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El Salvador

Damage, Loss, and Needs Assessment for Disaster Recovery and Reconstruction after the low pressure system associated with Tropical Storm Ida

Prepared by the Government of El Salvador with the support of the international community

November 2009



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- National Registry Center – *Centro Nacional de Registro (CNR)*
- National Center for Agricultural, Livestock and Forestry Technology – *Centro Nacional de Tecnología Agropecuaria y Forestal (CENTA)*
- Accreditation Commission – *Comisión de Acreditación (MH CDA)*
- Executive Hydroelectric Commission of the Lempa River – *Comisión Ejecutiva Hidroeléctrica del Río Lempa (CEL)*
- Autonomous Executive Port Commission – *Comisión Ejecutiva Portuaria Autónoma (CEPA)*
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- General Bureau of Civil Protection – *Dirección General de Protección Civil (DGPC)*
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- Salvadoran Institute for Women’s Development – *Instituto Salvadoreño para el Desarrollo de la Mujer* (ISDEMU)
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¹ Since its creation in September 2006, GFDRR has become an association of 25 countries and of regional and international organizations that are committed to aiding developing countries in reducing their vulnerability to natural risks and adapting to climate change.

- Wielinga, Doekle; Principal Specialist in Disaster Risk Management, GFDRR/World Bank (Washington headquarters)
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PRESENTATION

At the request of the Government of El Salvador, through the Secretariat of the Presidency (*Secretaría Técnica de la Presidencia -STP*), a joint post-disaster needs assessment (PDNA) mission was conducted from November 18 to December 4, 2009. The mission was composed of a team of national and international experts.

The assessment was conducted through the use of the damage and loss assessment methodology developed by the Economic Commission for Latin America and the Caribbean (CEPAL), and the assessment of humanitarian and community needs that incorporates methodologies of agencies of the United Nations System and UNDP for early recovery. The mission contributed elements for the government's Rehabilitation and Reconstruction Strategy and Plan.

With the government's leadership and in direct contact with the Rehabilitation and Reconstruction Committee,² as well as with the contribution of other relevant ministries and institutions, a detailed sectoral assessment was conducted. For this purpose, training and coordination workshops, convened by the STP were carried out; conversations were held with various ministers and field visits were conducted by specialized teams. On scientific matters, satellite images were used and a technical analysis of landslides was prepared by specialists of the Norwegian Geotechnical Institute.

This report presents the results of a comprehensive assessment, based on the information available to the mission members until the end of the mission. The opinions expressed do not jeopardize the Government of El Salvador or the institutions sponsoring and participating in it.

² Executive Decree No. 89, issued in the Presidential House on November 26, 2009 and published in the Official Gazette, volume 385, number 223 dated November 27, 2009, created the National Committee for Rehabilitation and Reconstruction (the Committee), formed by: a) the Technical Secretary of the Presidency of the Republic, who acts as its Coordinator; b) the Secretary of Social Inclusion; c) the State Ministers and Deputy Ministers; d) the General Director of Civil Protection and Disaster Prevention and Mitigation; and e) the heads of Autonomous Institutions. The Committee has the following duties: a) to define and oversee the rehabilitation and reconstruction strategy, which includes a medium- and long-term vision; one of its key components is disaster mitigation and prevention; and b) to establish the priorities to be addressed in the strategic context of rehabilitation and reconstruction.



The event that took place on this occasion is associated with heavy precipitation totaling over 450 mm in a three-day period (November 7 to 9, 2009), with a maximum intensity of 355 mm in a five-hour period during which the landslides and catastrophe occurred.



SUMMARY AND CONCLUSIONS

Through the use of the damage and loss assessment methodology developed by the Economic Commission for Latin America and the Caribbean (CEPAL) and the humanitarian and community needs assessment that incorporates methodologies of agencies of the United Nations System and UNDP for early recovery, the mission contributed elements for the government's Rehabilitation and Reconstruction Strategy and Plan.

With the government's leadership and in direct contact with the Rehabilitation and Reconstruction Committee, as well as with the contribution of other ministries and relevant institutions, a detailed sectoral assessment was conducted. For this purpose, training and coordination workshops convened by the STP were conducted and conversations were held with several line ministers.

The number of disasters generated by natural events in El Salvador, according to data from national studies and those collected in international databases, as well as evaluations conducted by CEPAL, shows the high risk that the country faces, especially due to its economic and social vulnerability. Historical data³ confirm El Salvador's high index of risk in the event of disasters and the heavy weight of climate events in this total, with costs in general not sufficiently measured. If database information is used, such as that from the Centre for Research on the Epidemiology of Disasters (CRED) at the University of Louvain in Belgium and the evaluations conducted by CEPAL over the years (since 1972), the country has had nearly 6,500 deaths, with an economic cost that is only partially assessed and that could be over US\$16 billion in 2008 dollars. Of these events, those of a climate nature generated over 62% of deaths and between 87% and 95% of impacts, according to the source. Due to the limitation of the CEPAL sample and the fact that the economic assessment is partial and generally limited when the complete damage and loss methodology has not been used, the estimated economic impact could be less than 68% of the impact that actually occurred.

The event that took place on this occasion is associated with heavy precipitation totaling over 450 mm in a three-day period (November 7 to 9, 2009), with a maximum intensity of 355 mm in a five-hour period during which the landslides and catastrophe occurred. This figure corresponds to nearly five times the average precipitation expected for the month of November. The lahars⁴ that hurled down over Verapaz, where the greatest numbers of deaths took place, occurred in the early morning of November 8.

Based on historical data, it may be inferred that critical situations for disaster events with a large number of victims occur with relatively high frequency: every 10 to 30 years in the country, due to climate events.

³ Ministry of Environment and Natural Resources (MARN), historical compendium of disasters in El Salvador 1900–2005, publication by D-SNET and UNDP, 2008 (ISBN 978-99923-868-1-1, see also OFDA CRED Emergency Events Database EM-DAT, at <http://www.emdat.be/>) and the assessments conducted by CEPAL since the 1970s in the country (www.cepal.org, click on "disasters" button).

⁴ Lahars are flows of mud, water and other materials. (See footnote #7 for a detailed definition.)

On the basis of families that lost their homes or were displaced from them in the emergency, and taking into account the income losses that occurred as a consequence of the disaster, it has been estimated that the population affected in a primary and secondary manner totals just over 122,000.

Based on the use of the disaster assessment methodology developed by CEPAL since 1972, it has been estimated that, besides suffering the regrettable loss of human lives, the value of damages and losses caused by the November 2009 disaster in El Salvador totals US\$314.8 million, which represent the equivalent of 1.44% of the country's gross domestic product (GDP). Of the entire economic effect, US\$210.7 million correspond to the destruction of assets (66.9% of total damages and losses), while the remaining US\$104.1 million represent changes in economic flows and include both production losses and higher service costs (33.1% of the total). Of the total amount of damages and losses, 63.3% (US\$199.3 million) refers to public property, while 36.7% (US\$115.5 million) refers to private property (see Chapter II, Table 7), a ratio that illustrates the relative effort that each of these sectors will have to make in recovery activities.

The magnitude of the disaster at national level is limited. However, when geographically more disaggregated values are examined, the tragedy caused by this event can be better visualized. It is worth noting that the impact of the disaster was concentrated in 5 of the country's 14 departments, accounting for nearly 85% of damages and losses. There is an inverse relationship between the higher value of damages and losses per person, and the relationship between these effects and the GDP, with regard to the current year's Human Development Index (HDI). This implies damages and losses to the livelihoods of segments of the population with high levels of economic and social vulnerability. These have been concentrated on the population that suffered the partial or total loss of their homes and assets.

Different types of needs with a different degree of urgency and duration are drawn from this impact profile. With information on the quantification of damages and losses, and information on the requirements expressed by the various sectors consulted, a table of recovery and reconstruction needs has been prepared, detailing by principal sectors the amounts needed for each type of intervention. In summary, the amount needed for recovery is estimated at US\$105.9 million, which would be used between December 2009 and June 2010, before the next rainy season starts in the country, while the total amount needed for reconstruction is estimated at US\$149 million, to be used between the end of 2009 and 2014 (see Chapter VI, Table 47). Added to these are immediate needs for early recovery and, in the short and long terms, for undertaking substantial risk reduction efforts.

The country needs to adopt an explicit risk reduction strategy in view of the recurrence of this type of phenomena and historical experience. Moreover, this event presents an opportunity to make significant changes in the pattern of spatial development and the development of economic and social sectors which must be given greater attention due to their potential and their vulnerability.

In effect, a strategic framework of risk management is recommended, combining specific elements found in El Salvador and lessons learned from international experience. The principles that underlie this framework are: (i) human loss and the economic impact of disasters may be reduced through pre-disaster planning and investments in prevention; and (ii) the strategic framework and the action plan are effective in terms of cost and implementation. The pillars of the Risk Management Framework and their description are presented in Chapter V.

I. DESCRIPTION OF THE EVENT

A. BACKGROUND

As indicated by the Bureau of the Territorial Studies Service (*Dirección del Servicio de Estudios Territoriales* -D-SNET) of the Ministry of Environment and Natural Resources of El Salvador,⁵ the country, “due to its geomorphology, geographic location and orography is exposed to threats of natural origin such as hurricanes, floods, earthquakes, landslides, volcanic eruptions, the phenomenon of the El Niño Southern Oscillation (ENSO–*El Niño/La Niña* phases), which, when they impact the territory, cause economic losses and damages to homes, infrastructure, transportation and agriculture, service interruption, etc.”

The number of disasters generated by natural events in El Salvador, according to data from national studies and those collected in international databases, as well as evaluations conducted by CEPAL, shows the high risk that the country faces, especially due to its economic and social vulnerability. Historical data⁶ confirm El Salvador’s high index of risk in the event of disasters and the heavy weight of climate events in this total, with costs in general not sufficiently measured. If database information is used, such as that from the Centre for Research on the Epidemiology of Disasters (CRED) at the University of Louvain in Belgium and the evaluations conducted by CEPAL over the years (since 1972), the country has had nearly 6,500 deaths, with an economic cost that is only partially assessed and that could be over US\$16 billion in 2008 US dollars. Of these events, those of a climate nature generated over 62% of deaths and between 87% and 95% of impacts, according to the source. Due to the limitation of the CEPAL sample and the fact that the economic assessment is partial and generally limited, when the methodology that counts both damages and losses has not been used, it is estimated that the reported amount of the economic cost could be less than 68% of the impact that actually occurred.

TABLE 1. COMPARISON OF THE IMPACT OF DISASTERS ACCORDING TO CEPAL AND CRED

| | Deaths | Population affected | Damages (CRED) | Impact (CEPAL) (in millions of US\$) |
|---------------------------------------|--------|---------------------|----------------|---|
| Total | 6,934 | 2,867,172 | 15,196 | 13,806 |
| Total climate events | 4,313 | 1,089,791 | 13,232 | 13,060 |
| Climate events with respect to totals | 62.20% | 38.01% | 87.07% | 94.60% |

Source: Prepared by the CEPAL Disaster Unit based on the database of economic and social assessments conducted in El Salvador and on CRED_EM-DAT data (<http://www.emdat.be/disaster-list>) and reliefweb.

⁵ Based on reports by the Bureau of the National Territorial Studies Service (D-SNET) of El Salvador, Report on flows of debris (landslides) in the cities of Verapaz, Guadalupe the outskirts of Tepetitán, November 2009, and with the contribution of the Norwegian Geo-Technical Institute (NGI).

⁶ Ministry of Environment and Natural Resources (MARN), historical compendium of disasters in El Salvador 1900–2005, publication by D-SNET and UNDP, 2008 (ISBN 978-99923-868-1-1; see also OFDA CRED Emergency Events Database EM-DAT, at <http://www.emdat.be/>) and the assessments conducted by CEPAL since the 1970s in the country (www.cepal.org, under “disasters”).

It is difficult to establish a trend regarding whether the recurrence or frequency of these events is increasing as a consequence of climate change processes, although their economic cost has undoubtedly grown exponentially. Even on a partial basis (only those events that the country's government has requested are evaluated), the average annual impact of this type of disasters is around 160,000 people affected, with damages of nearly US\$470 million and losses of nearly US\$220 million. Their weight in the GDP is 4.2%, while damages represent over 20% of gross capital formation (GCF). Although this average is biased by the large-scale events that occurred (Hurricane Mitch, the 1986 and 2001 earthquakes, principally), these evaluations do not take into account the “everyday disasters” or small-scale events that the country suffers each year—particularly recurring floods and landslides in the rainy season—, especially affecting the most vulnerable zones in urban areas and disadvantaged agricultural producers, on slopes and riverbanks that are regularly flooded.

TABLE 2. EL SALVADOR: STATISTICS OF EVENTS EVALUATED BY CEPAL, 1982–2005

| | Population affected | | Total (in millions of US dollars, 2007) | | | | Relation of total impact to preceding GDP | Damages with respect to preceding GCF |
|------------------------------------|---------------------|-----------|---|---------|--------|-----------------|---|---------------------------------------|
| | Deaths | Direct | Total | Damages | Losses | External effect | | |
| Total events evaluated | 3,385 | 3,648,343 | 15,763 | 10,743 | 5,020 | 3,357 | 32.3% | 160.5% |
| Average per event | 564 | 608,057 | 2,627 | 1,791 | 837 | 559 | 16.1% | 80.2% |
| Average per year during the period | 147 | 158,624 | 685 | 467 | 218 | 146 | 4.2% | 20.9% |

Source: CEPAL assessments (1982–2005).

B. NOVEMBER 2009 EVENT – CAUSES AND DESCRIPTION

The event that occurred on this occasion is associated with heavy precipitation that totaled over 450 mm in a three-day period (November 7 to 9, 2009), with a maximum intensity of 355 mm in a five-hour period during which landslides occurred and rivers overflowed their banks. This figure corresponds to nearly five times the average precipitation expected for the month of November. The lahars⁷ that hurled down over Verapaz, where the greatest numbers of deaths took place, occurred in the early morning (around 2:00 a.m. on November 8, 2009).

⁷ A lahar (or mudflow) is a flow of mud moving down from the slopes of stratovolcanoes. In recent centuries, lahars have destroyed more public or private property than any other volcanic process and have caused the losses of thousands of human lives. Lahars, together with falling tephra, are the principal cause of risks associated with volcanoes. Lahars may occur due to:

1. Intense rainy periods, not necessarily coinciding with periods of volcanic activity.
2. Glacial fusion in the upper parts of a volcano during volcanic activity.
3. Emptying of a crater lake located at the top of a volcano.
4. Collapse of slopes due to prolonged hydrothermal alteration or earthquake.

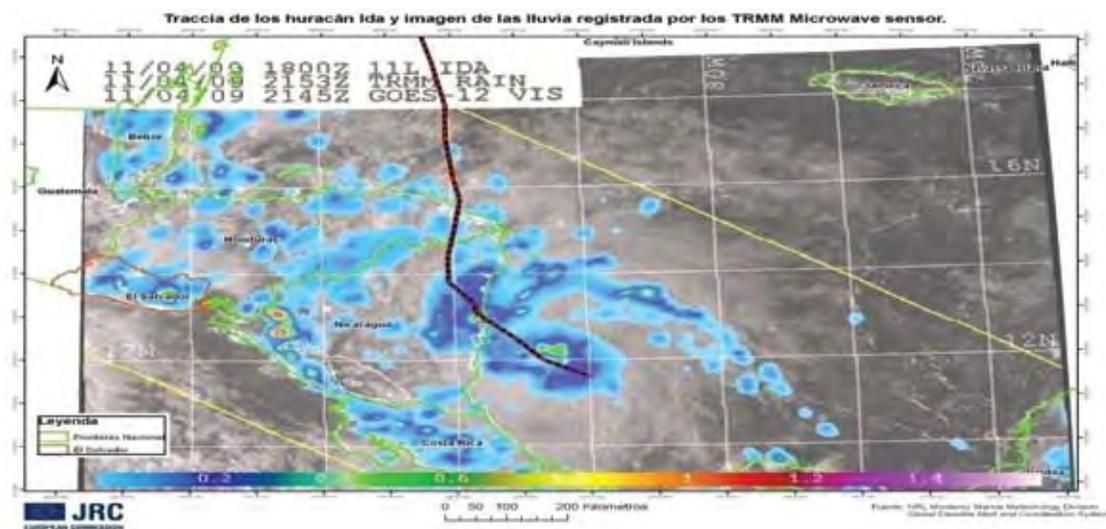
Unlike landslides of debris, lahars are humid deposits where water influences both the genesis and the transport of the remobilized mass (<http://es.wikipedia.org/wiki/Lahar>)

The intense rain also resulted in flooding and erosion in rivers and landslides on steeper slopes. The mix of water, mud and sediment—material carried by the current—saturated riverbeds, already considerably silted by prior events, causing widespread flooding on the plain and affecting settlements, towns and urban areas, with damages to urban, rural and transport infrastructure.

In addition, the lahar on slopes caused significant soil losses, and floods caused sediment to accumulate on agricultural lands, with damages to terrain and plantations and crop losses.

Tropical Storm Ida began November 4th on the Atlantic coast of Nicaragua, near Bluefields. By the next day, Thursday the 5th, it had become a hurricane (Level 1 on the Saffir-Simpson scale). Upon making landfall in Nicaragua, it lost strength as it moved to the northwest. On Friday the 6th, now only a tropical depression, it continued moving and crossed Honduras on a north-northwesterly path, while a low-pressure front persisted in the direction of southwestern El Salvador, causing the abundant humidity to move toward this country.

IMAGE 1. IDA'S PATH AND IMAGE OF RECORDED RAINFALL

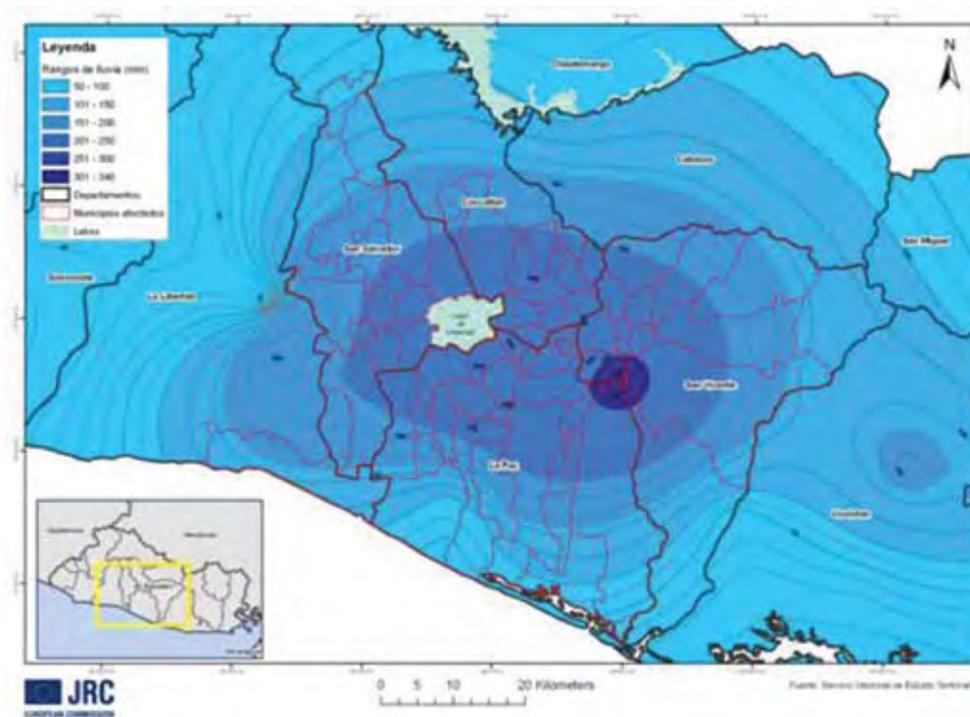


Source: Joint Research Center of the European Commission (JRC).

Ida again gained strength on Saturday, November 7th, when it entered the Caribbean, strengthening between 9:00 and 10:00 p.m. By 10:00 p.m. on Saturday, rain had increased significantly in the Departments of San Salvador, La Paz and San Vicente. Ida was reclassified as a Category 1 hurricane at 11:15 p.m. Associated with the low-pressure system, it continued to cause intense, ongoing precipitation in San Salvador between 8:00 p.m. on Saturday and 2:00 a.m. on Sunday, November 8th. In the Departments of La Paz and San Vicente the heaviest rainfall occurred at 10:00 p.m. on Saturday and at 4:00 a.m. on Sunday, November 8, 2009.

The weather station that recorded the greatest accumulated precipitation was that located at the San Vicente (Chinchontepac) volcano, totaling 355 mm (with a maximum intensity of 81 mm per hour and 317 mm in 7 hours). The spatial distribution of rainfall shows the heaviest concentration in the Departments of San Salvador, La Paz and San Vicente. On Sunday, November 8th, the low-pressure system continued along El Salvador's coastline, gradually weakening.

IMAGE 2. RAINFALL RECORDED ON NOVEMBER 7, 2009



Source: Joint Research Center of the European Commission (JRC).

The intense rain and most of the landslides were concentrated on the steeper slopes in an area of approximately 400 km² between Lake Ilopango and the San Vicente volcano. Consequently, the greatest impact was observed on the northern side of the volcano and on slopes to the south and southeast of Lake Ilopango. The most affected slopes face northward.

IMAGE 3. MUNICIPALITIES AFFECTED BY TROPICAL STORM IDA IN EL SALVADOR

Source: Joint Research Center of the European Commission (JRC).

1. Description of Types of Landslides

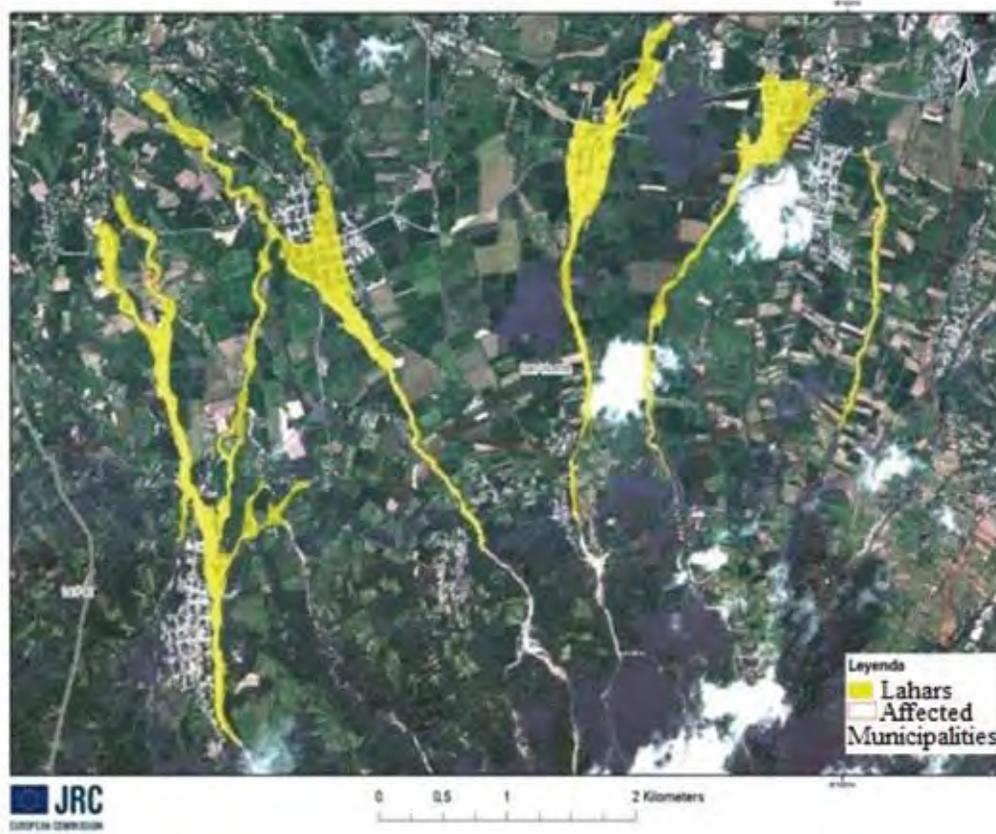
The following types of landslides were observed:

- a) Lahars. Flow of materials and mud composed of pyroplastic material⁸ and water on the slopes of a volcano, generally following the course of a river in a valley. Lahars were the principal type of landslide on the San Vicente volcano.
- b) Shallow landslides. In this type of landslide, the runoff surface is within the soil layer or eroded rocks, at depths ranging from decimeters to several meters. These landslides predominated on the slopes surrounding Lake Ilopango.
- c) Depressions. These consist of massive erosion that occurs when unstable or unconsolidated materials move a short distance over a slope. The landslide area may be a raised concave or flat. Many of these depressions occurred along road slopes.

⁸ Pyroplastic flow: a phenomenon that accompanies a volcano's eruption, also called a pyroclastic cloud, pyroclastic lava or glowing cloud. It happens when lava with a high gas content cools and decompresses upon reaching the surface during a volcanic eruption. <http://www.wikiteka.es>

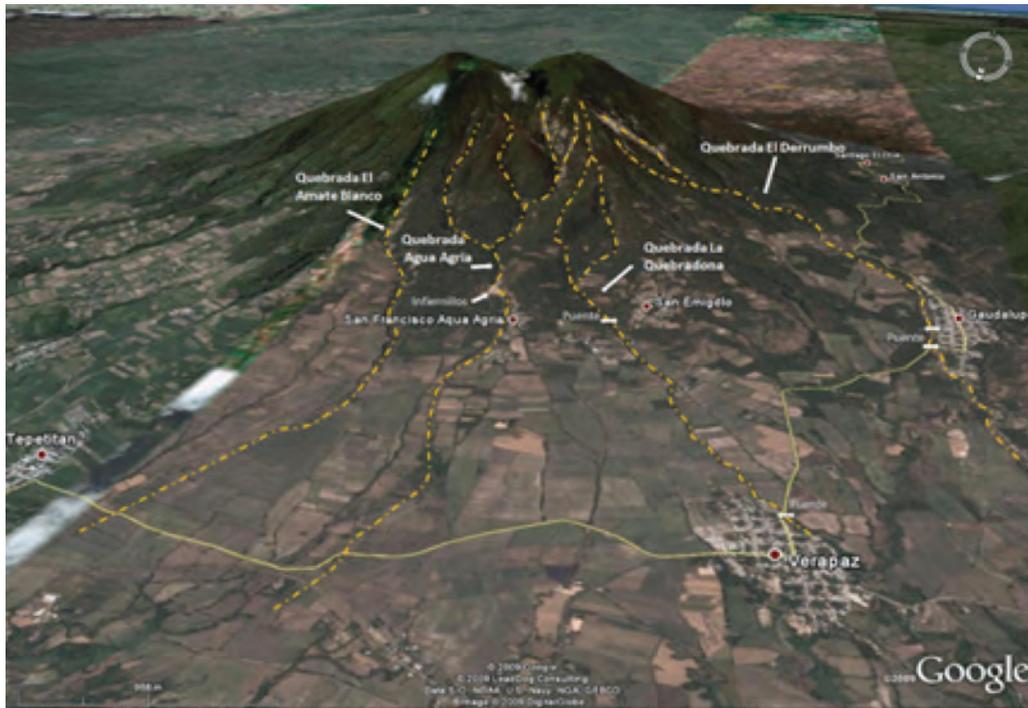
- d) Falling rocks (rock fragments that fall or roll from steep cliffs, as observed in a large part of the affected zone).

IMAGE 4. PRINCIPAL CREEKS THAT WERE ACTIVATED DURING THE RAINS OF NOVEMBER 7 AND 8, 2009, ON THE NORTHERN SLOPE OF THE SAN VICENTE VOLCANO



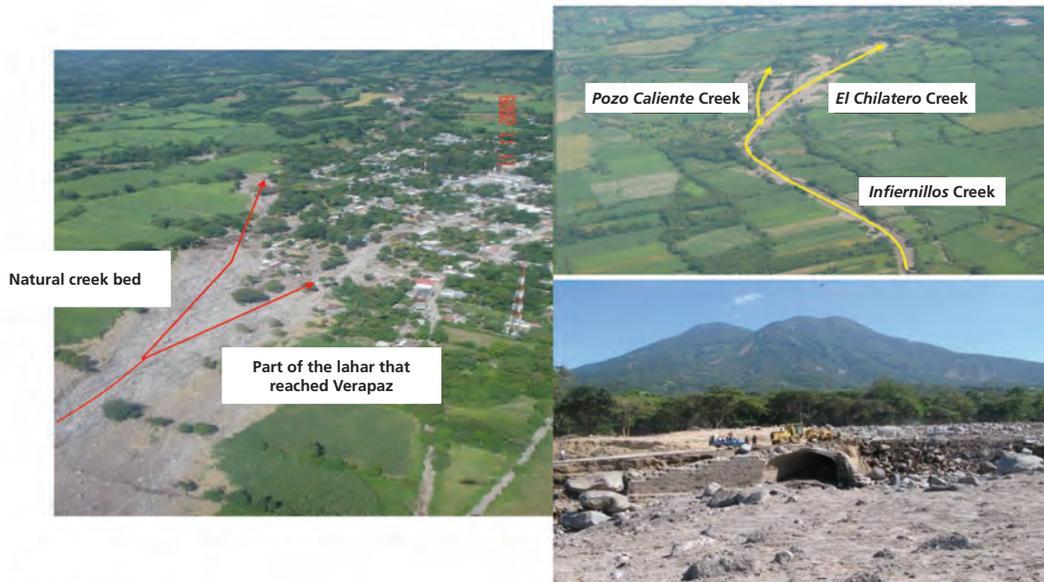
Source: Joint Research Center of the European Commission (JRC).

IMAGE 5. LANDSLIDES



Source: Google Earth with contribution from CEPAL.

IMAGE 6. EROSION ON THE SLOPES OF SAN VICENTE VOLCANO



Photos: SNET/MARN

2. Triggers

The main triggers of landslides were the rains that took place from November 7 to 8. The rain had two severe consequences: an increase in water flow in natural drainage channels on the lower slopes of the San Vicente (Chinchontepec) volcano, and an increase in the pressure of water runoff on deposits of loosely compacted materials and on bedrock.

Due to the wind from the north that accompanied the precipitation, the slopes facing this direction experienced rain gusts that generated major environmental humidity which cooled when it encountered an obstacle. The increased runoff resulted in erosion on the floor of river channels and on riverbanks.

Cuts on steeper slopes destabilized adjacent slopes and caused an increase in the materials that flowed toward streams. The slope also gave rise to the accumulation of runoff pressure which reduced the slope’s stability. When a large part of the slope totally collapsed, river streams were blocked and the rupture of these obstructions, due to pressure, caused the lahars. All of these processes caused a flow of water with a high concentration of sediments. When the discharge of this mixture exceeds a critical value, the flow becomes a lahar. Under these circumstances, the mass does not behave according to classic laws of hydraulics and what scientists call “non-Newtonian flows” occur, since the ratio of water to solids is less than 1 and sometimes reaches values of 0.50 or even less. Next, sedimentation of materials occurs when the lahars reach less steep slopes, at the foot of the volcano, clogging channels and reducing the rivers’ carrying capacity (drainage or load). This caused new river courses to open, the most notable case being that of Verapaz. Another element in this process is the pulsating character of the flow: the frontal part of the lahar contains thicker materials that reduce its speed, causing dams which, when they break up, make a new acceleration possible. Eyewitnesses in Verapaz observed several surges prior to the main landslide that devastated the city.

Smaller lahars continued along the channels of rivers without entering towns, although the volumes of materials filled these channels and caused them to overflow in several directions, affecting nearby lands and vast populated zones. Measurements by D-SNET and MARN make it possible to estimate the magnitude of the principal lahars that surged from the San Vicente volcano.

TABLE 3. CHARACTERISTICS OF LAHARS ON SAN VICENTE VOLCANO

| Stream (population affected) | Sedimentation area | Thickness of sedimentation | Volume of sedimentation | Runoff distance |
|------------------------------|------------------------|----------------------------|-------------------------|-----------------|
| El Derrumbo (Guadalupe) | 250,000 m ² | 0.5 – 2.5 m | 360,000 m ³ | 6 km |
| La Quebradona (Verapaz) | 150,000 m ² | 0.5 – 2.0 m | 250,000 m ³ | 6 km |
| El Amate Blanco (Tepetitán) | 250,000 m ² | 0.5 – 2.0 m | 300,000 m ³ | 6 km |

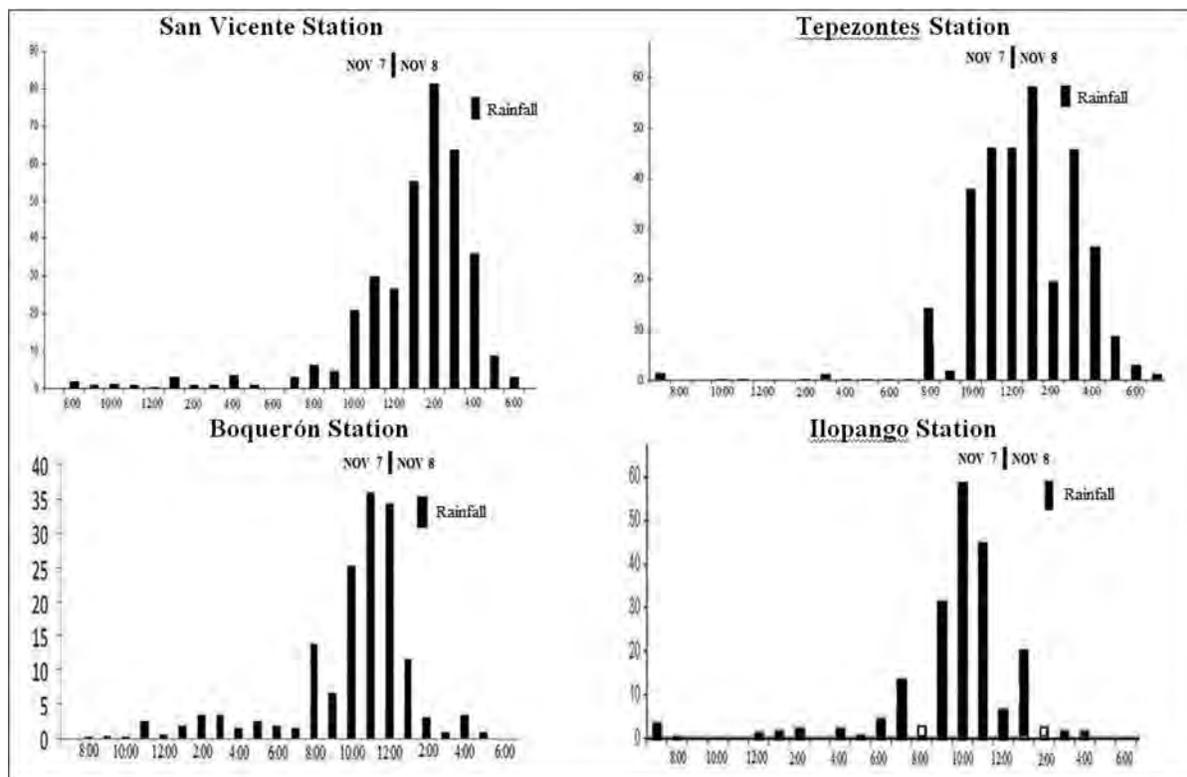
Source: D-SNET/MARN.

Specialized literature⁹ offers models to determine the speed historically achieved by lahars. A “typical” lahar can reach great speed on a volcano’s steepest slope (up to 50 m/s). In the upper part of the alluvial fan, speed may vary from 15 m/s to 25 m/s, while in the lower part, in the fan’s softest zone, it may vary from 5 m/s to 15 m/s. However, it is surprising how lahars are able to maintain their movement for many kilometers, even on nearly flat lands (as occurred on the coastal plains of the Department of La Paz). The lahars moved 6 to 10 kms, carrying rocks weighing 10 to 20 tons, with slopes no steeper than 2 to 3°. This was possible due to the high water content that reduced friction on the stream bed to nearly zero.

The cut of the section of the lahar that flowed over Verapaz measured nearly 100 m². With a flow speed of 10 m/s, the discharge must have been around 1,000 m³/s. Damage to vegetation and buildings in Verapaz shows that the lahar had a height of about 3 meters. If one assumes a speed of 10 m/s on the vertical wall, pressure would have been around 200 kPa (kiloPascals per area), which corresponds to 20 ton/m², a force that even highly resistant buildings could not have withstood.

⁹ • Kinematic models of straight-line movement of flows:
 a) $V = V_0 + at$; where V: final speed (m/s), V_0 : initial speed (m/s), a: acceleration of movement (m/s²), and t: arrival time at stabilization zone (seconds).
 b) $e = V_0t + \frac{1}{2}at^2$; where e: the scope of material conveyed (in km).
 c) $V^2 = V_0^2 + 2gh$.
 • Darcy Law to determine the discharge of material conveyed in m³/seconds.
 $Q = V \cdot A$; V: speed of flow (m/s), A: section of channel through which the flow moves given m²
 • Mathematical model of relationship for the calculation of geometric parameters of mudflow:
 $V = \text{Width (A, given in meters)} \times \text{Length (l, given in meters)} \times \text{Thickness (E, given in meters)} = \text{m}^3$; where E: is the scope of material conveyed in km; and A = width x l given in m², being the physical area occupied by the mudflow.

GRAPH 1. RECORDED PRECIPITATION



Precipitation recorded during the period between 7:00 a.m. on November 7th and 7:00 a.m. on November 8th at the weather stations of San Vicente, Tepezontes, Boquerón and Ilopango.

Source: D-SNET/MARN.

The key factors that contributed to the magnitude of the lahars were:

- The prior saturation of soils when rain intensity increased; thus the rain fell directly on the runoff area, making response time very short.
- The intensity of precipitation was high (over 20 mm/hr) over a long period of 7 hours and at an excessive level for 3 hours, causing extreme runoff.
- The presence of abundant eroded material, accumulated in river streams, increasing the sediment conveyed during the flood. The presence of this silt is associated with the 2001 earthquakes that caused various landslides and the depositing of materials in river channels.

As consequence of all this, the mission noted that the towns and cities located near rivers adjacent to the San Vicente volcano directly suffered the impact of the lahars that flowed along the main river channels, with severe consequences on housing and urban infrastructure in Verapaz, San Vicente and Guadalupe. Likewise, homes and towns, including a vacation center, located on the banks of Lake Ilopango were covered by landslides and their foundations were eroded due to the action of water. The destruction of bridges and damage to culverts and drains along many roads were significant. In others, cuts occurred due to deposits of loose materials, rocks and mud. Extensive areas used for agriculture on alluvial fans were covered with gravel and sand due to flooding. Sedimentation from mud deposits in numerous rivers and especially in Lake Ilopango caused floods and the lake's natural drainage was blocked. This drainage had already been blocked during the 2001 earthquakes and the incomplete drainage work and construction of a drainage system collapsed due to the erosion of gabions and walls, exposing its fragility due to the narrowness of the outlet.

Schematically, the event is described as follows: in terms of climate, a combination of a low-pressure system and a tropical storm occurred, causing high levels of concentrated rainfall (from a return level between 100 and 300 years), with differential consequences:

- a) At the San Vicente (Chinchontepec) volcano, lahars occurred; in geology these are called "torrential landslides on volcanic lands."
- b) A very large amount of solids, in a proportion of 0.60 to 1 with respect to water.
- c) In the lower courses of rivers, the prior siltation of streams in their channels caused more widespread flooding.

When the current reached the coastal strip, which is elevated with respect to the plain and in which highways parallel to the coast, resorts and beach houses have been constructed, the coast's natural drainage was obstructed and the mouths of rivers overflowed, causing new outlets to open that brought about destruction on the coast.

IMAGE 7. LANDSLIDES AND LAHARS



Source: D-SNET

C. HOW UNUSUAL IS THIS EVENT? HISTORICAL EVIDENCE OF SIMILAR EVENTS

With regard to the extreme rainfall, according to historical records and recorded landslides, and with respect to climate events that affect the country, this event is neither unusual nor infrequent. There is information on previous events and there are records from the last 100 years about various lahars with disastrous consequences in the San Vicente area. Most of them were the result of intense rains (lasting 5 to 7 days straight, according to witnesses' testimonies).

BOX 1. THE SEVEREST LAHARS IN EL SALVADOR

- 1774:** Lahar on the northeastern slope of the volcano, affecting the city of San Vicente.
- 1912:** Lahar totally destroys Verapaz, causing numerous deaths both in Verapaz and in Agua Agria, a village higher up on the slope of the volcano.
- 1934:** Total destruction of Tepetitán by a lahar that originated in El Blanco creek, with numerous victims (for this reason, Nueva Tepetitán was founded). Likewise, Guadalupe was struck in 1934 by a lahar that originated in El Derrumbo creek, destroying various houses and causing victims.
- 1996:** On the southern slope of the volcano, a landslide blocked the main road between Tecoluca and Zacatecoluca.
- 2001:** Landslides caused by the February 13th earthquake on the northern and northwestern slopes flowed toward the valley although they did not become lahars. However, the landslides deposited over 200,000 cubic meters of sediments in the channels that drain the volcano, and thus the instability of these sediments represents an increased risk for floods and lahars downstream toward Guadalupe, Verapaz and Tepetitán, as demonstrated in 2009.
- 2001:** On September 15th, Guadalupe was struck by a lahar from El Derrumbo creek, triggered by rains. There was one victim and numerous houses were destroyed in approximately the same zone that was affected by the 1934 event.
- 2005:** Tropical Storm Stan produced several landslides on the eastern shore of Lake Ilopango.

The period of return (recurrence) of situations with intensities similar to the current one is difficult to estimate due to the lack of continuous series of precipitation by hour per day. However, it may be stated that a critical factor was the 7-hour period of rain. The major damages caused by landslides appear to be associated with the presence of tropical storms lasting 3 to 4 days. If rains occur for periods of 5 to 10 hours, with per-hour intensities over 30 to 50 mm in the final phase of a storm or depression, when the soil is saturated it is almost certain that a catastrophic event will occur.

