II. THE IMPACT OF DISASTERS ON WOMEN

1. Introduction

The differential impact of disasters on women is a subject new to the Handbook. Its inclusion partly reflects a growing awareness in the international community that full development can only be achieved when women and the resources they represent are fully integrated in the development process and are empowered to improve the economic, social and political conditions of developing countries within a framework of sustainable development.[1] This addition also, and perhaps chiefly, reflects an understanding that men and women reveal vulnerabilities peculiar to their sex when confronted by disaster situations. In the face of this reality, it is essential to keep a clear gender focus to be able to support women facing a disaster and to reinforce their capacity to overcome these situations. Such an awareness can reshape reconstruction tasks or projects.

Rather than making the differential impact of disasters on women and their role in reconstruction a separate sector in this analysis, we treat it as a broad theme that cuts across the entire spectrum of social, economic and environmental sectors. Similarly, this theme should not be considered the exclusive province of women, nor should analysis of such issues be relegated exclusively to a team member chosen to conduct gender analysis. Instead, it should be seen as a social subject of multisectoral scope on which all specialists in each discipline must cooperate.

Just as a post-disaster reconstruction programme contains projects meant to re-establish production in a given sector, it must contain projects addressing the specific needs of vulnerable social groups. Such initiatives make it possible to mend the torn fabric of society while facilitating economic recovery. It is thus essential to determine the specific impact on the women of an affected country or region in order to design actions and projects that help to reduce their opportunity cost and increase their ability to recover. Disasters should also be seen as an opportunity to improve pre-existing conditions, including sex equity. Reconstruction, therefore, should not be thought of simply as a process of replacing what has been lost, but also as an opportunity to perform actions that make the most underprivileged groups less vulnerable, favor sex equity and improve living conditions for women, especially those who are heads of households.

1 See, for example, page 14 of Directrices y guía de conceptos del Comité de Ayuda para el Desarrollo sobre la igualdad entre mujeres y hombres, published by the Office for International Cooperation and for Latin America, Ministry of Foreign Affairs, Madrid, 1998.

One of the consequences of a disaster is the decapitalization of women and the reduction of their share of productive activities in the formal and informal sectors. Not only do they sustain direct damages or production losses (housing and means of production), but they also have relatively high opportunity costs because they lose income when they have to apply themselves temporarily to unpaid emergency tasks and an increased amount of unpaid reproductive work, such as caring for their children when schools are closed because they are being used as shelters for disaster victims.[2] Such reproductive work is usually granted a lower status than paid work because of the greater physical toll that it takes on women. It is also a continuous job, without weekends off or vacations, which limits women's mobility and can sometimes even prevent them from exercising their rights as citizens.[3]

Regardless of who the head of the household might be, women's contributions to family budgets are as important as men's. Although a woman might not hold a paid job, she may generate household income from a variety of informal sector activities, whether from the backyard economy or from a small home-based business, thus allowing her to combine productive tasks with reproductive ones. Activities of this sort (both productive and reproductive) are not included in official national accounts. However, if the income from them were to be taken into consideration, we would see that men and women more evenly contribute to sustaining a household.

Although the differential impact of disasters on women should be treated transversally throughout the damage assessment (both in their sectoral and geographic dimensions), we have chosen to handle it on two levels in this Handbook. The first is by including in each sector (whether social, economic or environmental) an additional section about the way in which a disaster's differential impact on women should be assessed. The second is to include this separate chapter on how to obtain a preliminary estimate of the total impact of a disaster on women and how to orient reconstruction projects towards them.

It must be clearly borne in mind (and a mention made of the fact in the assessment report) that this transversal assessment is not fully comparable to overall economic impact findings inasmuch as some valid parameters for the assessment of the impact on women are not included in national accounts. It is also important to avoid problems of double accounting by simply folding the impact on women into the other sectoral assessments, which should have already contemplated such damage and losses.

2 Reproductive work is defined as activities required to renew the work force (child care, education of future generations of human resources, provision of meals, etc.), ensure the availability of its productive members (housekeeping, provision of meals, personal care and attention in home and community) and care for those who are no longer active members of the work force because of age, sickness or handicap.

3 Gálvez P., *Thelma, Aspectos económicos de la equidad de género*, p. 20, Serie Mujer y Desarrollo No. 35, ECLAC, Santiago de Chile, June 2001.

2. The overall impact of a disaster on women

Each sectoral specialist should produce the most detailed information possible needed to ascertain a disaster's overall impact on women. The following is a description of one approach to measuring that impact. As in the other sectors covered in the Handbook, damages are classified as direct (i.e., on property) or indirect (i.e., on economic flows).

a) Direct damages

The quantification of all the direct damages sustained by women should take into account all the property they possess.[4] When the head of the household is a woman, this covers loss of or damage to the dwelling itself, as well as household furnishings and appliances. If she runs a home-based workshop or micro or small business, the assessment should include its equipment and machinery, as well as any other productive property she owns. It should include her farm animals, fields and crops if she is engaged in activities in the so-called backyard economy. In all of the above cases, evaluations should include stocks of goods produced, whether stored at home or nearby.

Damage estimates for such property belonging to women will come directly from the sectoral assessments, in which damages will have been broken down by sex. Only the part that refers to damage in the private sector will be used. For this reason, the women's specialist should refer to the corresponding chapters in each relevant sector and co-operate directly with each of the sectoral specialists in estimating and breaking down the data.

b) Indirect losses

While the Handbook considers ways of estimating most indirect losses by following the instructions for separating damages by sex, there are also indirect losses that only affect women, namely, those that are related to the increase in reproductive work created by the disaster and its aftereffects. Therefore, a methodological innovation is required.

