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**Introduction to Damage and Reconstruction Needs Assessment**

**Readings**

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**III. DAMAGE OVERVIEW<sup>1</sup>**

**1. General comments**

After the assessment of social, economic, and environmental impacts of a disaster has been completed there must be a recapitulation of damages to provide an overview with the full results of the analysis. Such overview is the final result of the assessment work and will provide the basis for the subsequent macroeconomics analysis. It should include both the total amount of damage and losses and different breakdowns to identify the most affected sectors, geographic areas and population groups. In addition to quantifying the total amount of the impact in monetary terms, this overview must allow an identification of sectors and geographical areas that must receive priority attention in the reconstruction process, thus providing a valuable input for the definition of its strategy, plans and projects.

**2. The total amount of damages**

Based on the sectoral estimates undertaken – following the uniform assessment methodology discussed in previous chapters and Sections – the overall damage assessment specialist must prepare a summary of both direct damage and indirect losses in order to arrive at a figure for the total amount of damage caused by the disaster under analysis.

Special care must be exercised in order to avoid double accounting of damages. The damage in one sector must not also be included under another sector, a common mistake in the case of indirect losses related to production chains (for example, production, processing and commercialization). Similar care should be taken to ensure that the total amount of damage thus estimated includes only losses that can be measured in terms of national accounts, leaving aside other cases such as the differential impact of the disaster on women or on the environment which follow somewhat different procedures for their estimation.

Once total damage and losses have estimated, selected breakdowns will be required to provide a complete overview on the general impact of the disaster and to enable future comparisons. The following three types of breakdowns should be made:

- Total direct damage and indirect losses;
- Total damage to assets and to production, and increased costs or decreased income in the provision of services; and
- Total damage to public and private sectors.

The distinction made between total direct and indirect damages will provide a measure of the effects on assets and on future economic performance, respectively. The amount of direct damage is a measure of the efforts that will have to be made in order to replace lost assets in the affected country or region. On the other hand, indirect losses or effects reflect changes in economic flows that will be used by the

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<sup>1</sup> Excerpt from Handbook, ECLAC, 2003

macroeconomics specialist to project future national or local economic performance as a result of the disaster.

The breakdown into damage to assets and to production, and the changes in costs and income in the provision of services, will enable a further analysis to identify losses of assets, decreases in production, the effects on national finances and on enterprises that provide public services, as well as possible increases in the population's cost of living. Direct damages include both destroyed assets and losses of production that was ready for consumption. These two types of direct damages must be separately estimated to enable the subsequent macroeconomics analysis to be made. On the other hand, indirect effects include both future production losses as well as higher costs and decreased revenues in the provision of services such as water and sanitation, electricity, transportation, etc. Therefore, this second breakdown will provide a measure of total damage and losses of assets and production, as well as of the indirect effects on the finances of the State and of (public and private) enterprises that provide basic services.

The breakdown into public and private sectors of the total amount of damage will enable the determination of some characteristics of reconstruction programmes, by defining the relative efforts required from the State and from private individuals or enterprises. Even though the cost of reconstruction of public infrastructure must be met by the government – which allows a determination of the amount of future public financing requirements – the latter may also have to establish financial schemes or credit lines for the private sector affected by the disaster, especially in the case of the lowest-income population or of strategic sectors of the national economy. In addition to the breakdowns described above, the damage overview specialist must determine the distribution of total damage among the different sectors in order to identify those most affected and which, therefore, should be given the highest priority in the reconstruction strategy and plans.

### **3. The net amount of damages**

Insurance of assets and production is becoming a common feature in Latin America and the Caribbean. Therefore, a net amount of damage can be obtained by deducting insurance payments from the total amount of damage. However, insurance coverage varies from country to country, and among sub regions.<sup>1</sup> The damage overview specialist should determine this net damage figure on the basis of information provided by the sectoral specialists.

Moreover, major foreign consortia usually reinsure local insurance companies. There can be a significant positive effect derived from inflows of foreign exchange currency in the form of reinsurance payments. This effect must also be estimated so that the macroeconomics specialist can use it in the subsequent analysis of future (national or local) economic performance.<sup>2</sup>

### **4. The costs of reconstruction**

As mentioned in the introductory chapter of this handbook, the costs of reconstruction are not the equal to the total amount of damages. This is because the amount of damage is estimated as the present value of lost or damaged assets, whereas replacement must take into account both higher present construction or purchase costs of goods as well as the additional cost of prevention and mitigation measures envisaged to reduce damage that future disasters might bring about. Therefore, the damage overview specialist must also determine total reconstruction costs using information provided by the sectoral specialists.

