

Winds of Change for Facing Climate Change in El Salvador: Foundations for a National Strategy



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Informe



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Acronyms

AbM	Adaptation-based Mitigation
ANDA	<i>Administración Nacional de Acueductos y Alcantarillados</i> / National Water and Sewerage Administration of El Salvador
CBD	Convention on Biological Diversity
CDKN	Climate and Development Knowledge Network
CEL	<i>Comisión Ejecutiva Hidroeléctrica del Río Lempa</i> / Lempa River Executive Hydroelectric Commission of El Salvador
CENDEPESCA	<i>Centro de Desarrollo de la Pesca y la Acuicultura</i> / Center for Fisheries and Aquaculture Development of MAG
CENTA	<i>Centro Nacional de Tecnología Agropecuaria y Forestal</i> / National Center for Agricultural and Forestry Technology of MAG
COP	Conference of the Parties
CRED	Center for Research on the Epidemiology of Disasters
DACGER	<i>Dirección de Adaptación al Cambio Climático y Gestión Estratégica del Riesgo</i> / Directorate for Adaptation to Climate Change and Strategic Risk Management of MOP
DGPC	<i>Dirección General de Protección Civil</i> / Directorate General of Civil Protection of the Ministry of Government of El Salvador
ECLAC	Economic Commission for Latin America and the Caribbean
EIA	Environmental Impact Assessment
ELES	Environmental Law of El Salvador (<i>Ley del Medio Ambiente</i>)
FONAES	<i>Fondo Ambiental de El Salvador</i> / Environmental Fund of El Salvador
GEF	Global Environment Facility
IDB	Inter-American Development Bank
IMF	International Monetary Fund
IPCC	Intergovernmental Panel on Climate Change
MAG	<i>Ministerio de Agricultura y Ganadería</i> / Ministry of Agriculture and Livestock of El Salvador
MARN	<i>Ministerio de Medio Ambiente y Recursos Naturales</i> / Ministry of Environment and Natural Resources of El Salvador
MESPABAL	<i>Mesa Permanente de Actores del Bajo Lempa</i> (Lower Lempa stakeholders group)
MH	<i>Ministerio de Hacienda</i> / Ministry of the Treasury of El Salvador

MINEC	Ministry of Economy of El Salvador
MINED	Ministry of Education of El Salvador
MOPTVDU or MOP	<i>Ministerio de Obras Públicas y Transporte, Vivienda y Desarrollo Urbano</i> / Ministry of Public Works and Transportation, Housing and Urban Development of El Salvador
MSPAS	<i>Ministerio de Salud Pública y Asistencia Social</i> / Ministry of Public Health and Social Welfare of El Salvador
NCCC	National Communication on Climate Change
NCCP	National Climate Change Policy
NEP	National Environmental Policy
NSCC	National Strategy on Climate Change
PAF	<i>Plan de Agricultura Familiar</i> / Family Agriculture Plan of MAG
PNRR	<i>Programa Nacional de Reducción del Riesgo</i> / National Risk Reduction Program
PREP	<i>Programa Nacional de Restauración de Ecosistemas y Paisajes</i> / National Program for Ecosystem and Landscape Restoration of MARN
PRISMA	<i>Programa Salvadoreño de Investigación sobre Desarrollo y Medio Ambiente</i> / Salvadoran Research Program on Development and Environment
SEA	Strategic Environmental Assessment
SICA	Central American Integration System
SINAMA	<i>Sistema Nacional de Gestión del Medio Ambiente</i> / National Environmental Management System of El Salvador
STP	<i>Secretaría Técnica de la Presidencia</i> / Technical Secretariat of the Presidency of El Salvador
TD 12E	Tropical Depression 12-E
UNFCCC	United Nations Framework Convention on Climate Change

Glossary of Terms¹

Adaptation - Adjustment in natural or human systems to a new or changing environment. Adaptation to climate change refers to adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.

Adaptive capacity - The ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences.

