
UNIT 14 DAMAGE ASSESSMENT

Structure

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14.0 LEARNING OUTCOME

After studying this Unit, you should be able to:

- Understand the concept and significance of Damage Assessment; and
- Get an overview of the various levels and types of assessments, types of reports and reporting formats.

14.1 INTRODUCTION

Damage assessment is an important tool for *retrospective* and *prospective* analysis of disasters to assimilate the extent of impact of a disaster. This forms the basis for future disaster preparedness and preventive planning. It is essential in determining: *what happened, what the effects were, which areas were hardest hit, what situations must be given priority and what types of assistance are needed*, for example, Local, State, or Union? Emergency response can be more effective, equipment and personnel can be better used, and help can be provided quicker if a thorough damage assessment is performed beforehand. The basic objectives of damage assessment could be summarised as follows:

- To make a rapid assessment of areas affected to know the extent of impact for purpose of immediate rescue and relief operations;
- To prepare estimates for the amount of relief to be provided and the mode of relief, be it food, clothing, medicines, shelter or other essential commodities;
- To make a detailed assessment regarding requirements for long-term relief and rehabilitation planning; and
- To identify focus areas for the purpose of ‘retrofitting’ actions in similar future situations.

Damage Assessment is therefore *a prerequisite* for effective disaster response effort. For effective decisions, officials responsible for organising post-disaster relief operations should

be properly informed of the damage/possible damage should the event repeat itself some time in the future, so that they can know the needs, *current*, as well as *prospective*, in precise terms. They must have appropriate and timely information about: *what happened, what needs to be done, and what resources are available?* Their decisions can save lives; minimise injury, damage and loss; prevent any further escalation; prevent secondary hazards and inform people who need to know. Well-organised response will also help in building confidence and enhancing the credibility of the administration.

Relief operations are essentially about *the management of information and resources*, which is based on assessments and reports carried out from time to time. Information is needed at all levels of administration but the nature of the information required varies from one level to another. Good assessment and reporting require forethought; hence, the assessment and reporting system should be established during the preparedness planning stage.

Damage assessment is also a multi-disciplinary exercise involving officials from a cross section of experts and administrators from police, fire, health, engineering, public works, social scientists, non-profit organisations, community *et al* to get a comprehensive account of losses for adequate future mitigation planning. Some of the data required is already available in the form of baseline data (maps, population statistic etc.), which however must also be supplemented by *real time* information regarding the extent/nature of on going damage during a disaster event, from the damage site (mostly in the form of incoming reports from various sources after the disaster, (from the disasters scene) as pre- disaster estimates, however accurate, may not provide sufficient information.

14.2 ESSENTIAL FEATURES OF DAMAGE ASSESSMENT

Flow of Information

There is a clearly defined sequence to managing information:

- Converting raw data to useful information;
- Information input;
- Sorting (grading, collating, discarding what is unreliable);
- Evaluation;
- Decision making;
- Information output (dissemination); and
- Action

For example, specific objectives for damage assessment in the aftermath of cyclones and droughts, as per the *University of Wisconsin Disaster Management Centre* (Cuny, 1995), would include:

- Identification of the extent of damage or loss
- Identification of the types of assistance needed
- Identification of crops that can be grown as an interim substitute

- Determination of the amount of seeds, fertilizer and tools needed, the resources available in the area, and the amount of supplies required from outside the affected area
- Identification of local institutions that could carry out the program and their capabilities
- Identification of the level of farming skills in the affected community
- Determination of technical assistance requirements
- Determination of the receptivity of local institutions and the public to proposed agricultural rehabilitation activities.