Indirect losses sustained by women have four main components: loss of productive employment outside the home; loss of household production and income, including that of the backyard economy and of small or micro - businesses run by women from home; the increase in reproductive work; and other damage of a financial nature stemming from outstanding debts or loans.

i) Loss of productive employment outside the home and related income. This refers to the temporary loss of a paid job that a woman holds outside her home, whether its nature is domestic, industrial or commercial or, for that matter, technical, professional or executive. Such temporary unemployment stems from damage caused to formal production systems, and its duration will depend on the time needed to re-establish or reconstruct them.

4 The backyard economy includes the rearing of poultry, goats, sheep and pigs, as well as the benefit obtained from milk, eggs, wool, etc. It also includes fruit trees and produce grown on small plots located near the home.

Once again, estimates under this heading should be taken directly from the sectoral assessments or from the employment assessment, and the women's specialist should cooperate with the sectoral specialists to facilitate the breakdown of damage by sex.

In any case, the value of this indirect damage is obtained by multiplying the number of days or weeks during which remunerated employment is interrupted by the average unit wage for each level of income. Unit wages should be those used for each of the sectors. (The sources from which they can be obtained are described in the relevant chapters and are not repeated here). Obviously, the period of temporary unemployment for women should coincide with that used for analysis purposes in the other sectors.

ii) Loss of household production and income. Here we strive to estimate the temporary loss of production and income from home-based women's enterprises, regardless of whether the head of the household is a woman. These temporary losses include those sustained in the backyard economy and by micro and small enterprises run by women from their homes.

Partial estimates of temporary losses in the backyard economy are made by either the housing or the agriculture specialist, who must work with the women's specialist to estimate the losses for each sex and to make a joint recovery-time estimate for the activity in question. A sampling of affected women is also needed to determine whether the estimates made by the sectoral specialists include all the components of the backyard economy or whether additional estimates will be required.

Production losses in formal sector small and micro businesses are normally assessed by industrial, commerce and services sectors analysts. The employment specialist cooperates closely with them to estimate or measure the unemployment or temporary loss of income caused by the temporary interruption of production in these areas. The women's specialist should also work closely with those analysts to separate this indirect damage by sex. As with the backyard economy, it is useful to undertake a sampling of the affected women to ensure that all losses have been included and to determine whether the estimates of the sectoral specialists should be supplemented with additional estimated data from the sampling.

Similar cooperation between the women's specialist and those focused on industry, commerce and services is also necessary to assess the lost production in women-owned, home-based small and micro businesses in the informal sector that may have been destroyed or damaged. The method for estimating or measuring losses of this sort is described in the relevant chapter. The same specialists should work together to estimate the time it will take for production to recover.

iii) Increase in women's reproductive work. Disaster situations always bring an increase in women's unpaid reproductive work. The greater physical workload and emotional toll must be quantified if the total impact of a disaster on women is to be ascertained. This task is the responsibility of the women's specialist, who may require support from other members of the assessment mission in the form of relevant information about each sector's activities, the way they have been affected and, most importantly, how long women's increased reproductive responsibilities are likely to last.

Estimates of the increase in women's reproductive work should be made in comparison to a baseline situation, which has to be established for each particular case. Different patterns of reproductive work may be found in the same country depending on the customs or environmental and spatial conditions (e.g., urban and rural) of the affected areas. It is necessary to make a list of common forms of reproductive work activities, for which analysts must examine the relevant literature, speak with local specialists and undertake a quick sampling, when feasible. If no such quantitative information is available, data can be obtained from a sampling of affected women; failing this, one may assume that they dedicate at least eight hours a day to this unpaid work.

Later it will be necessary to determine the new pattern of reproductive activities that women have to perform as a result of the disaster, based on either representative samplings or, if this is not possible, estimates. In addition to the usual baseline activities cited previously, this assessment should consider that women have assumed new activities connected with the performance of emergency-related tasks, rehabilitation and reconstruction, and that other activities they performed previously will now take longer.

Typical examples of reproductive tasks during the post-disaster stages are volunteer work in refugee camps and time spent queuing to receive food. When gauging the increased time devoted to household work one should include the additional time spent hauling water and collecting firewood because usual sources have been damaged or curtailed; collectively preparing meals in refugee camps; caring for children whose schools have been closed; purchasing goods that require transport along roads in bad state of repair; and so forth.

By comparing the time dedicated to reproductive work, in the post-disaster situation with the normal or baseline situation, it is possible to determine the additional time (with the appropriate disaggregations or spatializations) women spend in reproductive work every day due to the disaster.

This calculation should be expressed in monetary terms; perhaps the only way to accomplish this is to make a suitably adjusted comparison with the value of productive work. For example, the average monthly wage for women (separated at least into urban and rural wages) could be divided by 30 eight-hour days instead of by 22 working days.

To determine the total amount of the disaster-related increase in women's reproductive work, one should estimate the duration of the abnormal situation, which will undoubtedly vary for each activity, area or sector, depending on the type and severity of the damage. The women's specialist should cooperate closely with each of the sectoral specialists to ascertain, or at least estimate as precisely as possible, the different factors that will determine the duration of each situation that increases women's reproductive work.[5]

5 For example, the time needed to restore the electricity or water supply and to refurbish housing (whether rural or urban) or schools is a key determinant, since these factors force women to spend more time on reproductive work.