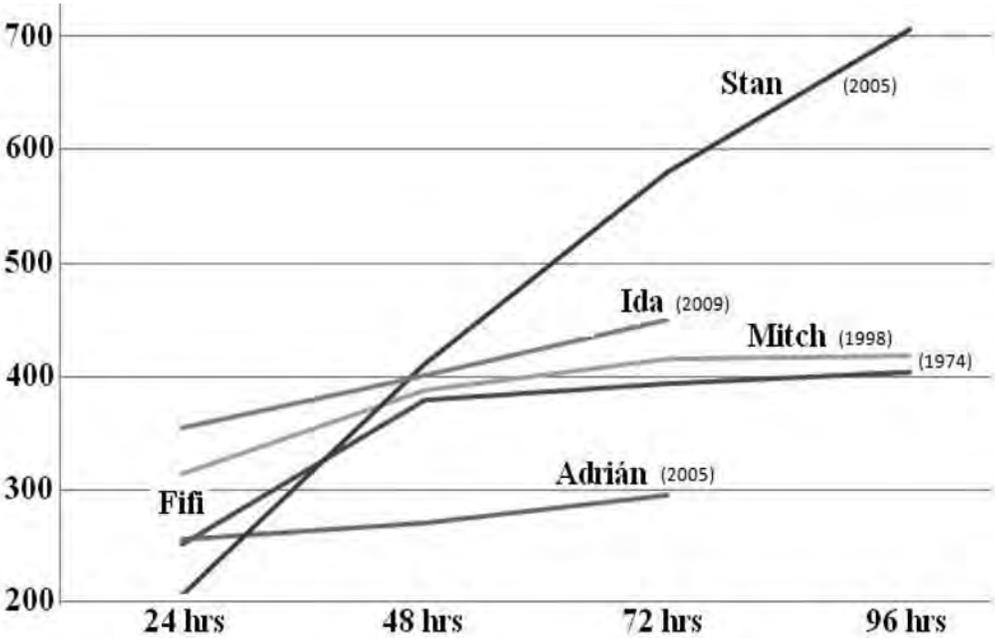
TABLE 4. MAXIMUM LEVELS OF PRECIPITATION RECORDED IN THE ZONE OF SAN VICENTE

| Tropical Storm | 24 hrs. | 48 hrs. | 72 hrs. | 96 hrs. |
|----------------|---------|---------|---------|---------|
| Fifi (1974) | 252.8 | 379.1 | 394.1 | 404.0 |
| Mitch (1998) | 314.5 | 387.6 | 415.6 | 419.2 |
| Adrián (2005) | 256.6 | 271.4 | 296.0 | |
| Stan (2005) | 207.2 | 411.5 | 580.5 | 705.4 |
| Ida (2009) | 355.0 | >400 | >450 | |

Source: National Territorial Studies Service (D-SNET), Ministry of Environment and Natural Resources (MARN).

The maximum critical levels of precipitation that cause landslides in the zone of San Vicente during tropical storms are above 200 mm and rain that exceeds 300 mm.

GRAPH 2. MAXIMUM LEVELS OF PRECIPITATION RECORDED IN THE ZONE OF SAN VICENTE DURING RECENT EXTREME EVENTS

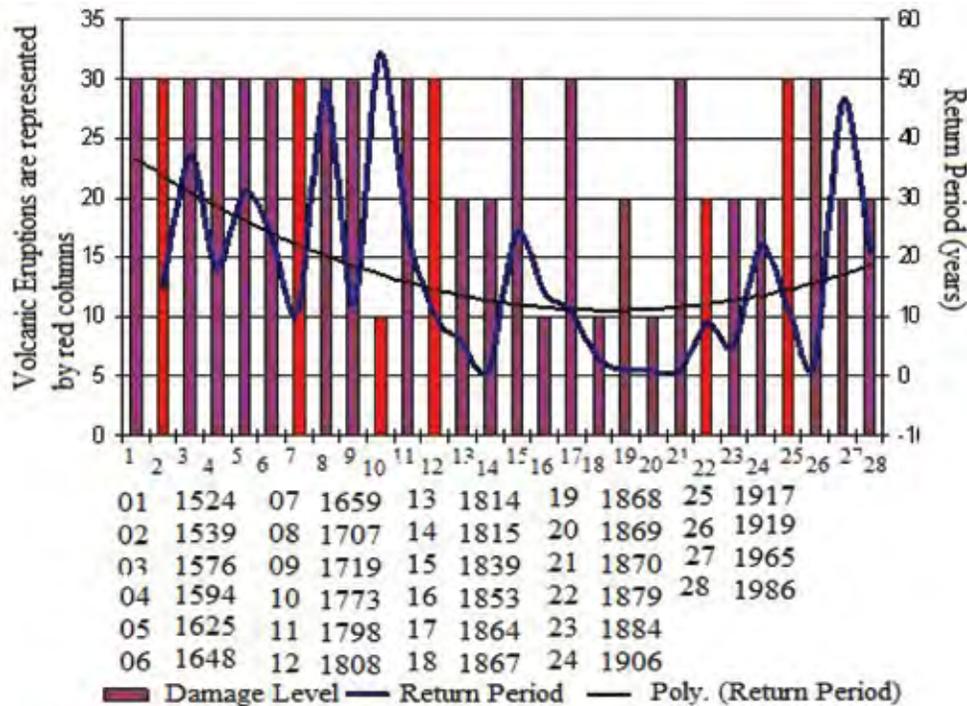


Source: Prepared by CEPAL.

Using historical data, it may be inferred that critical situations for disaster events with a large number of victims occur with relatively high frequency every 10 to 30 years in the country due to climate events. A high intensity of rain can also affect other regions but, based on available evidence, the zones of San Vicente and Ilopango have greater exposure. Lahars of similar magnitude may be assumed to have a period of recurrence of nearly 50 years, and those that originated in San Vicente appear to have the greatest

potential for occurring in the country. If one also takes into account the potential that, due to climate change, there is a greater frequency of rain events above historical averages, similar episodes could occur with greater frequency in the future. This only reinforces the need for immediate preventive actions in order to prepare for future destructive lahars.

GRAPH 3. TIMETABLE OF EARTHQUAKES AND VOLCANIC ERUPTIONS IN THE SAN SALVADOR METROPOLITAN REGION



Source: Prepared by CEPAL.

To complete the array of threats that the country faces, the periods of recurrence and intensity of impact of seismic events and volcanic activity are considered. The periods of recurrence in this type of events with a high level of damage are around 26 years, and the period of recurrence for events with light to moderate levels of damage is 17 years. All of this reinforces the notion that comprehensive, cross-cutting risk management measures are needed in all sectors and activities as part of the development strategy, strengthening intersectoral and intraregional cooperation. This is also a clear indication that the country requires not only structural and non-structural measures (such as appropriate early-warning, monitoring and response systems), but also measures to transfer and spreading out the risk—at microeconomic level and focusing on sectors with fewer resources and less capacity as well as at macroeconomic level to protect social budgets and state investments.

D. NATIONAL AND INTERNATIONAL RESPONSE

Based on the weather forecast issued by the Ministry of Environment and Natural Resources, through the Bureau of the National Territorial Studies Service (MARN/D-SNET), on November 5, 2009 the General Bureau of Civil Protection and Disaster Prevention and Mitigation declared a preventive Green Alert throughout all of El Salvador and began to issue communiqués to place municipal and departmental governments on alert and to ready their respective Departmental and Municipal Civil Protection Commissions. On November 8th the level of alert was raised to Orange in the five municipalities most affected by the disaster.

The first response by the National Civil Protection System was to activate the seven Sectoral Technical Commissions for Civil Protection: emergency services, logistics, security, shelters, technical-scientific services, infrastructure and health. The initial operational actions were undertaken by all government agencies related to addressing the emergency; these agencies carried out efforts to rescue victims, evacuate the population and transfer people to shelters.

On Monday, November 7th, the President of the Republic issued Decree N° 73 which declared the State of Emergency throughout the entire country. Legislative Decree 175 dated November 9th was also issued; this decree declared a State of Catastrophe. Later, the Legislative Assembly issued Decree 179 on December 12, 2009 in order to redirect resources to handle the emergency.

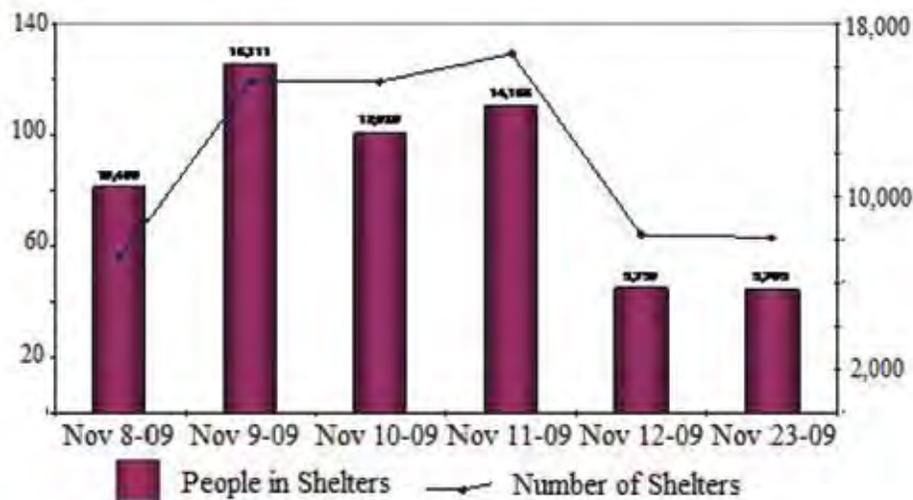
In addition, the Legislative Assembly issued Decree 178 which allows Municipal Councils to use resources from the Economic and Social Fund (*Fondo Económico y Social* -FODES) to allocate resources from the months of November and December to address the consequences of the climate phenomenon. The Minister of the Interior asked the Minister of Finance to appropriate US\$3.5 million from the Civil Protection and Disaster Prevention and Mitigation Fund (*Fondo de Protección Civil, Prevención y Mitigación de Desastres* -FOPROMID) to deal with the short-term emergency. During the emergency's development, 56 temporary shelters were put into operation, aiding nearly 10,400 people; this service continued to be expanded until there were 135 shelters and nearly 15,000 refugees.

Numerous state agencies and organizations participated in the response efforts, including the Secretariat of Social Inclusion which, with the support of the World Food Program, took charge of food distribution in the various zones affected. The Ministry of Public Health and Social Assistance activated health surveillance in the shelters and strengthened health services with more personnel, especially in the areas of orthopedics and surgery. Mobile units of the Solidarity Fund for Health (*Fondo Solidario para la Salud* -FOSALUD) were deployed to priority areas and 15 round-the-clock health units were installed in the Departments of Cuscatlán, San Vicente, La Paz and Cabañas.

The Ministry of Education (MINED) decreed a total suspension of classes in 18 schools damaged by the phenomenon and in those that were being used as shelters. The Ministry of Agriculture and Livestock (MAG) conducted an assessment of crop damages.

In order to respond to the evolution of emergency needs, the President of the Republic formed the Rehabilitation and Reconstruction Committee under the coordination of the Technical Secretary of the Presidency. The Committee was composed of ministries with duties directly related to recovery, in order to plan and expedite subsequent medium- and long-term actions.

GRAPH 4. EVOLUTION OF SHELTERS AND POPULATION ASSISTED



Source: General Bureau of Civil Protection and Disaster Prevention and Mitigation, El Salvador.

1. Private Sector and Civil Society

In coordination with the Ministry of Public Works (MOP), several private firms joined in efforts to remove debris. The Salvadoran Chamber of Construction (*Cámara Salvadoreña de la Construcción* -CASALCO) made heavy machinery available to MOP in order to assist the municipalities of Verapaz, Guadalupe and Tepetitán, located in the Department of San Vicente. In turn, the Salvadoran Association of Engineers and Architects (*Asociación Salvadoreña de Ingenieros y Arquitectos* -ASIA) provided 25 experts to cooperate with this state agency.

Other private firms also made their machinery available to join in efforts to remove debris and clear highways.

In turn, the Salvadoran Foundation for Health and Human Development (*Fundación Salvadoreña para la Salud y el Desarrollo Humano* -FUSAL), together with the National Association for Private Enterprise (*Asociación Nacional de la Empresa Privada* -ANEP) and the *Telecorporación Salvadoreña* [TCS]), opened centers to receive donations from companies and the civilian population.

From the start of the emergency, the Salvadoran Red Cross Society (*Sociedad de la Cruz Roja Salvadoreña* -SCRS) activated its emergency operations center and mobilized 500 volunteers. It also deployed specialized personnel, including the flood rescue team, vertical rescue teams, teams of scuba divers and boat operators, transportation, first aid, damage assessment and the national intervention team.

The distribution of humanitarian aid conducted by SCRS was coordinated with Civil Protection and other nongovernmental organizations such as OXFAM, CARE and Plan International.

2. International Cooperation

The international community responded quickly to the national government's appeal for support in coping with the emergency. The United Nations, at the request of the national government, activated the United Nations Disaster Assessment and Coordination (UNDAC) Team which monitored the coordination efforts conducted by the Emergency Operations Center and the interagency United Nations Emergency Team (UNETE).

In order to define requirements for reconstruction, the government, through the Secretariat of the Presidency and the Ministry of Foreign Relations, asked CEPAL, the United Nations and the World Bank to conduct a damage assessment and a needs analysis. This was conducted under a procedure known as the Post Disaster Needs Assessment (PDNA).

TABLE 5. INTERNATIONAL AID RECEIVED

| Contributor during the humanitarian aid effort | Amount in cash or in kind (US\$) |
|---|---|
| United Nations Agencies | 3,992,029 |
| Multilateral Agencies | 465,000 |
| DAC Donors | 4,246,713 |
| Other countries | 560,158 |
| Red Cross and NGOs | 992,345 |
| Total | 10,256,245 |

Source: Office of the UN Resident Coordinator, El Salvador.

The United Nations, responding to the parameters of international organization for crisis situations, activated the operation of inter-institutional clusters or teams in the areas of agriculture, temporary housing, coordination, early recovery, education, food assistance, health, protection, shelters, water and sanitation. The support of international organizations in cash and in kind totaled over US\$10 million.

In coordination with the national government and international cooperation agencies, a quick assessment of first response and early recovery needs was conducted, and a call for international support (Flash Appeal) was made, with requests for support by the international community totaling US\$13,125,999. Of these requests, a request for resources was submitted to the Central Emergency Response Fund (CERF) in the amount of US\$2.5 million, which were approved for execution up to three months after the event.

II. POPULATION AND AFFECTED AREAS

As a consequence of the event's severity, especially on the lower slopes of the San Vicente (Chinchontepec) volcano, there were a significant number of victims. In total, 199 deaths were recorded, and as of the closing date of this report 76 persons have been reported missing.

As the emergency unfolded, 56 temporary shelters were put into operation, aiding nearly 10,400 people. This service continued to be expanded until there were 135 shelters and nearly 15,000 refugees.

Numerous state agencies and organizations participated in the response efforts, including the Secretariat of Social Inclusion which, with the support of the World Food Program, took charge of food distribution in the various zones affected. The Ministry of Public Health and Social Assistance activated health surveillance in the shelters and strengthened health services with more personnel, especially in the areas of orthopedics and surgery. Mobile units of the Solidarity Fund for Health (*Fondo Solidario para la Salud* -FOSALUD) were deployed to priority areas and 15 round-the-clock health units were installed in the Departments of Cuscatlán, San Vicente, La Paz and Cabañas.

During the emergency, an estimated 75,000 people were affected by the disaster, and initial estimates indicated that the number was undoubtedly higher.¹⁰ Based on families who lost their homes or were displaced from them during the emergency, and taking into account the income losses that occurred as a consequence of the disaster, the total population affected in a primary and secondary manner by the event has been estimated:

TABLE 6. PRIMARY AND SECONDARY POPULATION AFFECTED

| Department | Total population | Workers employed | Affected housing | Loss of work | Total population affected (estimated) |
|-------------------------------|------------------|------------------|------------------|--------------|---------------------------------------|
| La Libertad | 719,406 | 287,826 | 742 | 9,621 | 16,932 |
| San Salvador | 1,728,852 | 723,556 | 6,539 | 24,186 | 47,237 |
| Cuscatlán | 237,571 | 94,800 | 2,467 | 3,169 | 7,799 |
| La Paz | 319,341 | 125,511 | 5,930 | 4,195 | 12,989 |
| San Vicente | 135,820 | 63,707 | 4,997 | 2,129 | 37,859 |
| Total in affected departments | 3,140,990 | 1,295,400 | 20,674 | 43,300 | 122,816 |

Source: Estimates by assessment mission.

¹⁰ United Nations, El Salvador Emergency Situation Report N° 8, covering the period from November 23 to 26, 2009.

A. ANALYSIS OF DAMAGES AND LOSSES CAUSED BY THE DISASTER

Based on the use of the disaster assessment methodology developed by CEPAL since 1972,¹¹ it has been estimated that, besides experiencing the regrettable loss of lives, the value of damages and losses caused by the November 2009 disaster in El Salvador totals US\$314.84 million, which represents the equivalent of 1.44% of the country's GDP (see Table 7).

TABLE 7. SUMMARY OF DAMAGES AND LOSSES CAUSED BY THE DISASTER

(in millions of US\$)

| Sector | Amount of effects | | | Property | |
|---------------------------|--------------------------|---------------|---------------------|---------------------|---------------|
| | Damages | Losses | Total | Public | Private |
| Productive sectors | 12.46 | 69.90 | 82.36 | 0.65 | 81.71 |
| Agriculture | 4.70 | 37.81 | 42.50 | 0.65 | 41.85 |
| Industry | 0.28 | 15.19 | 15.47 | 0.00 | 15.47 |
| Commerce | 0.58 | 14.37 | 14.96 | 0.00 | 14.96 |
| Services | 6.89 | 2.54 | 9.43 | 0.00 | 9.43 |
| Social sectors | 32.59 | 7.07 | 39.66 | 20.84 | 18.82 |
| Housing | 17.84 | 0.54 | 18.38 | 0.40 | 17.98 |
| Education and Culture | 9.22 | 1.85 | 11.07 | 11.07 | 0.00 |
| Health | 5.53 | 4.68 | 10.21 | 9.37 | 0.84 |
| Infrastructure | 119.6 | 13.13 | 132.75 | 117.76 | 14.99 |
| Water and sanitation | 12.73 | 6.93 | 19.66 | 18.13 | 1.53 |
| Electricity | 0.69 | -5.76 | -5.07 | -6.57 | 1.50 |
| Transportation | 106.20 ^a | 11.52 | 117.72 ^a | 106.20 ^a | 11.52 |
| Communications | 0.00 | 0.44 | 0.44 | 0.00 | 0.44 |
| Environment | 46.05^a | 14.02 | 60.07 | 60.07 | 0.00 |
| Total | 210.7 | 104.12 | 314.84 | 199.32 | 115.52 |

Source: Estimates by assessment mission.

^a Based on post-report clarifications.

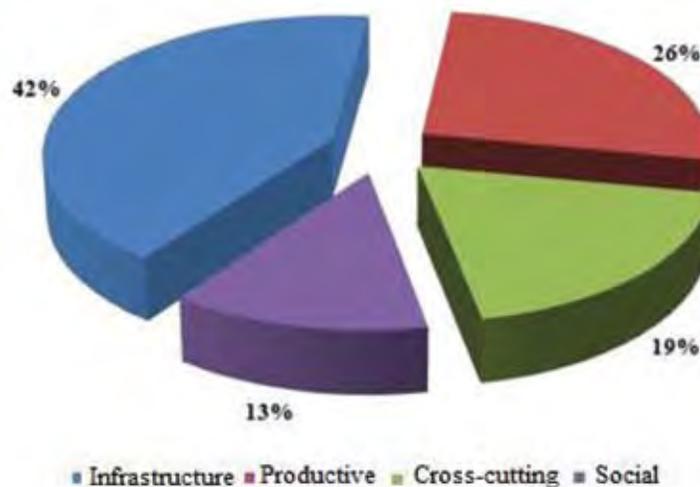
¹¹ See CEPAL, Manual for the evaluation of the socioeconomic and environmental impact of disasters, United Nations, World Bank, 2003. Damages are understood as the (total or partial) destruction of assets, patrimony, goods, capital (valued at the same quality); losses (changes in flows stemming from damages) are understood as the higher costs of services, losses in production or sales (with respect to the previous trend).

Of the above figure, US\$210.7 million correspond to the destruction of assets (66.9% of total damages and losses), while the remaining US\$104.12 million represent changes in economic flows and include both production losses and higher service costs (33.1% of the total). This distribution between damages and losses is typical of cases of disasters caused by phenomena such as landslides and erosion. It should be noted that this disaster brought with it not only damages and losses, but also a benefit that occurs after the event. Thanks to high levels of precipitation, there is greater water storage in dams which will make it possible to produce a larger portion of hydroelectricity between November and April, thus reducing the average costs of national energy production which will translate into lower electricity costs for the consumer. The amount of these savings or benefits appears with a minus sign under the electricity sector in the previous table.

Of the total amount of damages and losses, 63.3% (199.32 million) refers to public property, while 36.7% (115.52 million) refers to private property (see Table 7); this ratio illustrates the relative effort that each of these sectors will have to make in recovery, rehabilitation and reconstruction activities.

It is necessary to point out that the disaster affected the country's activities and sectors in a different proportion. The major damages and losses were concentrated on the country's physical infrastructure (42.10% of the total), followed by productive sectors (26.20%), environment (19.10%) and social sectors (12.60%), as indicated in the following graph:

GRAPH 5. RELATIVE DISTRIBUTION OF DAMAGES AND LOSSES BY KEY SECTORS



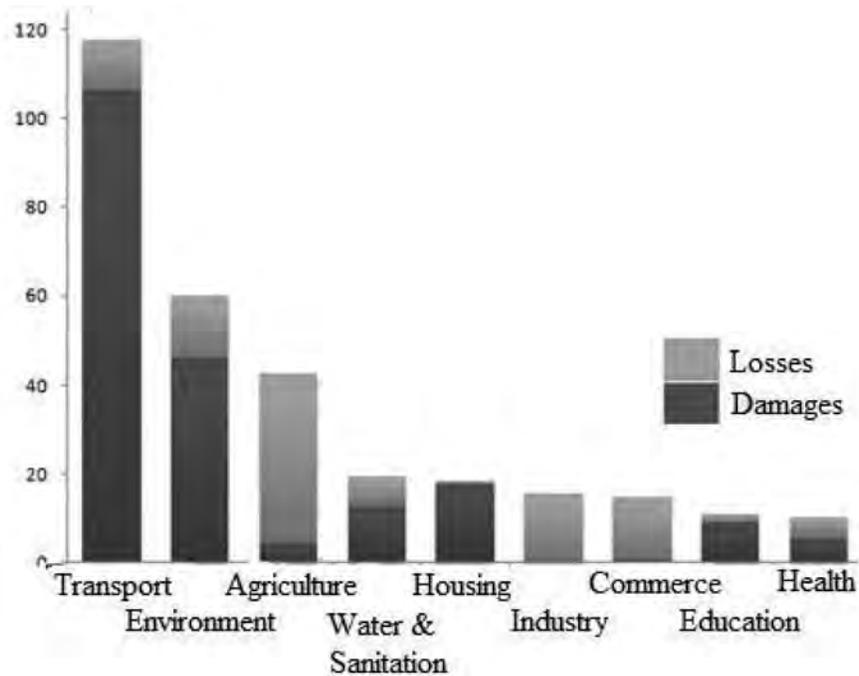
Source: Estimates by assessment mission.

Graph 5 illustrates the distribution of damages and losses for the sectors of economic activities that were most affected in the country. First, what stands out is the amount of destruction of roads and bridges (US\$117.72 million) with the consequent reduction in connectivity, and the subsequent impact on productive and social activities that this represents. Second, the environmental sector experienced an effect on

ecosystems, caused by landslides and floods (US\$60.07 million). Third, the agricultural sector experienced the destruction of irrigation infrastructure and significant production losses in various crops, chiefly coffee, sugar cane and beans, with a combined value of US\$42.5 million. Fourth, the water and sanitation sector (US\$19.7 million) suffered significant destruction to water supply and sewerage systems; its operational revenue was affected for a relatively long period of time. Next is the housing sector which experienced significant destruction (US\$18.4 million), with the consequent worsening of preexisting housing shortages in terms of quantity and quality, followed by the industrial sector (US\$15.5 million) and commerce, which had significant losses in terms of sales and the destruction of assets and stocks (US\$14.9 million). The education sector experienced the destruction of schools and partial damage to some 100 others (US\$11.07 million). The health sector reported damages to installations and medical supplies (US\$10.2 million)

GRAPH 6. DAMAGES AND LOSSES IN THE MOST AFFECTED SECTORS

(in millions of US\$)



Source: Estimates by assessment mission.

The magnitude of the disaster at national level is limited (1.44% of GDP),¹² and the comparison of the value of destroyed assets is equivalent to 3.4% of the annual rate of gross formation of fixed capital. However, when geographically more disaggregated values are examined, one can better visualize the tragedy caused by this event. It should be noted that the disaster's impacts were concentrated in 5 of the country's 14 departments, and these accounted for nearly 85% of damages and losses, as indicated below:

TABLE 8. DAMAGES AND LOSSES BY DEPARTMENT

| Department | Damages and losses (in millions of US\$) | Percentage of total |
|--------------|---|---------------------|
| La Paz | 56.6 | 25.3 |
| San Salvador | 54.6 | 24.4 |
| San Vicente | 49.4 | 22.1 |
| La Libertad | 27.2 | 12.2 |
| Cuscatlán | 18.9 | 8.4 |

Source: Estimates by assessment mission.

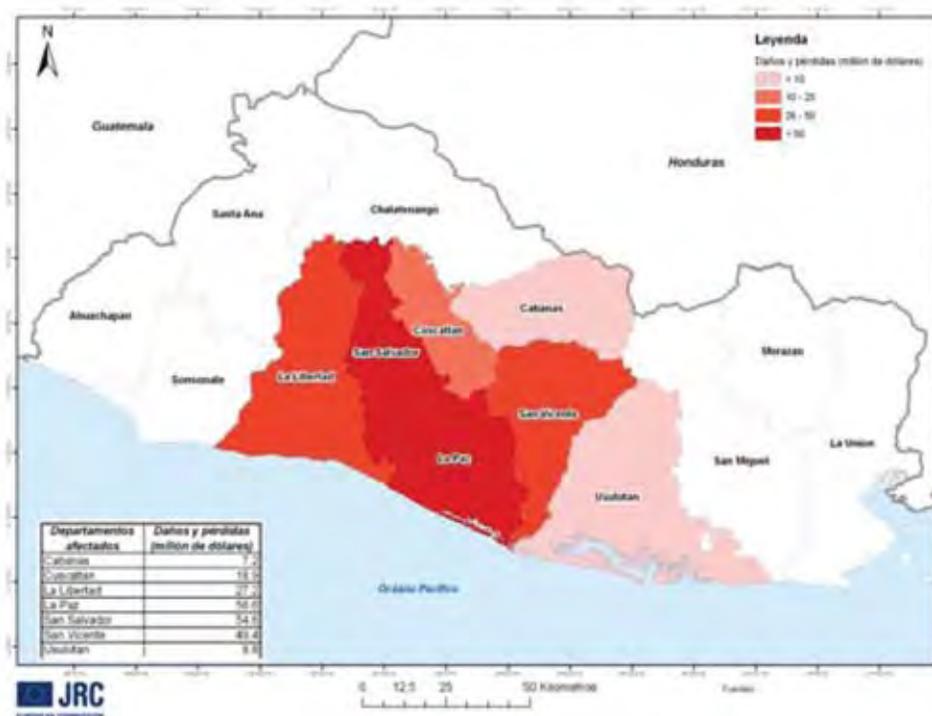
Image 8 illustrates this spatial distribution of the disaster's total effects.

By considering the figures dealing with the effects of the disaster, by department, one can obtain more details on how the country's inhabitants have been affected. Table 9 shows, for the five most affected departments, the figures corresponding to the Human Development Index (HDI) prepared by UNDP for the current year,¹³ together with the value of damages and losses per inhabitant and the value of total effects in comparison with the GDP per inhabitant. From this, it can be inferred that there is an inverse relationship between the greater value of damages and losses per person, and the relationship between these effects and the GDP with regard to the current year's HDI. This reinforces the idea that persons with lower degrees of relative development in the country are those who have received the strongest impact caused by the disaster, and government efforts to reduce the nation's poverty and unemployment must be increased and focused on the departments that were most affected (see Images 9 and 10).

¹² Note that the purpose of this comparison is to illustrate the gross magnitude of the disaster; it does not represent the reduction to which the GDP may be subjected as a result of the losses. This issue will be addressed in the next chapter.

¹³ See Status of human development in the municipalities of El Salvador, 2009, United Nations Development Programme (UNDP), Dr. Guillermo Manuel Ungo Foundation (FUNDAUNGO), and Under-Secretariat of Territorial Development and Decentralization, San Salvador, 2009.

IMAGE 8. SPATIAL DISTRIBUTION OF DISASTER EFFECTS



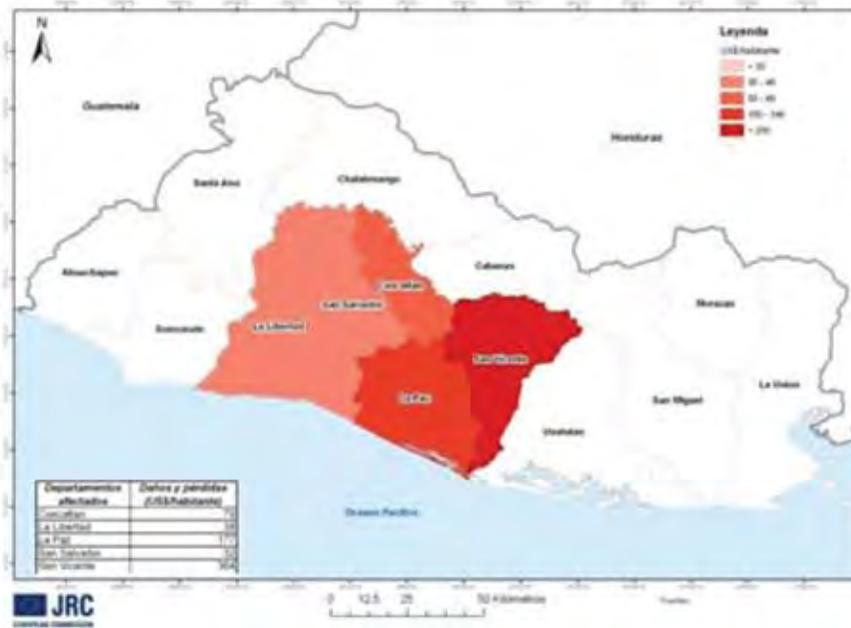
Source: Joint Research Center of the European Commission (JRC).

TABLE 9. COMPARISON OF DAMAGES AND LOSSES PER INHABITANT WITH THE GROSS DOMESTIC PRODUCT IN THE MOST AFFECTED DEPARTMENTS

| Department | 2009 Human Development Index | Effects per inhabitant (US\$/person) | Effects/GDP % |
|--------------|------------------------------|--------------------------------------|---------------|
| San Vicente | 0.688 | 364 | 13.8 |
| La Paz | 0.707 | 177 | 7.7 |
| Cuscatlán | 0.727 | 79 | 3.9 |
| La Libertad | 0.758 | 38 | 1.0 |
| San Salvador | 0.795 | 32 | 0.6 |

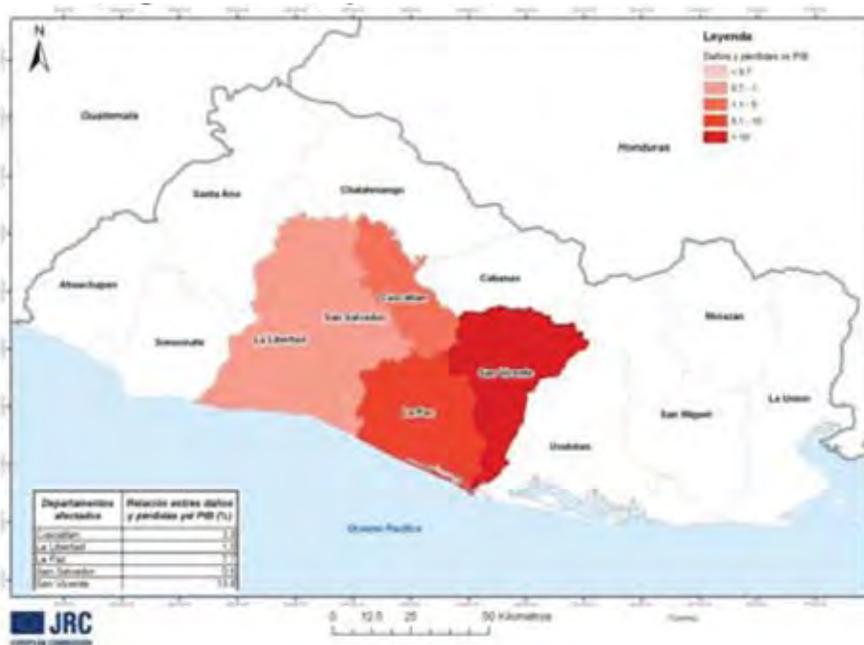
Source: Estimates by assessment mission.

IMAGE 9. DAMAGES AND LOSSES PER INHABITANT IN THE AFFECTED DEPARTMENTS



Source: Joint Research Center of the European Commission (JRC).

IMAGE 10. RELATIONSHIP BETWEEN DAMAGES AND LOSSES AND THE GDP BY AFFECTED DEPARTMENTS



Source: Joint Research Center of the European Commission (JRC)

The November 2009 disaster is not an isolated event in the country; El Salvador has a very long history of disasters dating from the colonial era. Considering only the most recent years, one can see how these new damages and losses are added to a list of events that have been duly evaluated through the use of a common methodology, making it possible to compare their effects and magnitudes. This event, of hydro-meteorological origin, may be compared to disasters that occurred in the past three decades. The amount of its effects is lower than those caused by Hurricanes Mitch in 1998 and Stan in 2005, as well as by floods and landslides in 1982, and greater than the effects of the regional drought that took place in 2001. It certainly represents a fraction of the damages and losses caused by the 1986 and 2001 earthquakes (see Table 10). Nevertheless, its magnitude is not negligible, especially when its impacts at departmental and local levels are measured. Furthermore, this again shows the need to address the issue of disaster risk management more effectively than in the past, due to the worsening of conditions resulting from the vulnerability of the most affected areas in the country's central zone.

TABLE 10. COMPARISON OF THE IMPACT OF RECENT DISASTERS IN THE COUNTRY

| Disaster | Year | US\$ millions adjusted for inflation | | |
|-------------------------|------|--------------------------------------|--------|---------|
| | | Damages | Losses | Total |
| Floods | 1982 | 218.1 | 67.6 | 285.7 |
| San Salvador Earthquake | 1986 | 1,351.3 | 429.8 | 1,781.2 |
| Hurricane Mitch | 1998 | 219.9 | 283.8 | 503.7 |
| Earthquakes | 2001 | 1,137.6 | 805.8 | 1,943.5 |
| Drought | 2001 | - | 38.1 | 38.1 |
| Hurricane Stan | 2005 | 177.4 | 217.4 | 394.8 |
| Tropical Storm Ida | 2009 | 210.7 | 104.12 | 314.84 |

Source: CEPAL.

In addition to the above considerations and conclusions, the post-analysis of the disaster's impact on the economy's overall evolution at the national level and on employment and income at family and personal levels will make it possible to estimate the consequences of the disaster on the country, its departments and municipalities. It is important to highlight the fact that, although this was not a disaster of great magnitude, the figures presented above are sufficient to state that this event has halted the efforts made by the country to achieve development and reduce the poverty and vulnerability of the population, and make evident the enormous need to support these efforts in the future.

B. SECTORAL DAMAGES AND LOSSES

The following is a summarized description and an assessment of the damages and losses that occurred in each sector of economic activity, caused by the disaster.

B.1 PRODUCTIVE SECTOR

B.1.1 Agriculture

a) Agricultural and Livestock Subsector

In recent years, the agricultural and livestock sector's contribution to GDP has been of great importance; this sector ranks third among productive sectors and thus acts as an important, dynamic axis of the economy in terms of generating employment and obtaining foreign exchange.

El Salvador's agricultural and livestock sector was affected by Tropical Storm Ida in the Atlantic and the low-pressure system in the Pacific, which caused heavy rains with maximum precipitation of 355 mm, giving rise to large landslides that destroyed rural roads, irrigation systems, drainage works and areas of several types of crops, causing the loss of crops and the death of animals, and forcing fishery activities to stop for several days, with the consequent detriment to income and employment for all producers.¹⁴

IMAGE 11



Source: National Center for Agricultural, Livestock and Forest Technology (CENTA).

¹⁴ In terms of monitoring the prices of agricultural and livestock products, an increasing trend is expected in the coming weeks as a response to crop losses.

The Departments of La Libertad, San Salvador, Cuscatlán, La Paz and San Vicente were those mainly affected.¹⁵

In light of the above, the Ministry of Agriculture and Livestock (MAG) designed several measures to ensure the population's access to basic grains:

- i) Monitoring markets to identify the performance of supply and demand in terms of ensuring the availability of and access to foods.¹⁶
- ii) Easing import permits for private companies in order to prevent shortages.
- iii) Designing an incentive program for planting beans for seed in wetland areas, in order to seek greater production in 2010.
- iv) Maintaining MAG's Bean and Corn Seed Program as well as fertilizer delivery for the following year, in order to increase national production and generate more income for the affected population. This subsidy will be focused on the neediest people, and deliveries will be made in a timely and transparent manner.
- v) Working with the support of international agencies on programs to distribute food to the affected population in order to ensure food security.

b) Agricultural Subsector

The production expected by MAG in the 2009–2010 cycle of basic grains was shown to be positive, with an approximate growth of 4% in the planted area.

IMAGE 12. DEPARTMENT OF SAN SALVADOR



Source: PROCAFE.

¹⁵ At production level, significant impacts have also been observed in Chalatenango, Cabañas and Usulután, and in terms of basic grains all of El Salvador's departments were affected to a lesser extent.

¹⁶ If necessary, MAG could make purchases overseas to ensure the population's food supply and food security.

Technical assistance was continued, and in 2008 the Program for Free Delivery of Improved Seeds and Fertilizers benefited a total of 285,000 hectares of basic grains, grasses and vegetables, and 532,200 producers.¹⁷ One must not overlook the fact that basic grains are of great importance in the population's daily nutrition, especially the population living in areas that have been affected, and to a lesser extent in generating income from the sale of these grains in the local market.¹⁸

The disaster damaged a total of 35,700 hectares, representing 5.1% of the area slated for all crops. Crops such as beans, rice, guava and *loroco* were those most affected (see Table 11). In addition, it was necessary to act in a quick and coordinated manner with the Ministry of Public Works to collect sugar cane and coffee in order to avoid a decrease in yields and losses which could have been substantial.

The crop most affected was beans, which are planted on lands located over 400 meters above sea level and on soils with sloping topography. At the time of the catastrophe, the crop was ripening and was severely damaged due to its susceptibility to moisture. Twenty-eight percent of the crop area was affected, representing over 29,000 tons lost. The worst deterioration was in the Departments of La Libertad and San Salvador, because in many cases landslides occurred in crop areas.

This category experienced the largest loss of workdays, totaling 725,239, equivalent to 2,900 direct jobs. Although foreign purchases had increased in recent years (since 2006), there will be serious repercussions on domestic availability, which will have a negative impact on the trade balance due to the need to resort to imports whose cost, for the loss along, could total about US\$27.7 million.¹⁹

With regard to corn crops, the abundant rains affected corncobs due to the flattening of plants that were already bent, causing the grain to rot. In some cases the husk²⁰ protected the grain and thus it was possible to avoid moisture, funguses and major losses.²¹ 1.8% of anticipated production was lost, equivalent to 14,800 tons. The most affected departments were San Vicente, La Libertad and San Salvador (see Table 11).

¹⁷ The following have contributed to production performance: provision of shelling machines to support corn and sorghum producers in harvesting, and the delivery of 30,000 metal silos to reduce post-harvest losses and contribute to the achievement of better income for rural producers and their families. See: Ministry of Agriculture and Livestock (MAG), Office of Policies and Strategies (OPE), *Informe de Coyuntura* [Status Report], January–December 2008, March 2009.

¹⁸ Under the current situation of reduced remittances and unemployment, many rural families are resorting to the planting of basic grains to provide food security for their members. See: *Informe Trimestral de Coyuntura, Primer Trimestre de 2009* [Quarterly Status Report, First Quarter of 2009], Salvadoran Foundation for Economic and Social Development (FUSADES), Antiguo Cuscatlán, El Salvador, April 30, 2009.

¹⁹ Bean imports in 2010 could double. To avoid shortages, possible markets (Nicaragua, Colombia, Brazil, Mexico or Venezuela) are being sought. See: La Prensa Gráfica, "Se duplicaría la importación de frijol" [Bean imports could double], Friday, November 20, 2009.

²⁰ The husk surrounds the corncob; it could be considered its shell.

²¹ See: *Impacto de la Tormenta Ida en el sector agrícola, pecuario y pesca (Datos al 13 de November de 2009)* [Tropical Storm Ida's impact on the agricultural, livestock and fishery sector – Data as of November 13, 2009], Office of Sectoral Policy and Planning (OPPS), Ministry of Agriculture and Livestock (MAG), Santa Tecla, November 2009.

IMAGE 13. CORN



Source: CENTA.