Data would be required regarding:

- Identification of the predominant food and cash crops, cropping patterns, and normal production levels.
- Likely losses, such as; if whole or part of a crop is likely to be damaged, if any portion could be salvaged by timely mitigation, the quantum of insurance that would suffice, keeping in view, estimated losses.
- Identification of land problems to identify the extent of erosion, landslide zones, flood-prone areas, and areas where desertification could occur. Also note agricultural land forms such as terraces or contour farming (or lack thereof).
- Identification of water supply problems as certain disasters create special problems in water supply, for example, salt water flooding in cyclones can pollute local water wells and leave irrigation water salty; droughts dry up aquifers; wave action can destroy irrigation channels and desert windstorms can erode or fill shallow irrigation channels in arid zones.
- Determination of supply needs meaning, a determination should be made whether additional seeds, tools, fertilizers, etc., or alternative seeds could be planted immediately. For example, replacing traditional varieties of rice with a fast-growing variety may be possible in some cases, yet this might require introduction of needed fertilizers.
- Determination of local farming practices since it is important to identify the social, cultural and traditional aspects of farming, especially in the low-income and subsistence farming sectors. The time needed to plant certain crops, the normal growing season, and information about seasonal availability or constraints to certain types of crops is vital. It is also important to identify traditional responses to the disaster such as crop diversification, growing alternative varieties or alternative crops, altering cropping patterns, growing “famine foods,” or building food reserves.
- Determine the status of drought animals to check total losses and determine whether the losses will delay rehabilitation. Check to see if animals need emergency feeding, and determine whether farmers would have to sell them off.
- Institutional preparedness, studying ministries/departments engaged in disaster management, whether, disaster plan, contingency funding, official maps are in place, etc.

Utility of Damage Assessment

The information would enable:

- Quantified assessment of losses that would accrue to farmers and the likely impact on food supply in the market.
- Planning interim assistance like insurance needs of identified vulnerable segments, which are mainly, small-scale farmers, repairing irrigation systems, contouring, farmland repair etc. that would help further mitigation efforts.
- Alternate supportive projects; also possibly for how long; leading to articulation of long-term strategy for generating sustainable livelihoods and therefore achieving risk reduction in the area.

Levels of Assessment

Damage Assessment is required at two basic levels of intervention. *Firstly*, it is required for emergency relief measures in which quick assessment of damage is the basis for the amount of relief material and food stocks that reach the disaster area. This type of an assessment is called *Rapid Damage Assessment*. At the *second level* would be, a detailed technical analysis of damage for long-term restoration and rehabilitation works. From a long-term perspective, damage assessment scrutinises the mechanisms of failure that took place during the disaster. It is called *Detailed Damage Assessment*. These studies are very useful for all prevention and mitigation efforts for disasters in the future.

Rapid Damage Assessment

The official agency for reporting estimates of disaster damages is usually the Revenue and Relief Department of the state government, as they are also the authority for distributing relief to affected persons. As usual, there is a hierarchy of officials who report from the lowest level of Villages/Panchayats through Blocks/Revenue Circles, Tehsils/ Talukas, and Sub-divisions and finally to the districts and then to the state headquarters. However, relief agencies including NGOs also have their own damage assessment systems and teams to carry out the assessments. The basic items covered in rapid assessment are:

- Name of the place
- The causative disasters
- Date and time of disaster strike
- Area affected
- Total number of villages or neighbourhoods affected
- Total population
- Population affected in terms of number of people and households
- Details of local bodies (panchayats or wards/municipalities) affected
- In case of floods, area still under water
- In case of an earthquake or cyclone, buildings damaged
- Infrastructure affected (transportation, power, social infrastructure)

- Estimated number of deaths and injuries
- Estimated loss of property
- Closest sources of emergency aid.

Detailed Damage Assessment

Detailed damage assessment goes further than the rapid assessment, and it includes the following additional information regarding disaster damage:

- Verified number of human lives lost and number of injuries
- Livestock lost
 - a) Number
 - b) Estimated Value
- Details of damage to crops in hectares and estimated loss of produce in quintals
 - a) Hectares completely damaged
 - b) Hectares partially damaged
 - c) Hectares likely to be replanted or re-sown
 - d) Extent affected in percentage
 - e) Crops lost in quintals
 - f) Estimated value of crops lost in rupees
- Houses damaged or destroyed
 - a) Number
 - b) Estimated value
- Loss to public works and utilities including local bodies property
 - a) Name of the work and utility
 - b) Nature of damage
 - c) Estimated value of damage
 - d) Estimated cost to restore work or/and utility
- Rough estimate of the total financial loss in rupees