Once the value of the additional time spent in reproductive work and the duration of the different post-disaster recovery situations have been ascertained, it will be possible to estimate the total indirect cost arising from the increased reproductive work that can be validly attributed to the disaster.

Care should be taken to avoid double acounting. When a disaster forces a woman or group of women to temporarily perform reproductive rather than productive work, only the income lost as a result of being temporarily suspended from paid work should be taken into account. The lost pay will undoubtedly be higher than the value of the temporary increase in reproductive work.

iv) Other indirect damages. Women frequently purchase goods through formal or informal credit as a way to increase their and their families income or to improve the quality of life, Such goods might be damaged or completely lost because of a disaster before the credit has been completely repaid.

Strictly speaking, to avoid double accounting when the loss of a good purchased in this way is already recorded as part of direct damages to family property or housing one should not add the amount of the outstanding balance of the credit to the value of the lost goods (as housing, trade, industry or services specialists routinely do). It is, however, valid to include penalty interest that may be charged for late payment of the outstanding balance until the woman once again begins to earn her normal income. A further item that could be recorded under the heading of lost goods is the higher amount of interest that a woman would have to pay if she were to refinance the debt so as to include not only the outstanding balance, but also new funds with which to buy new goods to replace the goods that were lost.

An example of how to assess the impact of a disaster on women is presented in Appendix XIV. It is based on information obtained during the earthquakes that occurred in El Salvador in early 2001.

3. Sources of information

Basic information on women's participation in social and economic activities can usually be found in population censuses. In many Latin American and Caribbean countries, the 2000 censuses have already been started or completed. If the results of these recent censuses are not available, specialist can use information from the most recent household surveys, which are regularly carried out in the countries. Information from both censuses and household surveys can be obtained from each country's statistics office.

A second local source of information on women's participation in development activities is the Human Development Report published annually by the United Nations Development Programme (UNDP). This can be obtained from any local UNDP office.

Finally, national universities and organizations that promote sex equality usually have a large amount of relevant documented information. The gender specialist should also consult these organizations to obtain additional relevant information and to elicit their assistance for any rapid surveys or samplings that may be needed during the assessment.

Basic information on the subject may also be found in the ECLAC Annual Statistics, which offers comparable data from different countries. Further information about populations and their characteristics appears in the publications and on the web page of the Latin - American Demography Center (Centro Latinoamericano de Demografía – CELADE). Updated country information from the Gender Index System (maintained by ECLAC's Women and Development Unit) is available at http://www.eclac.org/mujer/.

CELADE's Redatam software uses information from the censuses and household surveys of a country or any of its geographical or political subdivisions, thus enabling the specialist to determine the distribution of any variable to be analyzed. It is easy to use, and its usefulness in assessing the impact of disasters was demonstrated in the 1999 flooding in Venezuela and the earthquakes in El Salvador in January-February 2001.

APPENDIX XIV
A REAL CASE EVALUATION

This appendix describes the assessment of the overall impact on women of the earthquakes that affected El Salvador in January and February 2001.[6] It is based on information described in documents prepared by ECLAC for each of these events, as well as on information obtained through a sample survey undertaken by a consultant on gender issues who was part of the ECLAC assessment team.[7]

1. Assessment of direct damages

The direct damage assessment is based on individual assessments made by the specialists in each of the affected sectors. As we briefly describe below, several different procedures and sources of information were used to prorate the value of direct damage between sexes.

a) Housing

The method used to place a value on direct damage caused to women's share of housing was to identify the amounts contributed by each gender to the household's total income. An alternative would have been to try to obtain figures on the ownership by sex of each affected dwelling, but this would have been too time consuming and would not necessarily have provided a fair view of the way in which the cost of the dwelling was financed. A previous nationwide study revealed that on average women's contribution to the home was equal to or greater than men's in 49% of urban households and in 56.6% of rural households.

Once the amount of direct damage to urban and rural dwellings (including furniture, other goods and appliances) had been ascertained and multiplied by the above coefficients, it was estimated that damage to women's household property amounted to 146.1 million dollars. ECLAC's methodology for assessing housing damage contemplates 70% to 80% of lost or damaged assets in women's backyard economy, so care should be taken to avoid double accounting later on.

b) Industry, trade and services

In this case, use was made of available statistics on women's share of the ownership of industrial, commercial and service establishments. These showed that women owned 40% of small and micro industrial businesses, 60% of commercial businesses and 71% of service businesses. Large industrial and maquila businesses were exclusive male domains.

---

6 ECLAC, *The January* 13, 2001, *Earthquake in El Salvador: Socio-economic and Environmental Impac*t, (LC/MEX/L.457), Mexico City, February 21, 2001, and ECLAC, *El Salvador: Assessment of the Tuesday January 13, 2001, Earthquake*, (LC/MEX/L.457/Add.2), Mexico City, February 28, 2001.

7 Arenas Ferriz, Angeles, *Estimate of Damage to Production Activities of Women who Lost Their Homes and the Shadow Value of Their Work in the Emergency and Rehabilitation and Reconstruction Tasks* Madrid, 2001.