TABLE 11. EL SALVADOR: LAND AREA OF PRINCIPAL CROPS AFFECTED BY TORRENTIAL RAINS, NOVEMBER 2009

(Figures to November 2, 2009)

| Crop | Area scheduled for production (hectares) | Affected area | |
|----------------------------------|--|----------------------|----------------------------------|
| | | Land area (hectares) | Percentage with respect to total |
| Basic grains | 467,308.1 | 35,205.8 | 7.5 |
| Rice | 4,400.9 | 197.4 | 4.5 |
| Beans | 107,954.7 | 30,218.3 | 28.0 |
| Corn | 257,452.3 | 4,755.1 | 1.8 |
| Sorghum | 97,500.2 | 35.0 | 0.0 |
| Export crops | 220,500.0 | 375.9 | 0.2 |
| Coffee | 154,000.0 | 222.6 | 0.1 |
| Sugar cane | 66,500.0 | 153.3 | 0.2 |
| Non-traditional | 17,567.9 | 130.6 | 0.7 |
| Vegetables and root crops | 12,303.9 | 80.9 | 0.7 |
| Tomato | 1,393.0 | 2.1 | 0.2 |
| Loroco | 399.0 | 24.5 | 6.1 |
| Cassava (manioc) | 1,709.4 | 21.0 | 1.2 |
| Pipián (squash) | 1,680.0 | 14.0 | 0.8 |
| Chile | 980.0 | 4.6 | 0.5 |
| Corn | 3,150.0 | 7.0 | 0.2 |
| Green beans | 192.5 | 5.6 | 2.9 |
| Watermelon | 2,800.0 | 2.1 | 0.1 |

(Continued)

TABLE 11 (Conclusion)

| Crop | Area scheduled for production (hectares) | Affected area | |
|---------------|--|----------------------|----------------------------------|
| | | Land area (hectares) | Percentage with respect to total |
| Fruits | 3,164.0 | 20.3 | 0.6 |
| Banana | 3,080.0 | 14.0 | 0.5 |
| Guava | 84.0 | 6.3 | 7.5 |
| Others | 2,100.0 | 29.4 | 1.4 |
| Sesame | 2,100.0 | 24.5 | 1.2 |
| Nurseries | - | 4.9 | - |
| Total | 705,376.0 | 35,712.3 | 5.1 |

Source: CEPAL, based on Ministry of Agriculture and Livestock (MAG), General Bureau of Agricultural and Livestock Economics (DGEA), National Center for Agricultural, Livestock and Forest Technology (CENTA), Salvadoran Foundation for Coffee Research (PROCAFÉ) and Salvadoran Sugar Industry Council (CONSAA).

Domestic availability will have no repercussions on the food security of peasant families, nor will it have a negative impact on the balance of payments due to increased imports. It should be stated, however, that the volume of foreign purchases had increased since 2006.

Rice production also experienced losses due to flattening of plants, because of which the rice was swept away by the current. The affected area totaled only 197.4 hectares, representing only 4.5% of the planted area, and production totals 1,400 tons. The most affected departments were Chalatenango, La Libertad and La Paz. With respect to sorghum, losses to crop area and production were minimal.

Anticipated production of coffee in 2008 decreased by 3.4%; this also created fewer jobs. This reduction was due to: i) negative bi-annual crop performance; ii) severe defoliation of coffee trees which interrupted physiological activity in the phase of flower bud preparation; iii) strong winds and low temperatures that occurred in early 2008 and mainly affected farms located in the western region and the upper part of the central zone; and iv) strong rainfall recorded in September and October throughout the country.²²

Coffee production in 2009 was affected by the intense rains that struck several of the country's departments with greater force. Landslides totally damaged 223 hectares which collapsed due to over-saturation of the soil in the Departments of San Vicente, Usulután, Cuscatlán, San Salvador and La Paz, also implying environmental damage. In addition, infrastructure experienced deterioration in 142 kms of internal and external access roads to farms, which could have been an obstacle to removing over 12,000 tons of coffee beans that are expected to be harvested.²³

²² See: MAG, Status Report, op. cit.

²³ See: Salvadoran Foundation for Coffee Research (PROCAFÉ), Survey of damages caused by Hurricane Ida in coffee-producing zones, Santa Tecla, November 2009.

IMAGE 14. SAN VICENTE



Source: National Center for Agricultural, Livestock and Forest Technology (CENTA).

**TABLE 12. EL SALVADOR: ESTIMATE OF AGRICULTURAL PRODUCTION LOSSES
DUE TO THE EFFECT OF TORRENTIAL RAINS, NOVEMBER 2009**

(Figures to November 2, 2009)

| Products | Thousands of tons | | | Percentages |
|----------------------------------|--------------------------------------|---------------------------------------|-----------------|---|
| | Planned production before the events | Estimated production after the events | Lost production | Relationship between lost production and planned production |
| Basic grains | 1,101.3 | 1,055.7 | 45.6 | 4.1 |
| Rice | 32.1 | 30.7 | 1.4 | 4.5 |
| Beans | 104.7 | 75.4 | 29.3 | 28.0 |
| Corn | 800.7 | 785.9 | 14.8 | 1.8 |
| Sorghum | 163.8 | 163.7 | 0.1 | 0.0 |
| Export crops | 5,396.0 | 5,369.7 | 26.3 | 0.5 |
| Coffee ^a | 69.4 | 68.9 | 0.5 | 0.7 |
| Sugar cane | 5,326.7 | 5,300.9 | 25.8 | 0.5 |
| Non-traditional | 296.5 | 295.2 | 1.3 | 0.4 |
| Vegetables and root crops | 197.8 | 197.0 | 0.8 | 0.4 |
| Tomato | 42.9 | 42.9 | 0.1 | 0.2 |
| Loroco | 1.3 | 1.2 | 0.1 | 6.1 |
| Manioc (cassava) | 20.9 | 20.6 | 0.3 | 1.2 |
| Pipián (squash) | 12.1 | 12.0 | 0.1 | 0.8 |
| Chile | 19.6 | 19.5 | 0.1 | 0.5 |
| Corn | 33.4 | 33.3 | 0.1 | 0.2 |
| Green beans | 1.5 | 1.5 | 0.0 | 2.9 |
| Watermelon | 66.1 | 66.0 | 0.0 | 0.1 |
| Fruits | 97.2 | 96.7 | 0.5 | 0.5 |
| Banana | 96.5 | 96.0 | 0.4 | 0.5 |

| Products | Thousands of tons | | | Percentages |
|----------|---|--|--------------------|---|
| | Planned production before the events | Estimated production after the events | Lost production | Relationship between lost production and planned production |
| | | | | |
| Guava | 0.8 | 0.7 | 0.1 | 7.5 |
| Others | 1.4 | 1.4 | 0.0 | 1.2 |
| Sesame | 1.4 | 1.4 | 0.0 | 1.2 |

Source: CEPAL, based on Ministry of Agriculture and Livestock (MAG), General Bureau of Agricultural and Livestock Economics (DGEA), National Center for Agricultural, Livestock and Forest Technology (CENTA), Salvadoran Foundation for Coffee Research (PROCAFÉ), Salvadoran Sugar Industry Council (CONSAA) and the Sugar Producers' Association of El Salvador.

^a The loss includes 207 tons of coffee beans due to the landslide, and 292 tons that could not be recovered from coffee beans that fell from the trees.

The total loss of production represents only 0.56% of estimated production and totals 499 tons: 230 are due to the landslide, and the remainder are coffee beans that fell to the ground and no longer have any economic value, i.e., 34% of the total amount that fell,²⁴ added to the above, accounts for a social loss due to the loss of 135,750 workdays, which would reduce the income of workers (direct and indirect jobs) in the affected zones by over US\$605,635.²⁵

The impact on the balance of payments will be a decrease in exports between the remainder of 2009 and part of 2010. At the average price provided by the International Coffee Organization (ICO), this is estimated at US\$1,675.80, which could be reduced or increased, depending on international price variations.

According to the Salvadoran Sugar Industry Council (CONSAA) and the Sugar Producers' Organization of El Salvador, sugar production increased by 6% in 2008 due to an increase in international prices which also allowed an increase in sugar yields per hectare, equivalent to a production of over 581,000 tons. Due to the storms, sugar production decreased by only 25,800 tons, which could have increased to a million tons if internal and external access roads to farms had not been repaired through a joint effort by the private sector and MOP.

With regard to other crops such as vegetables, roots and fruits, losses totaled US\$609,100; the crops most affected were *loroco*, manioc, banana and guava. With regard to vegetables, a highly profitable and employment-generating category, exclusive to small farmers, losses totaled 7,600 tons in 80.9 hectares.

In addition, within the agricultural subsector, irrigation systems experienced significant damages when canals and floodgates became filled with silt and broke in the Districts of Lempa-Acahuapa, Atiocoyo Sur, Atiocoyo Norte and Zapotitán; 15 mini-irrigation systems were unserviceable and wasted, macro-tunnels, greenhouses, warehouses and farm implements were damaged, totaling US\$796,000. Total damages and losses in the agricultural subsector have been estimated at US\$33.3 million.

²⁴ There could be a greater increase in lost production of coffee that has fallen to the ground, if there is a labor shortage.

²⁵ If one takes into account the fact that, to collect and process a *quintal* [100 libras, or 46 kilograms] of coffee beans, 12.5 workdays are needed; thus the estimated loss is over 605,600 workdays, equivalent to 543 rural jobs.

c) Livestock Subsector

In 2008, the livestock subsector gave a greater momentum to the economy, contributing 11.5% of agricultural GDP; it also provided some 152,098 direct jobs dealing with bovine cattle and 10,170 jobs dealing with hogs. The sum of indirect jobs exemplifies the great importance of this subsector, accounting for a total of about 811,340 jobs.

IMAGE 15. CORN



Source: National Center for Agricultural, Livestock and Forest Technology (CENTA).

In addition, MAG has contributed to development by delivering machinery and equipment for the development and use of new technologies. These deliveries included milking machines, cooling tanks, semen banks, hammermills, mixers, choppers, harvesters, shellers, feeding centers, silos and tractors with their respective implements.²⁶

Despite the high costs of raw materials for the preparation of animal feed, especially corn, soy meal and fats, beef production showed an increase of 6.6% in 2008, supported by the use of lower-cost alternative techniques, with better results used in the cattle fattening process. In addition, the strategy to improve producers' profitability has been to sell heavier animals.²⁷

The poultry sector experienced a 13.5% drop in chicken meat production and 6.2% in egg production. For 2009, MAG again estimated a 5% reduction in production compared to that recorded in 2008. The poultry subsector was affected the most, with the loss of 40,918 laying hens, the largest number corresponding to commercial farms, but it should also be considered that the 2,736 backyard chickens belong to peasant families who are on the poverty or extreme-poverty line, and thus the disaster's impact reduced their incomes. Other damages correspond to smallholder economy, as shown in the chapter dealing with livelihoods.

Damages and losses in this subsector total US\$6.8 million and are especially concentrated on egg production.

²⁶ See: MAG, Status Report, op. cit.

²⁷ *Ibid.*

**TABLE 13. EL SALVADOR: VALUE OF DAMAGES AND LOSSES IN AGRICULTURE.
DUE TO TORRENTIAL RAINS, NOVEMBER 2009**

(in thousands of US\$)

| Sector and subsector | Damages and losses | | | Impact on external sector | |
|---------------------------------------|--------------------|---------|----------|---------------------------|---------------------|
| | Total | Damages | Losses | Increase in imports | Decrease in exports |
| Agriculture (1 + 2) | 33,617.7 | 3,390.1 | 30,227.6 | | |
| 1. Assets | 3,390.1 | 3,390.1 | - | | |
| 1.1 Lands | 2,594.2 | 2,594.2 | - | | |
| Coffee farms ^a | 1,121.2 | 1,121.2 | - | | |
| Sugar cane farms ^b | 1,395.0 | 1,395.0 | - | | |
| Rural roads inside farms ^c | 78.0 | 78.0 | - | | |
| 1.2 Agro-productive infrastructure | 795.9 | 795.9 | - | | |
| Irrigation districts | 653.0 | 653.0 | - | | |
| Small-scale irrigation systems | 22.5 | 22.5 | - | | |
| Macro-tunnels | 4.2 | 4.2 | - | | |
| Four greenhouses | 24.0 | 24.0 | - | | |
| Warehouses, etc. | 16.6 | 16.6 | - | | |
| Farm implements ^d | 75.6 | 75.6 | - | | |
| 2. Production | 30,227.6 | - | 30,227.6 | | |
| Basic grains | 28,090.8 | - | 28,090.8 | | |
| Rice | 524.7 | - | 524.7 | 690.0 | |
| Beans ^e | 23,111.4 | - | 23,111.4 | 27,728.9 | |
| Corn | 4,433.3 | - | 4,433.3 | 2,474.1 | |
| Sorghum | 21.4 | - | 21.4 | | |
| For export | 1,527.6 | - | 1,527.6 | | |
| Coffee | 982.6 | - | 982.6 | | 1,675.8 |
| Sugar cane ^f | 545.1 | - | 545.1 | | 1,509.2 |
| Non-traditional | 609.1 | - | 609.1 | | |
| Vegetables and root crops | 437.3 | - | 437.3 | | |
| Tomato | 56.3 | - | 56.3 | | |
| Loroco ^g | 127.8 | - | 127.8 | | 862.7 |
| Manioc (cassava) | 89.2 | - | 89.2 | | |
| Pipián (squash) | 43.8 | - | 43.8 | | |
| Chile | 55.4 | - | 55.4 | | |
| Corn | 25.2 | - | 25.2 | | |
| Green beans | 28.9 | - | 28.9 | | |
| Watermelon | 10.8 | - | 10.8 | | |
| Fruits | 130.3 | - | 130.3 | | |
| Banana | 66.7 | - | 66.7 | | |
| Guava | 63.6 | - | 63.6 | | |
| Others | 41.5 | - | 41.5 | | |
| Sesame | 6.5 | - | 6.5 | | |
| Nurseries | 35.0 | - | 35.0 | | |

Source: CEPAL estimates, based on official and productive-sector information.

^a The cost of one hectare of land for coffee, including investment, is US\$5,040.

^b The cost of one hectare of land for sugar cane is US\$9,100.

^c An average of US\$1,500 per kilometer was used only for coffee farms.

^d Refers to farm tools (pickaxes, shovels, wheelbarrows, backpack pumps, and hoes).

^e For 2009–2010, bean imports would increase to 45,000 tons.

^f If damaged bridges cannot be repaired, losses would equal one million tons, which means 20% of national production that could not be cleared and processed. Exports refer to raw sugar.

^g Export losses are calculated by leaving 25% of production for domestic consumption.

TABLE 14. EL SALVADOR: VALUE OF DAMAGES AND LOSSES IN THE LIVESTOCK SUBSECTOR DUE TO TORRENTIAL RAINS, NOVEMBER 2009*(in thousands of US\$)*

| Sector and subsector | Damages and losses | | | Impact on external sector | |
|--------------------------|--------------------|---------|---------|---------------------------|---------------------|
| | Total | Damages | Losses | Increase in imports | Decrease in exports |
| Livestock ^a | 6,787.8 | 354.6 | 6,433.2 | | |
| 1. Assets | 479.6 | 354.6 | 125.0 | | |
| Bovine cattle | - | - | - | | |
| Hogs | - | - | - | | |
| Poultry | 204.6 | 204.6 | - | | |
| Poultry coops | 150.0 | 150.0 | - | | |
| Prophylaxis ^b | 125.0 | - | 125.0 | | |
| 2. Production | 6,308.2 | - | 6,308.2 | | |
| Eggs | 6,308.2 | - | 6,308.2 | | 368.3 |

Source: CEPAL, based on figures from the Ministry of Agriculture and Livestock (MAG), General Bureau of Plant and Animal Health (DGSVA).

^a Does not include smallholdings totaling US\$195,000, due to damages to family poultry, cows, hogs, Pelibuey sheep, and horses.

^b Includes medicines and payment to auxiliary staff.

d) Fishery Subsector

Fishery production in El Salvador has increased as a result of the growth in industrial fishing and aquaculture, which has allowed the country to export tilapia fillets.

Due to the storms, for several days fishing could not be carried out, and thus artisanal and industrial fishing were affected. On the one hand, capture and production were reduced, and on the other hand, infrastructure suffered damages.

IMAGE 16. LAKE ILOPANGO

Source: CENDEPESCA.

In terms of damages, aquaculture was the most affected, in the amount of US\$299,800, especially to pond gates. Production losses refer to captures that could not be made, totaling more than US\$1 million, divided into US\$857,000 for artisanal fishing and US\$179,000 for industrial fishing, including white shrimp, juvenile southern white shrimp and prawn.

In terms of aquaculture, losses occurred in shrimp and tilapia, with a total loss of US\$109,200.

Damages and losses in the fishery and aquaculture sector totaled US\$1.4 million, with the most damages related to artisanal fishermen because of the days they could not go out to fish.

e) Workdays Lost

In total, due to the storms, the agricultural subsector lost 964,186 workdays, representing 3,857 direct jobs. This means that peasants who work in agricultural and livestock activities lost US\$3.1 million in wages.²⁸

No information is available on workdays lost in the livestock and fishery sectors.

**TABLE 15. EL SALVADOR: WORKDAYS AND JOBS LOST IN AGRICULTURE
DUE TO TORRENTIAL RAINS, NOVEMBER 2009**

(Number of daily wages and jobs)

| | Workdays | | Direct jobs | |
|------------------|------------|---------|-----------------------|-------|
| | Expected | Lost | Expected ^a | Lost |
| Basic grains | 24,424,617 | 803,377 | 97,698 | 3,214 |
| Corn | 14,674,781 | 66,571 | 58,699 | 266 |
| Beans | 6,801,146 | 725,239 | 27,205 | 2,901 |
| Sorghum | 2,535,005 | 315 | 10,140 | 1 |
| Unhusked rice | 413,685 | 11,252 | 1 655 | 45 |
| Vegetables | 1,394,451 | 4,885 | 5 578 | 20 |
| Tomato | 401,184 | 151 | 1 605 | 1 |
| Loroco | 112,518 | 3,357 | 450 | 13 |
| Manioc (cassava) | 109,402 | 525 | 438 | 2 |
| Pipián (squash) | 159,600 | 406 | 638 | 2 |
| Chile | 195,020 | 182 | 780 | 1 |
| Corn | 185,850 | 70 | 743 | 0 |
| Green beans | 23,678 | 157 | 95 | 1 |
| Watermelon | 207,200 | 38 | 829 | 0 |
| Fruits | 331,688 | 980 | 1,327 | 4 |
| Banana | 317,240 | 350 | 1,269 | 1 |
| Guava | 14,448 | 630 | 58 | 3 |
| For export | 21,718,060 | 154,943 | 86,872 | 620 |
| Coffee | 16,940,000 | 135,750 | 67,760 | 543 |
| Sugar cane | 4,710,860 | 18,899 | 18,843 | 76 |
| Sesame seed | 67,200 | 294 | 269 | 1 |
| Total | 47,868,816 | 964,186 | 191,475 | 3,857 |

Source: CEPAL, based on production cost information provided by the General Bureau of Agricultural and Livestock Economics (DGEA) of the Ministry of Agriculture and Livestock (MAG).

^a One job equals 250 workdays.

²⁸ The minimum wage as of January 2009 is US\$3.24 per day.

The approximate amount of damages and losses for the agricultural and livestock sector totals US\$41.6 million, of which 90.3% correspond to losses and the remaining 9.7% to damages in the agricultural, livestock and fishery subsectors. Among all departments, the most affected were La Libertad, San Vicente and La Paz.

TABLE 16. EL SALVADOR: VALUE OF DAMAGES AND LOSSES IN AGRICULTURE, LIVESTOCK PRODUCTION AND FISHING DUE TO TORRENTIAL RAINS, NOVEMBER 2009

(in thousands of US\$)

| Sector and subsector | Damages and losses | | |
|----------------------------|--------------------|---------|----------|
| | Total | Damages | Losses |
| Agriculture (1+2) | 33,617.7 | 3,390.1 | 30,227.6 |
| 1. Assets | 3,390.1 | 3,390.1 | - |
| 2. Production | 30,227.6 | - | 30,227.6 |
| Livestock Production (1+2) | 6,787.8 | 354.6 | 6,433.2 |
| 1. Assets | 479.6 | 354.6 | 125.0 |
| 2. Production | 6,308.2 | - | 6,308.2 |
| Fishing (1+2) | 1,445.1 | 299.8 | 1,145.3 |
| 1. Assets | 299.8 | 299.8 | - |
| 1.1 Fishing | - | - | - |
| 1.2 Aquaculture | 299.8 | 299.8 | - |
| 2. Production | 1,145.3 | - | 1,145.3 |
| 2.1 Fishing | 1,036.1 | - | 1,036.1 |
| 2.2 Aquaculture | 109.2 | - | 109.2 |
| Total | 41,850.5 | 4,044.5 | 37,806.0 |

Source: CEPAL estimates based on official information from all productive sectors.

B.1.2 Industry, Commerce and Service Sectors

It is worthwhile to note that the assessment of the impact on the industrial, commercial and service sectors (including tourism) was conducted on the basis of a survey carried out in the 14 most seriously affected municipalities, whose human development indexes are lower than the national average. Thus, the relatively low amounts of damages and losses in the industrial, commercial and service sectors, far from showing a contained impact, are evidence of the low income levels of the most affected communities.

In the economy as a whole, the disaster's impact on industrial, commercial and service activities was quite limited. In general terms, neither the assets nor the flows of large- and medium-sized companies were affected by the floods and lahars. As detailed later in this document, the greatest impact was experienced by micro-businesses, which are also those with the least access to mechanisms that would allow them to deal with the damages and losses that they endured.

As mentioned, the assessment of the disaster's impact on the industrial and commercial sectors was conducted based on the survey carried out for this purpose in the 14 most seriously affected municipalities (see Box 2).

Of all companies surveyed, 26% report that they were affected by the disaster. Most of the affected companies (76%) resumed their activities within one week, and another 20% within two weeks. As shown in Table 17, the sectors in which more facilities were affected were the service and small commercial sectors, which together account for 80% of all businesses affected. By department, the largest number of businesses affected was in San Vicente (38%) and San Salvador (26%). Finally, in terms of size, one can observe that nearly 80% of the businesses affected are micro-businesses.

BOX 2. SURVEY OF DAMAGES AND LOSSES IN THE COMMERCIAL, INDUSTRIAL AND SERVICE SECTORS

Taking advantage of the timeliness of the information, it was decided to conduct the survey of damages and losses in the 14 municipalities that Civil Protection evaluated as having experienced serious impact. The 14 municipalities are San Bartolomé Perulapia and San Pedro Perulapan in the Department of Cuscatlán, San Luis La Herradura, San Pedro Masahuat, Santa María Ostuma and Santiago Nonualco in the Department of La Paz, Ilopango, San Martín and Santiago Texacuangos in the Department of San Salvador, Guadalupe, San Vicente, Tepetitán and Verapaz in the Department of San Vicente, and La Libertad in the Department of the same name. The 14 municipalities surveyed represent 18.6% of the population, 10.9% of personnel employed, and 13.8% of the economic establishments of the 66 municipalities affected by the disaster.

The sampling framework was defined based on the directory of facilities used for the economic census conducted in 2005. As shown in the table, the large majority of facilities in these municipalities are micro-businesses with fewer than five employees. Taking the above into account, it was decided to conduct a stratified sampling of the approximately 12,000 businesses with fewer than five employees and to take a census of the rest. By type of activity, businesses were classified in five sectors: agroindustry, industry, large-scale commerce, small-scale commerce, and services.

FACILITIES IN AFFECTED MUNICIPALITIES

| Size according to employment | Degree of impact ^a | | | Total |
|------------------------------|-------------------------------|---------|--------------|--------|
| | Slight | Serious | Very serious | |
| 1–4 | 6,533 | 62,440 | 12,000 | 80,973 |
| 5–49 | 290 | 8,411 | 613 | 9,314 |
| 50–99 | 12 | 474 | 19 | 505 |
| 100–499 | 9 | 330 | 24 | 363 |
| 500 and over | 4 | 67 | 13 | 84 |
| Total | 6,848 | 71,722 | 12,669 | 91,239 |

^a Degree of damages in municipalities, prepared by the General Bureau of Civil Protection according to the "Damage Assessment and Needs Analysis" (DANA) methodology.

TABLE 17. CLASSIFICATION OF AFFECTED BUSINESSES*(Percentage of total)*

| By Department | |
|---------------------------|------|
| Cuscatlán | 2.6 |
| La Libertad | 17.6 |
| La Paz | 16.2 |
| San Salvador | 25.9 |
| San Vicente | 37.6 |
| By Economic Sector | |
| Industry | 12.1 |
| Large-scale Commerce | 5.3 |
| Small-scale Commerce | 39.7 |
| Services | 42.9 |
| By Size | |
| Large Business | 0.9 |
| Medium Business | 2.6 |
| Small Business | 17.6 |
| Microbusiness | 78.8 |

Source: Prepared by the authors based on the survey conducted by DIGESTYC.

In the 14 municipalities surveyed, an impact equivalent to US\$7.69 million is estimated, of which a total of US\$3.88 million correspond to damages and the rest to losses. These values were extrapolated to all municipalities affected, assuming that the impact on the 14 municipalities surveyed represents 50% of the damages in the 66 municipalities affected. Thus, at national level, damages and losses are estimated to be equivalent to US\$7.75 million and US\$7.62 million, respectively.

To evaluate the key factors that affect businesses due to the disaster, during the survey participants were asked to list the three most important factors. The results indicate that the drop in demand has been the most important factor, followed by road access problems due to blocked roads. Other factors mentioned include damages to the site, and problems with the provision of basic services.

In line with the above, of the values of damages presented in Table 18 over 70% correspond to damages to buildings, while among losses the principal components are losses associated with reduced activity, representing 90% of the total.

With regard to damages, 7.3% of businesses suffered damages to the construction of their establishment, 4.3% to other assets, and 4.6% to inventories. By type of activity, the service sector experienced the most damage (US\$3.44 million); San Salvador was the municipality most affected. This result reflects damages of nearly US\$2 million reported in buildings of the service sector in said department. In turn, retail busi-

nesses experienced damages totaling US\$271,500; La Paz and San Salvador were the departments most affected. In La Paz, nearly half of damages in the small business sector were caused by damages to inventory.

In the Department of San Salvador, most damages occurred in commercial sites. With regard to manufacturing, over three-quarters of damages correspond to US\$108,450 in damages to buildings in the Department of San Salvador. Finally, of the US\$20,000 in damages experienced by the wholesalers, nearly US\$14,500 correspond to equipment damages in the Department of La Paz.

Ninety percent (US\$3.43 million) of losses are due to the foreseen reduction in economic activity, which is expected to return to normal within about three months. It is worth noting that one third of total losses correspond to the reduction in retail activity in the Department of San Vicente, estimated at US\$1.28 million. In the Department of San Salvador, losses due to the reduction in retail activity are estimated at around a quarter-million US dollars. Most losses in the service sector are also due the reduction in activity, also concentrated in the Department of San Vicente, although in the Departments of La Libertad, La Paz and San Salvador estimated losses due to the reduction in activity total US\$470,000.

In turn, wholesalers' losses total US\$533,900, of which 57% corresponds to the reduction in activity in the Department of San Vicente and 34% to the reduction in activity in the Department of La Libertad. Finally, 60% of losses in the manufacturing sector correspond to the foreseen reduction in activity in the Department of San Salvador.

Reflecting the micro-business profile, of those businesses affected only 37% have access to financing and less than 5% of the affected businesses were insured at the time of the disaster. Of those businesses with access to financing, approximately half have faced problems in making pending loan payments due to the disaster. With regard to difficulties in marketing products and services, most businesses facing such difficulties are those with less demand.

Based on the above, it may be concluded that the disaster worsened the already precarious situation faced by micro- and small businesses. This situation is characterized by strong vulnerability to demand fluctuations, combined with problems of access to financial mechanisms that allow them on the one hand to soften the effect of such fluctuations, and on the other hand to finance an escalation that allows them to move up on the value chain and diversify their geographic base.

Besides the negative effects described above, an estimate has been made of the additional losses that the agroindustrial and commercial sectors will experience due to reduced food production in the agricultural and livestock sector as a result of the disaster. The lost value of the processing and sale of food products was estimated on the basis of losses in primary production, taking into account the volumes that producers retain for their own consumption. Thus, the unit prices of products affected in this manner at producer, wholesale and retail levels were used as a comparison. These additional losses, estimated at US\$14.9 million for agroindustry and US\$9.5 million for commerce, would occur in the first four months of 2010 because they stem from production in December 2009.

Thus, the summary of damages to assets and of production losses in these sectors totals around US\$39.9 million, as detailed in the following table:

TABLE 18. SUMMARY OF DAMAGES AND LOSSES IN THE INDUSTRIAL, COMMERCIAL AND SERVICE SECTORS*(in millions of US\$)*

| Sector | Effects of disaster | | |
|----------|---------------------|--------|-------|
| | Damages | Losses | Total |
| Industry | 0.28 | 15.19 | 15.47 |
| Commerce | 0.58 | 14.37 | 14.96 |
| Services | 6.89 | 2.54 | 9.43 |
| Total | 7.75 | 32.10 | 39.85 |

Source: Estimates by assessment mission.

B.2 SOCIAL SECTORS

B.2.1 Housing Sector

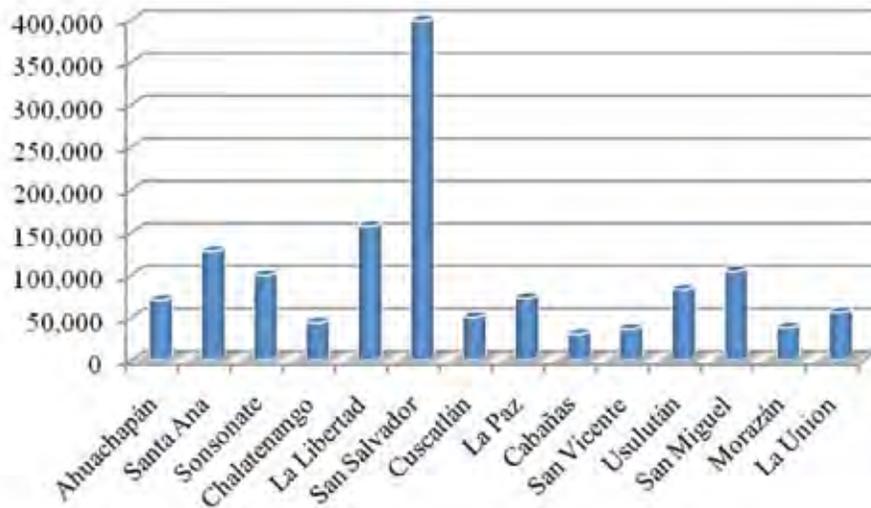
a) Background

According to the 2007 Population and Housing Census, in El Salvador there are 1,372,853 housing units or homes throughout the 14 departments (see Graph 7). According to the Vice-Ministry of Housing, there is a quantitative deficit in the sector, estimated at 43,000 units, while the qualitative deficit is approximately 400,000 units. Moreover, it should be noted that the sector's construction capacity in the country is approximately 15,000 units/year.

The number of existing houses in the five affected departments is 857,544 units. There is a significant problem of unoccupied houses throughout the country, since 17% of the total number of houses has been reported as unoccupied (V Housing Census, 2007).

Unemployment rates in the departments affected by Hurricane Ida are: San Salvador (13.6%), San Vicente (17.7%), La Paz (19.9%), La Libertad (18.4%), and Cuscatlán (13.8%). Most people own their homes, although titling is not regulated in most cases. Only 6% of the population is estimated to be renters. This percentage is divided between the 3% of the population that pays rent and the 3% that pay mortgage credits.

The San Salvador Metropolitan Area has the country's largest urban concentration, with a population of 1.5 million people (27% of the total population), and is where the most critical housing factors are found, due to a combination of factors: i) the population increase in recent years, as a result of the nation's natural growth rate and internal migrations from rural zones to the San Salvador Metropolitan Area which disproportionately increase population density; ii) high population densities; iii) uncontrolled and unplanned growth; iv) the high risk of houses located along the eroded banks of rivers and creeks; v) abandoned houses in working-class macro-urbanizations (known as *colonias*); and vi) overcrowding and uninhabitable rental houses.

GRAPH 7. TOTAL NUMBER OF HOUSES IN EL SALVADOR'S 14 DEPARTMENTS

Source: ZUU / Housing Census.

b) Situation after the Disaster

Hurricane Ida is estimated to have destroyed, damaged or placed at high risk approximately 5,008 houses in the abovementioned five departments (see Graph 8). This represents 0.58% of total existing houses. Although the relative quantity of houses affected by the disaster is relatively low, Salvadoran authorities see the impact on the housing sector as an important opportunity to address the need to strengthen institutional preparedness for disaster and risk management in the sector. The affected houses were mainly located along creeks that were flooded both by high volumes of water and rain and by flowing mud and debris.

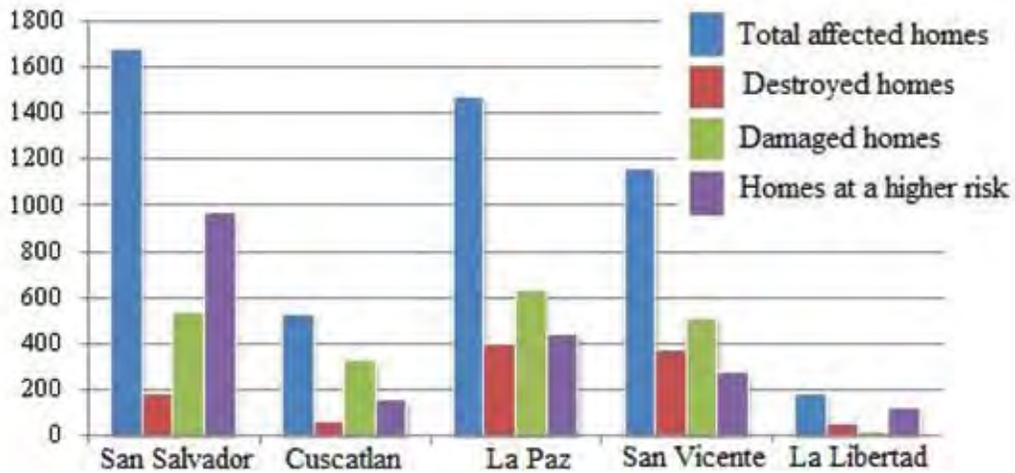
The average size of lots and houses in the five affected departments has been estimated at approximately 140 m² and 28 m², respectively. Houses in the affected departments are characterized as being made of concrete blocks, adobe, clay bricks, metal sheets and wattle- and-daub. The affected houses were mostly located in urban areas and small villages.

IMAGE 17. VERAPAZ



Source: CEPAL.

GRAPH 8. HOMES AFFECTED, BY DEPARTMENT



Source: Prepared by assessment mission.

It is estimated that 3,003 homes were totally destroyed or were classified as being at high risk and could not be rebuilt on their original sites due to their exposure to future disasters. Applying urban standards of 140 m² per lot, which include the 30% needed for urbanization, the amount of land needed to relocate these homes is 42 hectares.

IMAGE 18. VERAPAZ



Source: CEPAL.

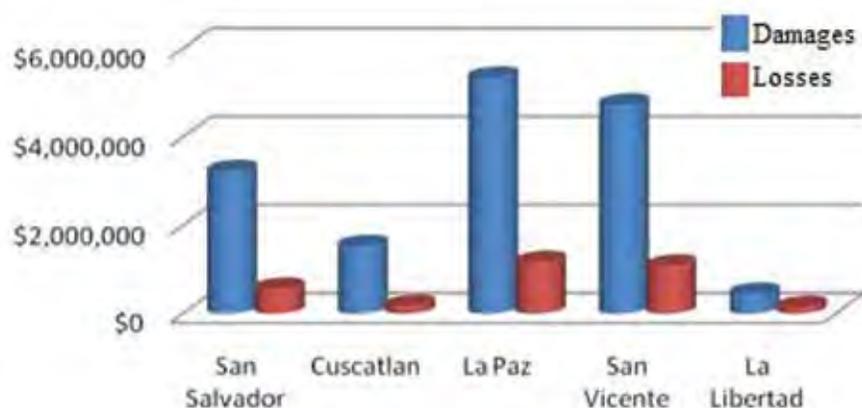
c) Estimate of Damages and losses

The repair of damages in the sector should be considered a priority among post-disaster activities. Total damages in the affected departments have been estimated at US\$15,259,300. The severest damages occurred in the Department of La Paz, where 398 houses were totally damaged and 442 are at high risk. The amount of these damages in La Paz totals US\$5,336,000. In San Vicente 371 houses were totally damaged and 273 are at high risk, with total damage of US\$4,728,500. Moreover, the sum of damages to houses that have remained in high-risk zones of San Salvador is US\$3,221,700, in Cuscatlán US\$1,528,400, and in La Libertad US\$444,700.

Most damages were centered on the private sector. No public building was affected. However, damages to public sector buildings have been considered in the other sectors. That is, damages to this type of buildings have been quantified within the respective sectors (health, education, etc.)

According to the CEPAL methodology, total losses (flows) in the five affected departments are estimated at US\$3,117,955. The most significant losses occurred in the Department of La Paz, totaling US\$1,164,140. The greatest losses occurred in the Municipality of San Pedro Masahuat (US\$191,145). These were followed by the Departments of San Vicente (US\$1,069,600), San Salvador (US\$560,970), Cuscatlán (US\$167,660) and La Libertad (US\$146,275). The amount of losses includes the cost of debris removal and elimination on and around houses, and lost rental income over an estimated six-month period.

GRAPH 9. DAMAGES AND LOSSES BY DEPARTMENT



Source: Estimates by assessment mission.

During the assessment process, no information was collected on gender, head of household, ages, size of house, vulnerable groups and income level, or on the status of land occupation, tenants, owners, type of material, etc. Their subsequent inclusion will be essential at the time of defining rehabilitation and reconstruction strategies, as well as interventions in each of them.

BOX 3. ASSUMPTIONS USED FOR THE HOUSING SECTOR ASSESSMENT

Data: The data used for this report are based on the information that municipal administrations provided to the Vice-Ministry of Urban Development and Housing, of the Ministry of Public Works.

Definitions: The assessment used the following definitions in its analysis of Hurricane Ida's damage to El Salvador's housing sector:

Destroyed: Total structural destruction.

Damaged: Non-structural damage.

High risk: Located in inadequate places and with the possibility of collapsing in the short term.

The damage estimate was based on three considerations: i) the cost of replacing a destroyed house, estimated at US\$7,000, ii) houses with moderate, non-structural damage, estimated at US\$2,100 (30% of a destroyed house; and iii) damages to personal effects, estimated at US\$1,200.

The estimate of losses was based on three measures, each with included subfactors: i) removal and demolition of debris: US\$380, including labor, machinery and removal; ii) lost revenue, taking into account the loss of monthly income for six months for rented houses: US\$100, and lost revenue from the payment of mortgage credits for six months: US\$150; iii) relocation for destroyed and high-risk houses, taking land into account (a 140 m² lot: US\$2,450); and iv) replacement of high-risk houses: US\$7,000.

TABLE 19. DAMAGES AND LOSSES IN THE HOUSING SECTOR*(in US\$)*

| | Damages | Losses | Total |
|--|----------------|---------------|--------------|
| Houses destroyed | 7, 378,000 | | 7,378,000 |
| La Libertad | 343,000 | | |
| San Salvador | 1,260,000 | | |
| Cuscatlán | 392,000 | | |
| La Paz | 2,786,000 | | |
| San Vicente | 2,597,000 | | |
| Urban properties lost | | | 2,582,300 |
| La Libertad | | 120,050 | |
| San Salvador | | 441,000 | |
| Cuscatlán | | 137,200 | |
| La Paz | | 975,100 | |
| San Vicente | | 908,950 | |
| Homes partially damaged | 4,210,500 | | 4,210,500 |
| La Libertad | 27,300 | | |
| San Salvador | 1,110,900 | | |
| Cuscatlán | 680,400 | | |
| La Paz | 1,318,800 | | |
| San Vicente | 1,073,100 | | |
| Household effects | 3,670,800 | | 3,670,800 |
| La Libertad | 74,400 | | |
| San Salvador | 850,800 | | |
| Cuscatlán | 456,000 | | |
| La Paz | 1,231,200 | | |
| San Vicente | 1,058,400 | | |
| Demolition and removal of debris | | 400,520 | 400,520 |
| La Libertad | | 18,620 | |
| San Salvador | | 68,400 | |
| Cuscatlán | | 21,280 | |
| La Paz | | 151,240 | |
| San Vicente | | 140,980 | |
| Lost revenue | | 135,135 | 135,135 |
| Monthly revenue leased houses | | 54,054 | |
| Monthly revenue houses under credit arrangements | | 81,081 | |

Source: Estimates by assessment mission based on official information.

d) Several Recommendations

The overall objective for reurbanization is to build better houses, strengthen communities, reduce risks and improve the quality of life of citizens affected. The reconstruction of destroyed and high-risk houses should ensure that the new houses are resistant to future disasters, are located on suitable land, and have better-quality construction.

The government should take the lead in coordinating a support program and initiating the reconstruction phase in the short term. The incorporation of participatory processes in post-disaster reconstruction is highly effective and yields high levels of satisfaction.

To ensure that the funds allocated for reconstruction are used properly. The government should carefully consider whether the cash grant to affected persons is the most appropriate solution. One alternative in this regard could include government financing for the construction of foundations, floor tiles, columns and roofs, making a credit available for the purchase of materials at local hardware stores.

Because until now only 5,000 people have remained in shelters, the government must balance short-term solutions with long-term objectives that contribute to improving houses and strengthening community training for risk reduction and management. Temporary houses frequently require considerable management; this does not allow objectives to be met in order to improve housing conditions for the future.