14.3 TYPES OF DAMAGES

In order to perform effective damage assessment, one must know various types of damages that are required to be taken into consideration. Among others, the important ones are mentioned below:

Damage to Buildings

The damage caused to buildings by the various disasters may be categorised as loss

under the following heads:

- The loss of the main building
- The loss due to failure of other components whose damage is attributed to the main building damage
- Area covered by the collapsed structure
- Death or injury to life due to building collapse
- Loss incurred in terms of debris removal and restoration
- Loss of revenue during the idle period

In addition to these, there would be socio-economic costs as a consequence of the disaster, which would add to the loss under the heads listed above. Building damages, on the wider scale, usually are most relevant in terms of damage to houses, more than other buildings. Damage to house property is estimated in terms of the number of households affected, reporting percentage damage, and estimated repair cost per household. This estimation is needed for all houses, but under classified categories of *Kutcha Houses*, *Pucca Houses*, and *Semi-pucca Houses*. This is required in order to carry out a value-based assessment.

Besides the house structure damage itself, there is also an aspect of household asset damage, which has to be taken into account. Damage to house structure can cause resultant damage to household goods, artisan assets and other productive assets stored in the house. These need to be accounted for in terms of average value of damage per household, in rupees.

Damage to Land

Damage to land due to disaster could be short-term damage, as in land rendered useless due to coverage by debris of silt, and loss of standing crops, or else it could be long-term damage as loss of productivity of land. The most important in the immediate post disaster scenario is the aspect of agricultural loss through land destabilisation.

Crop damage is assessed in terms of percentage of households reporting damage under the following heads:

- Area damaged per household (ha.)
- Production loss per hectare (quintals)
- Production loss per household (quintals)
- Value of production loss per hectare (Rs.)
- Value of production loss per household (Rs.)

Besides the damage to direct land attributes such as crops, there is also long-term impact on the productivity of the land itself, which is felt long after the disaster, mainly in case of floods, after the waters recede. The long-term impact on crop production could either be favourable or unfavourable. The favourable effect would be in the form of *deposit of silt* on land resulting in rise in the fertility of the soil, which manifests in crop yields. The unfavorable effects would be in the form of *sand castings* rendering the land unfit for

cultivation. This generally affects the production of Rabi crops after the floods. This effect can be assessed in terms of variation in production of the crop after floods, in terms of:

- Yield per hectare (quintals)
- Normal yield per hectare (quintals)
- Percentage variation in yield

Impact on Human Lives

The most disastrous and immediate impact on human lives is in terms of loss of lives by deaths that may occur due to the direct impact of the disaster, or through indirect impact as in the case of building collapses, fires etc. Injuries are the second level of impact of a disaster on human lives, and result from the same sources as deaths. The impact on lives in terms of deaths and injuries has to be estimated not only in numbers, but also in terms of the expenses incurred due to death or injury, as also the loss of productivity of the persons affected due to death, illnesses or disability, etc.

In a longer-term perspective, the impact of the disaster is also manifest as/in morbidity. Usually after a certain gestation period, which may be about two weeks after the disaster, diseases start to set in, due to unsanitary conditions resulting in contamination of drinking water and food. The affected persons, who may be housed in makeshift relief camps, might have no access to proper civic services, and as a result, vector borne diseases affect them, which may take the form of an epidemic if left unchecked.

Once again, the impact of the sickness due to disaster is felt in terms of expenditure on treatment and loss of employment during the sickness period. This may be assessed under the following heads:

- Total number of sample households
- Percentage of households reporting sickness, and the kind of sickness
- Average number of persons reporting sickness per household
- Average duration of sickness (days)
- Average expenditure on treatment per household (Rupees)
- Average employment lost per household (days)
- Average loss of income per household (Rupees)

Besides the physical impact of death, injury and morbidity, and their resultant financial implications, there is also a purely economic impact on human lives, which is in terms of loss of employment due to dislocation and disruption of routine activities due to the disaster. For assessment of this impact, it is necessary to first collect information on the total number of households, number of households reporting wage employment, and average number of wage earners per household in the affected area. An inventory has to be prepared enumerating the following factors:

- Average employment days per household
- Average earning per household (Rupees)
- Average earnings per earner (Rupees)

These factors have to be accounted for in the disaster scenario context, as actual figures in the post-disaster scenario, as well as in the situation in case there was no disaster. The comparison of these two scenarios would give a *gross loss in employment due to the disaster*.