Once the specialists for each of these sectors had estimated the value of property lost in each of the subsectors or activities where women held a significant share, it was multiplied by the above percentages. On this basis, it was calculated that total damage to women's share of the property in these sectors amounted to 117 million dollars.

c) Backyard economy

This heading includes the women-owned assets located at home that are used to produce foodstuffs for the family's own consumption, as well as for occasional sale. A relatively large percentage of these losses was already measured in the housing sector for urban areas and in the agricultural sector for rural areas.

The housing and agricultural sector specialists had estimated the value of the loss of productive assets and of domestic animals in homes. Nevertheless, a detailed analysis, including information from a survey among affected women, showed that damage to backyard economy assets had not been included in sectoral estimates and that their value would amount to about 20% of the damage to household goods and appliances in the housing sector, plus a similar percentage for damage to sheep, goats and pigs. The direct loss to backyard economy assets was estimated at 37.7 million dollars.

2. Indirect losses

a) Loss of employment outside the home and related income

Information about the number of jobs lost because of damage caused by the earthquake was available because the employment specialist worked together with the sectoral specialists to develop these figures. The UNDP's Human Development Report for 2000 was the source for data on women's share of jobs in each of the productive sectors and their average monthly income figures.

The survey undertaken by the women's specialist was a source of additional information, especially about women workers who lost their jobs; it corroborated, and in some cases supplemented, the estimates made by the sectoral specialists.

The available information covered jobs lost by women in assembly plants and in the agricultural sector, specifically in activities related to coffee and fisheries. In the case of women domestic workers, rough estimates were made based on the assumption that 15% of the women workers in the 150 660 homes destroyed had lost their jobs. The findings of the survey corroborated these figures. In each case, the urban or rural monthly wage was used, as appropriate. When calculated over the five-month period required for the most immediate rehabilitation and reconstruction activities, this yielded the results shown below:

	Months	USD/month	Millions of USD
Agriculture	3,700	111.03	0.4
Small, micro, med. bus.	105,750	226.60	24.0
Maquila	…	226.60	…
Domestic service	45,400	226.60	10.3

Therefore, the total amount of income from paid employment lost by women was estimated to be 34.7 million dollars.

b) Lost production in the home

For this heading, it was necessary to combine some of the lost-production data from the sectoral estimates with data obtained from the survey of affected women.

Specifically, estimates of backyard economy production losses, based on information obtained from the survey, were incorporated after verifying that they had not been included in the calculations by productive sector specialists. Future losses in backyard economy production for the five-month period were estimated at 25 million dollars.

A similar calculation was made to estimate losses in home-based productive activities (the small workshops or micro businesses operated by women from their homes). The information obtained from the survey of affected women made it possible to make a preliminary estimate of 91.8 million dollars, from which was deducted the amount of losses already measured and recorded by the specialist in the commerce, industrial and services sectors for small and micro businesses not based in the home (24 million dollars). In other words, this type of home-based activity was estimated to have lost production over a five-month period worth 67.8 million dollars.

Estimates of the increased amount of reproductive work among affected women were made based on survey data that revealed that urban and rural women in El Salvador devote an average of eight hours per day to reproductive work, over and above the time that they spend on their productive activities. The survey also showed that during the five-month rehabilitation and reconstruction period, women's daily reproductive work swelled to 14 hours in the urban sector and to 16 hours in the rural sector as they queued for food, helped to take care of children, the aged and sick, and obtained water from more distant sources.

A value of 1.29 dollars per hour was set on urban women's time. This figure was calculated by dividing the average urban monthly wage by 176 (eight hours per day for 22 days a month). In the case of rural women, a value of 0.46 dollars per hour was adopted. The latter figure was obtained by dividing the average rural monthly wage by 240 (eight hours per day for 30 days a month). These estimated losses amounted to 276.5 million dollars.

c) Other indirect losses

The amount of penalty interests that women would will have to pay because their earnings were significantly reduced during the period of rehabilitation and reconstruction was calculated on the basis of information gathered during the survey with regard to their outstanding credit balances.

This showed that 43% of women in the urban sector had an average debt of 240 dollars, while 35.5% of rural women had an average debt of 1 600 dollars. When a penalty interest rate of 3.5% was charged on these amounts for five months, the loss to the women was estimated to be 21.1 million dollars.

3. Summary of damages and losses

In the following table, the cost of direct damage to women's property has been added to formal and informal income lost by women. The result is the total amount of damage sustained by women.

Table 1

Type of damage	Amount, millions of USD
Direct damage	***300.8***
Housing, furniture and appliances	*146.1*
Industry, trade and services	*117.0*
Backyard economy property	*37.7*
Indirect damage	***414.4***
a) Loss of employment outside the home and income there from[8]	*(34.7)*
Lost production from home-based activities	*116.8*
Backyard economy	*25.0*
Informal micro and small businesses	*24.0*
Productive activities	*91.8*
Increase in reproductive work	*276.5*
Other damage	*21.1*
Total damage	***715.2***

These estimates show that total damages sustained by women in El Salvador because of the earthquakes would amount to 715.2 million dollars. Forty-two percent (300.8 million dollars) of the total represents decreases in assets owned by women before the disaster, while indirect losses of production and income account for the remaining 58% (414.4 million dollars). Total indirect losses totals (duly subtracted from the figure for lost earnings through unemployment outside the home to avoid double accounting) were valued at 241.8 million dollars for increased reproductive work, 116.8 million dollars for informal and formal production losses and an estimated 21.1 million dollars in penalty interests on outstanding debts at the time of the disaster.