Biodiversity - The numbers and relative abundances of different genes (genetic diversity), species, and ecosystems (communities) in a particular area.

Climate change - The United Nations Framework Convention on Climate Change (UNFCCC), in its Article 1, defines “climate change” as: “a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods.”

Climate variability - Climate variability refers to variations in the mean state and other statistics (such as standard deviations, the occurrence of extremes, etc.) of the climate on all temporal and spatial scales beyond that of individual weather events.

Conference of the Parties (COP) - The supreme body of the United Nations Framework Convention on Climate Change

(UNFCCC), comprising countries that have ratified or acceded to the UNFCCC.

Disaster - A serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources. A disaster is a function of the risk process. It results from the combination of hazards, conditions of vulnerability and insufficient capacity or measures to reduce the potential negative consequences of risk.

Disaster risk management - The systematic process of using administrative decisions, organization, operational skills and capacities to implement policies, strategies and coping capacities of the society and communities to lessen the impacts of natural hazards and related environmental and technological disasters. This comprises all forms of activity, including structural and non-structural measures to avoid (prevention) or to limit (mitigation and preparedness) adverse effects of hazards.

Ecosystem - A system of interacting living organisms together with their physical environment. The boundaries of what could be called an ecosystem are somewhat arbitrary, depending on the focus of interest or study. Thus, the extent of an ecosystem may range from very small spatial scales to, ultimately, the entire Earth.

Emissions - In the climate change context, emissions refer to the release of greenhouse gases and/or their precursors and aerosols

Sources: <http://www.eird.org/wikiesp/index.php/Terminolog%C3%ADa#C>, 7 September 2012; and www.ipcc.ch/pdf/glossary/tar-ipcc-terms-en.pdf; <http://www.unisdr.org/we/inform/terminology>; and http://www.unisdr.org/files/7817_7819isdterminology11.pdf, 5 November 2012.

into the atmosphere over a specified area and period of time.

Erosion - The process of removal and transport of soil and rock by weathering, mass wasting, and the action of streams, glaciers, waves, winds, and underground water.

Environmental Impact Assessment (EIA) - Studies undertaken in order to assess the effect on a specified environment of the introduction of any new factor, which may upset the current ecological balance. EIA is a policy making tool that serves to provide evidence and analysis of environmental impacts of activities from conception to decision-making. An EIA must include a detailed risk assessment and provide alternatives solutions or options.

Extreme weather event - An extreme weather event is an event that is rare within its statistical reference distribution at a particular place. Definitions of “rare” vary, but an extreme weather event would normally be as rare as or rarer than the 10th or 90th percentile. By definition, the characteristics of what is called extreme weather may vary from place to place. An extreme climate event is an average of a number of weather events over a certain period of time, an average which is itself extreme (e.g., rainfall over a season).

Floods - Abnormal rise in water level that causes rivers to overflow and temporarily cover land located along their banks.

(Climate) Impacts - Consequences of climate change on natural and human systems. Depending on the consideration of adaptation, one can distinguish between potential impacts and residual impacts. Potential impacts: All impacts that may occur given a projected change in climate, without considering adaptation. Residual impacts: The impacts of climate change that would occur after adaptation.

Kyoto Protocol - The Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC) was adopted at the Third Session of the Conference of the Parties to the UNFCCC in 1997 in Kyoto, Japan. It contains legally binding commitments, in addition to those included in the UNFCCC. Countries included in Annex B of the Protocol (most countries in the Organization for Economic Cooperation and Development, and countries with economies in transition) agreed to reduce their anthropogenic greenhouse gas emissions (carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride) by at least 5% below 1990 levels in the commitment period 2008 to 2012.

Mitigation - Structural and non-structural measures to reduce the sources or enhance the sinks of greenhouse gases.

Precipitation intensity - Amount of precipitation collected per unit time.

Risk index - Indicator that quickly indicates risk that can cause a disaster.