Finally, it is recommended that the government take advantage of the momentum that the reconstruction process will generate with regard to the national housing deficit, and focus its efforts on houses that are presently at high risk. This would mean the renewal and implementation of urban development plans that take into account population growth and the most likely areas for urban settlements. The government should design an integrated program for neighborhood promotion and recovery, for land use planning with incentives for its implementation, and for the structural reinforcement of houses, among others.

B.2.2 Education

According to information included in the Education Census that was prepared in 2007, nationwide El Salvador has a total of 6,213 educational centers, of which 5,159 correspond to the public sector (83.03%) and 1,054 (16.97%) to the private sector. Total enrollment nationwide, including preschool (229,539), basic (1,347,950) and middle (203,256) is 1,780,745 students, corresponding to 80.87% of enrollment at public educational centers and 19.13% at private schools (see Tables 20 and 21).

TABLE 20. SCHOOL ENROLLMENT BY LEVEL AND SECTOR

| Level | Public (%) | Private (%) | Enrollment |
|-----------|------------|-------------|------------|
| Preschool | 81.0 | 19.0 | 229,539 |
| Basic | 88.5 | 11.5 | 1,347,950 |
| Middle | 73.1 | 26.9 | 203,256 |
| Total | 80.87 | 19.13 | 1,780,745 |

Source: Cuellar-Marchelli 2008.

TABLE 21. EDUCATIONAL CENTERS BY DEPARTMENT AND SECTOR

| Department | Private | Public | Total |
|--------------|---------|--------|-------|
| Ahuachapán | 31 | 284 | 315 |
| Santa Ana | 87 | 459 | 546 |
| Sonsonate | 41 | 324 | 365 |
| Chalatenango | 9 | 412 | 421 |
| La Libertad | 157 | 449 | 606 |
| San Salvador | 551 | 589 | 1,140 |
| Cuscatlán | 22 | 205 | 227 |
| La Paz | 28 | 311 | 339 |
| Cabañas | 8 | 256 | 264 |
| San Vicente | 10 | 238 | 248 |
| Usulután | 25 | 466 | 491 |
| San Miguel | 61 | 468 | 529 |
| Morazán | 9 | 319 | 328 |
| La Unión | 15 | 379 | 394 |
| Total | 1,054 | 5,159 | 6,213 |

Source: MINED, School Census (Censo Escolar) 2007.

According to their location, 4,022 educational centers are located in rural zones and 2,191 in urban zones (MINED School Census 2007).

a) Damage Estimate

The major effects of Hurricane Ida's path through the country, in the education sector, occurred in the Departments of Cabañas, Cuscatlán, La Libertad, La Paz, San Miguel, San Salvador, San Vicente and Usulután, severely and moderately affecting 111 schools in 48 municipalities of these departments.

TABLE 22. EXISTING EDUCATIONAL CENTERS BY DEPARTMENT

| Department | Educational Centers |
|--------------|---------------------|
| La Libertad | 606 |
| San Salvador | 1,140 |
| Cuscatlán | 227 |
| La Paz | 339 |
| Cabañas | 264 |
| San Vicente | 248 |
| Usulután | 491 |
| San Miguel | 529 |
| Total | 3,844 |

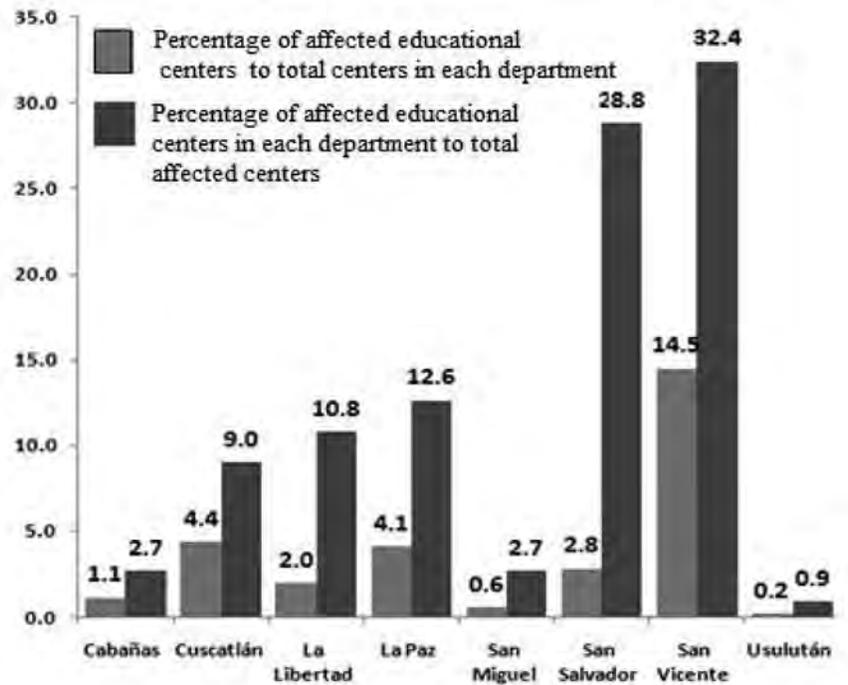
Source: MINED, School Census 2007.

TABLE 23. NUMBER OF SCHOOLS

| Department | N° schools |
|--------------|------------|
| Cabañas | 3 |
| Cuscatlán | 10 |
| La Libertad | 12 |
| La Paz | 14 |
| San Miguel | 3 |
| San Salvador | 32 |
| San Vicente | 36 |
| Usulután | 1 |
| Total | 111 |

Source: MINED, Damage Report 2009.

GRAPH 10. PERCENTAGES OF SCHOOLS WITH SEVERE AND MODERATE DAMAGE AND THOSE TO BE RELOCATED



Source: MINED, Damage Report 2009.

The information on total damages to schools belongs to the public sector. No private-sector information was available because the Ministry of Education does not have an official list of that sector's schools.

The severest damages occurred in 35 public educational centers in municipalities: in the Department of San Salvador (15) whose affected municipalities were: Aguilares (2), Apopa (2), Najapa (1), Panchimalco (2), San Martín (1), San Salvador (3), Santo Tomás (2) Soyapango (1) and Tonacatepeque (1); in the Department of Cabañas (1), the affected municipality was Llobasco (1); in the Department of Cuscatlán (4), the affected municipalities were: San Bartolomé Perulapia (1), San Pedro Perulapan (2) and Tenancingo (1); in the Department of La Libertad (1), the affected municipality was La Libertad (1); in the Department of La Paz (3), the affected municipalities were: El Rosario (1), Paraíso de Osorio (1) and San Francisco Chinameca (1); in the Department of San Vicente (10), damages were centered on the municipalities of Apastepeque (2), Guadalupe(1), San Cayetano (1), San Sebastián (1), San Lorenzo(1), Verapaz (3) and Tepetitán (1); and finally, in the Department of Usulután (1), the damages were centered on the municipality of Jucuapa (1).

The departments with the largest number of severely damaged schools were those of San Salvador (42.86%), San Vicente (28.57%) and Cuscatlán (11.43%), all belonging to the public sector.

TABLE 24. SCHOOLS DAMAGED, BY DEPARTMENT AND MUNICIPALITY

| Department | Municipality | Schools | Students Enrolled |
|--------------------|-------------------------|---------|-------------------|
| Cabañas | Ilobasco | 2 | 233 |
| | San Isidro | 1 | 57 |
| Total Cabañas | | 3 | 290 |
| Cuscatlán | Cojutepeque | 1 | 109 |
| | Monte San Juan | 1 | 361 |
| | Oratorio de Concepción | 1 | 149 |
| | San Bartolomé Perulapia | 2 | 552 |
| | San Pedro Perulapan | 4 | 1,177 |
| | Tenancingo | 1 | 108 |
| Total Cuscatlán | | 10 | 2,456 |
| La Libertad | Colón | 1 | 37 |
| | La Libertad | 7 | 3,441 |
| | San Juan Opico | 1 | 110 |
| | San Pablo Tacachico | 2 | 100 |
| | Tamanique | 1 | 342 |
| Total La Libertad | | 12 | 4,030 |
| La Paz | El Rosario | 2 | 1,418 |
| | Paraíso de Osorio | 1 | 850 |
| | San Francisco Chinameca | 2 | 126 |
| | San Luis la Herradura | 1 | 135 |
| | San Luis Talpa | 1 | 248 |
| | San Pedro Masahuat | 4 | 1,414 |
| | Santiago Nonualco | 1 | 515 |
| | Zacatecoluca | 2 | 1,243 |
| Total La Paz | | 14 | 5,949 |
| San Miguel | Nuevo Edén de San Juan | 1 | 70 |
| | San Gerardo | 1 | 442 |
| | San Jorge | 1 | 149 |
| Total San Miguel | | 3 | 661 |
| San Salvador | Aguijares | 2 | 415 |
| | Apopa | 2 | 1,144 |
| | Mejicanos | 2 | 2,981 |
| | Nejapa | 1 | 42 |
| | Panchimalco | 4 | 955 |
| | San Martín | 3 | 1,937 |
| | San Salvador | 6 | 7,321 |
| | Santiago Texacuangos | 3 | 783 |
| | Santo Tomás | 5 | 2,191 |
| | Soyapango | 3 | 1,968 |
| | Tonacatepeque | 1 | 530 |
| Total San Salvador | | 32 | 20,267 |
| San Vicente | Apastepeque | 4 | 397 |
| | Guadalupe | 1 | 150 |
| | San Cayetano Istepeque | 6 | 1,137 |
| | San Esteban Catarina | 2 | 894 |
| | San Ildefonso | 1 | 122 |
| | San Lorenzo | 1 | 162 |
| | San Sebastián | 2 | 529 |
| | San Vicente | 8 | 3,418 |
| | Santo Domingo | 2 | 650 |
| | Tecoluca | 1 | 71 |
| Tepetitán | 4 | 744 | |
| Verapaz | 4 | 567 | |
| Total San Vicente | | 36 | 8,841 |
| Usulután | Jucuapa | 1 | 786 |
| Total Usulután | | 1 | 786 |
| Total | | 111 | 43,280 |

Source: MINED, Damage Report 2009.

The classification of severe damages includes all damages to walls and fences, damages caused by landslides, damages to infrastructure, and collapsed sanitation services. These totaled US\$1,865,429.

Moderate damages occurred in 70 educational centers in municipalities belonging to the Departments of: San Salvador (14), affecting the municipalities of Mejicanos (2), Panchimalco (2), San Martín (2), San Salvador (3), Santiago Texacuangos (3), Santo Tomás (1) and Soyapango (1); Cabañas (2), affecting the municipalities of Ilobasco (1) and San Isidro (1); Cuscatlán (6), affecting the municipalities of Cojutepeque (1), Monte San Juan (1), Oratorio de Concepción (1), San Bartolomé Perulapia (1) and San Pedro Perulapan (2); La Libertad (10), affecting the municipalities of Colón (1), La Libertad (5), San Juan Opico (1), San Pablo Tacachico (2) and Tamanique (1); La Paz (9), affecting the municipalities of El Rosario (1), San Luis La Herradura (1), San Luis Talpa (1), San Pedro Masahuat (3), Santiago Nonualco (1) and Zacatecoluca (2); San Vicente (26), affecting the municipalities of Apastepeque (2), San Cayetano Istepeque (5), San Esteban Catarina (2), San Ildefonso (1), San Sebastián (1), San Vicente (8), Santo Domingo (2), Tecoluca (1), Tepetitán (3) and Verapaz (1); and finally San Miguel (3), affecting the municipalities of Nuevo Edén San Juan (1), San Gerardo (1) and San Jorge (1).

IMAGE 19. SCHOOLS



Source: MINED.

The classification of moderate damages takes into account all damages to roofs due to flooding and cave-ins, to gabions, temporary classrooms, fencing, floors and embankments. These damages totaled US\$2,146,995.

Included in the damages is the repair of 13 access roads to schools, essentially as a result of landslides, eroded streets, collapsed bridges or obstruction of vehicular traffic. The schools, whose numbers are in parentheses and which require repair, are located in Santa Tecla (5), La Libertad (Centro Escolar Cantón Los Pajales, Centro Escolar El Triunfo, Centro Escolar Granadillas, Centro Escolar Cantón El Limón, Centro Escolar El Sacazil); in Santo Tomás (1), San Salvador (Centro Escolar Cantón Chaltepe); in Apopa (3), San Salvador (Centro Escolar Caserío El Sartén, Centro Escolar Cantón Guadalupe, Centro Escolar Samaria Las Mercedes); in Nejapa (2), San Salvador (Centro Escolar Fca. Santa Isabel, Los Planes, Centro Escolar Caserío Los Naranjos); in Suchitoto (1), Cuscatlán (Centro Escolar Cantón San Cristóbal); and in Santa Cruz Analquito, Cuscatlán (Centro Escolar Santa Cruz Analquito).

IMAGE 20. DAMAGES IN SCHOOL



Source: MINED.

The costs of repairing access roads to schools total US\$325,000.

b) Schools Used as Shelters

During the emergency, 74 schools were used as shelters in the Departments of Cabañas (1), Cuscatlán (7), La Libertad (3), La Paz (25), San Salvador (26), San Vicente (11) and Usulután (1). In the Department of Cabañas the shelter was located in the Municipality of Dolores (1) (Centro Escolar Caserío Los Naranjos).

In the Department of Cuscatlán, the shelters were located in the Municipality of San Pedro Perulapan (1) (Centro Escolar General Francisco Morazán), Municipality of Cojutepeque (1) (Centro Escolar Cantón Cujuapa), Municipality of Monte San Juan (1) (Centro Escolar Cantón San Andrés), Municipality of San Bartolomé Perulapia (2) (Centro Escolar Cantón San Andrés and Centro Escolar San Bartolomé Perulapia), and in the Municipality of Perulapan (2) (Centro Escolar Cantón Paraíso Arriba and Centro Escolar Cantón de San Agustín).

In the Department of La Libertad, the shelters were located in the Municipality of La Libertad (3) (Centro Escolar Eduardo Guirola, Centro Escolar Cantón Santa Cruz and Centro Escolar de La Libertad).

In the Department of La Paz, the shelters were located in the Municipality of El Rosario (1) (Centro Escolar Caserío Santa Cruz El Tunal), in the Municipality of Paraíso de Osorio (2) (Complejo Educativo General Rafael Osorio Hijo and Centro Escolar Cantón Los Zacatales), in the Municipality of San Pedro Nonualco (1) (Centro Escolar Timoteo Lievano), in the Municipality of San Emigdio (1) (Instituto Nacional de San Emigdio), in the Municipality of San Luis La Herradura (3) (Centro Escolar San Luis La Herradura, Centro Escolar Cantón San Antonio Los Blancos and Centro Escolar Ángela Scorsonelli), in the Municipality of San Luis Talpa (4) (Centro Escolar Caserío El Salamar, Centro Escolar Cantón Nuevo Edén, Centro Escolar San Luis Talpa and Centro Escolar Lotificación Comalapa), in the Municipality of San Pedro Masahuat (2) (Centro Escolar Profesora María Olimpia Escobar de Sibrian and Centro Escolar Cantón Las Isletas), in the Municipality of Santa María Ostuma (3) (Centro Escolar Cantón El Chaperno, Centro Escolar Cantón San Antonio and Centro Escolar Adolfo López), in the Municipality of Santiago Nonualco (5) (Centro Escolar de Suecia, Centro Escolar Soledad Melara de Argueta, Centro Escolar Morelia, Centro Escolar Caserío El Carrizal and Centro Escolar Católico Fray Engelberto Malissori), and in the Municipality of Zacatecoluca (3) (Centro Escolar Cantón Las Tablas, Centro Escolar Profesor Saúl Flores and Centro Escolar Caserío El Recuerdo).

In the Department of San Salvador, the shelters were located in the Municipality of Aguilares (2) (Centro Escolar Modesto Barrios and Centro Escolar Urbanización Celsa Palacios), in the Municipality of Apopa (1) (Centro Escolar Ingeniero José Napoleón Duarte), in the Municipality of El Paisnal (1) (Centro Escolar Cantón Potrero Grande), in the Municipality of Guazapa (1) (Complejo Educativo Delfina de Díaz), in the Municipality of Ilopango (6) (Centro Escolar Vista al Lago, Centro Escolar Comunidad San Bartolo del Norte, Centro Escolar Fabio Castillo, Centro Escolar Colonia Llano Verde, Centro Escolar Cantón San José Shangallo and Centro Escolar Católico San José), in the Municipality of Rosario de Mora (1) (Centro Escolar Cantón Centro de Piedra), in the Municipality of San Marcos (1) (Complejo Educativo Católico Padre Mario Zanconato), in the Municipality of San Marcos (4) (Centro Escolar Colonia Anemona, Centro Escolar Cantón El Sauce, Centro Escolar Cantón Las Delicias and Centro Escolar Caserío El Mojón), in the Municipality of San Salvador (2) (Instituto Nacional Técnico Industrial, Centro Escolar Colonia Quiñonez), in the Municipality of Santiago Texacuangos (3) (Centro Escolar Camilo Campos, Centro Escolar José Mariano Calderón and Centro Escolar Cantón Joya Grande), in the Municipality of Santo Tomás (2) (Centro Escolar

General Manuel Belgrano and Centro Escolar Rubén Darío), in the Municipality of Soyapango (1) (Centro Escolar el Progreso), and in the Municipality of Tonacatepeque (1) (Centro Escolar Cantón Veracruz).

In the Department of San Vicente, shelters were located in the Municipality of Guadalupe (1) (Instituto Nacional Profesor Santiago Echegoyen), in the Municipality of San Cayetano Istepeque (1) (Centro Escolar Caserío La Entrevista), in the Municipality of San Sebastián (1) (Instituto Nacional de San Sebastián), in the Municipality of San Vicente (4) (Centro Escolar Concepción de María, Centro Escolar Doctor José Rosa Pacas, Complejo Educativo Marcelino García Flamenco and Centro Escolar Antonia Galindo), in the Municipality of Tepetitán (2) (Complejo Educativo Pedro Pablo Castillo and Centro Escolar Cantón Concepción de Cañas), and in the Municipality of Verapaz (2) (Centro Escolar Presbítero Francisco Palacios and Centro Escolar Caserío Santa Teresa).

Finally, in the Department of Usulután, the shelter was located in the Municipality of Santa Elena (1) (Centro Escolar Caserío Los Tres Postes).

In the 74 educational centers used as shelters, it is necessary to conduct a series of rehabilitation and replacement works, such as painting, replacement of doors and windows, installation of locks, cleaning of floors, cleaning of toilets and septic tanks, and replacement of incandescent lighting with energy-saving fluorescent lighting, among many other efforts that would leave these educational centers in workable, usable conditions for the next semester.

As additional information, fortunately students were in their final days of classes on the dates when the hurricane struck, and therefore the semester was not significantly affected. However, for some schools, the start of classes may need to be delayed until rehabilitation and replacement efforts have been completed.

The cost of rehabilitation and replacement of these educational centers has been considered a loss totaling US\$1,324,886.

c) Damages to Furniture and Equipment

With regard to this issue, it is necessary to replace cookware and dishes in the 13 schools with the severest damages in the Departments of San Salvador (7), Cuscatlán (3), San Vicente (1) and San Miguel (2). These costs represent damages totaling US\$10,559.

To replace furniture in classrooms and other areas, as well as equipment, consideration has been given to damages that occurred both in the schools damaged in the Departments of San Salvador, Cabañas, Cuscatlán, La Libertad, La Paz, San Vicente, Usulután and San Miguel, and in the schools used as shelters in the Departments of San Salvador, Cabañas, Cuscatlán, La Paz, San Vicente and Usulután. In both cases, the principal elements to be replaced under this category are student desks, office furniture, chairs, blackboards, bookcases, shelves and files, as well as furniture for libraries, science laboratories, support rooms, clinics, teachers' lounges and administrative areas.

The cost of these replacements in the damaged educational centers totals US\$2,444,245, and in the educational centers used as shelters, US\$1,908,105. In total, the costs of replacing furniture and equipment total US\$4,352,909.

IMAGE 21. DESTRUCTION INSIDE CLASSROOM IN SAN VICENTE

Source: MINED.

d) Interventions

Educational-psychological interventions have been conducted in shelters, as well as other interventions, with resources from the Ministry of Education.

The extra expenditures for overtime, vehicles, fuel, per diems, etc., incurred by the Departmental Bureaus of Education and the Offices of Logistics and Education in Science, Technology and Innovation, have been considered losses and are estimated at US\$159,977.

e) Short-term Needs

In terms of immediate requirements as a result of the impacts left by the path of Hurricane Ida, six schools require relocation.

The six schools that require relocation are located in the Municipality of La Libertad, La Libertad (Centro Escolar Cooperativa San Diego), San Francisco Chinameca, La Paz (Centro Escolar Caserío El Pagadero), San Pedro Masahuat, La Paz (Centro Escolar Cantón Las Hojas), in Santo Tomás, San Salvador (Centro Escolar Doctor Antonio Díaz and Centro Escolar Cantón Cuapa), and in Soyapango, San Salvador (Escuela de Educación Parvularia Colonia Las Brisas).

The costs of this relocation total US\$2,940,000.

B.2.3 Culture

Among its other duties, the Ministry of Culture is in charge of San Salvador's City Zoo, which experienced damages to its infrastructure totaling US\$354,023 and a loss of US\$366,599 due to a loss of revenue for the six months during which it will remain closed for repairs.

The repairs to be made consist mainly of demolition and removal of debris, including: dismantling, removal and clearing, grading and compacting, new metallic structures, repairs to various civil works, brick-laying, painting, tree planting and digging, electrical and sanitary installations, and dismantling of doors.

Damages, Losses and Needs in Education and Culture

In summary, the education sector experienced damages totaling US\$8,700,333 and losses totaling US\$1,484,814. The cultural sector reports damages totaling US\$354,023 and losses totaling US\$366,599.

Short-term needs total US\$2,940,000.

**TABLE 25. DAMAGES AND LOSSES CAUSED BY THE DISASTER
IN THE EDUCATION AND CULTURE SECTOR**

| | Effects of disaster | | | Property | |
|---|---------------------|-----------|------------|----------|---------|
| | Damages | Losses | Total | Public | Private |
| Infrastructure | 4,337,424 | 1,324,887 | 5,337,311 | | |
| Damaged educational centers (111) | 4,012,424 | | | X | |
| A. Severe damages (35) | 1,865,429 | | | | |
| B. Moderate damages (70) | 2,146,995 | | | | |
| C. Centers that require relocation | 2,940,000 | | | | |
| D. Centers that require repair of access roads (13) | 325,000 | | | X | |
| Centers used as shelters (74) | | 1,324,887 | | X | |
| Furniture and equipment | 4,362,909 | 159,927 | 4,522,836 | | |
| Cookware and dishes in centers with severe damages (13) | 10,559 | | | X | |
| Replacement of furniture and equipment | 4,352,350 | | | X | |
| Damaged educational centers | 2,444,245 | | | X | |
| A. Classroom furniture | 2,081,315 | | | | |
| B. Other rooms | 362,930 | | | | |
| Centers used as shelters | 1,908,105 | | | X | |
| A. Classroom furniture | 1,578,950 | | | | |
| B. Other rooms | 329,155 | | | | |
| Interventions | | 159,927 | | X | |
| Psych.-educ. intervention in shelters | | 125,795 | | | |
| Intervention with other MINED resources | | 34,132 | | | |
| Subtotal education | 8,700,333 | 1,484,814 | 10,185,147 | X | |
| Zoo | | | | | |
| Costs of damage repair | 354,023 | | | | |
| Demolition and removal | 4,856 | | | | |
| B. Dismantling | 7,485 | | | | |
| C. Removal and cleaning | 27,160 | | | | |
| D. Grading and compacting | 36,919 | | | | |
| E. Metallic structures | 7,206 | | | | |
| F. Repair of various civil works | 108,000 | | | | |
| G. Bricklaying | 18,806 | | | | |
| H. Painting | 3,825 | | | | |
| I. Tree planting and digging | 84,694 | | | | |
| J. Electrical installations | 7,500 | | | | |
| K. Supervision | 6,250 | | | | |
| L. Dismantling of doors, etc. | 594 | | | | |
| M. Miscellaneous | 40,728 | | | | |
| Lost revenue | | 366,599 | | | X |
| Total Culture | 354,023 | 720,622 | | | X |

Source: Estimates by assessment mission based on official figures.

B.2.4 Health Sector

a) Background

The natural event of November 2009 struck El Salvador which already ranked as having the second-highest percentage of total population at high risk of death due to multiple disasters.²⁹

With regard to health status, the country is undergoing an epidemiological transition, with an increase in deaths from non-transmissible diseases and a reduction in the relative number of infectious diseases. Most of the demand for health services continues to be for illnesses of mothers and children, especially respiratory illnesses and diarrhea, which are closely related to the provision of drinking water, hygiene conditions and lifestyles. It is estimated that over 50% of demand for ambulatory care may be met at first-level facilities such as health units.

El Salvador's public health system is of a mixed and organized nature in the public subsector, composed of the Ministry of Public Health and Social Assistance (*Ministerio de Salud Pública y Asistencia Social* -MSPAS), the Salvadoran Institute of Social Security (*Instituto Salvadoreño del Seguro Social* -ISSS), Teachers' Well-being (*Bienestar Magisterial* -BM), Military Health (*Sanidad Militar* -SM) and the Salvadoran Institute for Comprehensive Rehabilitation (*Instituto Salvadoreño de Rehabilitación Integral* -ISRI) assigned to MSPAS; and the private subsector. It is estimated that 41% of the population lacks access to health services and over 50% has insufficient access due to economic and geographic barriers or to deficient infrastructure (PAHO 2004).

Despite the limitations of the country's health sector, associated with structural and financial aspects, the national government, through the Ministry of Public Health and Social Assistance, the Salvadoran Institute of Social Security and other organizations, responded in a timely manner to the emergency. Added to this was the collaboration of foreign governments and of national and international cooperation agencies. All were mobilized to address the most urgent health needs.

As part of the emergency response, efforts were conducted to care for the wounded, and to treat cases of diarrhea and acute respiratory illnesses, dermatological and mental health problems, which were part of what was expected, considering the nature of the event and the country's epidemiological profile.

Despite the damages and environmental conditions, health services remained operating at all times, and public health care coverage was expanded through the strengthening of capacities in the disaster zone.

b) Effects of the Disaster

b.1) Effects on Health Services

Damages have been reported in eight health facilities, 2.8% of those existing in the affected departments. Most of them are located in the peri-urban zone of the city of San Salvador, where five of them suffered

²⁹ Natural Disaster Hotspot Study, World Bank.

the effects of the disaster;³⁰ the other three are located in the Departments of La Libertad, San Vicente and Usulután. Another group of facilities, although they were not directly affected, may be out of service in future emergencies because they lack measures to reduce their vulnerability; these account for 7.2% of the facilities existing in the six departments evaluated.³¹

The damages observed in the facilities are filtration and fallen roofing materials, which allowed water to enter the installations, affecting electrical and sanitary systems. Other buildings were flooded due to the overflowing of nearby rivers or creeks, and in the severest cases foundations were heavily affected due to landslides on the sites where the facilities are located.

The most affected facility was the Verapaz Health Unit, located in one of the municipalities that were strongly hit by the disaster. At this site, biomedical equipment, clinical furniture and the supply of medicines and medical inputs were lost. In order to continue providing services, the health unit was temporarily installed in a sugar mill on the outskirts of the city, thus avoiding the loss of health care for over 10,000 people.

TABLE 26. EFFECT OF THE DISASTER ON HEALTH FACILITIES. MINISTRY OF PUBLIC HEALTH AND SOCIAL ASSISTANCE. EL SALVADOR. NOVEMBER 2009

| Department | Health facilities ^a | | | | |
|--------------|--------------------------------|----------------------|---|--|--|
| | Existing | Damaged ^b | Without damage in high-risk zone ^c | Total damaged and without damage in high-risk zone | Damaged and without damage in high-risk zone (%) |
| La Paz | 47 | | 1 | 1 | 2.13 |
| La Unión | 51 | | 1 | 1 | 1.96 |
| Libertad | 42 | 1 | | 1 | 2.38 |
| San Salvador | 77 | 5 | 19 | 24 | 31.17 |
| San Vicente | 19 | 1 | | 1 | 5.26 |
| Usulután | 52 | 1 | | 1 | 1.92 |
| Total | 288 | 8 | 21 | 29 | 10.07 |

Source: Prepared using the database of the Health Information Unit (MSPAS), infrastructure assessment conducted by MSPAS and the evaluation mission.

^a Includes Hospitals, Health Units, Health Clinics, Rural Nutrition Centers and MSPAS Emergency Care Centers, and ISR centers.

^b Includes four facilities that require reconstruction and four others that need repairs.

^c Corresponds to those facilities that, although they did not suffer damages, are in a high-risk zone and will likely be affected in a new period of intense rains and floods.

³⁰ Severe damages were reported in the ISRI language unit and in the Health Units of San Martín, Verapaz and La Libertad, which should be relocated and reconstructed. Repairs are also needed to the Health Clinic (*Casa de Salud*) of Texacuango, the Unicentro Health Unit, Enfermera Vidal de Najarro National Hospital – San Bartolo in the Department of San Salvador, and the Los Molinos Unit in Usulután.

³¹ US\$2.1 million are needed to mitigate the effect of future disasters in the 21 facilities. This investment will be considered part of the medium-term needs but is not quantified as part of the damages associated with the natural events that occurred in November 2009.

IMAGE 22. VERAPAZ MEDICAL UNIT AFFECTED BY THE DISASTER AND TEMPORARY SITE IN OPERATION (MSPAS). DEPARTMENT OF SAN VICENTE



Source: Ministry of Public Health and Social Assistance of El Salvador (MSPAS).

The Health Units of La Libertad and San Martín also experienced damages. The disaster's effects have left these sites at high risk in the face of a new season of intense rains. If these units stopped operating, over 180,000 people could be left without health care.

IMAGE 23. DAMAGES IN ISRI. DEPARTMENT OF SAN SALVADOR



Source: ISRI.

The language and communication unit of the Salvadoran Institute for Comprehensive Rehabilitation (*Instituto Salvadoreño de Rehabilitación Integral* -ISRI) experienced serious flooding and a landslide on the land where it was built. Equipment to measure evoked potential, cameras, equipment for hearing tests,

etc., were seriously damaged. Reconstruction prior to the relocation of this unit is a priority in order to maintain continuity of health care, taking into account the fact that this unit receives 2,700 new cases and cares for over 130,000 cases per year. It should be noted that, despite damages to health infrastructure, facilities maintained service continuity and health care was expanded, especially for the population in shelters.

The cost of reconstructing the La Libertad, San Martín and Verapaz Health Units and the ISRI language unit include the replacement of equipment, totaling US\$5.53 million.³² These works need to be carried out in the medium and long terms. As part of incidental expenditures, an estimated US\$225,000 is needed for the demolition of units to be relocated.

In addition, to repair one health unit in Usulután and two units and one health clinic in San Salvador, US\$1.08 million are needed and should be invested in the short term.

In addition to infrastructural damages to health facilities, an investment of US\$68,000 should be added to replace the stock of medicines and of twenty-one pieces of fumigation equipment lost in La Joya Grande, San Vicente and Verapaz during the disaster, which are essential to control vectors in the affected zones.

b.2) Effects on Public Health

The disaster caused the deaths of 199 people and the disappearance of 76 more, as well as the displacement of over 18,000 people to 130 temporary shelters, most of which were located in the Departments of La Paz, San Salvador and San Vicente.

Due to preexisting conditions of social vulnerability, the destruction of houses, inadequate sanitation and decreased access to safe water because of damages to the systems, there was an increased risk of outbreaks of diarrhea and acute respiratory illnesses, skin diseases, mental health problems, and vector-transmitted diseases such as malaria and dengue, which are considered tracer illnesses from the adverse event.

Between November 8 and 19, the profile of illnesses treated in health units and shelters showed a predominance of acute respiratory infections (73.7%), dermatosis (10.6%), acute diarrhea (4.3%), followed by trauma (4.2%) and anxiety (3.7%). With regard to the same period in the previous year, there was a 14% increase in cases of acute respiratory illnesses, an 8% increase in cases of pneumonia³³ and a slight increase in cases of diarrhea.

However, although cases of dengue did not increase, there is risk of outbreaks of this disease, taking into consideration environmental conditions, the precarious status of sanitation, and the fact that the municipalities affected by the disaster historically account for 31% of confirmed cases of types I and II

³² The San Martín unit and the ISRI language and communication unit have been given MSPAS lands for their relocation, while negotiations are underway to obtain land donations from the municipalities for the La Libertad and Verapaz units. In this regard, no investment has been considered for the purchase of lands needed for the units' relocation.

³³ Report on health needs to address the emergency caused by the effects of the low-pressure system and Tropical Storm Ida. MSPAS. November 25, 2009.

dengue in the country. There is also a risk of increased cases of malaria in several localities, such as La Joya Grande.

In light of the situation that was generated by the disaster, national health authorities are developing the following actions:

- i) Disease treatment and prevention. Due to the displacement of the affected population to temporary shelters and the increase of tracer illnesses, MSPAS reinforced institutional capacities with mobile teams or brigades supported by FOSALUD³⁴ and treatment was extended to 24 hours at 15 health units in the Departments of Cuscatlán, San Vicente, La Paz and Cabañas.

IMAGE 24. TREATMENT BY MSPAS BRIGADES IN THE CITY OF VERAPAZ. SAN VICENTE



Source: Ministry of Public Health and Assistance of El Salvador (MSPAS).

In the first weeks following the impact of the event, 2,866 human resources were working in emergency relief efforts, including 527 physicians, 417 nurses, 265 health promoters, 223 health educators, and 560 members of the multidisciplinary logistical team, among others. Health personnel provided comprehensive intra-hospital care and treatment in shelters, as well as meeting normal demand within health facilities.

From November 8 to 18, the Ministry of Public Health and Social Assistance provided 25,249 treatments, of which 23,396 were for the population in shelters and 1,853 were in hospitals. Also important was the mobilization of health brigades, ISSS logistical and communications personnel, as well as the emergency care that this institution provided.

In all these efforts, the public sector invested US\$2.1 million, which include payment to personnel, overtime, the costs of emergency care, and fuel and food for the mobilization of brigades.

³⁴ The National Health Fund (Fondo Nacional de Salud -FOSALUD) was established in 2004 with 10% of its financing from sales on weapons, liquor, cigarettes, etc., in order to complement MSPAS financing. Its mandate includes formulating and executing comprehensive programs that address the basic health needs of the most vulnerable population affected by natural catastrophes.

- ii) Public health surveillance and control. As part of the emergency response and in light of the potential risk for disease in the affected zone, the epidemiological surveillance system was strengthened.

IMAGE 25. SUPPLY OF MEDICINES AT THE VERAPAZ HEALTH UNIT



Source: MSPAS.

Information was collected, processed and analyzed to identify changes in the behavior of pathologies such as influenza A(H₁N₁), dengue and leptospirosis, among others.

Three weeks after the disaster occurred, no disease outbreaks have been recorded in the affected zone. In response to the presence of cases of anxiety and depression, resulting from the loss of family members and belongings, MSPAS carried out the “Mental Health Protection Plan” to identify psychological and social problems and develop mental health interventions in the different stages of the emergency. Specific actions included treatment of the precritical and intermediate phase of the emergency, the identification of the most common elements in the psychological-social dynamics of persons in shelters, and the projection of common elements in the formulation of tasks.

Integrated groups were formed with mental health personnel from the Basic Systems of Comprehensive Health (*Sistemas Básicos de Salud Integral -SIBASI*) at national level, reinforced with specialized human resources from the psychiatric hospital, as well as special and intersectoral teams. Nine teams were formed with psychiatrists and psychologists from different institutions such as ISNA, ISDEMU, ISSS, the Armed Forces, the National Civil Police, the Ministry of Justice and Security, and MSPAS.

The brigades provided 8,613 treatments. It is felt that mental health interventions should be maintained for three more months, under the responsibility of specialized personnel.

As part of environmental health efforts, the quality of water distributed to the affected population has been overseen, proper human waste elimination has been supervised together with the removal of liquid and solid waste, and the control of food handling and the reinforcement of personal hygiene measures. In addition, the following were conducted: 14,551 sanitation inspections, the fumigation of 17,773 houses

to control dengue and malaria,³⁵ and an equal number of home visits to control dengue larvae. The investment in these efforts by the public sector totaled US\$383,000.

- iii) Coordination and management of supplies. In the face of the emergency situation, the Sectoral Technical Commission on Health (part of the National Civil Protection System) was activated to strengthen and focus the intersectoral coordination work initiated by the Ministry of Health. The following participate in this commission: eight government institutions, four international NGOs and PAHO as an observer. In turn, MSPAS coordinated health activities and remained in close communication with the health services in the affected zones.

The Health Surveillance Committee was activated and CONAPREVIAR³⁶ worked on dengue and pandemic influenza surveillance. Another important aspect was the formation of six multidisciplinary teams to review, select and handle medicines and medical inputs donated by international aid agencies. These teams were moved to the facilities of the International Center for Fairs and Conventions (*Centro Internacional de Ferias y Convenciones* -CIFCO) and to Comalapa International Airport. It is worthwhile to note the use of the SUMALSS computer tool, which is contributing to the organization and proper distribution of donations. The public sector invested US\$52,000 in the coordination and management of supplies.

b.3) National and International Humanitarian Assistance in the Health Sector

In response to the emergency, foreign governments, United Nations agencies, and national and international nongovernmental organizations (NGOs) mobilized medical brigades, delivered goods such as medicines and medical inputs to treat patients, and provided technical assistance to MSPAS.

In turn, the Pan American Health Organization (PAHO/WHO) mobilized international experts and its immediate response teams to support the efforts of the national health authority. It enabled the allocation of resources from its budget funds and those granted by the Spanish Agency for International Cooperation for Development (AECID) to support the analysis and evaluation of epidemiological surveillance data, the close and timely monitoring of dengue and pandemic influenza data, the purchase of medicines, and mental health. Other United Nations agencies such as the United Nations Population Fund (UNFPA) have planned reproductive and maternal health projects, taking into account the fact that in the departments affected, there are 17,500 women of reproductive age, and the babies of 1,050 pregnant women are expected to be born in the next three months.

³⁵ *Ibid* 5.

³⁶ The National Commission for Prevention of an Avian Flu Pandemic (Comisión Nacional de Prevención Contra una Pandemia de Influenza Aviar), an institutional and intersectoral coordination agency that stipulates the necessary measures and actions with respect to national and international responses to an Avian Flu health emergency.

TABLE 27. ESTIMATED VALUE OF DAMAGES AND LOSSES CAUSED BY THE DISASTER IN THE HEALTH SECTOR*(in thousands of US\$)*

| Component | Total | Effects | | Sector | | Effects on balance of payments |
|---|---------------|--------------|--------------|---------------------|-------------------------|--------------------------------|
| | | Damages | Losses | Public ^g | Non-public ^h | |
| Health facilities | 6,609 | 6,609 | | 6,609 | | 1,417 |
| Ministry of Public Health and Social Assistance (MISPAS) | | | | | | |
| Repair and rehabilitation | 1,079 | 1,079 | | 1,079 | | |
| Reconstruction ^a | 5,530 | 5,530 | | 5,530 | | 1,417 |
| Medicines and equipment | 68 | 68 | | 68 | | 68 |
| Ministry of Public Health and Social Assistance (MISPAS) | | | | | | |
| Replacement of lost stock | 26 | 26 | | 26 | | 26 |
| Replacement of vector control equipment | 42 | 42 | | 42 | | 42 |
| INCIDENTAL EXPENDITURES | | | | | | |
| Demolition and removal of debris | 225 | | 225 | 225 | | |
| Actions for treatment and prevention of diseases | 2,747 | | 2,747 | 2,105 | 642 | 871 |
| Emergency treatments ^b | 400 | | 400 | 400 | | |
| Strengthening of treatment capacity ^c | | | | | | |
| Mobilization of health brigades ^d | 1,284 | | 1,284 | 1,242 | 41 | 142 |
| Delivery of medicines and medical inputs | 334 | | 334 | 334 | | 730 |
| Public health actions | 730 | | 730 | 129 | 601 | |
| Epidemiological surveillance | 552 | | 552 | 383 | 169 | |
| Vector control ^e | 55 | | 55 | 35 | 20 | |
| Mental health | 271 | | 271 | 271 | | |
| Reproductive health | 103 | | 103 | 74 | 29 | |
| Social communication | 120 | | 120 | 3 | 120 | |
| Other actions^f | 3 | | 3 | 52 | | |
| | 78 | | 78 | | 26 | |
| Total | 10,279 | 6 677 | 3,602 | 9,442 | 837 | 1,486 |

Source: Estimates by assessment mission.

^a Corresponds to three health units (Verapaz, San Martín and La Libertad) and to the ISRI language and communication unit. The Verapaz and La Libertad units will be located to lands granted by the municipality; the other facilities to be relocated have been assigned lands belonging to MSPAS.

^b Includes costs of emergency treatment and hospital discharges for mild and serious cases of multiple traumas caused by the disaster and treated in MSPAS and ISSS.

^c Includes the hiring of personnel for the emergency zone, an estimate of overtime by health personnel, and the presence of personnel of Cuban and US brigades.

^d Includes payment of personnel that form part of brigades, as well as the investment in fuel and food for personnel.

^e Corresponds to the investment in personnel and inputs for home visits for larva control, fumigation and control of rat populations.

^f Includes investment for intersectoral and inter-institutional coordination, as well as for supply management.

^g Refers to Ministry of Public Health and Social Assistance (MSPAS) and the Salvadoran Institute for Social Security (ISSS).

^h Includes donations and resource contributions from CERF, United Nations agencies, NGOs, private organizations and foreign governments.