These figures apply exclusively to women in the private sector. If the prorated damage in the public sector of which women are also users were added, the total damage sustained by women would amount to 1.004 billion dollars, or 314 dollars per capita. These figures cannot be validly compared to per capita income or GDP, since they include values for items such as the backyard economy and women's reproductive time, which are not recorded in the national accounts.

8 This amount should be deducted from the total so as not to partially duplicate the figure for the increase in reproductive work.

III. DAMAGE OVERVIEW

1. General comments

Once the social, economic and environmental impacts of a disaster have been assessed, a recapitulation of damages is needed to arrive at an analysis overview, which marks the culmination of the assessment and lays the basis for the subsequent macroeconomic analysis. It should include the total amount of damage and losses, together with breakdowns that identify the most affected sectors, geographic areas and population groups. In addition to quantifying the total impact in monetary terms, this overview must make it possible to identify the sectors and geographical areas requiring priority attention, thus serving as an invaluable input for defining reconstruction strategies, plans and projects.

Based on the sectoral estimates made using the uniform assessment methodology discussed in previous chapters, 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 taken to avoid double accounting: damage recorded in one sector must not 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 damage estimate includes only losses that can be measured in terms of national accounts. Other cases, such as the differential impact of the disaster on women or on the environment, require somewhat different estimation procedures.

Once total damage and losses have been estimated, selected breakdowns will be required to provide a complete overview of 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 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 facilitates projections 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. Indirect losses or effects reflect changes in economic flows that will be used by the macroeconomics specialist to project post-disaster economic performance in the affected country or region.

The breakdown into damage to assets and production, and on the one hand changes in costs and income in the provision of services, on the other, will enable a further analysis to identify asset losses, decreases in production, effects on national finances and the impact 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 at the time of the disaster.

These two types of direct damages must be estimated separately to allow for subsequent macroeconomic analysis. Indirect effects include future production losses, as well as higher costs and decreased revenues in the provision of services such as water and sanitation, electricity and transportation. Therefore, this second breakdown will provide a measure of total damage and losses of assets and production, as well as the indirect effects on the finances of the public sector and of both public and private enterprises that provide basic services.

The breakdown of the total damage into public and private sectors 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 reconstructing 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 how total damage was distributed among sectors in order to identify those which were most affected and which, therefore, should be given the highest priority in the reconstruction strategy and plans.

3. Net damages

Insurance of assets and production is becoming common 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 within subregions.[1] 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 foreign currency inflows in the form of reinsurance payments. This effect must also be estimated so that the macroeconomic specialist can use it in the subsequent analysis of future (national or local) economic performance.

4. The costs of reconstruction

As mentioned in the introductory chapter of this handbook, reconstruction costs are not equal to total damages. Damage is estimated as the present value of lost or damaged assets, whereas replacement must take into account price increases on construction and goods, as well as the additional cost of disaster prevention and mitigation measures. Therefore, the damage overview specialist must also determine total reconstruction costs using information provided by the sectoral specialists.

---

1 The degree of insurance coverage and a country's level of development would seem to be 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.

There is another noteworthy difference between the total amount of damage and the cost of reconstruction. 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 services. It 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 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 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 requires foreign cooperation. The magnitude of the disaster may be determined by comparing the total amount of damage and its components and macroeconomic variables, such as:

- Total amount of damages as a percentage of GDP;
- Total amount of production losses as a percentage of GDP or the country's exports;
- Total amount of lost assets compared to the annual rate of gross fixed capital formation, local construction sector output or the national debt; and
- 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.[2] This type of comparison also reflects the intensity of efforts that the country will have to make during recovery and reconstruction.

2 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.

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

The comparison between the amount of damage to assets and the annual gross rate of fixed capital formation indicates the additional effort the country will have to make in construction. The comparison with the construction sector's domestic output 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 how much debt will have to be assumed to finance the reconstruction effort.

Determining the amount of total per capita damage and the ratio of damage to per capita GDP provides an idea of the negative effects on the living conditions of the affected population. It also provides a means of comparing 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 allow one to determine the geographic distribution of total damages and identify the most highly affected regions or geopolitical entities that, therefore, must receive priority attention in reconstruction plans.

The damage overview specialist, in close cooperation 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. It is a good idea to produce maps 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 for defining 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 most highly affected population groups. These must include the lowest-income groups –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 and the population involved in micro and small enterprises.

APPENDIX XV
AN EXAMPLE OF DAMAGE RECAPITULATION ANALYSIS

The recapitulation of damages caused by the earthquakes that struck El Salvador on January 13 and February 13, 2001, is described below to illustrate the type of analysis required in this regard.

The total amount of damage and losses caused by the earthquakes of January and February 2001 in El Salvador was estimated at 1.6 billion dollars.

Of this amount, 58% (939 million dollars) consisted of direct damages, and the remaining 42% (665 million dollars) of indirect effects or losses. Thus, the country's assets sustained the greatest damage, with the rest affecting economic flows throughout 2001 and in subsequent years. The following table details the aforementioned figures.