The loss of employment can be further classified according to the *nature of employment*. In a typical regional setting, the classifications adopted could be:

- Agriculture
- Dairying
- Fisheries
- Non Agricultural Labour
- Artisans
- Business/Trade
- Service
- Others

Damage to Live Stock

The damage to livestock, namely cattle, other animals and poultry, which are a very important asset for rural households, is generally assessed in terms of the number of households reporting loss, and the per household value of livestock lost in terms of rupees. It is generally observed that loss of livestock takes place because they are not moved out at the time of disaster threat, or else because people flee the area, leaving their livestock tied up or enclosed, with no means of escape. In this light it has been observed that in case of the floods, the loss of livestock is usually low in areas with high flood zones, because the people expect a disaster, and move out their livestock in time. Losses are high in low flood zones where severe floods are not so frequent, and when they come, they take the people by surprise, and they are not able to move their livestock out in time.

14.4 DAMAGE REPORTS

There is a clearly defined sequence to the process of managing information. In this sequence, each step is as important because on it depends the effectiveness of the subsequent step. The information at various stages of the disaster assessment process is in the form of different reports. The reports vary in terms of their timing and detailing. *The Major Types of Reports are:*

Flash Report (sometimes called First Information Report or SOS Report)

Flash Report should be submitted very quickly. Its purpose is simply to confirm that the disaster has taken place and that steps are being taken to cope with it and to give a first indication of the sort of external relief that might be required, and to inform the sources that further reports would follow shortly.

Initial Report

Initial Report should follow the flash report as soon as possible (within a matter of hours).

Its purpose is to inform the recipients of the severity of the disaster and, more importantly, by relating the severity of the disaster to coping capacities, provide the information needed to start mobilising resources from outside the affected area for timely help. The report should therefore, briefly summarise:

- The severity of the disaster (without necessarily providing precise figures)
- Actions being taken locally
- Local coping capacities (including locally available resources)
- The immediate priorities for external relief, where it is required and in approximately what quantities
- The best logistical means of delivering that relief, and
- a forecast of possible future developments including new risks.

As per the situation, the needs and priorities will change over time. An assessment only describes the state of affairs at the time the assessment is made. An initial assessment should, therefore, also establish the system for subsequent reports.

Interim Report

Interim Report should build on earlier reports providing additional and more precise information. To begin with interim reports should be submitted every 24 hours at the same time every day (the time being determined by the recipient according to needs) and thereafter, at intervals decided by the recipient. As time goes by, the emphasis of interim reports shifts from the needs for relief to the needs for rehabilitation and reconstruction (for example, repairs to damaged structures, restoration of agriculture, animal husbandry, fisheries and industrial production). It is not necessary to repeat what has already been said in earlier reports unless the earlier details require updating. Interim reports should provide forecasts (with inputs from specialists and people who have experience of previous disasters) and highlight information, which may not otherwise be obvious to the recipients, for example:

- Potential problems
- Changes, patterns, trends and indicators
- Particulars of especially vulnerable groups, and any other special concerns.

Specialist or Technical Reports

They provide supplementary technical details by/for specialists (for example, engineers and officials responsible for emergency health care).

Final Report

This will be a summary of:

- What happened;
- How the response was managed; and
- The lessons learned

In preparing a report, the writer should put himself in the position of the people to whom he is reporting and ask himself, "What do they need to know in order to meet their responsibilities and to make the right decisions?" A report should not be packed with unnecessary data, nor should it be delayed because of insufficient information. It is better to say, "we do not have as much information as we would like but, on the basis of what we do know and our experience, in broad terms, the situation is as follows and we estimate the needs to be in the following range... we shall provide more details as soon as we can". The details provided in reports should be consistent. Conflicting reports from different sources can cause confusion. Desirably, reports from one level of administration to another should be in a consolidated form.