Risk mitigation - Interventions designed to reduce or minimize existing risk. Mitigation assumes that in many circumstances it is not possible or feasible to totally control existing risk; that is, in many cases it is not possible to prevent or totally avoid damages and their consequences, but instead to reduce them to acceptable and feasible levels.

Recovery - Decisions and actions taken after a disaster with a view to restoring living conditions of the stricken community, while encouraging and facilitating necessary adjustments to reduce disaster risk.

Resilience / resilient - The capacity of a system, community or society potentially exposed to hazards to adapt, by resisting or

changing in order to reach and maintain an acceptable level of functioning and structure.

United Nations Framework Convention on Climate Change (UNFCCC) - The Convention was adopted on 9 May 1992 in New York and signed at the 1992 Earth Summit in Rio de Janeiro by more than 150 countries and the European Community. Its ultimate objective is the “stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent

dangerous anthropogenic interference with the climate system.” It contains commitments for all Parties.

Vulnerability - The conditions determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards.

National Context

El Salvador has undergone dramatic transformations, including a civil war, rapid urbanization, growing environmental pressures and large-scale out-migration. The Salvadoran economy, which for decades was dependent on agro-exports, now relies on remittances, sent back by Salvadorans living abroad, as its primary source of foreign exchange. The economic transformation of the country has led to a serious crisis in the agricultural sector, accompanied by high levels of rural poverty, aggravating the vulnerability of this sector, which is disproportionately affected by environmental problems due to its greater dependence on natural resources as an integral part of its livelihood strategies.

Consolidation of this economic transformation predates the onset of the recent global crisis (economic, energy, food and climate). The bursting of the financial and speculative bubble affected El Salvador in many ways, among them, increased unemployment, increased prices, greater food insecurity, a drop in remittances and a rise in fiscal constraints. In addition to these huge challenges, the country is facing others

because of its geographical characteristics, which make it particularly susceptible to the risks associated with climate variability and climate change.

In this turbulent setting, a leftist president was elected and took office in mid-2009, following four consecutive terms with the executive office in hands of the conservative ARENA party (June 1989-May 2009), marking a significant change in the government’s leadership and priorities. One of the first measures announced by the new administration was the launching of the 18-month Global Anti-Crisis Plan, to deal with the economic crisis and protect the most vulnerable citizens. Subsequently, a Five-Year Development Plan 2010-2014 was drafted, setting priorities for those years and focusing primarily on the following:

- i) Revitalization of the economy and production and a reduction in poverty.
- ii) Structural reform of the government and public administration.
- iii) Prevention of violence and creation of a new integrated development model.

- iv) Effective environmental risk management, with emphasis on the improvement of infrastructure and production affected, among other things, by the E96/Ida low pressure event (Gobierno de El Salvador, 2010: 52-53).

The Five-Year Plan, launched in July 2010, is the framework for the current administration's public policy agenda. One of the main five-year goals is: *"Reconstruct the social and productive fabric damaged by natural phenomena and roll-out across the nation the civil protection system and an effective early warning and risk prevention and management system"* (Gobierno de El Salvador, 2010: 54). However, reality shows that more is needed than political will, since the country is heir to a weakened, centralized government, great social expectations, severe fiscal constraints and, in addition, it has been repeatedly struck by climate events that have caused damages and losses of some \$1.3 billion (5.9% of the gross domestic product- GDP) in three years alone.

In this tremendously challenging context, government authorities, led by the Ministry of Environment and Natural Resources (MARN), have begun a process for addressing climate variability and change. The country's progress in risk management is not insignificant and includes the design and implementation of the National Risk Reduction Program (PNRR) 2010-2014.⁵ As a result, loss of life has been reduced and emergency response substantially improved, with significant advances in systematic observation and in hazard analysis. A monitoring center was created, which included the installation of a

network of eight weather radar stations that cover the entire country; development of meteorological, hydrological, seismic, volcanic and oceanographic monitoring and early warning systems, which now have a network of 600 local observers; and at least 70 municipal vulnerability studies that were done, which include detailed studies of the most critical areas.