Tabel A

SUMMARY OF DAMAGE CAUSED BY THE JANUARY AND FEBRUARY EARTHQUAKES IN EL SALVADOR
(Millions of dollars)

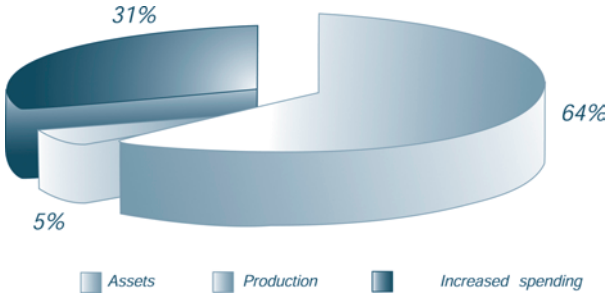
Sector and subsector	Damage			Property	
Totals	1,604	939	665	567	1,037
Social	**617**	**496**	**120**	**238**	**379**
Education and culture	211	190	20	69	142
Health	72	56	16	72	--
Housing	334	250	84	97	237
Infrastructure	**472**	**97**	**375**	**171**	**301**
Electricity	16	3	13	3	13
Water and sanitation	23	19	4	13	10
Transportation	433	75	358	155	278
Productive sectors	**339**	**244**	**96**	**15**	**324**
Agriculture and fisheries	93	39	55	13	80
Industry and comerce	246	205	41	2	244
Environmental affects	103	102	1	103	--
Other damages and expenses	73	--	73	40	33

Source: ECLAC estimates

The total amount described above can be broken down into the following types of damage or loss:

Type of damage	Millions of dollars
Asset losses	1,025
Production losses	84
Increased spending and decreased income	495

These figures reveal that most of the damage was to physical infrastructure and equipment (64% of total damage), followed by an increase in costs and diminished income in the provision of some services (mainly transportation) (31%) and losses in production (5%); this breakdown is presented in the pie chart below. This damage distribution coincides with the patterns expected of such geological phenomena.[3]



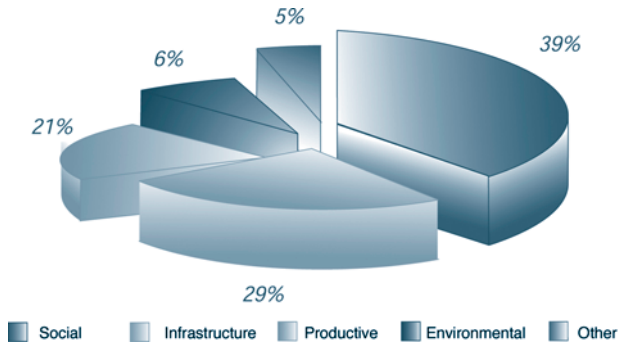
The fact that two-thirds of the total damage was to privately owned property and only a third to public properties is of special relevance, since this suggests characteristics the reconstruction program is likely to assume.

The distribution of total damage among affected sectors is as follows:

Sector	Damage, millions of dollars
Social	617
Infrastructure	472
Productive	339
Environmental	103
Other damages and costs	73

3 In the case of disasters caused by hydro-meteorological phenomena, most losses are in production activities. In this regard see Jovel, Roberto, Natural Disasters and Their Socio-economic Impact, in *ECLAC Review,* No. 38, Santiago, Chile, 1986.

As the following figure shows, social sectors felt the brunt of the impact (sustaining 39% of total damages), followed by infrastructure (29%), productive sectors (21%) and the environment (6%).



The hardest hit individual activities or sectors were transport and communications (433 million dollars), housing and human settlements (334 million dollars), industry and commerce (246 million dollars) and education and culture (210 million dollars). See Table A, above.

The total amount of damage (1.6 billion dollars) is by itself very high, but it must be put into context to better understand its impact on national economic development and the population's living conditions. Total damage was equivalent to 12% of the country's GDP and slightly over 40% of national exports for the previous year (2000). Damage to assets was the equivalent of 42% of the annual rate of gross fixed capital formation and about four times construction industry output.

The earthquakes' impact on the national economy obviously should not be underestimated, but nationwide data fail to fully convey the true dimension of the tragedy.[4] Most of the damage was sustained precisely by the social sectors –housing, education and health– and by the productive sectors of industry and commerce, in particular small producers and entrepreneurs and the lower-income strata of the population.

4 By way of comparison, 1988's Hurricane Mitch caused damages equivalent to 13% of the GDP of the entire Central American region. Moreover, reconstruction would have taken at least four years even if it had been possible to focus the construction industry's entire capacity on that endeavour.

Geographic or spatial distribution analysis also helps to demonstrate the magnitude of the impact of the disaster on the population. The following table presents such a breakdown for each department in the country, showing total and per capita damage, as well as the ratio between total damage and GDP in each of the affected geopolitical entities.

Table B

SPATIAL DISTRIBUTION OF DAMAGE CAUSED BY THE JANUARY 2001 EARTHQUAKES IN EL SALVADOR

Departament	Total damage, in million US$	*Per capita* damage US$ per inhabitant	*Per capita* GDP, US$ per inhabitant[5]	Total damage versus GDP,%
Ahuachapán	*20.3*	*64*	*2,242*	*2.9*
Cabañas	*3.5*	*23*	*2,191*	*1.1*
Chalatenango	*1.4*	*7*	*2,578*	*0.3*
Cuscatlán	*147.1*	*735*	*3,335*	*22.1*
La Libertad	*263.6*	*399*	*5,121*	*7.8*
La Paz	*270.5*	*943*	*3,020*	*31.2*
La Unión	*4.1*	*14*	*2,803*	*0.5*
Morazán	*0.8*	*5*	*2,475*	*0.2*
San Miguel	*47.5*	*101*	*3,526*	*2.9*
San Salvador	*199.5*	*103*	*4,142*	*2.5*
San Vicente	*243.7*	*1,533*	*2,671*	*57.4*
Santa Ana	*94.7*	*175*	*3,356*	*5.2*
Sonsonate	*127.0*	*289*	*3,252*	*8.9*
Usulután	*180.4*	*534*	*2,789*	*19.1*

Source: ECLAC estimates.