Reporting Formats

Given that reports will be received from many sources, it is essential that their formats be standardised so as to facilitate the process of analysis and collation. Likewise, there should be a common understanding of the terminology used. It is therefore better, that the recipients rather than the writers design the formats. This will ensure that the information is presented in the way that is most helpful to the people who have to act upon it. Reports should be a balance of narrative, data and graphics, and they should be formatted so that they can be transmitted electronically. Formats should be as simple as possible and should, like check lists, guide the reporter (who may be inexperienced in organising disaster response operations) through the sequence of stating the problem, identifying the current status of the response, identifying unmet needs (shortfalls or gaps) and decision-making.

To keep the formats simple it is better that they are presented in a series of separate parts. This will also make it easier for the recipient to distribute the parts for action by different desk officers. Suggested parts might include:

- Evacuation
- Search and rescue
- Protection
- Medical and Health
- Shelter and clothing
- Food (including cooking utensils and cooking fuel)
- Water
- Sanitation
- Lifeline systems (communications, power supplies, transport, etc).

The person responsible for completing each part should be clearly designated. Each part should indicate the need for relief workers, supplies and relevant logistical requirements. Unless otherwise stated, the provider should assume that the relief he supplies must be sufficient (for example food and accommodation for relief workers, transport and drivers, fuel, storage, maintenance, etc). It is often helpful to indicate what is not needed (which also shows that that particular item has not been overlooked).

Quantification of Needs

Needs should be communicated in as precise terms as possible, possibly quantified. As articulated in the Asian Disaster Preparedness Report on Damage Assessment Needs, (2000).

- X Search and Rescue Teams per Y missing people
- X items (plastic sheeting or cooking sets) per family
- Shelter for x percent of homeless people (on the assumption that many will have found their own shelter with neighbours or family members further a field)
- X grams of staple food per person for Y days
- X grams per child per day for Y days (for supplementary feeding)
- X litres per person for Y days.
- X tons/litres to create reserves.

The terminology used should be precise, for example, 'damaged' should refer to some predetermined criterion to describe the degree of destruction to a specific 'element; it should not be a generalised description that does not communicate the real damage.' For example, in terms of *usability*, it could be:

100 per cent damage: Structure is unusable; cannot be repaired.

- > 75: Major structural damage, Unsafe for use, Repairable within 1 month.
- > 50: Significant structural damage, hence, unsafe for use. Repairs will take more than one week.
- > 25: Some structural damage but safe for limited use, Repairable within 1 week.
- < 25: Minor structural damage: usable.

Correct estimations should be communicated to international donors so that right kind of assistance in requisite measure reaches the needy. Timing is important since procedural formalities such as customs clearance, etc. take in time. Officials carrying out assessments should be properly trained in the job.

Example from Aceh, Indonesia

The International Organisation of Migration and its partners conducted a damage assessment of 600 villages in 28 sub-districts at the request of the government of Indonesia in the aftermath of the December 2004 Tsunami. Select portions from the report are produced (IOM: 2005):

Housing and Settlement Areas

- Total Inspected Settlement Areas: 2976.49 hectares (15.8percent of which was totally destroyed and 14.6percent suffered major damage).
- Total Inspected Houses: 91,118 units (16.8percent destroyed and 21.3percent sustained major damage).

Public Buildings

- Total Inspected Health Facilities: 359 units (22.3percent destroyed and 26.5 per cent sustained major damage).
- Total Inspected School Buildings: 1,065 units (35.2percent destroyed and 36.2 per cent sustained major damage).
- Total Inspected Religious Buildings: 2,175 units (54.8percent totally destroyed, 22.1 per cent suffered major damage).
- Total Inspected Government Buildings: 468 units (22.9 per cent destroyed, 25 per cent sustained major damage).
- Total Inspected Markets: 196 units (53.6 per cent destroyed and 22.5 per cent sustained major damage).
- Total inspected shops: 1,013 units (48.3 per cent destroyed and 16.4 per cent sustained major damage).