The Henry Peeve Cuban Brigade has been present since November 13; the brigade is composed of 17 specialists who, in coordination with personnel of the MSPAS Para-central Region (SIBASIS of La Paz and San Vicente) are providing their support for medical care, the diagnosis of illnesses, and the management of environmental sanitation in the shelters and affected communities. A US brigade with 45 specialists from the Southern Command was also in the country; together with 15 Military Health personnel, they have participated in health care and environmental sanitation efforts in the zones of Guadalupe, San Diego, San Marcelino and Aguilares.

The NGO World Vision gave MSPAS donations of medicines and medical supplies, and its damage assessment and needs analysis teams were present in the Departments of San Vicente and Usulután. Several private companies in El Salvador also delivered donations for health care services to victims.

The contribution of nonpublic organizations for public health surveillance and control, disease treatment and prevention, and the management of supplies and coordination totaled US\$837,000.

b.4) Quantification of the Disaster's Effects on the Health Sector

The estimated impact of the disaster totals US\$10.3 million, of which 65% are damages to infrastructure, equipment and the stock of medicines in MSPAS facilities. The remaining 35% are losses due mainly to the investment in conducting disease prevention and treatment efforts (76%), and public health efforts during the emergency phase, as well as those units slated for rehabilitation.

According to the distribution of effects by department,³⁷ the most affected was San Salvador (53%), mainly because it had over 60% of the damages to health infrastructure. It is followed, in terms of level of impact, by La Libertad (17%), San Vicente (13%), La Paz and other departments such as La Unión y Usulután.

92% of the disaster's effects on health correspond to the public sector, principally the Ministry of Public Health and Social Assistance. It is also estimated that the disaster in the health sector will have a US\$1.5 million effect on the balance of payments due to imports.

b.5) Conclusions and Recommendations

The effects of Tropical Storm Ida and the low-pressure system on the health sector totaled US\$10.3 million, of which 65% are damages mainly to health facilities. These effects were augmented by the lack of preventive and recovery-oriented maintenance of physical infrastructure and the sites' location in zones highly vulnerable to floods and landslides.

In this regard, the sector must develop the Disaster-Safe Hospitals program for the incorporation of safety requirements from site selection to the design and construction of new buildings, as well as the relocation and reconstruction of those affected by the disaster. Furthermore, there is a priority need to protect the 21 facilities not affected but located in high-risk zones, for which an investment of US\$2.1 million is needed. It is also considered necessary to improve operational capacity through the provision of

³⁷ The spread of losses was evaluated by taking into account the amount of the population in shelters, the number of treatments, and the potential risk of epidemics mainly associated with vector transmission.

alternative water and electricity systems in those facilities considered priorities for response to emergency and disaster situations.

Three weeks after the disaster occurred, health authorities have not reported disease outbreaks; the increase in cases of diarrhea and respiratory illnesses has been addressed; and efforts are being implemented to control these illnesses. However, there is potential risk of dengue and malaria outbreaks, especially in the para-central zone of the country.

Strengthening of the system of epidemiological surveillance and vector control must be considered an immediate need; it is therefore necessary to generate capacities in municipalities and to purchase equipment, materials and supplies. The illnesses that have arisen in the emergency stage and those that could arise in the rehabilitation and reconstruction phases are among the principal common causes of demand for health services and most may be resolved at primary care level.

Thus, it is necessary to recover the level of equipment in health units with emphasis on maternal-child care, improve the quality of care, and develop a good referral and counter-referral system.

The timely implementation of measures to mitigate the disaster's effects on public health, such as disease and environmental surveillance and control, and the provision of health care to persons living in shelters, contributed to reducing the risk of disease outbreaks. It is estimated that the amount of demand for treatment of tracer illnesses will continue to decrease as existing shelters are deactivated and families return to their homes.

It is recommended that health promotion and social communication efforts be strengthened in order to develop healthy practices that serve families when they return to their homes, taking into account the fact that the repair of water systems takes some time, as does the total recovery of the affected zone.

In the case of the city of Verapaz, whose health unit was destroyed, it is suggested that the capacity of other nearby health facilities, such as that of Guadalupe, to provide services be strengthened, and that the referral and counter-referral system be improved for those cases that require more complex treatment.

Because the country is at high risk of multiple threats, it is recommended that Emergency Operations Committees at national level and the SIBASIS be strengthened in order to reinforce intra- and inter-sectoral coordination for disaster risk management.

B.3 INFRASTRUCTURE SECTORS

B.3.1 Water and Sanitation Sector

a) Background

The latest Multipurpose Housing Survey (*Encuesta de Hogares para Propósitos Múltiples*) conducted in 2008³⁸ indicates that the nationwide percentage of households with piped water service is 78.7%. Water supply systems that use wells account for 9.7%, and other means (including springs, rivers or creeks, water tankers, protected and unprotected springs, and rainwater collection) account for 11.6% of households.

The itemized analysis of data on water service coverage, according to said survey, reveals that 89.9% of households in El Salvador's urban areas have piped water, 4.6% use well water, and 5.5% use other means. In rural areas, 54.9% of households have piped water service, 20.5% use well water, and 24.6% use other means. Ninety-four percent of households in the San Salvador Metropolitan Area (*Área Metropolitana de San Salvador -AMSS*) have piped water, 0.8% use well water, and 5% use other means.

At national level 4.7% of households lack sanitation service: in urban areas 1.2% and in rural areas 12.3%. In the case of the AMSS, 0.5% of households lack sanitation service.

Nationwide, the Household Survey indicates that 51.7% of all households use the municipal garbage truck to dispose of their solid waste (this includes those that dispose it in containers); 0.5% of households use private trash collection services; 36.6% of households burn and bury their trash; and 11.2% of households dump their trash anywhere. In urban areas, 73.7% of households have the service of a municipal garbage truck; 0.6% of households have private trash collection; 19.5% of households burn and bury their trash, and 6.2% of households dump their trash anywhere. In rural areas, only 5.4% of households dispose of their trash by using a garbage truck, and 0.1% of households use private trash collection. 67.2% of rural households burn their trash; 5.4% of households bury it; and 21.9% of households dump their trash anywhere.

In the AMSS, 87.8% of households dispose of their trash by using the municipal garbage truck; 0.7% use private trash collection services; 7.1% of households burn and bury their trash; and 4.4% of households dump their trash anywhere.³⁹

In rural areas, the lack of water and sanitation coverage not only has effects on the population's quality of life, but also negative effects on health and productivity. The rural poor spend a significant amount of time collecting water, time that could be used to carry out productive activities. Those households that lack coverage spend an average of 9% of their productive time collecting water. The population living in extreme poverty conditions spends even more time collecting water, up to 14% of their productive time.

³⁸ 2008, General Bureau of Statistics and Censuses, Multipurpose Household Survey, Ministry of Economy, El Salvador, 2009.

³⁹ Republic of El Salvador, Country Environmental Analysis, Improving environmental management to address trade liberalization and infrastructure expansion. LCSSD, World Bank, 2007.

IMAGE 26. DAMAGES TO PIPES

Source: Ministry of Public Works (MOP).

Even those households that have drinking water service are forced to invest up to 5% of their productive time collecting water because of service interruptions due, among other things, to the decrease in water reserves during drought periods.

Statistics show the relationship between the lack of access to water and the greater risk of illness and death. It has been found that the infant mortality rate in households without residential connections is approximately 40 deaths for each 1,000 births, and in households with connections the rate is reduced to 30 deaths per 1,000 births. The economic result of the impact on health has been estimated at US\$89 million per year.

b) Effects of the disaster

The effects of Tropical Storm Ida and the low-pressure system on the water and sanitation sector total US\$19.7 million, of which US\$12.7 million correspond to damages and US\$7 million to losses.

Urban and rural water systems. The National Administration of Water Supply and Sewerage (*Administración Nacional de Acueductos y Alcantarillados -ANDA*) recorded damages in 34 of its drinking water supply systems (water main), which include 34 pumping stations and their respective water mains that serve 49 municipalities with a population served of 1,085,619 residents. In rural areas (whose water supply is administered by the Water Committees and Community Development Associations (*Asociaciones de Desarrollo Comunal-ADESCOS*), 58 drinking water systems have been reported to be damaged. In addition, the Social Investment Fund for Local Development (*Fondo de Inversión Social para el Desarrollo Local -FISDL*) reported damages in 584 wells located in rural areas.

The damages reported are mainly caused by the flooding of pumping stations that caused the structural collapse of their walls and severe damage to their equipment. Conduction lines were damaged due to the landslide that brought with it the fracture of the line and losses of segments of large- and small-diameter pipes, especially those located along the path of creeks.

Service by the 34 damaged systems, administered by ANDA, was reestablished, while repairs to rural systems still continue. It was necessary to immediately repair several components of the systems. In a considerable percentage of the cases, the affected components have remained exposed to higher levels of vulnerability than those present before the emergency, requiring additional medium- and long-measures—ranging from structural reinforcement efforts to the relocation of system components—such as pumping stations, etc. ANDA's technical personnel are preparing detailed assessments of damages and of risk prevention and mitigation measures. In some cases, various infrastructure works that have remained exposed to high levels of risk for future disasters need to be relocated.

Sanitation system. In the urban zone, ANDA reported damages to six wastewater pipes. With regard to damages in the rural area, FISDL reported damages to at least 1,360 latrines, whose rehabilitation or replacement with improved latrines is urgent.

Teams of workers are continuing to repair damages to the six pipes. Sanitation brigades were in charge of carrying out work to clear and repair manholes and wastewater connections.

Solid waste. The provision of garbage collection, street sweeping, and solid waste collection, treatment and disposal services is the responsibility of municipalities, with the exception of hazardous waste. According to information from the Ministry of Environment and Natural Resources (MARN), an estimated 3,200 tons of waste is generated each day in the county's urban areas, with a 77% rate of collection coverage.⁴⁰

Currently, the solid waste generated in the urban areas of municipalities is disposed in sanitary landfills authorized by MARN, with a total of 15 landfills in operation, 5 of which receive 95% of the waste collected; the rest are manual or semi-mechanized landfills with capacities of fewer than 20 tons per day.

⁴⁰ Technical Report on the low-pressure system in the Pacific and Tropical Storm Ida and their impact on the environment. Ministry of Environment and Natural Resources, San Salvador, 2009.

TABLE 28. EFFECTS OF TROPICAL STORM IDA AND THE LOW PRESSURE SYSTEM ON THE WATER AND SANITATION SECTOR*(in thousands of US\$)*

| Component | Effects | | | Sector | | Effects on the balance of payments |
|--|---------------|---------------|--------------|---------------|-------------------------|------------------------------------|
| | Total | Damages | Losses | Public | Non-public ^c | |
| Water systems | | | | | | |
| Urban systems | | 11,392 | 11,392 | | 11,392 | |
| Distribution lines | | 8,008 | 8,008 | | 8,008 | |
| Support and protection infrastructure | | 3,440 | 3,440 | | 3,440 | |
| Electrical installations | | 536 | 536 | | 536 | |
| Pumping systems | | 361 | 361 | | 361 | |
| | | 3,671 | 3,671 | | 3,671 | |
| Rural systems | | | | | | |
| Damages in systems administered by FISDL ^a | | 3,384 | 3,384 | | 3,384 | 361 |
| | | 3,384 | 3,384 | | 3,384 | 3,671 |
| Sanitation system | | 1,334 | 1,334 | | 1,334 | |
| Network for channeling and drainage of surface and waste water | | 1,334 | 1,334 | | 1,334 | |
| Unforeseen expenditures | 6,415 | | 6,415 | 4,889 | 1,526 | |
| Water for human consumption | | | | | | |
| Provision of water for the affected population | 3,940 | | 3,940 | 3,239 | 702 | |
| Measures to ensure water quality | 1,001 | | 1,001 | 510 | 492 | |
| Water storage ^b | 148 | | 148 | 4 | 145 | |
| Other actions | 1,171 | | 1,171 | 1,106 | 65 | |
| | 1,620 | | 1,620 | | 1,620 | |
| Sanitation | 170 | | 170 | | 170 | |
| Disposal of solid waste | 170 | | 170 | | 170 | 269 |
| Repair and cleaning of wells | 2,236 | | 2,236 | 1,620 | 617 | |
| Other actions | 68 | | 68 | 30 | 38 | |
| Lost income | 510 | | 510 | | 510 | |
| Total | 19,651 | 12,726 | 6,925 | 18,125 | 1,526 | 4,301 |

Source: Prepared using information from the National Water Supply and Sewerage Administration (ANSA), MSPAS and FISDL.

^a Information collected by ANSA.

^b The following were considered: the delivery of cans, tanks and other means for the proper storage of water in shelters.

^c Includes the investment made by agencies of the United Nations System and NGOs.

IMAGE 27. DAMAGE TO PIPES

Source: National Administration of Water Supply and Sewerage (ANDA).

In the context of the emergency, inspections were conducted in 14 sanitary landfills; in one, the leachate drain was found to be overflowing, and in another, erosion damage to landfill slopes and cells was found. During the inspection of 9 transfer plants, 3 were found to be affected by problems of rain-water saturation, the flowing of textile material into seasonal creeks, and the accumulation of waste. No effects on means of solid waste collection and disposal were observed.

In shelters, pits were used for the disposal of trash generated by families living in these temporary quarters. This waste was collected from the camps by the municipality and taken to the dump. However, these trash dumps lack protection and are therefore vulnerable to rains and floods. Thus, the dumps must be relocated or measures must be adopted to elevate them above ground level.

Unforeseen expenditures. US\$6.4 million were invested, of which US\$4.9 million (77%) corresponded to the public sector and US\$1.5 million (23%) to the non-public sector. The largest expenditure category was allocated to carrying out efforts to allow the delivery of safe water to the population living in shelters and affected by the disaster; this represented an investment of 61% of unforeseen expenditures. The repair and cleaning of wells was the second-highest investment category: 35% of total unforeseen expenditures, followed by the investment in sanitation and other efforts such as the mobilization of emergency response brigades, accounting for 4% of total expenditures.

As part of the disaster response, ANDA activated its Institutional Plan for Emergency Response. This plan included alternative contingency mechanisms to ensure the provision of safe water to the affected populations. In this regard, ANDA proceeded to distribute properly chlorinated water to the affected population by means of water tankers, and to supply the pipes installed in shelters; on other occasions it delivered 10-liter bags of waters.

In the cases of places that became isolated due to landslides, such as the municipality of Paraíso de Osorio in the Department of La Paz, ANDA used Air Force helicopters as a means of transporting drinking water, which was carried in a special device that contained 20 barrels.

IMAGE 28. WATER FOR SHELTERS



Source: National Administration of Water Supply and Sewerage (ANDA).

Water provision was completed through the adoption of potabilization measures, as well as the installation of means to store water in shelters and the delivery of water tanks to families for water storage under optimum conditions. ANDA rented pipes to serve 36 shelters, a need that is expected to last three months; 10,000-liter plastic tanks were also supplied and installed.

It should be noted that in the Municipality of Verapaz, San Vicente, ANDA installed three plastic tanks for drinking water storage. In Verapaz, ANDA put two water potabilization plants into operation; these process water from two artesian wells, one located in Cantón Molineros and the other in the Barrio El Calvario.

ANDA also obtained the donation of 30 tanks, with a storage capacity of 4,350 liters, from the Japan International Cooperation Agency (JICA). The Government of Spain sent 46 mobile water potabilization plants to hard-to-reach sectors.

The Ministry of Public Health and Social Assistance has participated in overseeing water quality in water supply and basic sanitation networks in shelters and affected zones, as well as in the distribution of purified water and in water disinfection. A survey of water and sanitation conditions in the Department of La Libertad has been conducted. These efforts have been complemented by health promotion and education.

IMAGE 29. WATER STORAGE

Source: National Administration of Water Supply and Sewerage (ANDA).

United Nations agencies participated actively in supporting the national authorities. UNICEF distributed 84,000 bottles of water and purchased 168,000 liters of water; it also delivered 3,500 30-liter containers and 2,700 80-liter containers to the affected areas. The Pan American Health Organization (PAHO) donated to MSPAS 100,000 tablets for disinfecting water for human consumption in shelters, and delivered 123,300 bottles of water to the affected communities.

The Salvadoran Red Cross conducted damage and needs assessments in San Vicente and La Paz. This organization distributed 568 water storage containers, 491 five-liter tanks, and 128,000 liters of water; it also delivered 644 (24-unit) bags of water. World Vision conducted a damage assessment and needs analysis in San Vicente, Tepetitán, San Cayetano and other municipalities. This organization delivered 14,000 tablets for water potabilization and 500 fifty-liter plastic tanks. Added to this was the support of the private company ASTAFI which delivered 1,800 1.5-liter bottles of water.

As part of the emergency response, latrines were installed in the shelters. The municipalities assumed the costs of maintaining them. However, there was a gap in latrine requirements for camps, as well as the need to increase the emptying of septic tanks at least once or twice a week. MSPAS, together with PAHO, conducted an identification of the need to install chemical latrines in priority shelters.

PAHO rented 100 latrines for one month, for use in shelters in the most affected departments; 50 were installed in Cantón Joya Grande of the Municipality of Santiago Texacuangos. In addition, cleaning and disinfection services were purchased for 50 artesian wells that have been made available for Ministry of Health priorities. With CERF resources, PAHO plans to support the rental of the 100 latrines for an additional month, and to build 100 pit latrines. UNICEF has also planned the construction of latrines.

Two weeks after the event, ANDA had repaired most of the 39 pumping stations and pipes damaged in the Para-central and Metropolitan Regions. ANDA's technical personnel and crews worked 24 hours per day to make these repairs. Crews from the Western and Eastern Regions joined the efforts, providing support in the areas that were most affected. The Armed Forces helped to transport the pipes that are

used in the rehabilitation of the drinking water system for several municipalities. PAHO purchased tools and equipment that were delivered to ANDA for emergency repair work.

It should be noted that, since the first week after the disaster, there was coordination among government institutions, system agencies and NGOs. In this regard, the implementation of the Water and Sanitation Cluster, coordinated by PAHO, has contributed to the convening and coordination of the intersectoral roundtable on water and sanitation for the assessment of damages and the monitoring of the emergency situation, and to progress in the process of recovering basic drinking water services, as well as in the formulation of projects that have been incorporated in the Flash Appeal, to be financed by the Central Emergency Response Fund (CERF).

ANDA has estimated that it will lose US\$510,000 by not billing for water services in the zones affected by the disaster, for a period of four months.

IMAGE 30. LATRINES



Source: National Administration of Water Supply and Sewerage (ANDA).

c) Recommendations

- 1) Tropical Storm Ida and the low-pressure system had a US\$19.7 million impact on El Salvador's water and sanitation sector. The greatest impact has been on damages to water systems located in urban zones, which have made evident the preexisting fragility and deficiencies in water systems in the affected zones.
- 2) As part of efforts to prevent damages and losses in water and sanitation systems in the event of disasters, it is considered necessary to strengthen the training of administrators of rural water supply systems (municipalities, Water Committees) for the implementation, during the processes of planning and operating their systems, of management and control mechanisms that ensure the quantity, quality and continuity of water supply and the operation of sanitation systems. Reinforcing ANDA's capacity to provide technical assistance in this area is considered essential for achieving this objective.

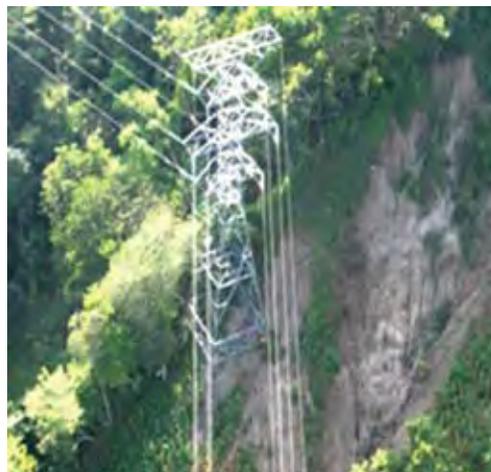
- 3) It is recommended that a nationwide Water and Sanitation Risk Management Plan be formulated and implemented. This plan should clearly identify the prevention efforts to be carried out to address the periodic occurrence of natural events, and all social and political stakeholders from various areas of national, departmental and municipal governments should be involved in the plan's design and development.
- 4) Developing and keeping contingency plans up-to-date with regard to natural threats should be a priority of the institutions that administer water and sanitation systems.
- 5) To prevent and mitigate the risks of effects on water and sanitation systems, it is necessary to implement engineering measures as well as measures to raise awareness about the value of water resources. Thus, it is important to strengthen the participation of national and local authorities responsible for protecting water resources, and the community.
- 6) The coordinated efforts of public organizations, international coordination and NGOs have been important in dealing with the emergency, especially in providing the means to make up for the interruption in water and sanitation services.

B.3.2 Electricity Sector

The transmission and part of the generation of electricity in El Salvador are in the hands of state enterprises (ETESAL and CEL), while distribution is the responsibility of private enterprises that provide public services. In the zones affected by the disaster, DELSUR and AES operate the electricity distribution networks.

As a result of precipitation, high-water levels in rivers, and landslides falling from higher zones, the system's assets were partially destroyed and there were changes in the sector's economic flows due to increased operating costs in distribution, reduced sales of electricity to users, and—something rather unusual in this type of disaster—savings in hydropower generation.

IMAGE 31. TRANSMISSION TOWERS



Source: CEL.

There were no damages to power plants. In the electricity transmission system, landslides and erosion affected the bases of numerous transmission towers, one substation and one of ETESAL's facilities. These will require work to avoid and mitigate disasters in the future. In the distribution networks, there were damages to the systems of DELSUR and AES; these were repaired quickly, using the equipment and supplies available in their workshops and warehouses.

With regard to system operation and electricity distribution, the service was quickly and effectively reestablished in a relatively brief period, although in some isolated zones it took longer. This assumed higher operating costs and, due to the destruction of a relatively high number of houses and small- and medium-scale businesses, there has been a slight decrease in demand and sales of electricity which will only be recovered in the medium term, in line with these users' reconstruction process.

The heavy and unusual precipitation that occurred during the natural event made it possible to store significant volumes of water in the systems' dams in the Lempa River basin. This allowed around 97.9 gigawatts/hour of hydroelectricity to be generated between November of last year and May 2010, displacing the equivalent in thermal generation, with the consequent savings in generation which will be passed on to users.

In summary, estimated damages totaled US\$690,000, and the companies were obliged to spend unforeseen funds to rehabilitate supply and to avoid greater damages, in the amount of an extra US\$2.13 million, with the consequent negative effect on their expected financial results. Through the introduction of savings in power generation estimated at US\$7.89 million, the sector shows a net benefit of US\$5.76 million resulting from greater generation in the hydroelectric plants (see Table 29).

TABLE 29. ESTIMATED DAMAGES AND LOSSES IN THE ELECTRICITY SECTOR

| System Component | Effects (in millions of US dollars) | | | Property | |
|---|-------------------------------------|--------|--------|----------|---------|
| | Damages | Losses | Total | Public | Private |
| Generation system | – | – 7.89 | – 7.89 | – 7.89 | |
| Higher hydropower generation | | – 7.89 | – 7.89 | – 7.89 | |
| Transmission system | – | 1.32 | 1.32 | 1.32 | |
| Mitigation costs: towers, substation and facility | | 1.32 | 1.32 | 1.32 | |
| Distribution system | 0.69 | 0.81 | 1.50 | – | 1.50 |
| Damages to distribution networks | 0.69 | | 0.69 | | 0.69 |
| System rehabilitation costs | | – | – | | |
| Damage assessment cost | | – | – | | |
| Higher operating costs | | 0.06 | 0.06 | | 0.06 |
| Fewer electricity sales | | 0.75 | 0.75 | | 0.75 |
| Total | 0.69 | – 5.76 | – 5.07 | – 6.57 | 1.50 |

Source: Estimates by assessment mission based on information from SIGET and companies.

B.3.3 Transportation Sector

The damages and losses caused by the disaster had an especially severe effect on bridges, causing some to collapse and significant damages to other structures. Landslides caused costs and obstructions to pavement. Fortunately, the damages are less than those that occurred on similar occasions: for example, during Hurricanes Mitch in 1998 and Stan in 2005, and the 2001 earthquakes.

The following is an estimate of the physical damages to road infrastructure caused by the disasters, and losses or increases in vehicular operating costs—incurred by users and subsector companies—as a result of the unavailability of road assets that were totally or partially affected and unusable, during the period in which they will not be in service. In this regard, the value of damages was estimated according to the cost of replacing the affected roads at their same level of quality and efficiency.

a) Background

The institutional qualification of El Salvador's roads distinguishes the following networks: special, primary, secondary and tertiary. The first corresponds to a part of the old main roads that, due to enormous demands, were expanded to highways with two separate routes, two lanes each; the primary network corresponds to roads that connect to provincial capitals and also connect provincial capitals with the national capital, ports and borders; secondary roads connect to municipal capitals and also connect these capitals with the primary network; and the tertiary network consists of local or country roads.

All of the above roads are the responsibility of the Ministry of Public Works (MOP). Road conservation is the responsibility of the Road Conservation Fund (*Fondo de Conservación Vial*), an autonomous agency with resources granted by law that stem from the specific tax on fuel.

Most of the background information used in the preparation of this report came from the work conducted by an MOP team. Background information on land was obtained in situ by MOP specialized personnel.

The following were also considered: background information from direct observations of various affected areas and individual road points; consultations with experienced professionals or those who have participated in similar analytical processes; and operators of the mass transportation of goods and people.

Damages mostly correspond to bridge collapses and to the destabilization of embankments, as well as to erosion, landslides, cave-ins, sinking and settling of pavement, among the main adverse consequences.

b) Damage Estimate

Costs were estimated by separately analyzing each physical damage and then assessing the respective replacement costs. The results obtained are presented in Table 30.

Addressing the damages expressed in the table corresponds to rehabilitation, except for bridges, most of which must be completely reconstructed (in this regard, see Recovery Needs in Chapter VI).

It is worth noting that the figure in the table includes emergency expenditures since these cannot be separated from replacement because a large share of the expenditures made immediately after the phenomenon include both items.

Of the total cost, US\$32 million correspond to the foreign component (imported materials required for reconstruction).

It was not possible to calculate the cost stemming from damaged vehicles even though some cases were observed, because there was not sufficient information on this matter or on possible insurance. There was also no background information in the accident rate in the without-disaster scenario, which would also have hindered making an estimate on this matter.

Finally, it should be noted that the figure is based on data observed up to November 27, 2009.

It is very important to note that the figure indicated in the table should not be interpreted as a definitive assessment of damages. This is because some of the damages are being observed over time, as is often the case of small damaged structures in which the degree of deterioration cannot be measured by direct observation. This could be the case of several bridges initially considered to be merely damaged, in which, following structural tests, for example, it is concluded that the materials are suffering from fatigue or have lost their elasticity. In these cases, the rating of “damaged” must be changed to “collapsed,” even though the bridges remain standing and major damages are not observed by sight. In these cases, these damages must be rated as requiring reconstruction, not simply rehabilitation.

TABLE 30. ESTIMATE OF DAMAGES TO ROADS, CAUSED BY THE DISASTER

(in thousands of US\$)

| Departments | Special | Primary | Networks | | Road access | Totals |
|--------------|---------|---------|------------------------|----------|-------------|----------|
| | | | Secondary and tertiary | Bridges | | |
| Chalatenango | 30.7 | 46.1 | 67.2 | 2,846.2 | | 2,990.3 |
| La Libertad | 47.8 | 71.7 | 269 | 4,269.4 | | 4,657.8 |
| San Salvador | 12.8 | 19.2 | 935.3 | 12,808.1 | 100 | 13,875.4 |
| Cusclatán | 30.7 | 46.1 | 623.5 | 5,692.5 | | 6,392.8 |
| La Paz | 22.2 | 33.3 | 703 | 25,616.1 | | 26,374.6 |
| Cabañas | 0.0 | 0.0 | 42.8 | 4,269.4 | | 4,312.1 |
| San Vicente | 17.9 | 26.9 | 434 | 15,654.3 | | 16,133.1 |
| Usulután | 3.4 | 5.1 | 269 | 2,846.2 | | 3,123.7 |
| Total | 165.5 | 248.3 | 3,343.8 | 74,002.2 | 100 | 77,859.8 |

Source: Estimates by assessment mission based on figures from STP and MOP.

A similar case, in which the true extent of damages is not observed in its full magnitude, is that of pavement that remains under water or debris. In the first case it may be that—after the water recedes and samples of pavement and foundations have been tested—layers are significantly eroded, making it necessary to demolish and reconstruct foundation layers and pavement. In these cases, the initial damage assessment must be changed from rehabilitation to reconstruction, with the consequent cost increases. This may be the case of pavement that could not be technically evaluated during the mission. Something similar occurs with pavement subjected to the pressure of very heavy debris; the real damages are observed in a laboratory.

At the close of this assessment, information was provided on damages that exceed the table's figure by about US\$25 million, in which case the damages would total US\$106.2 million.⁴¹ Unfortunately, at present it is not possible to assume this figure because it is not sufficiently supported and it is no longer possible to view the new damages in situ. However, this in no way constitutes a supposed rejection of last-minute information, but rather it simply follows the need to close the assessment exercise using the previously confirmed figures.

c) Estimate of Losses

These costs occur as a result of the need that forces drivers to resort to alternate routes in replacement of those they regularly use because traffic was interrupted or blocked by damages to the road infrastructure.

It should be noted that the abovementioned losses occur in the following situations, among others of lesser importance: detours by drivers who decide to use alternate routes, and traffic suppression. The mission observed situations that showed the occurrence of this type of costs, which are losses for the national economy.

The losses that were observed and later quantified correspond to higher operating costs incurred by drivers when they have to detour from their regular routes to others of lesser quality. This phenomenon is a frequent occurrence in freight traffic because drivers need to reach their destinations or return to where they started. This occurs in the case of insurmountable obstacles; the most typical case is the collapse of bridges, which occurred on 30 spans. Direct or normal traffic that has to travel on roads deteriorated because of rains also constitutes losses; this translates into increased operating costs for vehicles that have to travel on lower-standard roads.

Another case of losses observed are increased travel time and costs incurred on roads that, because they attract traffic, end up being saturated, causing the typical situation of traffic congestion.

The long waiting times due to involuntary stops also constitute losses; these stops generate costs corresponding to immobilized capital (value of the vehicle plus the value of the freight plus the value of the time of passengers who are forced to wait during the stop).

Loss estimates were based on alternate routes contributed by the already identified work group. The total amount of losses was estimated at 11.5 million, which fall fully on the private sector; of this, US\$7.3 million refer to the imported component.

The figures in the table above do not include costs stemming from traffic suppression because their

⁴¹ The respective document is dated November 30, 2009, while the figures at the close of the present document correspond to November 27 of the same year.

economic effect is included in the estimated losses in the productive and social sectors. It is therefore not appropriate to attribute the costs incurred by such suppressed traffic to the transportation sector because this would mean doubling the figures. Losses due to immobilized capital are also not included, because there was no information on vehicles trapped for a considerable period of time during or after the natural phenomenon under study.

Finally, the effectiveness and timeliness of the participation of government personnel from different agencies should be highlighted; in practice, their assistance translated into a significant decrease in costs and losses. This same constructive, dedicated attitude was repeated in the participation of personnel in said ad hoc working group.

d) Estimate of Needs for Rehabilitation and Reconstruction

For quite a long time it has been well known that El Salvador's road system is vulnerable to various severe phenomena of geological and hydrological origin, as in the previously mentioned cases of Hurricanes Mitch and Stan, which occur frequently, and of the devastating earthquakes in recent history.

As a result of these natural phenomena, two types of severe damage generally occur: landslides and structural collapse.

Fortunately, El Salvador's road system was and continues to be well designed, constructed and maintained, and thus damages are less than what might be expected.

However, both of the abovementioned weaknesses prevail, and thus it is necessary to address them in order to overcome them once and for all. In this regard, it should be remembered that in previous assessments conducted by CEPAL it was noted that the amounts of losses caused by phenomena such as those described exceed the investment needed to reconstruct these collapsed structures. The appropriateness of allocating the necessary resources is therefore clear, for the purpose of preventing damages and losses in future events similar to those already studied.

The needs detected under the scenario of reducing vulnerabilities and managing risks are significantly higher than the sum of all damages and losses. Under the assumption that these are very likely to occur, the investment differentials will later be compensated by avoiding similar costs and losses.

Table 31 indicates the identified investment needs.

TABLE 31. NEEDS FOR ROAD REHABILITATION AND RECONSTRUCTION*(in millions of US\$)*

| Items | Total | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|--|-------|------|------|-----------|------|-----------|-----------|
| Temporary roads and bridges for the emergency | 1 | 12 | | | | | |
| Rehabilitation of primary roads | 5.9 | 1.9 | 4 | | | | |
| Rehabilitation of secondary and tertiary roads | 4.7 | 1.7 | 3 | | | | |
| Preventive study of bridges | 2 | | 2 | | | | |
| Rehabilitation of bridges | 9.7 | | 4.7 | 5 | | | |
| Reconstruction of bridges | 77.6 | | 15 | 15 | 17.6 | 1 | 15 |
| Preventive reshaping of embankments | 70 | | 14 | 14 | 14 | 14 | 14 |
| Total | | | | 34 | | 29 | 29 |

Source: Estimates by assessment mission with information from MOP and STP.

Most of the initiatives contained in the table were conceived and analyzed by the ad hoc working group, so it is redundant to insist on them. It is therefore worthwhile to merge the two ideas that constitute an original contribution of the evaluation mission: the Preventive Study of Bridges, and the Reshaping of Embankments.

e) Preventive Study of Bridges

El Salvador's road system has been developing for quite a long time, and was a pioneer in Central America. Therefore, a number of its structures, fully justified and adequate at one time, are now obsolete from both a structural and geometric standpoint.

The collapse of these structures confirms previous conclusions about the need to reevaluate the appropriateness of keeping all these structures current. In this regard, the following should be kept in mind: the age of many of them, which translates into material fatigue and risk of collapse due to high demand; they currently suffer as well from the fact that their design does not generally correspond to the standard of the highway that they serve; road accesses are not adequate for existing demands; and adjacent areas are now inhabited, which endangers vehicle maneuverability and especially pedestrian safety.

Therefore, it is proposed that a study be conducted aimed at reducing vulnerabilities and managing risk. For example, there are many analyses of bridges; these should not be overlooked but instead existing information should be used, applying concepts of risk management and social assessment of projects under vulnerable scenarios.

f) Preventive Reshaping of Embankments

The purposes of this initiative are similar to the above in terms of their preventive nature. It does not appear necessary to insist on the vulnerability of many embankments in El Salvador's road system. It is also known that their reprofiling is costly.

However, the lengthy experience drawn from evaluations of the latest adverse natural phenomena leads to the conclusion that it is necessary to address this complex issue with the intention of resolving it

effectively and definitively. The repeated landslides in La Leona and in La Panorámica, among many others, are very well known and cause heavy losses.

Therefore, this initiative is proposed on a partial basis for now to improve the weakest cases. A good method to decrease the social cost of this type of works consists of carrying out the works based on intensive use of currently unemployed unskilled and semi-skilled labor. The implementation of this initiative may generate some 200,000 productive jobs.

It is therefore worthwhile to begin with the initiative by reshaping those sectors whose separations have caused enormous damages and losses, and the anticipated economic and social benefits will thus exceed the costs to be incurred.

In the initial stage, an investment of US\$70 million is proposed; this can later be replicated until the vulnerability of many unsuitable embankments is drastically reduced. The proposed investment may lead to significant savings in avoided costs, which may broadly justify this project.

g) Post-report Comments

Based on background information collected as of November 27, 2009, road damages totaled US\$77 million. Subsequently, the Salvadoran counterpart obtained additional information; as of December 8, 2009 damages were assessed at US\$103 million.

The difference between these two figures is explained by the increased number of damaged and collapsed bridges observed in the updating of background information conducted by the Salvadoran counterpart. In this regard, the CEPAL report stated that 26 bridges were damaged and 28 were collapsed, while the abovementioned update indicates 61 damaged bridges and 38 collapsed bridges.

B.3.4 Communications Sector

The institution in charge of controlling the sector's operation is the General Superintendency of Energy and Telecommunications (*Superintendencia General de Energía y Telecomunicaciones* -SIGET). The system's operation is conducted by private companies.

The baseline data for estimates were contributed by SIGET, which provided information on minor damages. One of these, referring to landline telephone service, refers to a cutoff in the system due to the overflowing of the Jiboa River and to landslides; repairs were estimated at US\$400,000.

Another damage, to mobile telephone service, was due to cuts in the fiber-optic route, also caused by the overflowing of the Jiboa River and by landslides, with a rehabilitation cost of US\$40,000.

No landline or mobile telephone company informed about variations in demand due to the disaster, and thus losses were probably insignificant.

TABLE 32. DAMAGES AND LOSSES IN THE TELECOMMUNICATIONS SECTOR*(in thousands of US dollars)*

| | |
|----------------|-----|
| Damages | 440 |
| Losses | 0 |
| Private Sector | 440 |

Source: General Superintendency of Energy and Telecommunications (SIGET).



III. CROSS-CUTTING ISSUES

A. ENVIRONMENTAL SECTOR

As previously indicated, El Salvador's population is vulnerable to natural disasters as a result of its geographic location and socioeconomic factors. According to the Bureau of the National Service for Territorial Studies (D-SNET), nearly 10% of the country is exposed to floods, approximately 20% is exposed to landslides, 50% may be affected by droughts, and nearly 75% of the country may be affected by earthquakes. The disasters affect the population, damage infrastructure, and hold back development. The following table shows the economic cost associated with the recent disasters in El Salvador. In particular, the poor are most affected by natural disasters because they are more likely to live in hazardous areas such as flood-prone plains, riverbanks, steep slopes, and fragile buildings in densely populated settlements.

TABLE 33. ECONOMIC COST OF RECENT NATURAL DISASTERS

| Disaster | Economic Cost (as percentage of GDP) |
|------------------------|---|
| El Niño (1997–1998) | 1.6 |
| Hurricane Mitch (1998) | 3.0 |
| Earthquakes (2001) | 12.0 |
| Drought (2001) | 1.2 |

Source: National Territorial Studies Service (D-SNET 2004).

Improper administration of natural resources could increase the country's vulnerability to natural disasters. For example, due to the country's mountainous nature, deforestation in areas of abundant rainfall accelerates erosion, nutrient loss and sedimentation, which in turn impact the number and intensity of floods, landslides and droughts (MARN 2004). The Framework for the Reduction of Vulnerability to Natural Disasters in Central America, enacted by the presidents of all of the region's countries in 1999, recognizes that environmental and natural resource management is essential for a vulnerability reduction policy. The fact that MARN, through D-SNET, is responsible for the national policy dealing with the prevention and reduction of environmental risks stresses the importance that the Government of El Salvador assigns to environmental and natural resource management in order to reduce the country's vulnerability.

The Dominican Republic – Central America Free Trade Agreement (DR-CAFTA) and infrastructure programs represent a challenge and an opportunity for environmental institutions in El Salvador. For example, DR-CAFTA is expected to increase commerce, investment and economic growth and to improve the well-being of El Salvador's population (including the poor). However, the extent of DR-CAFTA's net gains and benefits will depend on El Salvador's capacity to implement complementary policies. The treaty itself will probably not lead to substantial development gains if it is not accompanied by parallel improvements in areas such as infrastructure, trade facilitation, in-

stitutional and regulatory reform, innovation and education (Country Environmental Analysis, World Bank 2005). From an environmental policy perspective, the challenge consists of strengthening environmental institutions and policies so that they can effectively protect the country's environment and natural heritage while supporting the growth driven by commerce.

Impacts of the Low-Pressure System and Tropical Storm Ida on ecosystems within protected areas and agro-ecosystems. The preliminary assessment, prepared by MARN,⁴² of the effects on the environment caused by the low-pressure system and Tropical Storm Ida indicate the following impacts, which occurred to a greater or lesser degree in protected natural areas as well as in agro-ecosystems located in the affected zones: 1) degradation and deterioration of wildlife habitat (natural ecosystems and agro-ecosystems); 2) deterioration of water quality due to increased sediments and contamination with nutrients; 3) possible occurrence of eutrophication and other damages to bodies of water; and 4) significant increase of water volumes and floods that caused the degradation or complete destruction of gallery or riparian forest areas and mangrove zones. The most evident effect on the environment was caused by landslides of debris or by lahars that brought about major devastation and the loss of human lives among the residents of various communities.

Flow of debris in the city of Verapaz. According to data obtained by MARN, the approximate volume of debris that reached the city of Verapaz was calculated at 240,000 m³. The approximate distance from the start of the flow was estimated at 6 kilometers, reaching a height of 2 meters upon entering Verapaz.

Flow of debris in the city of Guadalupe. MARN's damage report indicates that several landslides converged in the city of Guadalupe, with the principal contribution being from the landslide on the northern flank of the San Vicente volcano, which emptied into El Derrumbo creek. The flow destroyed several bridges as well as houses in Colonia Santa Rosa. According to the data obtained, the approximate volume of debris was calculated at 370,000 m³. The approximate distance of the flow of debris was estimated at 6 kilometers.

Flow of debris in Los Infiernillos creek. The debris in Los Infiernillos creek flowed for a distance of about 6 kilometers. Preliminary calculations of the volume of the flow of debris deposited in the alluvial fan were 250,000 m³.

Flow of debris in El Amate Blanco creek. The debris in El Amate Blanco creek flowed for a distance of about 6 kilometers. The communities of El Refugio and Barrio San José near Tepetitán suffered the loss of human lives as well as material damages. Both communities were located in the middle of the zone where debris was deposited. According to measurements conducted, an estimated volume of 300,000 m³ of debris was deposited.

⁴² Preliminary report on the assessment of environmental damages caused by the storm from November 7 to 8, 2009. Prepared by the General Bureau of Environmental Management (*Dirección General de Gestión Ambiental -DGGA*), General Bureau of the National Territorial Studies Service (D-SNET), General Bureau for Natural Heritage (*Dirección General de Patrimonio Natural -DGPN*), General Bureau for Environmental Inspection (*Dirección General de Inspectoría Ambiental -DGIA*), Solid Waste Unit, November 2009.