However, the challenges to achieving integrated and prospective management of risk in general and of climate risk in particular continue to be enormous. As such, the National Strategy on Climate Change (NSCC) of El Salvador seeks to set the stage for responding simultaneously to the immediate impacts of climate variability associated with climate change and to the work of information, discussion and planning of sectoral, territorial and national actions aimed at responding to the medium- and long-range agenda sparked by this threat. While international climate change talks set the tone regarding commitments and funding opportunities for mitigation and adaptation, different international agencies, among which the Climate and Development Knowledge Network (CDKN) stands out, are contributing to the process of producing knowledge and changes in the design and implementation of development policies and practices compatible with the climate.

Overlapping interests led to a collaboration among MARN, CDKN and PRISMA (see Table 1. Counterpart Roles) that seeks to strengthen institutional and policy frameworks for addressing climate change, through the provision of relevant knowledge and information from different international experts to authorities and technical experts in

given to areas susceptible to river flooding and landslides around the Jiboa River Valley, Lake Ilopango, San Vicente Volcano, Acachuapa River, Titihuapa River, Central Coastal Zone and the San Salvador Metropolitan Area (SSMA). A total of US\$17.5 million has been allocated for this program (MARN, 2010).

⁵ The PNRR prioritizes four components: i) Creation of a Dynamic Risk Atlas; ii) Establishment of early warning systems (EWS); iii) Integration of the risk reduction perspective into public spending (infrastructure, housing, mitigation); and iv) Public awareness campaigns on environmental issues and risks. Although the program is planned to be implemented across the country, priority has been

different sectors of the government who are in charge of the initial response to problems resulting from the impact of extreme events, and in addition, to outline the medium- and long-range response, as mentioned above. This collection of specialized conceptual and technical contributions from international experts has played a key role at crucial moments for making concrete progress in integrating the issue of climate change into the public administration and the national development agenda.

Table 1. Counterpart Roles

INSTITUTION	ROLE
Ministry of Environment and Natural Resources (MARN)	MARN is the government body responsible for safeguarding the health of the environment; it is also the National Focal Point for the United Nations Framework Convention on Climate Change in El Salvador. As such, it is the government entity in charge of preparing a National Strategy on Climate Change (NSCC).
Climate and Development Knowledge Network (CDKN)	CDKN supports decision makers to design and deliver climate compatible development. It does this by combining research, advisory services and knowledge sharing to support locally owned and managed policy processes.
Salvadoran Research Program on Development and Environment (PRISMA)	PRISMA is a non-governmental research and dialogue organization, in charge of coordinating the technical inputs and preparing a roadmap for the NSCC.

Changes in Climate Variability and its Impact on El Salvador

El Salvador, with its small land area, spread along the Pacific coast; steep topography with many slopes 30 degrees or more; short watersheds; one large river (the Lempa), with its headwaters and part of its course in neighboring countries, suffers from a high level of exposure and susceptibility to climate change, which results in extreme vulnerability.

Climate variability, seen in a series of anomalies in the temporal and spatial patterns of the rains, is being increasingly felt in the country. The distribution of the rains in time and in space, as well as their intensity and duration, has changed substantially, affecting capacity for regulation, infiltration, quality and availability of water resources. Some of the manifestations of these changes can be summarized as follows:

- More frequent extreme weather events, now also originating in the Pacific Ocean.
- A more irregular spatial and temporal distribution of rains.
- Changes in intensity, course and number of cyclonic systems originating in the Atlantic and Pacific oceans, with a striking increase in those in the Pacific.
- Increasing length of the dry season, causing a considerable reduction in availability of water resources.
- A rise in the average water temperature in Atlantic and Pacific near-shore waters and rising sea levels.