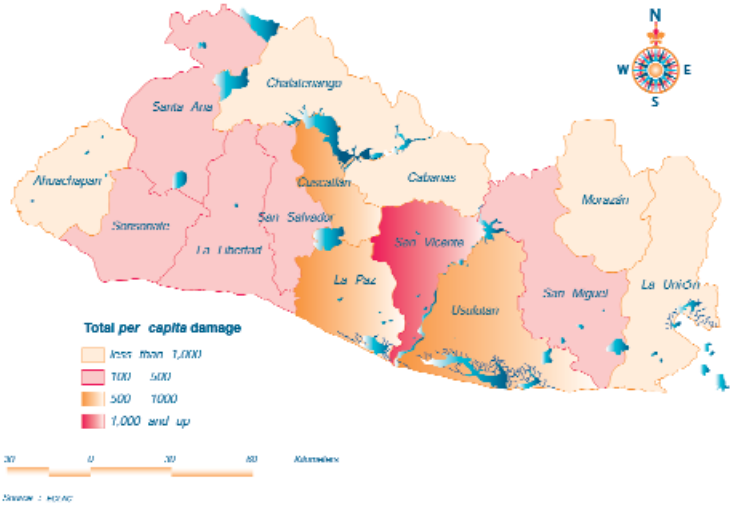
The preceding table shows that damages were most concentrated in the departments of San Vicente, La Paz and Cuscatlán, whose inhabitants sustained losses of between 1 500 dollars and 700 dollars, undoubtedly a very high percentage of their total assets. Inhabitants of the departments of Usulután, La Libertad and Sonsonate followed, in decreasing order of damage (see Table B and Map 1).

The geographic distribution of damage per inhabitant has both positive and negative implications. Most of the damage was sustained by the country's relatively more developed areas, which generally enjoy a greater recovery capacity than does the country's poorest departments (Cabañas, Morazán, Ahuachapán and La Unión). In other words, losses in human development did not greatly affect those departments where poverty is greatest (see Map 2).

Furthermore, reconstruction provides an opportunity to introduce mitigation measures that can include the provisioning of damage victims with housing and a means of production and income that is less prone to damage from future disasters.

5 United Nations Development Program (UNDP), Report on Human Development in El Salvador, San Salvador, 2001.

Map 1
GEOGRAPHICAL DISTRIBUTION OF DAMAGE CAUSED BY THE JANUARY AND FEBRUARY 2001 EARTHQUAKES IN EL SALVADOR
(Per capita loss in US per inhabitant)



We should note two negative aspects. First, the modest progress the country achieved in the recent past in human development indices has been erased in the departments most affected by the earthquakes. To put it differently, the geographical distribution of poverty has been modified by the disaster, with human development indices experiencing significant declines in the most affected departments. The new human development map for 2001 shows that the disaster pushed San Vicente, La Paz and Usulutan to join Cabañas, Morazán, Ahuachapán and La Unión in the country's lowest human development index category (see Map 3). Second, financial resources for reconstruction will have to be concentrated on the most affected departments, coinciding at least partly with areas where the greatest development investments are being made at the present time. This would entail a setback for poverty eradication in other relatively less developed regions.

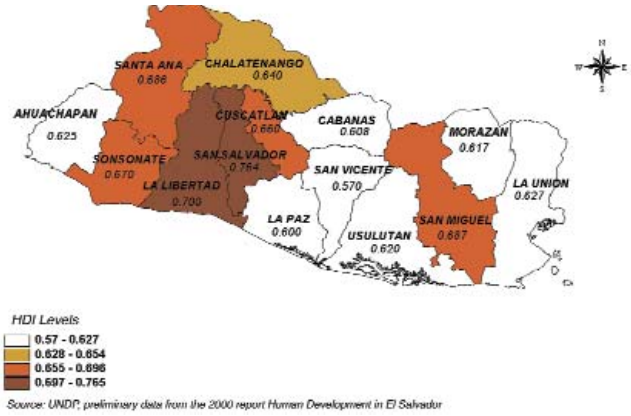
Map 2

IMPACT OF JANUARY 13, 2001, EARTHQUAKE: SPATIAL DISTRIBUTION ON THE HUMAN DEVELOPMENT INDEX BEFORE THE EARTHQUEAKES

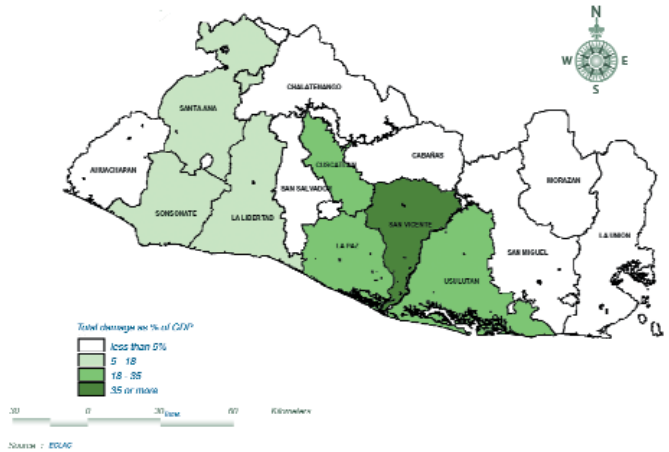
Source: UNDP, preliminary data from the 2000 report Human Development in El Salvador

The magnitude of damage –expressed as total damage as a percentage of GDP in the affected regions– was most severe in the departments of San Vicente (57%), La Paz (31%), Cuscatlan (22%) and Usulután (19%) (see Table B and Map 4) During a scant two minutes, the earthquakes caused the loss of a considerable portion of the annual GDP of these departments.