Other zones affected by landslides. During the aerial reconnaissance flights, a large number of landslides were observed in the areas of the towns of Paraíso de Osorio, San Emigdio, Santa Cruz Analquito, San Ramón and Candelaria, all located east of Lake Ilopango. Most of the landslides were not large or thick, but together they had a considerable effect while also increasing the level of risk to which the nearby communities have been exposed. Another zone impacted by landslides was to the north of Lake Ilopango, where towns such as San Agustín and nearby areas are located.

Damages and losses

The cost of removing the estimated volume of debris (1.2 million m³) exceeds US\$12 million. Damages to infrastructure within the protected areas were estimated at US\$62,000, while a preliminary estimate of losses to ecosystems totals US\$1.8 million. The effects on the environment not only include the accumulation of debris but also the loss of soils that were suitable for agricultural, livestock and forestry activities; and the silting of rivers and creeks, with the consequent increase in the risk of future floods due to the loss of natural drainage. The effects on water quality and on aquatic biota, among others, should be evaluated. Because a detailed analysis of damages and losses to environmental services could not be conducted for this analysis, it is recommended that a more in-depth assessment be conducted to help the country determine the real cost of environmental damage. However, additional data provided by government authorities after the conclusion of the preliminary damage and loss assessment indicate that environmental damages caused by the event total US\$46.06 million, with total damages of US\$60.07 million.

It is evident that some communities and small cities have remained at a higher level of exposure to risks. It is important that risk prevention and mitigation measures as well as environmental protection measures use a broad perspective, such as a watershed or landscape approach, to make it possible to better integrate environmental complexity and the interfaces between manmade and natural environments.

a) Damages and Losses to Livelihoods

Because the livelihoods of the population are home based, damages to homes have been used as a starting point to measure damages and losses in the sector.

According to Civil Protection reports, the evaluated housing damages totaled 1,054 completely destroyed houses and 2,005 with partial damages, of which 1,200 are considered to have household economic activity in 5 departments and 59 municipalities (see Housing Sector report).

Damages and losses to livelihoods have been concentrated on completely destroyed houses; these have been the subject of the present assessment.

As shown in the table, total damages and losses are calculated at nearly US\$3 million and include the sectors of commerce, backyard animal raising, production of foods made from corn cooked in lime-water (hominy) and the provision of services, all home based.

TABLE 34. IMPACT OF TROPICAL STORM IDA AND THE LOW PRESSURE SYSTEM ON THE ENVIRONMENTAL SECTOR*(in thousands of US dollars)*

| Component | Effects | | | Sector | Effects on balance of payments |
|--|---------------|-----------|---------------|----------------------|--------------------------------|
| | Total | Damages | Losses | Public Non-Public | |
| AFFECTED INFRASTRUCTURE | 62 | 62 | | 62 | |
| Damages to infrastructure within protected areas | 62 | 62 | | 62 | |
| ALTERATION OF HABITATS | 1,821 | | 1,821 | 1,821 | |
| Losses due to damages to habitat ^a | 1,821 | | 1,821 | 1,821 | |
| LOST REVENUE | 2 | | 2 | 2 | |
| Entrance fees for natural areas ^b | 2 | | 2 | 2 | |
| UNFORESEEN EXPENDITURES | | | | | |
| REMOVAL OF DEBRIS^c | 12,200 | | 12,200 | 12,200 | |
| Principal access roads | 2,200 | | 2,200 | 2,200 | |
| Urban roads ^d | 800 | | 800 | 800 | |
| Removal of lahar debris accumulated in creeks ^e | 9,200 | | 9,200 | 9,200 | |
| TOTAL^f | 14,084 | 62 | 14,023 | 14,084 | |

^a Estimate by Ministry of Environment and Natural Resources (MARN) of losses caused by alteration of habitats within protected natural areas.

^b Estimate by MARN based on payment of entrance fees for forest areas during a 12-month period.

^c Source: Ministry of Public Works and FOVIAL.

^d Corresponds to removal of debris in the city of Verapaz.

^e Corresponds to removal of debris in affected creeks in Guadalupe, Infiernillos and El Amate Blanco.

^f This estimate is based on the information that national authorities were able to provide to the Joint Assessment Mission as of the date of field data collection. Later, the assessment mission received data from the Government of El Salvador indicating that environmental damages total US\$46.06 million, with total damages of US\$60.07 million. This value is reflected in the data presented in Table 7, under the Cross-cutting category.

TABLE 35. SUMMARY OF DAMAGES AND LOSSES OF LIVELIHOODS OF THE POPULATION IN DEPARTMENTS AFFECTED BY TROPICAL STORM IDA

| | Commerce | Production | Services | Household Livestock Sector | Artisanal Fishery | Tourism | Total |
|---------|----------|------------|----------|----------------------------|-------------------|---------|---------|
| Damages | 2.5 | 2 | 205.9 | 273.2 | – | – | 502.6 |
| Losses | 110.5 | 56.3 | 823.5 | – | 1,349.1 | 28.7 | 2,368.1 |
| Total | 132 | 58.3 | 1,029.4 | 273.2 | 1,349.1 | 28.7 | 2,870.6 |

Source: Prepared by assessment mission.

With regard to the distribution per department of the impact on the population's livelihoods, the Department of La Paz is the most affected, as shown in the table. This corroborates the opinions of agencies such as CONAMYPE that have conducted surveys in this zone. In this department, some families have had to cease their tourism-related activities on various beaches, including 150 families in which the women work in the Costa del Sol as well as a good number of fishermen's families.

TABLE 36. LIVELIHOODS. DAMAGES AND LOSSES PER DEPARTMENT

| Department | Damages | Losses | Overall total | Percentage |
|--------------|---------|---------|---------------|------------|
| La Libertad | 19.2 | 38.3 | 57.4 | 2.0 |
| San Salvador | 82.6 | 329.2 | 411.8 | 14.3 |
| Cuscatlán | 26.6 | 21.0 | 47.7 | 1.7 |
| La Paz | 181.6 | 1,562.7 | 144.4 | 60.8 |
| San Vicente | 192.5 | 416.8 | 609.3 | 21.2 |
| Total | 502.6 | 2,368.1 | 2,870.6 | 100.0 |

Source: Estimated by assessment mission.

To conduct an analysis of the impact on the livelihoods of the population, differentiated by sex, the distribution of activities as informed by the Population and Housing Census has been used as a reference and has been corroborated in the field by the mission.

In the case of food production and retail commerce at household level, it is noted that these are mostly carried out by women. In the case of services, this activity is mostly carried out by men, also at household level. The raising of backyard animals has been reported by informants as being carried out by women. In the case of artisanal fishing, this work is carried out by men; and tourism-related activities, including the sale of food and small-scale commerce, are also carried out by women in the abovementioned affected areas whose use for this objective requires that the women pay a fee which, due to the disaster, has been exempted by the tourist park administration.

TABLE 37. PERCENTAGE OF THE DISTRIBUTION OF ACTIVITIES WITHIN HOUSEHOLDS, DIFFERENTIATED BY SEXES, IN THE AFFECTED DEPARTMENTS

| Department | Commerce | | Food preparation | | Services | |
|--------------|----------|-------|------------------|-------|----------|-------|
| | Man | Woman | Man | Woman | Man | Woman |
| La Libertad | 21.0 | 79.0 | 15.0 | 85.0 | 87.5 | 12.5 |
| San Salvador | 25.4 | 74.6 | 14.2 | 85.8 | 90.3 | 9.7 |
| Cuscatlán | 26.1 | 73.9 | 13.7 | 86.3 | 92.3 | 7.7 |
| La Paz | 22.5 | 77.5 | 14.2 | 85.8 | 93.7 | 6.3 |
| San Vicente | 27.4 | 72.6 | 13.1 | 86.9 | 93.2 | 6.8 |

Source: Interviews with key informants and Population and Housing Census, DIGESTYC, 2007.

In evaluating the amount of damages and losses, differentiated by sex, we found that losses affecting men's activities were the highest, especially due to the disaster's impact on artisanal fishing since fishermen have had to stop working because the waters are contaminated. This refers to 1,466 families of fishermen who work on the islands of El Cordoncillo, San Rafael Tasajera, La Calzada and La Colorada (Department of La Paz), and it is estimated that they will not be able to carry out their sale-oriented activities for a period of three months, which will seriously affect their food security.

TABLE 38. DAMAGES AND LOSSES OF LIVELIHOODS DIFFERENTIATED BY SEX IN AFFECTED DEPARTMENTS

| Department | Damages Women | Losses Women | Damages Men | Losses Men | Total Damages | Total losses |
|--------------|---------------|--------------|-------------|------------|---------------|--------------|
| La Libertad | 11.6 | 8.1 | 7.5 | 30.2 | 19.2 | 38.3 |
| San Salvador | 15.9 | 62.5 | 66.7 | 266.8 | 82.6 | 329.2 |
| Cuscatlán | 22.7 | 5.1 | 4 | 16 | 26.6 | 21 |
| La Paz | 140.3 | 48.1 | 41.4 | 1,514.6 | 181.6 | 1,562.7 |
| San Vicente | 106.3 | 71.7 | 86.3 | 345.1 | 192.5 | 416.8 |
| Total | 296.7 | 195.4 | 205.9 | 2,172.6 | 502.6 | 2,368.1 |

Source: Estimates by assessment mission.

B. THE DISASTER'S IMPACT ON WOMEN

The worsening of women's living conditions and the consequences this brings to their families must be emphasized, since the income they earn in their activities is an essential cornerstone for maintaining their households. The loss of their income and the impossibility of reversing this situation in the coming months will have a direct repercussion on their children's and their own malnutrition.

Added to the effect that the loss of their sources of income has on the well-being of women and their families is the fact that they find themselves unable to pay loans in order to maintain their livelihoods, even though they generally have the highest rating in microcredit financing agencies due to their dependability in making payments. FOSOFAMILIA, a public microcredit agency, informed that 60% of its affected clients in disaster zones are women. It may be inferred that the number of women in this situation is high because in the third quarter of 2009⁴³ the Multisectoral Investment Bank (Banco Multisectorial de Inversiones) informed that there was a significantly higher percentage in the number of credits granted to women, compared to the number granted to men; likewise, a higher percentage of the total amount of credits has been aimed toward women (66.0%).

These effects of the disaster are even more evident if we remember the high percentage of female heads of households in the affected departments.

⁴³ FIDEMYPE, quarterly report July–September 2009.

**TABLE 39. PERCENTAGE OF FEMALE HEADS OF HOUSEHOLDS
IN THE AFFECTED DEPARTMENTS**

| Departments | Percentage |
|--------------|------------|
| La Libertad | 32.6 |
| San Salvador | 36.2 |
| Cuscatlán | 34.8 |
| La Paz | 35.0 |
| San Vicente | 38.2 |

Source: Population and Housing Census, 2007, DIGESTYC.

To this backdrop of the socioeconomic status of women living in disaster conditions, the high percentage of teenage mothers should be added; this percentage may be inferred if one remembers that the proportion of births among females between the ages of 10 and 19 is around 30% of the total among women of reproductive age.

Another consequence of the disasters that directly affects women is the increased work that falls on them (caring for children, the ill and the elderly, and work to keep households and shelters operating), which is not remunerated by any institution. This increase is added, for example, to the time that women and girls must spend in their daily lives, especially in rural areas, carrying water for family needs (it has been observed that those households that lack water services spend an average 9% of their productive time collecting water, and that the population living in extreme poverty spends even more time collecting water, up to 14% of its productive time). Water coverage in homes of affected municipalities can illustrate this situation.

To reveal the disaster's impact on women and the economic contribution they make to society without receiving payment for such work, it is useful to conduct a monetary assessment of the increase in women's work as a result of the disaster. Considering the percentage of women from age 15 to over age 50 in houses totally or partially destroyed in the affected municipalities, the calculation of their work shows a total of nearly US\$3.5 million. A three-month period of abnormal living conditions, five more hours per day and an hourly salary equivalent to that of community, social and health services have been considered.

From November 16 to 25, 2009 there was a drastic reduction in the number of women and girls in shelters. On the former date the number was 7,151, and on the latter date 2,663. No general survey has been conducted on safety conditions and the coverage of needs of women and girls in shelters; this should constitute a lesson learned for future events since women and girls have specific requirements for better coping with these dramatic situations (separate bathrooms for each sex; sanitary napkins and underwear to maintain hygiene; good lighting in service areas to avoid sexual aggression, etc.).

TABLE 40. PERCENTAGE OF HOUSEHOLDS WITH ACCESS TO WATER WITHIN THE HOME

| Municipality | Urban | Rural |
|-------------------------|-------|-------|
| San Vicente | 82.5 | 63.2 |
| Verapaz | 83.3 | 67.8 |
| Paraíso de Osorio | 40.2 | 11.0 |
| San Antonio Masahuat | 65.2 | 35.0 |
| San Emigdio | 26.6 | 11.0 |
| San Francisco Chinameca | 56.5 | 18.3 |
| San Juan Nonualco | 90.7 | 36.6 |
| San Luis La Herradura | 64.0 | 25.1 |
| San Pedro Masahuat | 39.3 | 43.1 |
| Panchimalco | 75.7 | 36.6 |
| Santo Tomas | 68.2 | 22.2 |

Source: Population and Housing Census, 2007, DIGESTYC.

**TABLE 41. VALUE OF WOMEN'S REPRODUCTIVE WORK
IN HOMES TOTALLY OR PARTIALLY DESTROYED**

| Department | Women ^a | US\$ thousands |
|--------------|--------------------|----------------|
| La Libertad | 112 | 70.2 |
| San Salvador | 1,263 | 789.9 |
| Cuscatlán | 730 | 456.8 |
| La Paz | 1,835 | 1,147.8 |
| San Vicente | 1,614 | 1,009.5 |
| Total | 5,554 | 3,474.1 |

Source: Population and Housing Census, 2007 DIGESTYC.

^a Women with reproductive work.

Although the abovementioned survey of shelters has not been conducted, visits by various NGOs, IS-DEMU and mission members have found a good level of organization, a certain degree of protection and deficient coverage of articles for hygiene and of women's underwear.

C. FRAMEWORK FOR RECOVERY

Physical damages have been concentrated on the poorest families, due to the precarious nature of their houses and to their location in informal settlements, especially those along riverbanks and on the dry beds of old rivers and streams that, with the volumes of water produced by Ida, have filled again, leaving destruction and death in their path.

The paralysis of productive activities has generated losses that have weakened the family economy and, to the extent that productive assets are not replaced, the affected households will face a very severe deterioration of their living conditions.

In terms of structuring the social network for recovery, the situation is different between larger cities that are more closely linked to the national government's sectoral actions, as may be the case of San Salvador, and smaller cities where the community's linkage is closer to and dependent on actions by local governments. Moreover, in the former there are private agencies which, by seeking greater impacts, focus their efforts on places where damages are greater or reach a larger population.

Furthermore, in larger cities, the fact that populations have lost their homes does not necessarily mean that they have lost their livelihoods because they have kept their jobs or, since they are associated with the job market, they can enter it.

It is a different case for affected populations of smaller cities or rural towns that have lost everything, such as those analyzed in this section, in which the subsistence economy and the lack of linkage with the market generate a high level of dependence on state efforts in general and on municipal efforts in particular. However, the social perception is that "the municipalities are asleep, but the communities are active and eager to undertake recovery efforts even without waiting for (or because they do not expect) action by the State".⁴⁴ In the zones visited by the mission, spontaneous efforts by the communities have been reported; these communities have organized to remove debris and recover access roads. This is not an isolated incident but rather a characteristic of the Salvadoran people, considered one of the most hard working and enterprising in Central America.

If the spontaneous efforts carried out by the population can be adequately channeled with regard to early recovery programs based on the hiring the victims themselves as labor⁴⁵ to carry out the works, these may be the basis of a participatory, effective process with multiple effects:

- 1) The payment of daily wages to those affected who are hired as labor to carry out the works, contributes directly and effectively to the recovery of the family economy and the reduction in demands for humanitarian aid.

⁴⁴ Interview with representatives of CARITAS and the Ministry of Agriculture in the Municipality of San Vicente.

⁴⁵ In principle, unskilled labor is required to remove debris and carry out simple activities such as cleaning culverts, sewers and drainage systems, but thought may be given to including the skilled labor that exists in the communities to carry out small works such as the rehabilitation of culverts, sewers and small bridges, the channeling of rivers and streams, river defense works, reinforcement of slopes, etc.

- 2) Training of those affected, who are employed in recovery programs, in trades related to construction, improvement of employment possibilities and their inclusion in the job market and in reconstruction programs.
- 3) Training in risk management associated with early recovery programs makes it possible to improve their coverage and scope.
- 4) The recovery of damaged local assets at lower costs and under lower terms than those that would be obtained by contracted private companies from outside the locality.
- 5) The purchase of local materials for the execution of works and the injection of monetary resources through the payment of workdays generates the circulation of currency and thus positive effects for local economies.

IV. ECONOMIC IMPACT

A. IMPACT OF TROPICAL STORM IDA AND THE TROPICAL DEPRESSION

This chapter describes the analysis conducted on the impact that the damages and losses caused by the disaster will have on large macroeconomic aggregates and on the employment and personal income of those affected.

Overall Impact of Damages and Losses

The overall impact of damages and losses was estimated on the basis of the sectoral assessment presented in the previous chapter. An analysis was conducted of the economy's overall performance before and after the path of Hurricane Ida.

The total effects of the hurricane, although significant in social terms and considerable at departmental level, did not reach levels significant enough to substantially alter compliance with the macroeconomic targets stated by El Salvador's economic authorities.

The following is a brief overview of economic activity in the 2001–2008 period and in 2009, prior to the disaster; it then contrasts the expected post-disaster economic situation for 2009 and 2010. This background information is used to address the economic forecast following the disaster (the gap between performance with and without the disaster).

a) Pre-disaster Situation: Recent Macroeconomic Performance, 2001–2008

Principal trends. In the past eight years, the Salvadoran economy experienced a moderate, steady growth, equivalent to an average of 3%, with an annual inflation rate of 4% (see Table 42).

Economic activity showed rising growth rates from 2005 to 2007, mainly driven by the flow of remittances that the country received, equivalent to 17.6% of the GDP. These turned into an important source of financing for consumption and investment in an environment of abundant liquidity and low interest rates. In addition, the contribution of the external sector, especially since 2003, was increasingly negative because imports grew steadily while exports have remained relatively constant.

TABLE 42. PRINCIPAL MACROECONOMIC INDICATORS*(In rates of variation and percentages of GDP)*

| Indicators | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|-----------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Gross Domestic Product | 1.7 | 2.3 | 2.3 | 1.9 | 3.1 | 4.2 | 4.7 | 2.5 |
| Consumer prices | 1.4 | 2.8 | 2.5 | 5.4 | 4.3 | 4.9 | 4.9 | 5.5 |
| Balance of current account /GDP | -1.1 | -2.8 | -4.7 | -4 | -3.3 | -3.6 | -5.8 | -7.2 |
| Balance of goods and services/GDP | -15.8 | -14.7 | -15.9 | -17.2 | -17.7 | -19.4 | -21.4 | -22.1 |

Source: CEPAL based on official figures.

- i) Economic and fiscal policies. During the four-year period from 2004 to 2007, El Salvador was able to improve its fiscal performance thanks to expenditure control and increased tax revenue. This improvement reflected a substantial increase in tax revenue which raised tax collection to 14.1% of the GDP in 2007 (approximately 2% of the GDP above tax collection in 2003), thanks to a reform that increased income tax revenue. Meanwhile, expenditures remained relatively constant, around 20% of the GDP. This policy helped to address the expenditures caused by the 2001 earthquakes and made it possible to reduce the primary deficit in recent years. The overall deficit (including pensions) of the Non-financial Public Sector NFPS went from 3.1% of the GDP in 2004 to 1.9% in 2007. Consequently, the NFPS's public debt, including the pension debt, dropped from 40.5% of the GDP in 2004 to 38.9% of the GDP at the end of 2007. However, this reduction occurred following significant growth in recent years (about 10% of the GDP since 2000), especially after the 2001 earthquakes and the change in the pension system.

Fiscal performance began to deteriorate in 2008, reflecting an increase in the cost of energy subsidies due to the increase in petroleum prices, selective salary increases and an increase in capital expenditure. The NFPS's deficit rose from 1.9% of the GDP in 2007 to 3.1% of the GDP in 2008, while NFPS's debt rose to 39.7% of the GDP at the end of 2008.

- ii) Monetary and financial policies. The consolidation of the dollarization process drove the decrease in domestic interest rates. In real terms, average interest rate deposits with a term of 180 days dropped from 1.5% in 2002 to 0.1% in 2007. In turn, credit to the private sector grew 4.4% in real terms in 2007. This decrease in interest rates, together with increasing inflation, resulted in negative real interest rates, which achieved their highest level in March 2008 when the real interest rate reached -3.7%. With the prospect of the upcoming elections, the Central Reserve Bank of El Salvador (*Banco Central de Reserva de El Salvador*) temporarily increased reserve requirements by banks in mid-2008 by 3%. Beginning in the third quarter and due to the international crisis, growth in credit to the private sector became negative and interest rates increased, resulting in an average of -3% in real terms for 2008. To address this restriction on the system's liquidity, and in light of the uncertainty regarding the elections, the government contracted credits through multilateral banks in order to back international reserves and provide liquidity to the system.

- iii) Trade policy. In March 2006, CAFTA-DR came into effect, resulting in a significant growth in exports and imports. The signing of CAFTA, as well as increasing competition from Asian textile exports, imposed new competitive demands and opened both opportunities and challenges for exports and for economic growth in El Salvador. These factors highlight the importance of competitiveness as a critical issue for the country.
- iv) Evolution of key variables. Economic activity. Economic growth was relatively low in the first half of the decade, with considerable acceleration since 2005, achieving an annual growth rate of 4.7% in 2007. However, this positive trend was reversed since the middle of 2008 with the impact of the international crisis. Growth totaled only 2.4% in 2008, reflecting a tightening in construction and a slowdown in commerce, agriculture and industry on the supply side. On the demand side, there was a tightening in private investment and a slowdown in private consumption even though exports showed positive growth.
- v) Prices, wages and employment. Inflation grew with the petroleum and food crisis, from an average of 3.5% between 2000 and 2007 to an average of 7.3% in 2008. Thus, real wages increased nearly 0.5% between 2001 and 2007. Unemployment dropped slightly from 2001 (7%) to 2007 (6.3%), but in 2008 it again rebounded (7.5%)
- vi) External sector. The trade deficit experienced a significant increase beginning in 2003, from an average 13% of the GDP between 2000 and 2002 to 20% of the GDP in 2007 and 2008. This increase in the trade deficit went hand-in-hand with a significant increase in the flow of remittances, which increased from 13.5% of the GDP in 2003 to 18.1% of the GDP in 2007.

In 2008, the current account deficit was 7.2% of the GDP, higher than that observed in 2007, due to increased petroleum and food prices and to an increase in the debt service. Exports grew 14.1% in 2008, thanks to an increase in coffee and non-traditional exports. Despite this significant growth in exports, imports grew 10.6%, reaching 40% of the GDP in 2008 and resulting in a trade deficit equivalent to 20% of the GDP.

In the past, the high deficit levels in the commercial account were essentially financed through the remittances of emigrants and the entry of capital (public and private), and thus international reserve levels have remained stable. The annual growth in remittances between 2000 and 2006 averaged 14%. However, since 2007 average annualized growth has slowed considerably, reaching a growth of 2.4% in 2008, demonstrating the impact of the international crisis, particularly in the last quarter.

b) Expected Evolution of the Economy in 2009 Prior to the Disaster⁴⁶

- i) Key trends. Since the end of 2008, the Salvadoran economy was affected by uncertainty about the result of the legislative and presidential elections, in which Mauricio Funes of the *Frente Farabundo Martí para la Liberación Nacional* (FMLN) party was elected; he began his term of office in June 2009. The loss of momentum was exacerbated by the effects of the international crisis, which caused an overall tightening of economic activity. Consequently, CEPAL estimated that the GDP would drop 2.5% in 2009, which means that the GDP per inhabitant would be reduced by 4%.

Although cumulative inflation as of October was ranked at -0.7%, an upswing is expected, so that the year would end at around 0.5%. As a result of the drop in the level of activity, government revenue was seriously affected. Thus, the deficit of the NFPS, including pensions, is expected to be around 5.4% of the GDP. In the external sector, the reduction in petroleum prices partially compensated for the drop in exports as well as reductions in flows of remittances. Thus, the deficit in the current account is estimated to be nearly 2% of the GDP. For 2010, a modest recovery was forecasted, with a 0.5% growth, 2% inflation, 3% deficit in the current account, and 4.5% for the NFPS, including pensions.

To address the international crisis, the new government announced a plan organized around three pillars: social protection, employment promotion, and the formulation of a National Development Plan. Chief among the announced measures are the expansion and implementation of social programs aimed at the most vulnerable groups, the conversion of the Multisectoral Investment Bank into a National Development Bank, and the creation of 100,000 jobs through the implementation of infrastructure projects, including the northern transverse highway, as well as the construction of 25,000 public housing units.

- ii) Economic policy. Fiscal policy. Although several of the announced measures have been implemented, the government has had to face a rather complicated economic situation, characterized by a deterioration of public finance. Due to the drop in the level of activity, it is estimated that for 2009 the central government's revenue will decrease by over 11% in real terms. This outcome mainly reflects the drop in VAT tax collection, which is expected to decrease by nearly 14%. In contrast, current expenditure could increase by nearly 8% in real terms, while public investment could see a drop of nearly 4.5%.

Consequently, it is estimated that the NFPS deficit, including pensions, could reach a level of nearly 5.4% of the GDP. In light of this situation, the government has redirected previously agreed credits and has issued Treasury Bonds to cover current expenditures. At the end of September, it announced its intention to sign a new agreement with the International Monetary Fund (IMF), which would be of a precautionary nature, for US\$800 million with a three-year term, replacing the agreement signed by the Government of El Salvador in January 2009. Although the government has no intention to use the funds from this agreement, it provides access to financing by other multilateral agencies.

Furthermore, a tax reform plan was announced at the end of October; it is estimated that this plan could result in US\$250 million in additional revenue (approximately 1% of the GDP). The plan has been the subject of strong resistance by the business sector. Details remain pending on the government's plan to rationalize spending, as well as on the timetable for addressing the discussion of a possible broad fiscal reform.

⁴⁶ The economy's expected performance in 2009 is estimated using official information available up to the third quarter of the year, as well as estimates and forecasts for the fourth quarter.

Details on the productive development and social protection strategy are expected to be announced before the end of the year. The Government's bet is that planned investment and social protection will boost activity in 2010. Based on the above, it is expected that the NFPS deficit in 2010, including pensions, will be around 4.4% of the GDP. In addition, it is expected that the NFPS's total debt could reach 40% of the GDP in the same period.

- iii) Financial policy. As a response to greater risk aversion by El Salvador's commercial banking system, the granting of credit to the private sector decreased 5% in real terms. The banks took advantage of available liquidity to reduce their external debt by nearly 50% and to improve their temporary profile.
- iv) Evolution of key variables. Economic activity. With regard to economic activity, first-quarter information indicates a contraction in nearly all sectors of activity, with the exception of the agricultural and livestock, financial establishment and government services sectors. The contraction with the greatest economic impact has been observed in manufacturing and commercial activity, which reflects the severe contraction in both external and internal demand. Despite this, high-frequency indicators point to a moderation in the rate of decrease, and thus the GDP in 2009 may drop 2.5%.

With regard to expenditure components, the reduction with the greatest economic impact would be that of private consumption, which has been affected by the 10% drop in the nominal value of remittances and by the deterioration in employment conditions. As of August, the number of contributors to the Salvadoran Institute of Social Security had been reduced by nearly 20,000 workers, equivalent to a 6.7% decrease. The sector most affected is construction, where the decrease in formal employment totals nearly 30%.

In turn, a 14.5% drop in gross domestic investment is expected. In addition to the above-described credit conditions, private investment was affected by the drastic reduction in flows of direct foreign investment (DFI), which are estimated to have decreased from US\$784 million in 2008 to only US\$88 million in 2009. It should be mentioned that there is growing interest on the part of Brazilian investors in taking advantage of various opportunities stemming from the free-trade agreement signed by Central America, the Dominican Republic and the United States, with a significant increase in flows of DFI in 2010.

- v) Prices, wages and employment. Beginning in the third quarter of 2008, the reduction in international prices of basic goods gave rise to a sharp slowdown in food and beverages and in transportation in the Consumer Price Index. The result has been a reduction in interannual inflation, which in fact has become negative since the third quarter of 2009. Although as of October cumulative inflation is -0.7%, an upswing is expected in the final months of the year stemming from the comparison with low price levels observed at the end of 2008. In principle, it is estimated that inflation in 2009 will be around 1%.
- vi) External sector. It is estimated that exports of goods will experience a reduction of approximately 15%. Two-thirds correspond to the drop in assembly plant (*maquila*) exports, while one-third corresponds to the contraction in nontraditional exports, since traditional exports remained at a level similar to that observed in 2008.

As a result of the deep contraction in internal demand, as well as a nearly 50% reduction in the petroleum bill, it is estimated that imports of goods will contract by about 25%. In terms of volume, the principal reductions were observed in imports of durable goods as well as capital goods. Consequently, for the entire year it is expected that the deficit in the balance of goods and services will decrease by over US\$1.7 billion, reaching US\$3.26 billion (14.9% of the GDP).

In contrast to the above, a slight increase in the deficit of the revenue balance is expected, and a reduction of about US\$400 million in flows of remittances, which represent approximately 16% of the GDP. Thus, it is estimated that the deficit in the current account will decrease by over US\$1.2 billion, reaching US\$418 billion, a figure equivalent to 2% of the GDP. In terms of DFI, it is estimated that in 2009 the flow toward El Salvador would be reduced by approximately US\$700 million, whereby only US\$88 million would have been received in 2009.

For 2010, a normalization and a reactivation of both external and internal demand is forecasted, which implies that net exports will again become negative. Although an increase in the flow of remittances is expected, these will be insufficient to avoid a slight increase in the current account deficit, which will reach a level equivalent to 3% of the GDP.

c) Expected Economic Evolution in 2009 after the Disaster

- i) Key trends. The November 2009 floods caused by Hurricane Ida per se do not represent a problem of imbalance in key macroeconomic aggregates.⁴⁷ However, the GDP may experience a drop, depending on the speed of reconstruction works. In fact, considering the expansion of external demand through construction and the possible increase in remittances, a certain boost in economic activity may be expected by late 2009 and especially in early 2010.

Thus, in the baseline scenario (which has a greater probability of occurrence), a 2.54% decrease in the GDP for 2009 is observed. For 2010, it is estimated that recovery may occur, with a 1% growth until reaching a 4% increase in the GDP in 2014. Here, it should be noted that, taking into account the effects of the disaster caused by Hurricane Ida, we will have a decrease in the GDP of only 0.07% in 2009, while reconstruction efforts and a greater boost in consumption would provide gains of nearly 0.5% in the GDP for 2010, later adjusting to their trend by 2014.

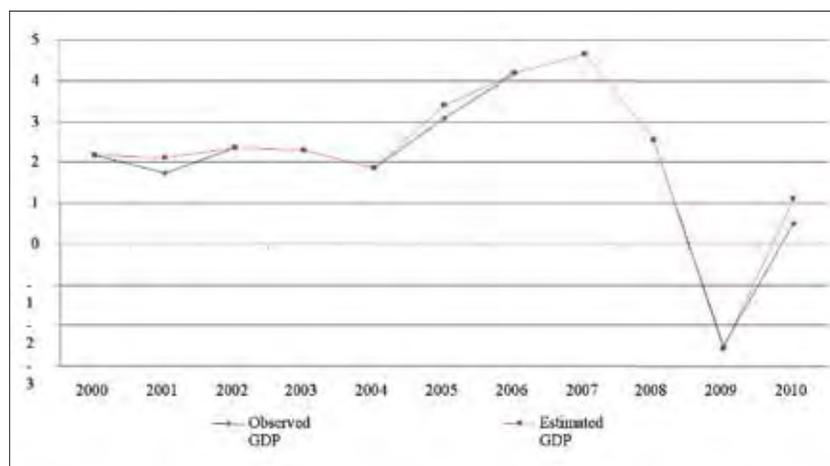
However, if one considers the disasters that have occurred from 1982 to the present one in 2009 (six events), an accumulated reduction in the GDP over this period, equivalent to 0.9%, can be observed. Although the impact seems relatively minor, this has misaligned the country's path toward theoretical equilibrium in the long term and has limited its possibilities for potential growth (see graph 11)⁴⁸.

⁴⁷ The cumulative effects of disasters and their inter-temporal dynamics have effects that can be quantified using techniques whose application is beyond the purpose of this document.

⁴⁸ The data in this graph come from preliminary estimates for both, and thus may not adequately represent the reality but rather a GDP trend, and thus the results obtained in this exercise should serve merely as an approximation and may change subject to the availability of more recent information.

**GRAPH 11. EXPECTED PERFORMANCE OF GDP BEFORE AND AFTER THE DISASTERS,
2000–2010**

(In rates of real annual variation)



Source: CEPAL estimates.

With regard to the external sector, taking into account the increase in the import component caused by Hurricane Ida in the fourth quarter of 2009, there will continue to be a slight deficit in the balance of the current account. Once again, free-trade zones, foreign exchange from tourism, and remittances would help to buffer the economic tightening.

The disaster's impact will divert resources and generate various fiscal pressures under a context of fiscal reform aimed at reducing public spending and achieving greater sustainability of the public debt. This will be moderated in the remainder of the fourth quarter and will be felt with relatively greater strength between 2010 as 2014, depending on how the reconstruction process develops.

- ii) Economic policy. Fiscal policy in the event of disasters. The President of the Republic declared a State of National Emergency whereby the government could allocate special funds to deal with the emergency. In addition, with this declaration of a national emergency the country can receive international aid to care for victims. In turn, the next day the Legislative Assembly decreed a State of Emergency, Public Catastrophe and Disaster, in order to streamline the appropriation of expenditures and the redistribution of budget allocations.

In order to have resources available for the emergency, at President Funes' request the Legislative Assembly approved the reallocation of US\$300 million from an IDB loan that were originally contracted for the Special Social Investment Program (*Programa Extraordinario de Inversión Social* -PEIS), allocating US\$150 million for expenditures associated with the emergency and reconstruction, and US\$150 million to finance the Global Anticrisis Plan (*Plan Global Anticrisis* -PGA) which still lacked sources of financing. Moreover, the Assembly authorized the placement of securities for an additional US\$300 million to finance the PEIS beginning in 2010. Finally, the Government asked the IDB for an emergency loan of US\$20 million to deal with the first stage of rehabilitation and damage repair following the emergency. With respect to grants from the international community, the government has asked the United Nations for support

from the Central Emergency Response Fund (CERF) in the amount of US\$2.5 million and the conduction of an international Flash Appeal to collect funds for emergency humanitarian needs, estimated at US\$13 million. Finally, it is expected that other grants that were planned for 2010 and the medium term can be reallocated for reconstruction.

Moreover, El Salvador reached a new financial agreement with the World Bank for US\$650 million, after the Bank's Board of Directors approved a Country Partnership Strategy (CPS) on November 24, 2009. This covers a period of three years and contemplates a program for technical assistance and analysis to support efforts to reduce poverty and inequality by means of three objectives: to solidify the groundwork for economic recovery, addressing macroeconomic and institutional vulnerabilities; to improve the provision of social services; and to increase economic opportunities, especially for the poor.

The government is committed to the objective of maintaining fiscal sustainability in the medium term; therefore, reconstruction and damage repair activities must be incorporated in the five-year plan that is presently being prepared. This implies that public spending must be reoriented and prioritized within the existing fiscal period. In the short term, due to the availability of resources from grants and loans, the NFPS deficit is expected to increase from 5.4% to 5.5% of the GDP following the disaster. This increase takes into account the expenditures incurred for the humanitarian aid stage and assumes that 10% of the works to be financed by resources reallocated from the IDB loan will be executed.

For 2010, the deficit is expected to increase from 4.4% to 4.5% of the GDP following the disaster. This increase assumes that 100% of the IDB loan will be executed, according to the requirements of this loan, and 20% of resources from the US\$120 million that were reallocated for this purpose. Moreover, it is assumed that 100% of the PEIS resources originally considered under the original budget will be executed and would be financed by a new issuance of bonds. For the medium term, the deficit and indebtedness profile is expected to return to the baseline scenario.

In light of these assumptions, the NFPS debt profile is expected to increase from 39.7% of the GDP in 2008 to 49.7% in 2011, and then begin to decrease in the medium term, as foreseen prior to the hurricane.

- iii) Financial policy. The hurricane's foreseeable effects on interest rates are clearly null in the post-Ida scenario. Moreover, the estimates made using available information indicate that no abrupt changes are expected in the NFPS's projected fiscal deficit, or in changes in the stock of international reserves. Thus, it is unlikely to expect a variation in the financial and monetary scenario due to the hurricane.

TABLE 43. FISCAL IMPACT OF THE DISASTER, 2009-2014
(in millions of US\$ and percentages of GDP)

| | Baseline Scenario | | | | | | | Post-Disaster Scenario | | | | | | |
|---|-------------------|----------------|----------------|----------------|----------------|----------------|----------------|------------------------|----------------|----------------|----------------|----------------|----------------|--|
| | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | |
| Transactions | | | | | | | | | | | | | | |
| Revenue and Grants | 3,732.0 | 3,431.0 | 3,915.3 | 4,244.3 | 4,776.3 | 5,289.0 | 5,637.6 | 3,434.1 | 3,915.3 | 4,244.3 | 4,776.3 | 5,289.0 | 5,637.6 | |
| A. Current Revenue | 3,679.0 | 3,319.3 | 3,733.5 | 4,056.4 | 4,639.0 | 5,198.3 | 5,601.5 | 3,319.3 | 3,733.5 | 4,056.4 | 4,639.0 | 5,198.3 | 5,601.5 | |
| B. Capital Revenue | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| C. Grants | 52.9 | 114.7 | 181.8 | 187.9 | 137.3 | 90.0 | 36.1 | 114.7 | 181.8 | 187.9 | 137.3 | 90.0 | 36.1 | |
| Expenditures, Concessions, Loans | 4,415.5 | 4,617.0 | 4,900.4 | 5,080.8 | 5,394.9 | 5,794.4 | 6,167.4 | 4,632.0 | 4,947.4 | 5,110.8 | 5,424.9 | 5,824.4 | 6,197.4 | |
| A. Current Expenditures | 3,754.4 | 3,905.3 | 4,124.9 | 4,244.1 | 5,515.7 | 4,824.1 | 5,131.0 | 3,905.3 | 4,124.9 | 4,244.1 | 4,515.7 | 4,824.1 | 5,131.0 | |
| B. Capital Expenditures | 661.7 | 711.7 | 776.4 | 837.7 | 880.2 | 971.4 | 1,037.5 | 726.7 | 823.4 | 867.7 | 910.2 | 1,001.4 | 1,067.5 | |
| C. Net Concession of Loans | -0.6 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | |
| Primary Deficit | -163.9 | -299.2 | -299.2 | -118.5 | 139.8 | 292.5 | 309.2 | -346.2 | -118.5 | 139.8 | 292.5 | 309.2 | 309.2 | |
| Overall Surplus (Deficit) Including Grants with Pensions | -683.5 | 1,182.9 | -985.0 | -836.4 | -618.6 | -505.4 | -529.8 | 1,197.9 | 1,032.1 | 866.4 | 648.6 | 535.4 | 559.8 | |
| 2. Excluding Grants | -736.4 | -1,166.8 | -1,024.3 | -755.9 | -596.2 | 565.9 | | -1,213.8 | -1,024.3 | -755.9 | -596.2 | -656.9 | | |
| 3. Including Grants w/o Pensions | -362.8 | -642.2 | -450.9 | -214.3 | -72.7 | -79.0 | | -671.2 | -450.9 | -214.3 | -72.7 | -79.0 | | |
| Deficit as % of GDP | -3.1 | 5.4 | -4.4 | -3.6 | -2.5 | -1.9 | -1.8 | 5.5 | 4.5 | 3.7 | 2.6 | 2.0 | 1.9 | |
| Total Financing | 687.1 | 1,182.9 | 985.0 | 836.4 | 618.6 | 505.4 | 529.8 | 1,197.9 | 1,032.0 | 836.4 | 618.6 | 505.4 | 529.8 | |
| Net External Financing | 126.8 | 1,395.4 | 486.3 | 422.2 | 297.5 | 195.3 | 148.6 | 1,395.4 | 806.3 | 422.2 | 297.5 | 195.3 | 148.6 | |
| Net Internal Financing | 560.3 | -199.9 | 498.7 | 414.3 | 321.1 | 310.1 | 381.2 | -184.9 | 225.7 | 414.3 | 321.1 | 310.1 | 381.2 | |
| Unfinanced Gap | -3.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |

Source: CEPAL, IDB and IMF based on official figures.

- iv) Evolution of key variables. Economic activity. The real sector of the economy was slightly affected by Hurricane Ida in November 2009. It is important to point out that the damages and losses affected both the stock of sectoral assets and the flows in the productive sectors and in infrastructure. The sectoral analysis showed that the most affected sectors were transportation, environment and agriculture, followed by water and sanitation, housing, industry, commerce, education, health and services.

In the transportation sector, damages exceeded losses because the damaged infrastructure corresponds to roads of secondary importance with respect to their connectivity with the city of San Salvador and with the rest of the country's departments.

In the agricultural and livestock sector, losses are greater than damages, mainly due to the effect on future coffee, bean, corn and sugar cane crops.