Another difference between the total amount of damage and the cost of reconstruction should also be noted here. The cost of reconstruction includes the replacement of lost assets but excludes the value of production losses and the amount of increased spending and decreased revenues in the provision of

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<sup>2</sup> The degree of insurance coverage and a country's level of development would seem to be inversely correlated, with the exception of the Caribbean where – probably due to the influence of the former colonial powers – the degree of coverage of assets tends to be high.

services, and must also include the financial cost of reactivating production when necessary. One example of the latter would be the amount of credit required to refinance producers in various sectors when they have sustained significant damage or losses in their activities, such as farmers who need to refinance equipment loans when flooding or drought has caused the loss of harvests. Therefore, the cost of reconstruction will unavoidably be different from the total amount of damage caused by a disaster. When direct damages constitute a high fraction of total damages, the cost of reconstruction can be significantly greater than the total amount of damage. On the other hand, when indirect losses are greater than direct damages, as it happens in the case of floods or droughts, the cost of reconstruction would be lower than the total amount of damages.

## **5. The magnitude of the disaster**

To determine the impact that a disaster will have on the affected region or country the total amount of damages must be compared to some regional or national variables. This comparison will provide an indication of the reconstruction efforts required, and a measure of whether the affected region or country has sufficient capacity to face reconstruction by itself or whether foreign cooperation will be needed. The magnitude of the disaster may be determined by means of comparisons between the total amount of damage and its components and some macroeconomic variables, such as:

- Total amount of damages in comparison to GDP;
- Total amount of production losses in comparison to GDP or to the country's exports;
- Total amount of lost assets compared to the annual rate of gross fixed capital formation, to the local construction sector product or to the amount of national debt;
- Total amount of damage as a function of the population of the country or region affected.

The comparison between the total amount of damage and GDP provides a measure of the impact a disaster might have in terms of a country or region's economy. In small Latin American countries or Caribbean islands the magnitude of a disaster might constitute a high proportion of GDP, or even be greater than its total, whereas larger economies may easily absorb the effects of disasters of limited scope.<sup>3</sup> This type of comparison also reflects the intensity of efforts that the country will have to make during recovery and reconstruction.

A comparison between total production losses and GDP gives an idea of the general effect of a disaster on national or regional production and of the impact the disaster may have on future economic growth, whereas a comparison of production losses with exports might provide an indication of the impact on the foreign sector of the country or region affected.

The comparison between the amount of damage to assets and the annual gross rate of fixed capital formation provides an indication of the additional effort the country will have to make in construction. The comparison with the construction sector's domestic product gives an indication of the national capacity for reconstruction and of the period required to carry it out. The comparison between damage to assets and the amount of national foreign debt of the affected country can provide an idea of future indebtedness that will be required for the reconstruction efforts.

The determination of the amount of total per capita damage and the ratio between damage to *per capita* GDP provides an idea of the negative effects on the living conditions of the affected population. It also

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<sup>3</sup> In this regard, Hurricane Mitch caused total damages in Honduras that represent 79% of GDP for the preceding year; the floods in Venezuela in 1999 caused total damages that exceeded 166% of the GDP in the state of Vargas; and the 1985 Mexico City earthquake caused total damages amounting to approximately 4% of national GDP.

provides means to compare the effects of different disasters occurring in the same country at different times or in different places.

### **6. The geographical distribution of damages**

The REDATAM tools described in the Section on social sectors enable the determination of the geographic distribution of total damages, in turn enabling the identification of the worst affected regions or geopolitical entities that, therefore, must receive priority attention in reconstruction plans.

The damage overview specialist, in close co-operation with the geographic information systems and population specialist, must determine the spatial distribution of total damage and damages per capita. This will provide more accurate estimates of how the population has been affected. Maps will usually be produced showing the geographic distribution of damage per inhabitant and of the ratio between *per capita* damage and GDP.

Such maps can be combined with those that describe the distribution of poverty in a given country thus giving decision-makers a tool they may use to define a geographical distribution of resources for reconstruction.