14.5 CONCLUSION

Damage assessment is an important tool for information regarding the extent of a disaster's impact, and forms the basis for immediate rescue and relief operations, as well as long-term rehabilitation and recovery programmes. Rapid assessment techniques are applied for quick assessment and immediate relief. Detailed damage assessment is a follow up activity that is more elaborate and helps plan longer-term interventions. Damage is mainly in terms of *Human lives lost; Injuries, Disease, Livestock lost, Land* and its attributes such as crops and structures, *Infrastructure*, including buildings and roads etc. Assessment of damage is required in terms of area covered, intensity of damage, households affected, and finally all this has to be converted in terms of economic loss, and represented in terms of rupees lost and required for restorative activities. Damage assessment reports are prepared at various stages of the disaster response process, and provide various levels of details depending on the timing of assessment. It is always advisable to have advance preparedness of damage assessment and reporting systems, and to have consistency in the approach and the formats of the damage reports. This goes a long way in ensuring good information communication leading to rapid and efficient disaster response.

14.6 KEY CONCEPTS

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|--------------------------|---|
| Assessment report | : Assessment Report gives information about the nature and extent of damage to specific 'elements at risk', <i>animate</i> (human and livestock population), and <i>inanimate</i> (houses, buildings, infrastructure) to communicate precise requirements to the government and other national and international agencies involved in relief, and long term preparedness. |
| Damage scenario | : Description of the location of the impact of a disaster and description of the extent of damage from it, to each specified element at risk, involving physical |

infrastructure, people and livestock make up the damage scenario. Real time data regarding disasters is communicated from the site of impact which aids/forms the basis of subsequent disaster preparedness/planning.

- Detailed assessment** : Assessments are not attempted in terms of gross averages, rather in terms of detailed figures as, for example, the number of houses damaged; to what extent; repairs/replacement required; number of injured; kinds of injuries suffered; in exact figures; the medical assistance required accordingly, etc.
- Rapid assessment** : *Base line data (existing information)* on disasters is combined with *real time* information from the impact scene during disasters to communicate needs and procure supplies on time from different sources, national and international. Rapid assessment requires good logistics and expertise of personnel.
- Rehabilitation plan** : Based on needs articulation with active ‘consultation’ with communities, rehabilitation plans are prepared as per feasibility and practicability. Rehabilitation plan is important since vulnerability conditions need to be rectified, henceforth, and not reinforced as might happen in case of unplanned restoration, in settlement types and construction, site selection etc. Livelihoods have also to be arranged for. Hence, both physical and socio economic vulnerabilities are tackled in rehabilitation plans.
- Reporting format** : The sequence in which information in a report is communicated is called the *reporting format*. Format is significant because needs are to be arranged as per criticality and communicated to aid agencies, in order of priority such as: evacuation, search and rescue, medical, protection, if law and order were disturbed, shelter and clothing *et al.*
- Rescue and relief plan** : Based on real time data, subsequent rescue and relief plan can be organised. In case of lack of preparedness on the part of the administration, rescue and relief is a hastily arranged /unplanned undertaking. However in subsequent disasters, planning is imperative, to minimise loss of life at least, if not property.
- Silt** : Silt is fine dirt that is suspended in water. Siltation is the build-up of silt that is suspended in rivers or other bodies of water.
www.enchantedlearning.com/subjects/rainforest/glossary/indexs.shtml

14.7 REFERENCES AND FURTHER READING

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14.8 ACTIVITIES

- 1) With the guidelines given in the Unit, prepare a rapid and a detailed damage assessment form. List the skills required in the assessment team members to be able to carry out the assessment as per your forms.
- 2) Prepare specimens of *Flash*, *Initial*, *Interim* and *Final* report. Discuss how the depth of information increases with time, and how the teams need to get more specialised and require more resources for reporting.