- v) Prices, wages and employment. The inflation rate showed mild variations in the period following the hurricane due to temporary shortages in products mostly for domestic consumption. Because supply was reestablished in a timely manner, the temporary price variations were neither significant nor permanent. The temporary increase in unemployment rates in the affected zones was able to be offset by rehabilitation and reconstruction activities, and therefore no strong variations are expected. However, it should be noted that performance during the first quarter of the year already reflected a deterioration in the number of jobs generated in the economy, so the unemployment rate is likely to be around 8%.
- vi) Evolution of the external sector. The increase in imports will be offset in part by the increasing flow of family remittances and by a slight upswing in exports, which will generate a current account deficit equivalent to 2% of the GDP. Therefore, the expected effects of Ida will not be significant in the current account deficit, despite the small increase in imports, mainly by the imported component associated with agriculture. Here, a loss of exportable products with an approximate value of US\$3.3 million is reported.

As for the service sector and especially tourism, a rapid recovery is expected due to minor damages and a return to normalcy in reservations and room occupation rates immediately after the emergency.

Finally, there could be a slight rise in regular transfers through family remittances and for reasons of solidarity, since this has been the case on other occasions. In terms of the capital and financial account, an increase may be expected due to increases in the flow of capital aimed at reconstruction activities. In turn, the financial account may reflect increases stemming from more grants from multilateral institutions.

B. IMPACT OF THE DISASTER ON PERSONAL INCOME

Although the disaster's impact on macroeconomic performance shows that the previous trend in terms of product growth should not be affected, the fiscal deficit may increase slightly in the short term and the greater imports required would be balanced by an increase in family remittances from overseas. At personal level, however, and at least for the next twelve months, income would experience a temporary

deterioration that would need to be propped up in order to avoid malnutrition as well as a possible increase in violence and other associated problems.

Using as a basis the relationship existing between the labor force of each sector of economic activity and gross production under normal operating conditions of the economy, temporary losses of workdays resulting from the production losses estimated in Chapter 2 were assessed. For each sector, this made it possible to estimate both the years/person that were lost and the income not earned by those working in these sectors. In addition, using the average salaries of each sector, paid to men and women, total income losses experienced by the affected persons were estimated (see Table 44).

The previous estimates indicate that men and women have lost an amount of income equivalent to US\$18.4 million, which represent the value that programs to generate personal income should replace, referring to the period between November of this year and May or June of 2010. The highest income losses occur in the agricultural and livestock sector, followed by the commercial and service sectors. In general, men lose the highest amount of income, compared to women; however, women lose more income in the commercial and service sectors. This is due to the existing ratio between the number of workers of each sex in the sectors analyzed (see again Table 44 and Graph 12).

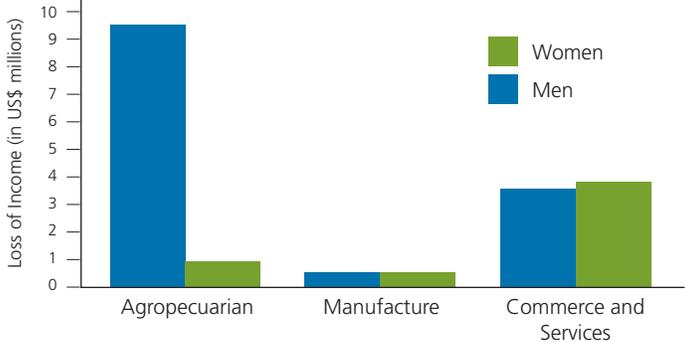
TABLE 44. ESTIMATE OF JOB AND PERSONAL INCOME LOSSES CAUSED BY THE DISASTER IN EL SALVADOR

| Item | Economic activity sectors | | | Totals |
|--|------------------------------------|---------------|-----------------------|--------|
| | Agriculture, livestock and fishing | Manufacturing | Commerce and Services | |
| Number of workers | 438,988 | 400,890 | 677,590 | |
| Men | 391,377 | 201,454 | 271,590 | |
| Women | 47,611 | 199,436 | 406,000 | |
| Average salaries, US\$/year | | | | |
| Men | 1,722.5 | 3,422.3 | 3,859.7 | |
| Women | 1,269.0 | 2,306.3 | 2,795.3 | |
| Job losses, years/person | 6,132 | 315 | 2,252 | 8,699 |
| Men | 5,467 | 158 | 902 | |
| Women | 665 | 156 | 1,349 | |
| Estimated income losses (millions of US\$) | 10.26 | 0.90 | 7.26 | 18.42 |
| Men | 9.42 | 0.54 | 3.48 | |
| Women | 0.84 | 0.36 | 3.77 | |

Source: Estimates by assessment mission.

The analysis also makes it possible to identify the sectors in which people who lose income are currently working; it is thus feasible to focus the target population for the abovementioned programs (see Graph 12 once again).

GRAPH 12. LOSSES OF INCOME BY MEN AND WOMEN IN PRODUCTIVE SECTORS DUE TO THE NOVEMBER 2009 DISASTER



Source: Estimates by assessment mission.

V. RISK MANAGEMENT

A. PROFILE OF DISASTER RISKS

The number of disasters generated by events of natural origin in El Salvador has increased exponentially in the past decade. During 1997–2007 there were 21 events, representing 53% the disasters that have occurred in 100 years; of these 21 events, 5 (23%) are of geological origin and 16 (76%) are of hydro-meteorological origin. According to D-SNET, the direct economic losses associated with destructive events in the last 20 years have meant nearly US\$4 billion for the country (with this amount of money, 33,000 basic schools or 298 regional hospitals, or about 25 ports such as that of Cutuco, could have been constructed); all of this without counting indirect losses, increases in public spending and increases in the fiscal deficit, which must then be compensated through tough fiscal austerity measures, in addition to the direct expenses of emergency assistance and the opportunity cost of investing in reconstruction rather than greater development. Among other things, disasters generate disproportionate losses and damages to the population, including human lives, family disintegration, and damages to physical, mental and moral integrity in adults and children.⁴⁹

Approximately 41 of each 100 Salvadorans reside in high-risk municipalities, that is, those localities that have been affected by three or four natural threats between 1980 and 2007 (earthquakes, floods, storms or droughts), and that account for 74% of deaths in El Salvador due to some type of disaster. During this period, there was an average of 1.5 disasters per year. This indicates that the national development process is affected by the recurrence and impact of adverse natural events on El Salvador's society and economy, on an ongoing basis.⁵⁰

In addition, based on the Disaster Risk Index (DRI),⁵¹ it may be inferred that, of the 100% of nation's population exposed to floods, earthquakes and storms, 23.3% risk the likelihood of death. At partial level, the methodological application of floods shows a DRI result of 4%, which means that, of the exposed population, for each 100 people, 4 are at risk of death in the threat of a flood. In turn, earthquakes show a DRI result of 15.5%, which means that, of the exposed population, for each 100 people, nearly 16 are at risk of death in an earthquake in El Salvador.

In the majority of events evaluated in the past, El Salvador's territory, prior to the disaster, was already in precarious, critical or conflict conditions due to internal or external reasons. Thus, the disasters only

⁴⁹ Technical report on the impact of the low-pressure system on the Pacific and Tropical Storm Ida, November 2009, Ministry of Environment and Natural Resources, General Bureau of the National Territorial Studies Service.

⁵⁰ Draft of the First National Report on the Status of Disaster Risks and Vulnerability in El Salvador (INER 2009), D-SNET-UNDP.

⁵¹ Carmona, Omar. Disaster Risk and Risk Management Indicators (IDB, 2007).

worsened prospects or made them more negative. As a result, the evaluations indicate the opportunities to change policy directions, improve previous structural conditions, and generate significant changes in risk management. A summary of these evaluations, conducted by CEPAL, is presented below.

TABLE 45. SUMMARY OF ASSESSMENTS MADE BY CEPAL IN EL SALVADOR

| Event | Year | Population affected | | | Total effects (2007 constant value) | | |
|---|------------------------|---------------------|------------------|---------------|-------------------------------------|--------------|-----------------|
| | | Deaths | Direct | Total | Damages | Losses | External effect |
| Earthquake (5.6 on the Richter scale) on June 19; drought in July and August, and storm from September 16 to 20. | 1982 | 600 | 20,000 | 1,828 | 1,395 | 432 | 548 |
| Earthquake (5.4 on the Richter scale). | 1986, Oct. 10 | 1 200 | 520,000 | 7,293 | 5,526 | 1,767 | 1,459 |
| Hurricane Mitch (sustained winds of up to 144 knots or 285 km/h at time of highest intensity and precipitation exceeding 600 mm). | 1998, Oct. 23 – Nov. 4 | 240 | 84,316 | 549 | 240 | 309 | 103 |
| January 13 (tectonic earthquake, 7.6 on the Richter scale), February 13 (independent event, 6.6 on the Richter scale). | 2001, Jan. – Feb. | 1 241 | 2,351,886 | 5,476 | 3,410 | 2,066 | 1,059 |
| Drought with effects mainly on Nicaragua, Honduras, Guatemala and El Salvador | 2001 | 35 | 600,000 | 234 | 0 | 234 | 80 |
| Torrential rains, Tropical Storm Stan and eruption of Ilamtepec volcano, October 2005 | 2005 | 69 | 72,141 | 383 | 172 | 211 | 107 |
| TOTAL | 23 | 3,385 | 3,648,343 | 15,763 | 10,743 | 5,020 | 3,357 |
| Average per event | | 564 | 608,057 | 2,627 | 1,791 | 837 | 559 |

Source: Evaluations by CEPAL.

Climate change models forecast that El Salvador will be subjected to warming and a trend toward drought. It is expected to receive more frequent heat waves, periods of drought and less intense rains, as well as increasing sea levels, as is predicted for the rest of Mesoamerica. It is known that the interannual variability of climate, whether from the Pacific or the Atlantic, explains a significant amount of the total variation in precipitation in the Caribbean and Central America. The combination of the abovementioned likely impacts of climate change, together with the possibility of greater frequency of the El Niño Southern Oscillation (ENSO), would aggravate existing health problems as well as the social and economic challenges that affect El Salvador.

El Salvador has adopted the recommendations of the strategic objectives and priority actions of the “Hyogo Framework for Action 2005–2015: Building the resilience of nations and communities to disasters.”⁵² With the objective of supporting countries in monitoring and compliance with the Hyogo

⁵² World Conference on Disaster Reduction, held from January 18 to 22, 2005, Kobe, Oigo, Japan. <http://www.unisdr.org/eng/hfa/docs/Hyogo-framework-for-action-english.pdf>

Framework for Action, a series of 22 indicators have been prepared which, when implemented, measure each country's progress in terms of compliance with said Framework. After these indicators are applied to national conditions, the indicator of the Hyogo Framework for Action shows, as a result for the issue of Risk Management nationwide, a value of 48.2%⁵³ of progress toward the achievement of the Framework for Action's targets. This denotes a certain amount of progress in compliance with the five targets, but systematic actions and genuine commitment are needed in order to introduce risk management as an integral part of planning and executing national development plans, strategies and programs.

B. LEGAL AND INSTITUTIONAL FRAMEWORK

El Salvador has developed a sound legal and institutional framework for disaster risk management (DRM). The Civil Defense Law, created by Legislative Decree No. 498 of April 8, 1976, called for the creation of the Civil Defense System as an essential part of National Defense for "the purpose of protecting and helping the population to overcome the consequences of public disasters or catastrophes". The primarily reactive focus of the Civil Defense System in the event of natural disasters turned out to be insufficient for adequate DRM.

For the purpose of improving the country's capacity to manage the risks of disasters and of manmade threats, the "Civil Protection and Disaster Prevention and Mitigation Law" was enacted by Legislative Decree No. 777 of August 18, 2005 (Law No. 777). The new law mandated the creation of the National System of Civil Protection and Disaster Prevention and Mitigation "as an interrelated, operationally decentralized set of public and private agencies that will be responsible for formulating and executing the respective work plans for Civil Protection, and work plans for prevention and management of risks of disasters and for mitigation of their impacts." This law repealed the Civil Defense Law and the Law of Procedures for Declaring a National Emergency (created by Legislative Decree No. 44 of July 29, 1988) and defined a new mechanism for the declaration of a State of Emergency, assigning the National Civil Defense Commission the authority to propose to the President of the Republic the need for such a declaration. To ensure the sustainability of the Civil Defense System, Law 777 also ordered the creation of a fund for Civil Protection and Disaster Prevention and Mitigation, giving the Ministry of the Interior the authority to request resources from this fund to finance measures to cope with emergencies caused by disasters.

The National Civil Protection System (the System) is composed of the National Commission for Civil Protection and Disaster Prevention and Mitigation (the National Commission), and the Departmental, Municipal and Community Commissions for Civil Protection (Law No. 777, art. 10). The System's objectives include: incorporating in development plans the prospective management of disasters; preparing and updating risk maps at each organizational level of the system; preparing and coordinating plans and actions to raise awareness and inform the population about possible catastrophic events; designing and executing Civil Protection plans to respond to catastrophic events; and maintaining cooperative relationships with similar agencies on an international basis.

⁵³ This value was obtained from the National Report on Progress in the Implementation of the Hyogo Framework for Action, prepared by D-SNET. Report Period: 2007–2009. Available at <http://www.preventionweb.net/>

The National Commission is composed of the Minister of the Interior who presides over it; the General Director of Civil Protection and Disaster Prevention and Mitigation (the General Bureau); the heads of the Ministries of Foreign Relations, Public Health and Social Assistance, Agriculture and Livestock; Environment and Natural Resources, Public Works, Transportation, Housing and Urban Development, National Defense, and Education; National Civil Police; two representatives of the National Association of Private Businesses; and three nongovernmental organizations that represent the country's western, central and eastern zones, respectively.

The National Commission's duties include: i) designing the National Policy for Civil Protection and Disaster Prevention and Mitigation; ii) proposing to the President of the Republic the declaration of a State of Emergency and, in the case of such a declaration, ensuring public order and immediate attention for the population with the support of civil and military authorities and of humanitarian organizations; iii) supervising the execution of Civil Protection and Disaster Prevention and Mitigation Plans in the country's most vulnerable areas, according to risk maps; iv) coordinating the work of subnational Commissions; and v) proposing to the President of the Republic, for his approval, the regulations necessary for compliance with Law 777, including regulations for human settlements in hazardous or potentially hazardous zones and Construction Codes, etc.

To ensure compliance with the National Civil Protection and Disaster Prevention and Mitigation Plan (National Plan) and other provisions, the National Commission relies on the General Bureau, which depends hierarchically and operationally on the Ministry of the Interior (Law 777, art. 17). The General Director, with the support of the Advisory Council (a permanent inter-institutional scientific and technical agency: Law 777, art. 19) and with the approval of the National Commission, is responsible for the preparation of the National Plan as well as declarations of different warning levels, based on the monitoring of natural phenomena and on technical information from the General Bureau of the National Service for Territorial Studies⁵⁴ (D-SNET) of the Ministry of Environment and Natural Resources (MARN).

El Salvador participates actively in various regional and international forums for disaster risk management, and is a member of the Coordination Center for Prevention of Natural Disasters in Central America (*Centro de Coordinación para la Prevención de Desastres Naturales en América Central* -CEPREDENAC).

⁵⁴ Law 777, art. 22, makes reference to the National Territorial Studies Service (D-SNET), which was created as a decentralized agency, assigned to MARN, by Decree No. 96 of September 14, 2001, for the purpose of developing an understanding of factors constituting risk, threats and vulnerability as a basis for adopting measures to ensure adequate levels of safety for the population in the case of events and processes of disaster risk. The Government of El Salvador repealed Executive Decree N° 41 of May 2, 2007 and Executive Decree N° 96 which created D-SNET. Executive Decree No. 42, published in the Official Gazette on May 18, 2007, transferred to MARN the environmental duties that had been assigned to the Ministry of Agriculture and Livestock (as stipulated by Executive Decree N° 24 on the Issuance of the By-laws of the Executive Agency, on April 18, 1989), together with the duties and responsibilities previously assigned to D-SNET.

C. STRATEGIC FRAMEWORK FOR RISK MANAGEMENT

This section recommends a strategic framework for risk management that combines specific elements found in El Salvador and lessons learned from international experience.⁵⁵ The principles that underlie this framework are that: a) human loss and the economic impact of disasters may be reduced through pre-disaster planning and investments in prevention; and b) the strategic framework and the action plan are effective in terms of cost and implementation. The pillars of the Risk Management Framework and their description are presented below:

GRAPH 13. RISK MANAGEMENT FRAMEWORK



Source: GFDRR.

⁵⁵ Based on Risk Management, No. 9, World Bank. "Preventable Losses - Saving Lives and Property".

Pillar 1: Risk Identification and Evaluation

For the effective identification and reduction of disaster risks and the promotion of a culture of resilience, it is necessary to understand the hazards and the physical, social, economic and environmental factors of vulnerability to disasters faced by the population, as well as the processes of change in hazards and vulnerability factors in the short and long terms, in order to adopt timely measures in terms of this knowledge.

It is necessary to develop, improve and expand systems of disaster risk indicators and of vulnerability at national, departmental, municipal and local levels that allow the responsible authorities to analyze, predict and model the impact of disasters on social, economic and environmental conditions, and to disseminate the results among the responsible authorities, citizens and exposed populations.

It is also necessary to standardize methodologies and terminologies for the assessment of risks and the dissemination of studies, as well as to keep information from being scattered. Efforts must be made to coordinate the conduction of studies with educational strategies.

To achieve this target, it is necessary, among other things, to periodically update and widely disseminate risk maps and related information among responsible authorities, citizens in general, and exposed communities in language that is accessible to all sectors of the population and particularly to the most vulnerable sectors.

Pillar 2: Risk Mitigation to Reduce Exposure to Natural Hazards

Civil Protection manages an early warning system to save lives and move the population away from zones of immediate risk. Among non-physical measures, it is necessary to strengthen and maintain early warning systems in order to be able to warn exposed people in a timely, clear and effective manner, taking into account the demographic features, gender, culture, way of living and other specific characteristics of the populations involved, providing clear guidance on how to act in the event of an alert and contributing to the effectiveness of interventions by those in charge of handling disaster situations and by other authorities.

In recent years, the monitoring system throughout the country, which forms the basis for the chain of information on natural hazards, has been affected by various disasters. Monitoring points have been reduced and have not been restored. It is necessary to reestablish and maintain rainfall monitoring stations in exposed populations in order to monitor the hourly intensities of precipitation and to adopt plans to evacuate exposed homes when critical levels of rainfall are reached. The stations should be operated by local authorities who are trained to deal with critical situations. The data should also be available in real time in the Bureau of the National Service for Territorial Studies (D-SNET) of the Ministry of Environment and Natural Resources (MARN).

Likewise, it is necessary to strengthen the capacities of the Ministry of Environment and Natural Resources, and in particular those of the Bureau of the National Service for Territorial Studies, for the development of skills with regard to improving the understanding of risks, monitoring phenomena of climate and natural origin, disseminating information, incorporating risk management in development plans,

programs and projects, establishing guidelines for land use and environmental planning, and providing scientific-technical support for the design, installation and operation of early warning systems.

Finally, it is necessary to reinforce and streamline coordination and communication mechanisms among D-SNET, the National Commission for Civil Protection and the Bureau of Civil Protection so that these institutions can be strengthened and can work in synergy on risk management activities. One very important aspect is to ensure that the Bureau of Civil Protection and Disaster Prevention and Mitigation has priority, immediate access to D-SNET's information and technical personnel, eliminating any administrative barrier that could reduce Civil Protection's ability to access and integrate critical information in its decision-making processes in order to warn the population of the possibility of a natural threat.

Structural measures to reduce exposure to lahars, landslides and floods that may be suggested based on experience and the current situation in the country include:

- a) Establishing physical protection measures in Verapaz, San Vicente and Guadalupe.
- b) Relocating houses located in the most exposed zones to zones of lesser risk.
- c) Improving the drainage systems of roads and highways to avoid erosion and damage to road fill.

More specifically, the following measures, focused on places and types of work, are recommended.

Lahars on the San Vicente (Chinchontepec) Volcano ⁵⁶

Canalization combined with deflecting walls in the lower part of slopes as the most appropriate measure for larger lahars. Other measures in the upper parts of slopes do not appear to be feasible. For Verapaz and Guadalupe, preliminary safety measures are proposed, to be conducted jointly by D-SNET/MOP.

A deflecting wall in Verapaz is proposed, with a height of no less than 10 meters and a length of 850 meters. The material resulting from the excavation of sediment now deposited in the canal could be used for filling. Preliminary NGI calculations indicate that the approximate cost of this work would be US\$3 million, including the construction of a new bridge. It is vitally important to carry out work to clear the materials deposited in the canal following each rainy season in order to maintain its capacity. The major challenge is to keep large volumes from accumulating behind the retaining wall, reducing its effective height.

In Guadalupe the excavation of the riverside canal should be accompanied by the restoration of sufficient transverse space. In a preliminary manner, it is suggested that the riverbed area be expanded to at least 100 m². It is necessary to excavate the other river courses that were saturated by lahar materials.

Since nearly all of Verapaz is exposed to new events, a decision should be made to gradually move it toward a less risky location, approximately 100 meters to the east. This move should take into account social and environmental considerations in order to minimize its impact. For Tepetitán, a decision was made

⁵⁶ Further studies are needed to establish all intervention costs. Only the US\$3 million for immediate construction of a deflecting wall are taken into account.

to relocate it following the lahar that destroyed a large part of the town in 1934. At the very least, the reconstruction of destroyed houses on the same current sites should be avoided. In San Vicente as well, the affected zones would have to be moved to less exposed areas.

As a risk reduction measure, a rainfall monitoring station should be established in the center of the town; it would be operated and monitored by local authorities. Benchmarks of critical rainfall intensity would be established for different levels of alarm (such as a traffic light). At levels of lesser danger, riverbeds would require more frequent inspections. At higher levels, the evacuation of more exposed zones to pre-established safe sites would be considered.

Similar early warning systems should be considered for areas threatened by sediments from lahars. It should be possible to coordinate these systems in the entire area under risk.

Steep Slopes at Lake Ilopango⁵⁷

On the steep slopes south of Lake Ilopango, riverbeds have been heavily silted and riverbanks have been eroded (in certain sections for several meters), reducing the slopes' stability. If these slopes remain unattended, they will continue increasing until reaching their maximum angle of repose. The protection of houses and roads at the peaks of these slopes could be achieved in three ways:

- a) Reforestation of the river basin,
- b) Filling the bases of hills in the valley until they reach their previous size, or
- c) Reinforcing the slope through the use of stabilizing materials such as geotextiles (made from polypropylene or polyester).

To avoid the ongoing erosion of riverbeds, the use of stones or concrete could be considered.

Road Drainage System. The drainage systems of roads that follow along the tops of slopes need to be repaired. The roads' culverts are invaded by materials that result from landslides and erosion and need to be removed. In many places, sewers are clogged or damaged and need to be repaired so that they can drain efficiently. In other places, existing sewers are insufficient and new ones must be built since the gutters and culverts were not able to channel the high volumes of water. Sewer inlets must be molded to reduce the speed of flow (vertical drop) and must be designed to prevent clogging with vegetation and sediments through grates. In sewer outlets, erosion should be avoided by reinforcing them with stones or concrete.

Road fill. Many road beds have been eroded or undermined by erosion on the slopes where they are located. Many of the existing problems stem from water erosion at sewer outlets or from uncontrolled surface runoff in culverts. It is necessary to control erosion from surface water that enters the slope and to reinforce terrain as preventive measures to avoid further erosion.

⁵⁷ Further studies are needed to establish all intervention costs that must be included in the environmental and public works sectors.

Taluses and ledges. Many of the cuts in roads have experienced landslides, erosion and depressions. To avoid further erosion, measures such as the following are required:

- a) Plant protection
- b) Reducing the cutting angle by means of excavating taluses
- c) Use of geotextiles
- d) Nets, gabions and ties in rocks, among other containment structures.

Sedimentation and Silting of Main Rivers

The Acahuapa and Jiboa rivers and Lake Ilopango experienced additional sedimentation on top of the silt accumulated in previous events and the normal rainy seasons that convey alluvial deposits. As a result, nearby plains were flooded. In the case of the rivers, materials should be removed in critical areas, to the extent possible, in order to reduce the level of water and facilitate their drainage by means of natural processes.

Pillar 3: To Strengthen and Improve Emergency Preparedness

Integration of risk management must be a high priority for the Government of El Salvador. To ensure that the National Commission and the General Bureau of Civil Protection can carry out their respective functions and duties, there must be a high-level political-technical agency that distributes and monitors the responsibilities of each sectoral and territorial agency in risk management. The on-going support from the Technical Secretariat of the Presidency in the organization of the National System of Civil Protection of Disaster Prevention and Mitigation, and improvement of the institutional authority of the General Bureau of Civil Protection are basic requisites for properly promoting the coordination and monitoring of the risk management plans of the various ministries and territorial agencies.

El Salvador is faced with the challenge of strengthening its institutional capacities for risk management through policies for decentralization of authority and of human and financial resources, in parallel with the strengthening of coordination among the various levels of territorial administration, as stipulated by Law 777 and its regulation. These policies make local governments responsible for the designation of and compliance with (among other obligations) construction codes and the regulatory framework for zoning and planned urban development.

In the areas affected by Ida, it is necessary to develop an integrated, decentralized, inclusive and participatory mechanism, preferably built from the level of vulnerable communities, with effective preparedness for risks and with the ability to offer effective responses.

Institutions responsible for urban development must provide information to the public on the feasibility of reducing disaster risks prior to the start of construction projects or land purchase or sale operations, and must ensure that land use regulations are complied with.

The affected communities must develop a risk management culture. This effort requires disaster education and preparedness and forms part of a strategy that involves institutions of basic and higher educa-

tion as well as public communication and social media. The strategic vision of MARN's new administration proposes the need to break the vicious cycle of widespread risk by educating and informing the population. These efforts should be incorporated and strengthened as part of a national strategy to raise the population's awareness of the risks of natural and manmade disasters.

Community preparedness can be strengthened through a participatory process of Community Risk Mapping and the formulation of Disaster Response Plans that include the responsibilities of each resident in the event of an emergency, and a clear action plan and a set of activities to be followed, including the early warning system, emergency contacts, safe evacuation procedures, etc. Local committees should also take the lead in conducting emergency works.

BOX 4. COMMUNITY-BASED DISASTER PREPAREDNESS (CBDP)

- Communities in disaster-affected areas are the real sufferers and are the first responders as well.
- Communities in high-risk areas have often developed their own coping mechanisms and strategies to reduce the impact of disasters. It is important to appreciate this local knowledge and resources, and to build on them in order to improve the capacity of people to withstand the impact of disasters.
- Ownership of disaster reduction should not be stripped from local people who would be left even more powerless in case external intervention does not occur.
- Disaster reduction activities should be based on participatory approaches involving local communities as much as possible, considering them as proactive stakeholders and not passive targets for intervention.
- Involvement and participation of communities will ensure a collective and coordinated action during emergencies.
- Building community leadership and a chain of trained community cadres through a participatory approach can help harness the resilience and resourcefulness of the community to cope.
- Solution is sustainable if it comes from people themselves rather than thrusting it upon them.
- Furthermore, it is not only the 'big' disasters that destroy lives and livelihoods. Accumulated losses from small floods, droughts and landslides can exceed the losses from big disasters and contribute significantly to increased vulnerability at the local level. These disasters attract little media attention and communities are often left to cope with the destruction. This provides another reason to invest in Community-Based Disaster Preparedness.

Source: Ajinder Walia, *The Australian Journal of Emergency Management*, vol. 23 No. 2, May 2008.

Pillar 4: Institutional Strengthening

In the past 25 years, the number of disasters and their repercussions on human and economic development have increased worldwide. This same trend is observed in El Salvador. In a global context of climate change and in light of the possible increase in floods, landslides and droughts, it is important to include the territorial and environmental dimension in economic and social policies, and thus to reduce the increasingly more frequent risks of disasters.

The complexity of disasters in El Salvador makes it necessary for risk management to be a State policy; this demands the incorporation of this issue in national policies and regulatory frameworks that have a direct effect on the use of land and its resources, such as those related to land use planning and urban development, housing and habitat, on the provision of public services and on sectors such as agriculture and livestock, the use of water resources, and environmental protection. A national risk management policy will give El Salvador the ability to better control risk levels and achieve the consensus of all sectors of society to participate in the implementation of risk reduction measures.

Risk reduction must be an integral part of the five-year plan that the Government of El Salvador is formulating for 2009–2014 to address the underlying causes of natural threats and reduce the percentage of the population living in hazardous areas.

The Legislative Assembly's approval of the Land Use Planning Law (*Ley de Ordenamiento Territorial*) will signify substantive progress in the task of including the revision of risk conditions in land use planning. However, experience shows that the best results in the implementation of this type of provisions are achieved when the Law's regulation is developed, technical assistance is offered for the formulation of and political consensus on land use planning, access to technical information is provided for the formulation of the plans, and efficient mechanisms are developed to control management and public investment for compliance with the plans.

Integrated water resources management, associated with land use planning efforts and with the promotion of integrated watershed protection mechanisms, is essential for risk management.

The Development Plan for the San Salvador Metropolitan Region must include risk reduction. This region contains nearly one-third of the population in 5% of the national territory, where access to decent, safe housing, land use, drinking water supply, sanitation, urban solid waste management, and transpiration are already serious problems.

The Government of El Salvador's risk management efforts require additional financial and technical support to improve the legal and institutional frameworks, including the strengthening of the National System for Civil Protection and Disaster Prevention and Mitigation, the General Bureau, and the consolidation and updating of the National Plan.

In terms of regional cooperation, it is hoped that El Salvador will continue to increase its role within regional organizations dealing with risk management (e.g., CEPREDENAC, UNISDR) through the development of synergies that strengthen the country's preparedness and resilience in the event of natural disasters.

Pillar 5: Financing of Long-Term Reconstruction, Recovery and Catastrophic Risks

Although international cooperation has played an important role during natural disasters in El Salvador, the country must develop innovative mechanisms to capitalize the Fund for Civil Protection and Disaster Protection, Prevention and Mitigation (established by law 777) in order to provide proper attention during emergencies. The country must have the capacity to respond effectively to the effects of natural disasters, including the development of risk transfer mechanisms to protect public infrastructure as well as social and economic networks.

Under the framework of its current risk financing strategy, El Salvador has access to limited financing to cope with small- to medium-scale disasters (repeated phenomena). A contingent credit line such as the Catastrophe Deferred Draw-Down Option (CAT DDO) scheduled with the World Bank will allow it to respond to emergencies caused by disasters that exceed its current level of reserves in major disasters (medium- to large-scale phenomena). In this context, the instrument may constitute the government's second line of protection; the government could use resources if medium- to large-scale phenomena occur or when an accumulation of events generates losses that exceed the capacity of the Fund for Civil Protection and Disaster Protection, Prevention and Mitigation. CAT DDO offers a greater degree of protection if a major disaster occurs.

Recent analyses show that the probable maximum loss caused in El Salvador by catastrophic events with a 50-year period of recurrence may total some US\$1.771 billion, while in a 100-year period of recurrence it may reach US\$3.776 billion (IDB 2007).

Any strategy for risk financing must note the difference between the specter of higher frequency/lower cost phenomena and those of lower frequency/higher cost. In general, risks at lower levels (higher frequency/lower cost phenomena) are financed through reserve mechanisms, special budget allocations or budget reallocations. These sources of funds are rarely sufficiently to address higher-level risks, for which other risk financing instruments are often needed. CAT DDO has been designed to provide liquidity in those cases of medium-scale (or cumulative) disasters that cannot be financed with internal reserves, as well as temporary financing while other sources of financing are mobilized in the case of a disaster of major proportion.

Within the process of financial risk management, the management of contingent obligations, that is, those monetary obligations that depend on the occurrence of future, uncertain events, plays an increasingly more important role within the planning, execution and financial control process of public agencies. Due to the economic impact caused by the occurrence of a natural disaster, countries are beginning to design financial strategies to reduce their fiscal vulnerability.

In order to offer a greater degree of protection to its contingency liabilities, the Government of El Salvador could also analyze the feasibility of creating a fund for catastrophes that backs the insurance of public assets, for the purpose of reducing its fiscal vulnerability to adverse natural phenomena.

In summary, the structure of catastrophe financing must consider 3 pillars (Cummings and Mahul, World Bank 2008):

- a) Assessment of the government's contingent liabilities through risk models that reflect exposure to natural disasters, and the losses associated with different events.
- b) Promoting the transfer of risk to competitive insurance markets. The government can reduce its contingent liabilities by promoting the insurance of private assets. In the event of a natural disaster, the government can focus its efforts on assisting the less-favored classes.
- c) Financing of sovereign risk. The government can manage its contingent liabilities by promoting the insurance of its public assets and seeking mechanisms to protect its budget from liquidity crises.

The World Bank, like other financial agencies, is willing to continue supporting the Government of El Salvador in its efforts to develop an effective legal and institutional framework that incorporates integrated risk management as a central theme in the national planning process within critical sectors and different levels of government administration.

D. SUMMARY OF RISK MANAGEMENT NEEDS

The following table summarizes the estimated needs for conducting a risk management and mitigation program focused on strengthening the identification of threats, emergency mitigation and preparedness in the affected areas, as well as improving the capacity to manage disaster risks throughout the country.

The estimated costs presented in this table are based on estimates by the Post-Disaster Needs Assessment team and thus should only be considered indicative.

TABLE 46. ESTIMATE OF NEEDS FOR A PROGRAM OF INVESTMENTS IN DISASTER RISK REDUCTION*(in thousands of US\$)*

| Program | 2009–2013 | 2014–2018 | Total |
|---|---------------|---------------|---------------|
| 1. Identification and Assessment of Risks | | | |
| Design, improve and extend the geographic and thematic coverage of early warning system (EWS) | 1,000 | 500 | 1,500 |
| Update detailed risk maps | 500 | 500 | 1,000 |
| Include risk management in land use planning | 750 | 750 | 1,500 |
| Promote active collaboration between national scientific and technical agencies on the issue of risks | 200 | 200 | 400 |
| Implement initiatives such as the Central American Probabilistic Risk Assessment (CAPRA) | 500 | 1,000 | 1,500 |
| 2. Mitigation of Risks | | | |
| Create and update protection plans at national, departmental, municipal and community levels. | 1,000 | 1,000 | 2,000 |
| Construct a deflection wall in Verapaz | 3,000 | | 3,000 |
| 3. Strengthening of Emergency Preparedness | | | |
| Develop preparedness and contingency plans for all levels of the territory. | 1,500 | 1,000 | 2,500 |
| Reestablish monitoring points. | 1,000 | 500 | 1,500 |
| Develop response capacity (e.g., simulations and staff training.) | 1,000 | 1,000 | 2,000 |
| 4. Development of Institutional Capacity | | | |
| Define a national risk management policy. | 500 | 500 | 1,000 |
| Strengthen the planning and coordination capacities of the National Civil Defense Commission and the technical analysis and execution capacities of the General Bureau. | 5,000 | 5,000 | 10,000 |
| Develop a National Development Plan that includes risk management as a central theme. | 1,000 | 250 | 1,250 |
| Develop risk education campaigns. | 700 | 500 | 1,200 |
| Promote the active participation of communities in risk management. | 1,500 | 1,000 | 2,500 |
| 5. Financing of Disaster Risks | | | |
| Develop a financial risk management strategy. | 400 | 250 | 650 |
| Develop financial mechanisms to support the country's liquidity in the event of catastrophes, such as the World Bank's Catastrophe Deferred Draw-Down Option (CAT DDO). | 250 | 250 | 500 |
| Evaluate the government's contingent liabilities through risk models that reflect exposure to natural disasters and potential losses. | 100 | 100 | 200 |
| Analyze the feasibility of creating a catastrophe fund that supports the insurance of public assets | 100 | 100 | 200 |
| Total of Risk Reduction Activities | 20,000 | 14,400 | 34,400 |

Source: Estimates by disaster needs assessment team.

VI. ESTIMATE OF RECOVERY AND RECONSTRUCTION NEEDS

A. BACKGROUND

After a disaster strikes, it is necessary to address the needs of the affected population: first, requirements for dealing with immediate or emergency needs are identified; next, two types of activities designed to ensure the recovery of the economy and of living conditions and to reconstruct the physical assets that were destroyed are addressed simultaneously. Finally, activities aimed at reducing the risk of future disasters should be initiated and put into practice in the long term.

In the case of the disaster in El Salvador caused by Tropical Storm Ida and the low-pressure system, which occurred in early November 2009, it may be stated that the emergency humanitarian aid stage is now over, although some of this type of activities should continue for a while longer. Those activities corresponding to the subsequent recovery, reconstruction and risk reduction stages should be carried out next, keeping in mind that they should begin simultaneously and be executed according to different timeframes.

In accordance with the CEPAL methodology, recovery needs are estimated on the basis of the financial resources required for the economy—at macro, sectoral and family or personal level—to return to normal performance levels; these resources represent a fraction of the value of production and income losses in each sector. Reconstruction needs, however, are estimated as the requirements for financing that will make it possible to repair, reconstruct or reinforce the physical assets that were destroyed or damaged by the disaster. These figures are increased in order to consider quality improvements, the adoption of anti-disaster design and construction regulations, and in some cases the relocation of various activities and settlements to safe places.

Finally, if reconstruction is estimated to take more than one calendar year, it is necessary to add the corresponding inflation rates.

The estimate of financial needs for recovery and reconstruction therefore uses quantitative information from the systematic estimate of the value of destroyed assets (damages) and of changes in economic flows (losses), presented in Chapter 2 of this assessment. This makes it possible to ensure objectivity when estimating needs for recovery as well as for reconstruction, and to avoid subjective opinions on this matter.

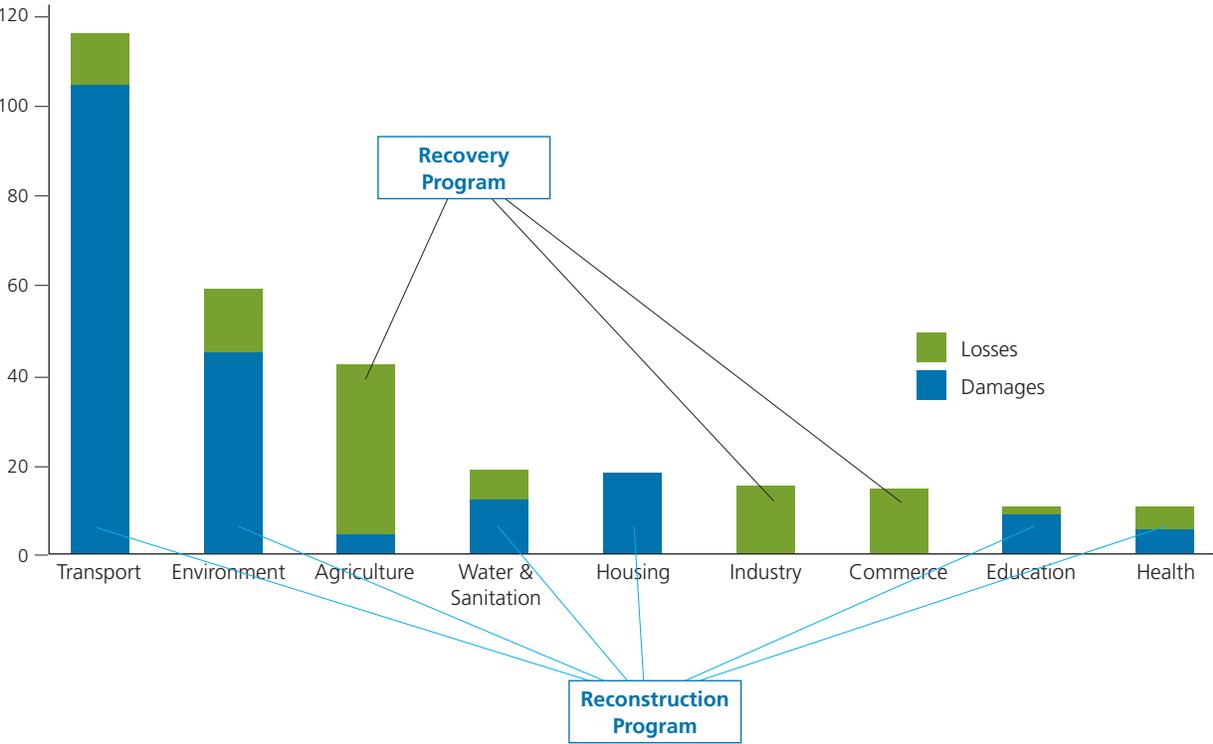
Specifically, the value of losses in each sector of economic activity that was affected is used—in terms of the characteristics of each of these sectors—to estimate the amount of resources required for recovery in income and production in as short a period as possible. Furthermore, the amount of reconstruction needs is estimated on the basis of the value of destroyed assets (damages), adding them to the amounts

required to introduce quality improvements, mitigation-oriented construction regulations, and the expected value of multi-year inflation throughout the period adopted for reconstruction.

The process described above is illustrated in Graph 14, which shows how recovery needs are estimated on the basis of the value of losses, and how reconstruction needs are estimated on the basis of the value of duly added damages.

GRAPH 14. USE OF DAMAGES AND LOSSES TO ESTIMATE RECOVERY AND RECONSTRUCTION NEEDS

(in millions of US\$)



Source: Disaster Assessment Unit, CEPAL.