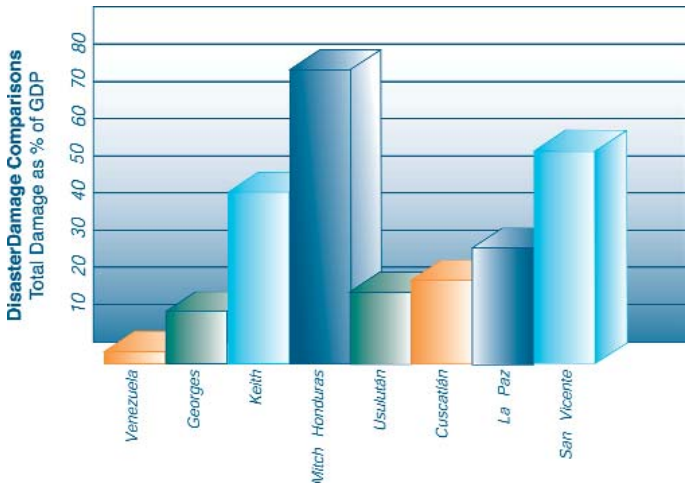
Map 3
IMPACT OF JANUARY 13, 2001, EARTHQUAKE: SPATIAL DISTRIBUTION OF THE HUMAN DEVELOPMENT INDEX (DHI) AFTER THE EARTHQUAKES



Map 4
GEOGRAPHICAL DISTRIBUTION OF DAMAGES CAUSED BY THE JANUARY AND FEBRUARY 2001 EARTHQUAKES IN EL SALVADOR



As the following figure indicates, the loss to GDP experienced in the hardest hit department (San Vincente) was greater than that registered in Venezuela from the floods of late 1999 or in the Dominican Republic in 1998 from hurricane Georges, and it is surpassed only by hurricanes Mitch in Honduras (1998) and Keith in Belize (2000).



By analyzing the absolute and relative earthquake-damage figures, we can identify several special disaster characteristics:

- A relatively high amount of damage, two-thirds of which corresponds to the private sector;
- Disruption and destruction of the highway transport infrastructure, thereby significantly increasing operational costs;
- Destruction or significant damage to housing and human settlements, especially in small towns and rural areas, thus aggravating existing deficits;
- Destruction or significant damage to education and health services, eroding the country's development efforts in these sectors;
- Damage to the production of micro, small, and medium-sized agricultural, industrial and commercial enterprises, while large-scale businesses in those same sectors were relatively unharmed;
- Significant damage to the environment, with considerable loss of land due to landslides and numerous hillsides that became unstable;
- A considerable concentration of damage in some departments, principally in the central part of the country;
- Significant losses in various departments, whether measured in per capita terms or in terms of the loss as a percentage of departmental GDP; and
- A reshaping of the poverty map, with several departments falling into the lowest human development index category.

However, the damage described above should also be considered within different contexts. In the first place, the property that was destroyed represents more than 40% of the country's gross annual formation of fixed capital, which provides an idea of the efforts that will be required for its replacement. Moreover, replacement costs will be notably higher than the value of the destroyed assets at the time of the disaster and are estimated at no less than 1.94 billion dollars. Although some of the construction industry's capacity was idle at the time of the disaster, its capacity is limited. We estimate that it will take between four and five years to replace all lost assets, and the population will have to endure significantly lower living conditions throughout that period.

In the second place, damage to transportation infrastructure is increasing cargo and commuter travel times, the additional costs of which are estimated at around 358 million dollars. Said costs will eventually have to be absorbed by the users, with the corresponding impact on the cost-of-living index. Similarly, despite emergency assistance received from the international community, the unforeseen costs incurred by the government both in the emergency and in reconstruction will result in increased fiscal deficits.

In the third place, production losses represent less than 3% of the country's exports, which might give the impression that the country's production capacity is virtually intact. Nonetheless, a good part of lost production is that of micro and small enterprises, earmarked for domestic consumption. Apart from a loss of income for those population sectors, this might result in shortages of various products on the domestic market, which would have to be imported.

In the fourth place, some of the damages caused by the disaster that occurred in El Salvador affect Central America as a whole, thus making this a subregional tragedy. With some parts of the Pan-American Highway left impassable, cargo and commuter traffic must take longer alternate routes, resulting in delays and increased transport costs for intra-regional trade. In addition, foreign tourists canceled reservations throughout Central American in the erroneous belief that damages widespread. Finally, the regional transformation and modernization strategy that the Central American countries have presented to the international community with the purpose of seeking partners to combat poverty will have to be modified to assign a greater priority to disaster vulnerability and disaster impact reduction so that Central America does not become less attractive to foreign investors.[6]

6 See Jovel, Roberto, et al., *Transformation and Modernisation of Central America in the XXI Century,* General Secretariat of the Central American Integration System (SG-SICA), San Salvador, January 2001.