### **7. The identification of the effects on vulnerable groups**

On the basis of sectoral analyses the damage overview specialist must be able to identify the worst affected population groups. This must include the lowest-income groups – and the map that shows the spatial distribution of total damage compared to per capita income or GDP is a very useful tool for this purpose – along with women, children, and the aged, as well as the population that might be involved in micro and small enterprises.

Table 1

EFFECTS OF NATURAL DISASTERS ON THE SURFACE OF THE EARTH, ON  
INFRASTRUCTURE AND ON AGRICULTURE

Type of disaster	Effects on the earth surface	Effects on infrastructure	Effects on agriculture
Earthquakes	Tremors and cracks Landslides Liquefaction Underground settling and rockfalls Avalanches and mudslides Changes in underground water courses	Damage to constructions (productive, e.g. factories; public; social; housing, and cultural heritage) Diverse damage in roads, bridges, dikes and channels Broken ducts: pipes, posts and wires Burial and undermining of dams, silting of rivers causing local floods Sinking of structures and buildings Deterioration of underground constructions Destruction and damage to urban infrastructure (networks, streets, equipment and furniture)	Minimal Localized losses in areas affected by landslides, avalanches or liquefaction Temporary loss of irrigation systems Localized losses in plants and plant cover and forests
Hurricanes, typhoons and cyclones	Strong winds, both steady and gusts Floods (due to rain and swollen and burst rivers)	Damage to buildings Impact-damaged, broken and fallen distribution lines, especially overhead Damage to bridges and roads due to landslides, avalanches and torrential mudslides	Loss of plant cover, fallen trees, crop damage, especially wind damage to grass species Erosion affects root and tuber crops Changes in natural and man-made drainage systems Sedimentation, salinization, contamination and erosion of soils
Drought	Drying and cracking of the earth and loss of plant layer Exposure to wind erosion Desertification	Does not cause major losses	Loss of crops and plant cover Erosion and damage to forests Depositing of sand and infertile earth Changes to crop types and cycles Growth of arid climate, drought-resistant vegetation, such as thorn bushes and cactuses

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Table 1 (Conclusion)

Type of disaster	Effects on the earth surface	Effects on infrastructure a/	Effects on agriculture
Floods	Erosion Waterlogging and destabilization of soils, landslides Sedimentation	Loosening of foundations and piles of buildings Burial and slippage of constructions and infrastructure works Blockage and silting of channels and drains	Destroys crops, alters crop types and growing cycles Localized damage in land, fields and woods Increased humidity improves quality of some land and makes it productive (albeit temporarily)
Seaquakes or tsunamis	Floods Salinization and sedimentation in coastal strips Contaminate water and water table	Destroy or damage buildings, bridges, roads, irrigation and drainage systems	Localized damage in crops Destruction of coastal plantations Changes in reproductive cycles of coastal fauna and damage to fishing
Volcanic eruptions	Fires, loss of plant cover Depositing of incandescent material and lava Depositing of ash Deterioration of soils due to settling of airborne chemicals Landslides, avalanches and torrential mudslides Liquefaction Meltwaters and avalanches	Destroys buildings and all types of infrastructure Collapsed roofs due to ash deposits Burial of buildings Fires Affects channels, bridges and overhead and underground conduction and transmission lines	Extensive defoliation Damage to plant cover and forests Fires in areas near eruption Burial of crops, damage to productive land due to silting, contamination and landslides Fires in plantations Ash deposits increase fertility of undamaged soils

Source: Adapted from Frederick C. Cury (1983), *Disasters and prevention*, Oxford University Press, New York.

Table 2

## IMMEDIATE ECONOMIC AND SOCIAL EFFECTS OF NATURAL DISASTERS, BY TYPE

Type of disaster	Temporary migration	Permanent migration	Loss of housing	Loss of industrial production	Loss of trade	Losses of agricultural production (plants, crops, harvests)	Damage to infrastructure	Changes to market distribution and operation	Interruption of transport systems	Interruption of communications	Panic	Social disorder
Earthquakes			X	X	X		X	X	X	X	X	X
Cyclones			X	X	X	X	X	X		X	X	X
Floods	X	X	X	X	X	X	X	X	X	X		
Seaquakes or tsunamis			X		X	X	X	X		X	X	
Volcanic eruption			X	X	X	X	X	X	X	X	X	X
Fire			X	X	X	X	X	X	X	X	X	
Drought	X				X	X		X				
Famine	X	X			X	X		X				X

Source: Adapted from Frederick C. Cuny (1983), *Disasters and prevention*, Oxford University Press, New York.