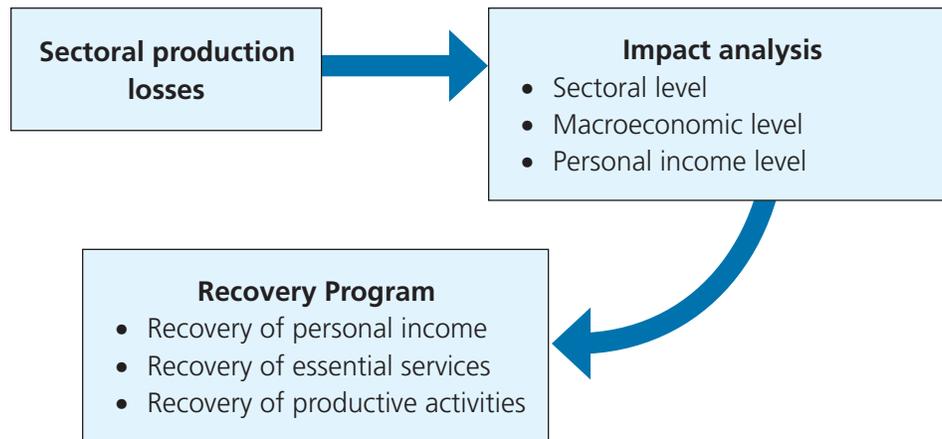
The needs estimate encompasses all sectors of the economy at their different levels, as previously stated; these are separated for execution by both the public and private sectors. Thus, it is a combination of State interventions and private-sector initiatives.

The CEPAL methodology makes it possible to identify and quantify the total recovery and reconstruction needs for the entire country, divided into sectors of economic and social activity. Because this methodology is based on the application of the national accounts system, used by all of world’s countries, its disaggregation in geographic or geopolitical terms can only reach the level of the country’s departments and municipalities. Therefore, the needs assessment has been complemented by the procedure used by UNDP/BCPR to estimate early recovery needs at community level.

B. RECOVERY NEEDS

The process for estimating early recovery needs implies using the estimate of production losses in each sector to determine the disaster's impact on a national, sectoral, family or personal level. When this impact is significant, programs of activities or interventions to be carried out in the short and medium terms are designed for the purpose of achieving the recovery of personal income, of normal service levels and of productive activities (see Graph 15).

GRAPH 15. PROCESS FOR ESTIMATING RECOVERY NEEDS



Source: CEPAL.

The amount of each of these needs is determined as that fraction of the losses in each sector that will make it possible to have available the capital and inputs required for the normal operation of each activity, which varies in each case from one sector to another. In some cases, this is the value of inputs for planting a new crop or of importing foods whose production is deficient following the disaster, in others such as the capitalization needs for micro- and small-scale manufacturing, commercial or service businesses through grants and highly concessionary credits, while in the case of the water and sanitation sector the provision of a minimum allotment of water by means of tanker trucks is included until the system's damages are repaired. In the education and health sectors, needs include the funds required for educational-psychological treatment for the population, repairs to schools and replacement of schools' equipment and furniture, as well as the continuation of health care and vector control. In the case of housing, shelter needs, urgent repair of houses and replacement of minimum household effects for families are included, in addition to the amount needed for income-generating programs or activities for those who lost their income.

The amount of recovery needs is estimated at US\$105.9 million, which would be used between December of this year and June 2010, before the next rainy season begins in the country. Details are shown in Table 47.

TABLE 47. SUMMARY OF RECOVERY AND RECONSTRUCTION NEEDS

| Sector | Activity or intervention | Emergency | Recovery | Recon- struction | Risk reduction | Total |
|--------------------|--------------------------------|-----------|----------|---------------------|-------------------|--------------|
| Housing | | | 7.88 | 34.26 | 13.64 | 55.78 |
| | Temporary shelter | ... | | | | |
| | Repair of housing | | 4.21 | | | |
| | Replacement of furnishings | | 3.67 | | | |
| | Reconstruction | | | 7.38 | | |
| | Relocation | | | 26.88 | 13.64 | |
| Education | | | 8.47 | 5.16 | | 13.63 |
| | Psychological-educational care | | 0.16 | | | |
| | School repair | | 3.79 | | | |
| | Furniture and equipment | | 4.52 | | | |
| | School reconstruction | | | 2.22 | | |
| | School relocation | | | 2.94 | | |
| Health | | 2.75 | 1.65 | 5.53 | 5.43 | 12.61 |
| | Emergency care | 2.75 | | | | |
| | Demolition, debris | | 0.23 | | | |
| | Health care | | 0.55 | | | |
| | Replacement of equipment | | 0.07 | | | |
| | Public health care | | 0.80 | | | |
| | Reconstruction | | | 5.53 | | |
| | Mitigation actions/works | | | | 5.43 | |
| Agriculture | | | 37.52 | 4.24 | | 41.76 |
| | Inputs for new crops | | 6.18 | | | |
| | Food imports | | 30.89 | | | |
| | Reconstruction of irrigation | | | 3.39 | | |
| | Cattle stock | | | 0.35 | | |
| | Fishing equipment, gear | | | 0.30 | | |
| | Reconstruction aquaculture | | | 0.20 | | |
| | Prophylaxis in cattle raising | | 0.15 | | | |
| | Replacement of hatchlings | | 0.30 | | | |
| Industry | | | 1.05 | 0.35 | | 1.40 |
| | Microcredit for capitalization | | 1.05 | | | |
| | Ditto for reconstruction | | | 0.35 | | |
| Commerce | | | 3.67 | 0.73 | | 4.40 |
| | Microcredit for capitalization | | 3.67 | | | |
| | Ditto for reconstruction | | | 0.73 | | |
| Services | | | 0.76 | 8.61 | | 9.37 |
| | Microcredit for capitalization | | 0.76 | 8.61 | | |
| | Ditto for reconstruction | | | | | |

Continues

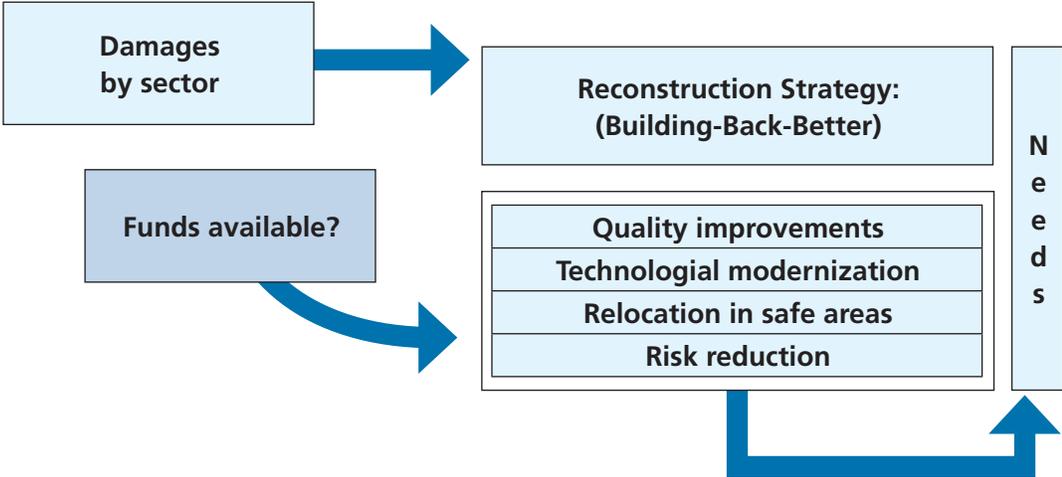
| Sector | Activity or intervention | Emergency | Recovery | Recon- struction | Risk reduction | Total |
|-----------------------------|---|-----------|----------|---------------------|-------------------|---------------|
| Water and sanitation | | | 1.30 | 0.74 | 1.35 | 3.39 |
| | Temporary water supply | | 0.80 | | | |
| | Institutional strengthening | | 0.50 | | | |
| | 2,000 sanitary latrines | | | 0.50 | | |
| | 200 water wells | | | 0.24 | | |
| | Solid waste management | | | | 1.00 | |
| | Mapping of water and sanitation networks | | | | 0.35 | |
| Electricity | | | 1.32 | | | 1.32 |
| | Prevention, mitigation in transmission | | 1.32 | | | |
| Transportation | | | 22.60 | 89.30 | 7,000 | 181.90 |
| | Temporary bridges | | 12.00 | | | |
| | Rehab. Roads | | 10.60 | | | |
| | Prevention study | | | 2.00 | | |
| | Rehabilitation and reconstruction | | | 87.30 | | |
| | Bridges | | | | 70.00 | |
| | Protection of slopes | | | | | |
| Income generation | | | 18.40 | | | 18.40 |
| | Dinero por Trabajo (Money for Work) Program | | 18.40 | | | |
| Total | | | 105.94 | 148.93 | 90.42 | 343.97 |

Source: Prepared by assessment mission.

C. RECONSTRUCTION NEEDS

The process for estimating reconstruction needs begins on the basis of damages estimates for each of the economic and social activity sectors included in the assessment. Next, budget items are added to allow them to take charge of reconstruction under improved conditions (“building back better”): better-quality housing to ensure the dignity of people and families, the adoption and implementation of regulations for design and construction with resilience to future disasters, the relocation of houses and activities to safe, less risky areas, and the expected inflation in the reconstruction period, which may take up to four years (see Graph 16).

GRAPH 16. PROCESS FOR ESTIMATING RECONSTRUCTION NEEDS



Source: CEPAL.

In reconstruction, coordinated and consistent efforts between the State and the private sector will be necessary to ensure success and effectiveness. To address private-sector reconstruction needs, it is expected that concessionary lines of credit will be opened for micro- and small businessmen in the manufacturing, commercial and various service sectors.

The total amount of reconstruction needs was estimated at US\$148.93 million, to be executed between the end of this year and 2014 (see Table 47).

D. NEEDS FOR RISK REDUCTION

The previous chapter dealt in considerable detail with the importance and urgency for El Salvador to undertake systemic efforts to reduce the risk of disasters throughout the five key thematic areas.

To avoid redundancy or confusion, the content of these needs is not repeated here.

E. EARLY RECOVERY NEEDS

As part of the post-disaster needs assessment (PDNA), the UNDP's Bureau for Crisis Prevention and Recovery (BCPR) is in charge of estimating those recovery requirements that correspond to the earliest period and preferably refer to community-level demands.⁵⁸

In this regard, it is necessary to make clear that in the estimates presented in this section there must be no duplications with regard to the overall needs identified in the previous chapters; they encompass El Salvador's economy and society as a whole; and their scale or magnitude is obviously lower than total recovery needs.

Early recovery estimates at community level are presented below.

1. Basic Approach of Early Recovery

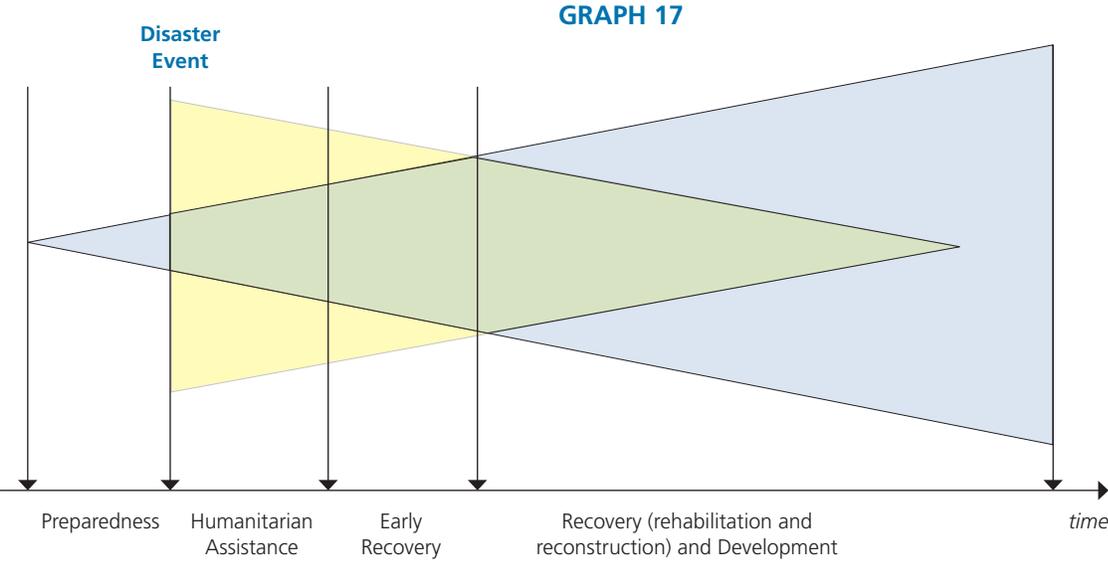
Early recovery is a multidimensional process that begins in the humanitarian context. It is guided by development principles that seek to build on humanitarian programs and promote sustainable development opportunities. It seeks to generate self-sustainable, resistant, nationally owned processes for post-disaster recovery. It includes the restoration of basic services, livelihoods, housing, governance, security and rights, environment, and the social dimension, including the reintegration of displaced populations.⁵⁹

The diagram below presents early recovery with regard to the preparation phase, the humanitarian phase, long-term recovery and the development phase.⁶⁰

⁵⁸ UNDP/BCPR makes use of the methodology known as Human Early Recovery Needs Assessment (HERNA) to estimate these needs at community level. A description of this methodology is beyond the scope of the present document but it may be viewed on the UNDP's website.

⁵⁹ Guidance Note on Early Recovery, by the Cluster Working Group on Early Recovery, 2008.

⁶⁰ Adaptation of the Guidance Note on Early Recovery, by the Cluster Working Group on Early Recovery, 2008.



Source: UNDP/BCPR.

Early recovery typically begins during the humanitarian assistance stage and has a duration of approximately 18 months. It seeks to meet the needs of the affected population and the government in the short and medium terms. It has three general purposes:

- a) To increase humanitarian operations.
- b) To support the population’s spontaneous recovery efforts.
- c) To help lay the groundwork for long-term recovery.

Early recovery helps to restore and strengthen government capacity at all levels to manage and lead the recovery process and simultaneously restore communities’ capacity to recover from the disaster.

2. Early Recovery Needs Assessment in El Salvador due to the Effects of Hurricane Ida

The early recovery needs assessment refers to the sectors of: a) governance and coordination for recovery, b) livelihoods and productive activities, c) food security, d) temporary housing, e) social services, and f) roads and basic infrastructure.

General recommendations for the early recovery phase.

The recommendations for organization and overall focus on the post-disaster recovery process, based on collected experiences, are the following:

- a) Because of the disastrous events that have occurred in El Salvador in recent decades, post-disaster reconstruction projects have been promoted, several of which have led to the reproduction of pre-disaster risk conditions. A key principle in the current recovery process should be to seek sustainability and integrated risk management in all investment decisions.

- b) The current recovery process must ensure the participation of the affected population, the solution of shortages, institutional development, and the strengthening of organizations under a sustainable development approach.
- c) Recovery must be an occasion to stimulate local economies and must be a tool of the policy for the equality and well-being of the most economically vulnerable population.
- d) The strengthening of governance, the coordination between ministries and sectoral agencies, between authorities at different territorial levels and the alliances between different sectors of society are an essential condition for promoting successful recovery processes.
- e) It is necessary to generate and ensure the full operation of coordination mechanisms among the National Committee for Rehabilitation and Reconstruction and local authorities and local-level inter-institutional working teams, national NGOs, United Nations agencies and international cooperation agencies.
- f) United Nations agencies as well as other nongovernmental organizations have well-known experience in promotion and technical assistance in the humanitarian and development issues needed in recovery processes. Their contributions may be widely used on this occasion to leave behind permanent institutional capacities and developments in the country while responding to the current needs of the population.
- g) The technical agencies in charge of recovery planning and public infrastructure investment, such as the Technical Secretariat of the Presidency, the Ministry of Public Works and the Ministry of Environment and Natural Resources, must strengthen their disaster risk management capacities and incorporate them in their development agenda.
- h) In early recovery, it is essential to accelerate the revitalization of the local economy through the generation of employment and income opportunities in support of local initiatives.
- i) The role of local governments as the key actors in their own development and recovery must be promoted, especially in the 43 municipalities that were most affected. In this regard, the preparation of recovery plans by similar areas may be a valuable mechanism to facilitate the unity of efforts and coordination.
- j) It is necessary to promote the responsible empowerment of the population affected by the disaster, which must play an active, leading role in the recovery process under a framework of rights and duties.
- k) It is appropriate to strengthen the role of women in the post-disaster recovery process, in decision making and in building a more inclusive society that strengthens the family unit and social protection networks.
- l) Transparency and accountability at different levels should be promoted.
- m) It is essential to preserve the knowledge and lessons learned during the process and, based on these experiences, seek to design a permanent post-disaster recovery policy for the country.

TABLE 48. QUANTIFICATION OF NEEDS FOR EARLY RECOVERY

| Sector | Subsector | Amount (US\$) |
|--------------------------------|----------------------------|-------------------|
| Governance and Coordination | | 740,000 |
| Recovery of Livelihoods | | 2,505,383 |
| Food Security | | 3,800,000 |
| Housing | | 3,837,760 |
| Social Services | Health | 2,100,000 |
| | Education | 1,020,000 |
| | Water and Basic Sanitation | 220,000 |
| | Social Protection | 600,000 |
| Roads and Basic Infrastructure | | 1,250,000 |
| Total Early Recovery | | 16,073,143 |

Source: Estimates by assessment mission.

3. Analysis of Needs by Sectors for Early Recovery

a) Governance and Coordination

The magnitude, territorial extent and multiple dimensions of the social and productive activities involved in the disaster require a government support response that facilitates interaction and collaboration among national, departmental and local authorities, as well as with national and international nongovernmental support agencies and civil society agencies.

To ensure the governance of the recovery process, it is necessary to encourage national authorities, the governments of San Salvador, Cuscatlán, La Libertad, San Vicente and La Paz, as well as the 43 local governments of the most affected areas, to strengthen their institutional, conceptual, technical, financial and human capacities for the proper planning, organization and monitoring of their recovery.

It is essential to establish mechanisms for the adequate coordination of efforts and the design of national and territorial recovery plans that allow guidelines to be set for aligned and comprehensive actions.

The National Committee for Rehabilitation and Reconstruction constitutes the highest-level scenario for the coordination of national efforts, and it is therefore worthwhile to seek the design and monitoring of the Recovery Plan and the establishment of coordination committees in the five departments that were most affected.

In addition, the early recovery process demands the creation of forums for communication and coordination with the affected communities, as well as with social organizations, nongovernmental agencies and government authorities.

1) Objectives

❖ General objective

To ensure the governance of the early and medium-term recovery process, using criteria of sustainable development, citizen participation and institutional strengthening.

- Specific objectives
 - To ensure adequate intra-sectoral and intra-territorial coordination mechanisms for adequate planning, organization and monitoring of post-disaster recovery.
 - To strengthen local and departmental institutional capacities for the planning, organization, monitoring and control of the recovery process.
 - To facilitate communication and the participation of the population affected by the disaster in the planning, organization, monitoring and control of the recovery process.

2) Program

- Support for the planning, organization, monitoring and tracking of short- and long-term post-disaster recovery processes in the Departments of La Paz, La Libertad, Cuscatlán, San Salvador and San Vicente.

Key aspects

- i) By strengthening governance, the aim will be to respond both to humanitarian needs and to definitive rehabilitation and recovery needs, seeking the appropriate linkage of programs and avoiding gaps in the process of supporting the affected population.
- ii) The authorities will ensure that disaster risk management is a key component of the process of recovery planning, organization and execution.
- iii) The development of an information system or mechanism is essential for coordination, accountability and monitoring of political authorities and the population.

TABLE 49. GOVERNANCE AND COORDINATION

| Objectives | Activities | Results | Actors | Budget |
|--|---|--|--|----------------|
| To support the planning, organization, monitoring and tracking of post-disaster recovery processes in the Departments of La Paz, La Libertad, Cuscatlán, San Salvador and San Vicente. | Formation and consolidation of coordination forums for recovery in territorial agencies. | Formulation and monitoring of coordination forums for recovery. | National Commission for Rehabilitation and Reconstruction. | 740,000 |
| | Formulation of early recovery planning tools for the Departments of La Paz, La Libertad, Cuscatlán, San Salvador and San Vicente. | Formulation of 5 recovery planning tools. | Governments of La Paz, La Libertad, Cuscatlán, San Salvador and San Vicente. | |
| | Formulation of the National Recovery Plan. | Formulation of the National Recovery Plan. | | |
| | Incorporation of the National Recovery Plan in the National Development Plan. | Assistance in municipal administrations for coordinating the execution of the recovery plan. | Local governments of municipalities (43) identified as having the most damage. | |
| | Technical and social support to prioritized municipal governments for the conduction of recovery efforts. | Recovery Monitoring System. | | |
| | Design and launch of a post-disaster recovery monitoring and tracking system. | Communication Strategy for Recovery. | UNDP | |
| | Development of a public communication and information strategy on the recovery process. | | | |
| | Systemization of lessons learned in the recovery process. | | | |
| Total | | | | 740,000 |

Source: Prepared by assessment mission.

b) Livelihoods

Small peasant producers and fishermen have been considerably affected by the effects associated with Hurricane Ida, as well as people who depended on small-scale commercial and service activities for their subsistence, such as the preparation and sale of foods, repairs, small-scale construction, handicrafts, etc. The departments that were most impacted, in order of damage, were La Paz, La Libertad, San Vicente, San Salvador and Cuscatlán.

Several financial efforts conducted during the phase of the emergency's impact made it possible to serve a limited proportion of the population that depends on agricultural and livestock activities, through

animal health interventions, the provision of seeds, etc.⁶¹. These efforts will make it possible to address an initial phase but are insufficient to respond to the income needs of the vulnerable population during the months needed for new planting activities or the medium-term recovery process.

Efforts to recover the livelihoods of the vulnerable population must be aimed at offering rapid responses for income improvement, either in a temporary or definitive manner; these responses must avoid greater socioeconomic impacts stemming from the deterioration of current conditions. A possible linking of social effects unique to the current stage may lead families to migrate from the affected zones to the cities, and to an increase in the dynamic of urban marginality and in the reconstruction of new risks.

Some of the key aspects to be taken into account for the recovery of affected families' livelihoods, especially in small agricultural production units, are conditioned by factors such as seasonal climate which, in the best of cases, will only allow one bean crop to be planted in May and harvested in July 2009.

Most of the people affected by the emergencies in the different zones of the country carried out subsistence-level agricultural and livestock activities, with only small margins of surplus for sale; there were high levels of malnutrition and low levels of human development. The process of recovering livelihoods will need development processes that "transform while repairing," aimed at generating a model that improves and diversifies the economic activities of the affected populations and allows a transition from subsistence economies to market economies. Likewise, it is ideal to seek a transition from individual models of rural employment to associative production organizations, for which there must be technical assistance and social monitoring, the provision of inputs and the development of financial support and risk-transfer mechanisms.

1) Objectives

❖ General objective

To offer temporary alternatives for income recovery to vulnerable families and facilitate the transition to the ongoing improvement of income.

➤ Specific objectives

- To offer temporary employment and income alternatives to the vulnerable population affected by the disasters.
- To replenish the vulnerable population's productive assets and facilities for production and marketing, with emphasis on women, especially female heads of households.
- To guide, promote and control the conduction of agricultural and livestock activities in accordance with considerations of risk and productive potential.
- To facilitate the recovery of permanent non-agricultural activities.

2) Programs

- Program to restore small-scale productive assets and improve skills for production and commerce.
- Planning of agricultural and livestock activities in departments affected by Hurricane Ida.

⁶¹ Flash Appeal, El Salvador, November 2009.

- Development of associative productive projects in communities affected by the disaster.
- Support for women living in temporary conditions.

Key aspects

- i) Support for the development of each productive project must be provided by means of analyzing risk conditions and avoiding the construction of productive infrastructure in zones of non-mitigatable risk.
- ii) Actions focused on women must be prioritized (with emphasis on expectant women, heads of household, etc.).
- iii) The housing design should include a space devoted to economic activities.
- iv) Training of men and women to carry out new activities during their stay in temporary housing until they are offered permanent housing.

TABLE 50. RECOVERY OF LIVELIHOODS

| Objectives | Activities | Results | Actors | Budget |
|---|--|---|--|-----------|
| Strengthen the livelihoods of small producers through restitution of small assets and skills improvement. | Survey of information on economic activities, affected families, skills and needs for capital. | Intervention plan. | Secretariat of Social Inclusion. Departmental Governments, UNDP, ILO, FAO | 175,897 |
| | Restitution of implements for product preparation: small businesses, food production, services, livestock, fishing, tourism. | Delivery of equipment and implements. | Secretariat of Social Inclusion, Departmental Governments, Municipalities, UNDP, ILO, FAO. | 703,589 |
| | Training for improvement of individual and associative skills. | Training course for skills development. | Secretariat of Social Inclusion, Departmental Governments, Municipalities. UNDP, ILO, FAO. | 175,897 |
| | | | | Continues |

| Objectives | Activities | Results | Actors | Budget |
|--|--|---|--|------------------|
| Plan agricultural and livestock activities in departments affected by Hurricane Ida. | Identification of land uses according to classification of hazard zones and productive potential. | Identification and delimitation of development zones and human settlements with lesser risk of natural disasters, according to land use planning processes. | Ministry of Agriculture and Livestock, Ministry of Environment, Departmental Governments, Local Governments, FAO, NGOs, etc. | 200,000 |
| | Development of institutional and community rules and regulations on land use and tenure, as well as policies to incorporate risk criteria in investment decisions. | Institutional and community regulations for land use and control. | | |
| | Strategies for information, dissemination and promotion of integrated rural development and of human settlements in safe zones. | Processes to disseminate regulations and policies. Human settlements and productive activities redirected toward safe zones. | | |
| Carry out associative productive projects in communities affected by the disaster. | Identification of needs for recovery of activities and inventory of associative and productive capacities. | Needs identified. | Secretariat of Social Inclusion, Ministry of Agriculture and Livestock, MARN, INSAFOR, CONAMYPE, Local governments | 500,000 |
| | Strengthening of associative and productive capacities and new endeavors. | Capacities strengthened | | |
| | Promotion and support for associative productive development. | Productive development promoted. | | |
| Support to women living in temporary conditions. | Incentive to women who work in shelters providing support to shelters' organization and maintenance under temporary conditions. | Support for "double dividend", maintenance of temporary conditions, and recognition of role of women. | ISDEMU, Secretariat of Social Inclusion, UNDP, ILO, local organizations. | 750,000 |
| Total | | | | 2,505,383 |

Source: Prepared by assessment mission.

c) Food Security

Floods and landslides had exacerbated the levels of food insecurity, which have been worsening due to the economic crisis. The destruction of people's basic resources, such as damages to cattle, poultry, crops and grains, and to the inputs of small-scale commercial and productive activities, has increased the risk of food insecurity in the 14 municipalities with a strong prevalence of chronic malnutrition.

According to World Food Program (WFP) estimates, nearly 6,000 families (30,000 people) will require assistance for the food emergency at community level for about two months. This group includes families with food insecurity who belong to the affected communities and who have been seriously weakened, as well as the population that is returning from shelters to their communities, or those who are relocating to safe areas. WFP has estimated that half of this group (15,000 people) will be part of the disadvantaged urban and peri-urban areas, and the rest will be part of the rural areas.

The extent of lost resources and crops and the seriousness of insecurity justify supporting the reestablishment of livelihoods and the food security of 8,000 families for an additional three months. Moreover, it is essential to prevent the deterioration of the nutritional level of vulnerable groups at a high level of nutritional risk, especially expectant women, nursing mothers, children under age five, persons with HIV-AIDS and the elderly, who will require food with supplements and micronutrients, and especially nutritional education.

1) Objective

❖ General objective

Offer support alternatives for basic attention to the nutritional needs of the population affected by the disaster associated with Hurricane Ida.

2) Program

- Provision of nutritional assistance to the affected and vulnerable population.

Key aspects

- i) Prioritize nutritional aid for expectant women, nursing mothers, children under age five, persons with HIV-AIDS and the elderly.
- ii) Gradually dismantle nutritional support as livelihood recovery programs are activated.
- iii) Continue monitoring the zone's nutritional conditions.
- iv) Carry out nutritional education efforts.
- v) Assign priority to sheltered families with problems of malnutrition and lack of food security, farmers who lease land or small landowners, and women with less than one hectare of property.
- vi) Carry out "food for work and training" alternatives.

Courses of Action

- a. Monitoring and reporting on the nutritional conditions of the affected population.
- b. Provision of nutritional resources.
- c. Training and education on nutrition and on food preparation and handling practices.
- d. Support through the "food for work" scheme.

- e. Support for the organization of community kitchens and solutions for food handling in shelters and temporary housing.

TABLE 51. FOOD SECURITY

| Objectives | Activities | Results | Actors | Budget |
|--|--|------------------------------------|--|------------------|
| Supply nutritional assistance to the affected and vulnerable population. | Monitoring and reporting on nutritional conditions of the affected population. | Report on nutritional conditions. | Ministry of Agriculture and Livestock. | 3,800,000 |
| | Provision of nutritional resources. | Food delivered. | WFP | |
| | Training and education on nutrition and food preparation and handling practices. | Training and education provided. | Secretariat of Social Inclusion. | |
| | Support to community organization for food handling in temporary shelters. | Community organizations supported. | | |
| Total | | | | 3,800,000 |

Source: Prepared by assessment mission.

d) Housing

Temporary Living Conditions and Transition to Permanent Housing: houses affected by floods and landslides and those at high risk total 5,008. Houses that are completely damaged total 1,054; those that are partially damaged, 2,005; and those at high risk, 1,949. An appreciable amount of the affected population has returned to its homes and has gone to live with relatives and friends, and a small number has rented houses. In some cases, crude shelters have been built with rustic materials in high-risk zones. Twenty-two days after the emergency, 4,821 people remained in 49 shelters, most of which were in schools.

As housing is made available for the affected population, it is necessary to plan, organize and maintain solutions for the supply of housing or temporary lodging for the population that lacks its own alternatives for handling this phase. In addition, it is necessary to ensure that “self-sheltered” families are provided with basic social services and adequate social monitoring.

The preparation of the bases for the process of permanent housing recovery implies the development of a series of stages that include the definition of housing and habitat policies, natural resources, identification of beneficiaries, location of lots, lands or areas for urbanization, analysis of risks of buildings and conditions for land use, coordination and planning for the provision of public and social networks and services for resettlements and the process per se of housing construction, etc.

1) Objectives

To provide adequate conditions for managing the temporary conditions of people who lack housing while permanent housing solutions are prepared.

2) Programs

- Establishment of solutions for temporary lodging.
- Provision of basic social services to the population living in temporary conditions.
- Psychological-social protection and community organization to improve coexistence during the temporary phase.

Key aspects

- Establishment of solutions for temporary lodging.
 - i) The establishment of solutions for temporary lodging will consider alternatives such as: a) organized settlements, b) spontaneous settlements, c) in situ, d) payment for leasing and other modalities according to local circumstances.
 - ii) Avoid operating shelters in educational facilities during the school year.
 - iii) Ensure restrictions on occupation in high-risk zones.
 - iv) Demolish buildings that have remained in high-risk zones once the resettlement process begins and allocate these public assets for low-risk uses.
 - v) Seek a temporary phase with a human-rights approach, aiming at conditions for strengthening the family unit and providing dignity to the affected population.
 - vi) Keep in mind efforts to dismantle or withdraw from shelters and temporary lodging.
 - vii) Keep in mind the ongoing need to work together with local governments.
 - viii) Consider aspects of idiosyncrasy, culture and local reality.
- Provision of basic social infrastructure for the population living in temporary conditions.

Key aspects

- i) Ensure the provision of safe water, proper sanitation, health care, adequate food and nutritional care, and integrated social protection.
 - ii) Seek conditions of safety and coexistence and healthy recreational areas.
 - iii) Ensure the proximity of resources and employment sources.
 - iv) Ensure access to common spaces for the activities of sheltered families and promote their use by humanitarian agencies.
- Psychological-social protection and community organization to improve coexistence during the temporary phase.

Key aspects

- i) Support for grieving and bereavement.
- ii) Subsidization of public services aimed at households.
- iii) Reestablishment of social and productive networks.
- iv) Seek permanent lots as much as possible.
- v) Organization of work safety and coexistence committees.

e) Social Services. Health

The field of health was one of those for which there was the most demand during the emergency that was caused by the path of Hurricane Ida. From the first moment, health services were activated and addressed the emergency, with the constant monitoring of patients and conditions in National Health System facilities.

To assist the population and prevent an increase in cases of respiratory infections in shelters, the Ministry of Health mobilized a total of 1,359 health professionals, including doctors, nurses, health promoters, educators and environmental inspectors. The principal illnesses treated among those affected were respiratory illnesses, dermatitis, conjunctivitis, trauma, and panic attacks.

It is necessary to launch health services that are adjusted to the prevailing disease conditions among those affected. Emphasis should be placed on expectant and nursing women.

1) Objectives

- ❖ General objective
 - Conduct epidemiological surveillance and provide comprehensive health services.
- Specific objectives
 - Conduct epidemiological surveillance in the affected zone.
 - Provide psychological-social treatment to the affected population and promotion and prevention efforts suited to temporary conditions.

2) Programs

- Provide health services suited to temporary conditions.

TABLE 52. TEMPORARY CONDITIONS

| Objectives | Activities | Actors | Budget |
|---|--|---|-----------|
| Establish solutions for temporary conditions. | Plan, organize and maintain conditions for the management of temporary conditions for affected families. Define the beneficiary population by means of selection criteria. Establish the type of management solution for temporary conditions in accordance with needs and surrounding conditions. Conduct analyses of strategies for the management of temporary conditions, in coordination with the Vice-Ministry of Housing and Urban Development (VMVDU), the affected communities and local governments. Provision of self-help for emergency assistance in transitional shelters. Facilitate efforts to provide and promote water, sanitary facilities, protection, means of subsistence, and environmental health strategies for the settlements. | Vice-Ministry of Urban Housing, municipal mayors' offices, NGOs, Ministry of Public Health and Social Assistance, UNDP. | 2,702,700 |

Continues

| Objectives | Activities | Actors | Budget |
|---|--|--|------------------|
| Provide basic social infrastructure for the population living in temporary conditions. | Design and establishment of water and sanitation strategies and hygiene promotion. Formation of water committees in charge of regulation and distribution. Solid waste management, collection and disposal. Design and establishment of electricity services. Design and provision of sanitary services and showers (individual or collective.) Ensure that children have access to schools. Promote the development of productive initiatives or livelihoods (small businesses). Wastewater management. Vector control. | National Administration of Water Supply and Sewerage, energy distribution companies, Vice-Ministry of Urban Housing, municipal mayors' offices, NGOs, Ministry of Public Health and Social Assistance, mayors' and governors' offices. | 191,430 |
| Offer psychological-social protection and community organization to improve coexistence during the temporary phase. | Promote forums for coexistence and coordination of activities aimed at managing the settlement. Promote the formation and training in mental health/psychological-social support for a commission within the settlement. Construction of areas for leisure and recreation by gender and by age groups. | Ministry of Public Health and Social Assistance, mayors' and governors' offices, churches, NGOs. | 191,430 |
| Prepare the groundwork for the recovery of the housing sector. | Study and analysis of risks in affected zones. Definition of the Resettlement and Reconstruction Policy and development of local regulations. Land-use and urban planning based on a consideration of land uses, risk, linkage with basic services and productive possibilities. Facilitate the processes of ownership and of management of the resettlement process for the construction of safe housing. | Vice-Ministry of Urban Housing, municipal mayors' offices, NGOs that support the construction of temporary housing, Ministry of Public Health and Social Assistance, Ministry of Environment and Natural Resources, OPAMSS, IFRC. | 751,200 |
| Total | | | 3,836,760 |

Source: Prepared by assessment mission.

f) Social Services. Education

Hurricane Ida's path affected 111 schools, of which 34 were located in urban areas and 77 in rural areas; 35 had severe damage; 70 had moderate damage, and 6 need to be relocated. The Ministry of Education (MINED) decreed a total suspension of classes in the 18 schools damaged by the phenomenon and in those that were being used as shelters. During the emergency phase, a total of 46 educational centers were used as shelters, providing refuge to 6,447 people and spread among 7 departments.

For the start of the school year in January 2010, it is necessary to have facilities that can serve as replacements for damaged infrastructure and to make use of facilities that are still being used as shelters.

1) Objectives

❖ General objective

Facilitate conditions for learning under temporary conditions.

➤ Specific objectives

- Offer alternative facilities for the school population that has lost its own facilities.
- Educational-psychological treatment for students and teachers affected during the emergency.
- Incorporation of the culture of risk management in curricula.

2) Programs

- Facility for the operation of school activities under temporary conditions.
- Offer educational-psychological treatment to educational communities during the temporary phase.
- Incorporation of the culture of risk management in educational facilities.

g) Water and Basic Sanitation

The events associated with the path of Hurricane Ida have caused damages to power plants used to operate supply systems in two of the most affected regions. Civil Protection has offered water and latrine services in places where these services have been destroyed. Water supply is not assured in some areas, and its provision must be guaranteed.

In addition, one of the most important efforts is to prevent the possible development of epidemics, diarrhea or respiratory illnesses that may arise due to sanitation and hygiene conditions.

Programs

- Training and public information program for use of water and hygiene.

Courses of Action

- a) Citizen education strategy for water management, wastewater disposal and solid waste management.
- b) Public information for water and solid waste management.

h) Social Protection

The affected population has been under the effects of stress and psychological-social risks typical of the post-disaster situation. This has created psychological-emotional needs that require the treatment and emotional stabilization of the affected population. Psychological-social risk conditions may generate consequences, such as abuse and violence against children, adolescents and women who are the most vulnerable groups. It is necessary to offer psychological-social support in a systematic, ongoing manner to the affected communities, with emphasis on the most vulnerable population groups.

Psychological-social support for the vulnerable population.

Protection of children from abuse, violence, and family separation.

TABLE 53. SOCIAL SERVICES

| Objectives | Activities | Actors | Budget |
|---|---|--|-----------|
| Health | | | |
| Provide adequate health services under temporary conditions. | Conduct epidemiological surveillance in the affected zone. Provide psychological-social treatment to the affected population and promotion and prevention efforts that are in line with temporary conditions. | Ministry of Public Health, municipalities, PAHO, NGOs. | 2,100,000 |
| Education | | | |
| Facility for the operation of school activities under temporary conditions. | Facilitation of temporary classrooms. Provision of school supplies and other services to students (uniforms, supplies, shoes). | MINED, UNICEF, municipalities, NGOs. | 720,000 |
| Offer educational-psychological treatment for educational communities during the temporary phase. | | MINED, UNICEF, Municipalities, NGOs. | 100,000 |
| Incorporation of the culture of risk management in educational facilities. | Incorporation of risk management in curricula. | MINED, UNICEF, Municipalities, NGOs. | 200,000 |
| Basic water and sanitation | | | |
| Training and public information for the use of water and hygiene during the temporary phase. | Citizen education strategy for water management, wastewater disposal, and solid waste management. Public information for water and solid waste management. | ANDA, MSPAS, Municipalities. | 220,000 |
| Social protection | | | |
| Psychological-social support to the vulnerable population. | Children and families in the early recovery phase. Monitoring in shelters and vulnerable communities. Training of 800 promoters from communities and institutions. | Salvadoran Institute for Childhood and Adolescence (ISNA), Ministry of Public Health and Social Assistance, Ministry of Education, UNICEF, UNFPA, NGOs, municipalities, Office of the Attorney General of the Republic, Youth Network. | 400,000 |
| Protection of children from abuse, violence, family separation. | Identification and support for children without a family protection network. Focus on vulnerable children in recovery programs. Creation of institutional and community capacities and training of youth promoters. | Salvadoran Institute for Childhood and Adolescence (ISNA), Ministry of Public Health and Social Assistance, Ministry of Education, UNICEF, UNFPA, NGOs, municipalities, Office of the Attorney General of the Republic, Youth Network. | 200,000 |

Continues

| Objectives | Activities | Actors | Budget |
|---|---|--|------------------|
| Protection of children from abuse, violence, family separation. | Identification and support for children without a family protection network. Focus on vulnerable children in recovery programs. Creation of institutional and community capacities and training of youth promoters. | Salvadoran Institute for Childhood and Adolescence (ISNA), Ministry of Public Health and Social Assistance, Ministry of Education, UNICEF, UNFPA, NGOs, municipalities, Office of the Attorney General of the Republic, Youth Network. | 200,000 |
| Total | | | 3,940,000 |

Source: Prepared by assessment mission.

i) Roads and Basic Social Infrastructure

Floods and landslides have damaged road infrastructure and small-scale community works. The recovery of these small works requires rehabilitation and reconstruction.

- Program for the rehabilitation and recovery of small-scale access works for vulnerable communities.

TABLE 54

| Access | Disaster preparation/mitigation |
|---|---|
| <ul style="list-style-type: none"> ▪ Paths ▪ Streets within the community ▪ Municipal-level roads ▪ Pedestrian bridges ▪ Vehicular bridges | <ul style="list-style-type: none"> ▪ Community early warning systems ▪ Flood protection walls ▪ Small dams |
| Community services | Recreation |
| <ul style="list-style-type: none"> ▪ Daycare centers ▪ Community centers | <ul style="list-style-type: none"> ▪ Sports and recreation centers ▪ Others |

Source: Prepared by assessment mission.

TABLE 55. ROADS AND BASIC SOCIAL INFRASTRUCTURE

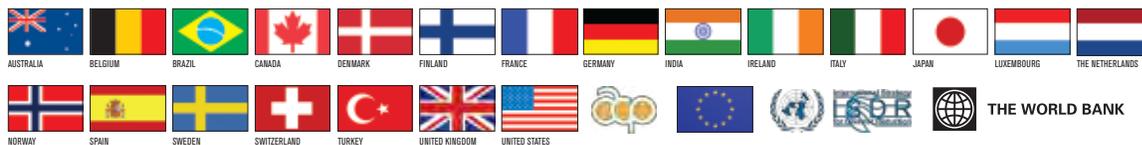
| Objectives | Activities | Actors | Budget |
|--|--|---|------------------|
| Rehabilitation and recovery of small access works for vulnerable communities | Identification of small works Formation of program and organization for execution | MOP, Communities, Municipalities, UNDP, ILO | 1,250,000 |
| Total | | | 1,250,000 |

Source: Prepared by assessment mission.

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