead to overall inflation; hence, the importance of their estimation. Losses in this sector refer to higher transport costs that are incurred when longer alternate routes are necessary, when alternate modes of transport are adopted, and when transport flows are fully interrupted.
In order to estimate the losses, three key elements are required: the volume flows of traffic and the expected higher unit operating costs involved over the time required for the rehabilitation or reconstruction to take place.

In regard to the time of rehabilitation and reconstruction, the usually accepted time periods range from a minimum of three months for full rehabilitation, to about six months for the construction of alternate short road sections, through 1 to 5 years for full reconstruction (involving mitigation through redesign and reinforcement) of entire roads.

To estimate the flows of traffic that will be involved in the assessment of losses, the traffic patterns and volumes under non-disaster conditions must be known, and projections must be made of the expected temporary changes of flow brought about by the disaster. The pre-disaster traffic flows can be obtained directly from the local authorities through the appropriate division or unit of the Transport or Public Works ministry or agency, using the most recent survey of origin and destination, duly updated when necessary. The post-disaster traffic flows must be derived by the transport specialist in close cooperation with the local counterparts, bearing in mind the time required for rehabilitation and reconstruction of the affected roads.

The marginal operating cost of vehicles varies depending on the type of vehicle, type of terrain and quality of road surface. They include different cost components, such as fuel, repairs, tires, depreciation, crew salaries, additional time of passengers, etcetera. These operating costs must be available in the affected country for their direct application in the estimation of losses. In fact, planning departments of the Transport or Public Works ministries or agencies usually have the required information. Should this information not be available, use can be made of data shown in Table 3-2, duly adjusted to local conditions by the transport specialist, which provides the ranges of typical values of marginal operating costs for different road conditions and for the main types of vehicles in developing countries of the Latin America and Caribbean region\(^\text{17}\). The range indicated goes from good to bad state of conservation of the road surface, using roughness as the main parameter.

### Table 3-2

**Marginal operating costs of different types of vehicles**  
In different types of road conditions  
(US Cents per vehicle-kilometer)

<table>
<thead>
<tr>
<th>Type of road</th>
<th>Type of terrain</th>
<th>Cars and other light vehicles</th>
<th>Medium size buses</th>
<th>Large buses</th>
<th>Flat bed and other trucks</th>
<th>Rigs and trailer trucks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paved roads</td>
<td>Flat</td>
<td>29 - 32</td>
<td>63 - 69</td>
<td>80 - 91</td>
<td>107 - 126</td>
<td>139 - 154</td>
</tr>
<tr>
<td></td>
<td>Undulating</td>
<td>30 - 33</td>
<td>65 - 75</td>
<td>112 - 120</td>
<td>125 - 156</td>
<td>155 - 181</td>
</tr>
<tr>
<td></td>
<td>Mountainous</td>
<td>31 - 34</td>
<td>69 - 80</td>
<td>144 - 157</td>
<td>156 - 182</td>
<td>156 - 225</td>
</tr>
<tr>
<td>Gravel roads</td>
<td>Flat</td>
<td>44 - 56</td>
<td>106 - 126</td>
<td>135 - 163</td>
<td>179 - 220</td>
<td>203 - 243</td>
</tr>
<tr>
<td></td>
<td>Undulating</td>
<td>49 - 63</td>
<td>111 - 136</td>
<td>157 - 189</td>
<td>180 - 225</td>
<td>204 - 267</td>
</tr>
<tr>
<td></td>
<td>Mountainous</td>
<td>46 - 67</td>
<td>114 - 144</td>
<td>197 - 234</td>
<td>204 - 267</td>
<td>207 - 246</td>
</tr>
<tr>
<td>Dirt roads</td>
<td>Flat</td>
<td>44 - 56</td>
<td>90 - 111</td>
<td>125 - 147</td>
<td>179 - 223</td>
<td>203 - 243</td>
</tr>
<tr>
<td></td>
<td>Undulating</td>
<td>45 - 63</td>
<td>92 - 113</td>
<td>127 - 162</td>
<td>180 - 226</td>
<td>206 - 246</td>
</tr>
<tr>
<td></td>
<td>Mountainous</td>
<td>46 - 57</td>
<td>96 - 113</td>
<td>134 - 176</td>
<td>184 - 249</td>
<td>207 - 267</td>
</tr>
</tbody>
</table>

Source: ECLAC

\(^{17}\) These ranges have been developed by the Economic Commission for Latin America and the Caribbean for use in developing countries of said region.
e) Macro-Economic Consequences
The overall assessment of disaster effects requires that the impact of the damage and losses on the macro-economic performance of the affected country or area be defined. The impact of the disaster on the country’s gross domestic product, balance of payments and trade, and the fiscal budget is to be estimated. These estimations are to be made regardless of whether the transport facilities and services are government owned or under concession to private enterprises.

The damage assessment should include the necessary breakdowns so that estimations can be made of the value of rehabilitation and reconstruction items that must be imported from abroad - including equipment, machinery, construction materials and skilled labor - due to absence of domestic production.

Estimations must be made of the impact of losses on the country’s balance of payments and trade, through the assessment of any significant amounts of increased imports or decreased exports of fuels for the transport sector arising from the disaster. In addition, the impact of losses on the government budget must be ascertained in terms of increased operational costs and lower revenues when the transport enterprises and services are directly owned by the government.

In addition, whenever insurance of assets are involved, the conditions of said insurance are to be ascertained to enable the determination of the net effects of the disaster on the functioning of the affected enterprise - whether public or privately owned - and also on the possible receipt of re-insurance proceeds that would improve the balance of payment of the country.

The above information is to be supplied to the specialist in charge of the overall macro-economic impact analysis.