**GOVERNMENT OF EL SALVADOR – MINISTRY OF ENVIRONMENT AND NATURAL RESOURCES
ACCUMULATED RAINFALL DURING TD12E AND HURRICANE MITCH**

24-hour maximum: Maximum rainfall recorded in 24 hours by some of the country's stations (7AM-7AM)

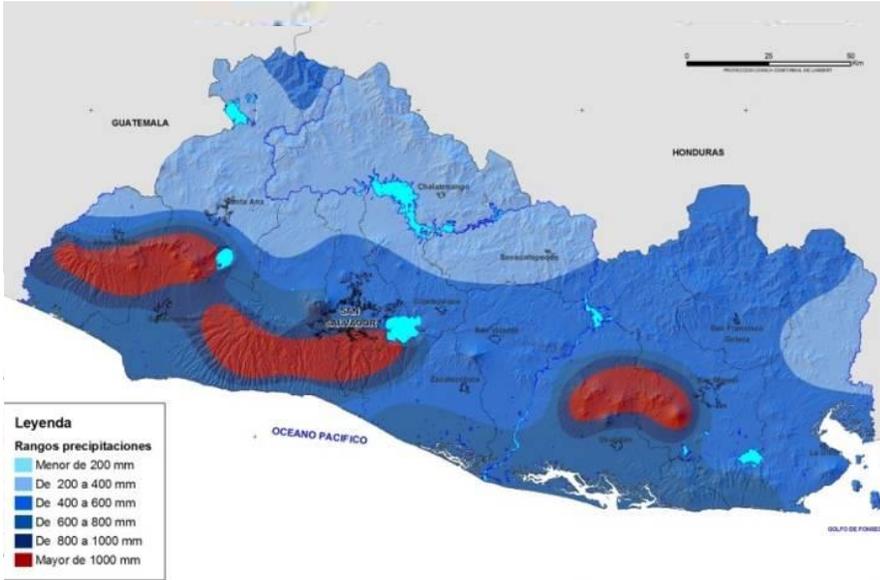
Maximum N days: Maximum accumulated rainfall recorded during the entire event by some of the country's stations

National Accumulated Average N days: National average rainfall in the entire event calculated on the basis of its spatial distribution

TD12E AND DEPRESSION SYSTEM (10-19 October 2011)

Duration: 10 days | Maximums 24h/10days: 433mm/1513mm

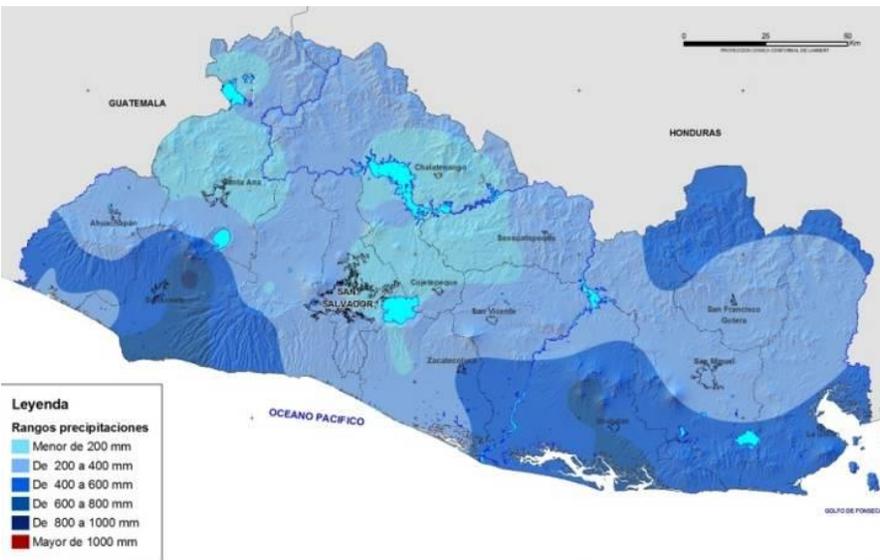
National Accumulated Average 10 days: 747mm (75mm/day)



HURRICANE MITCH (29 October - 4 November 1998)

Duration: 7 days | Maximums 24h/8days: 375/861mm

National Accumulated Average 7 days: 472mm (67mm/day)



Legend

Precipitation

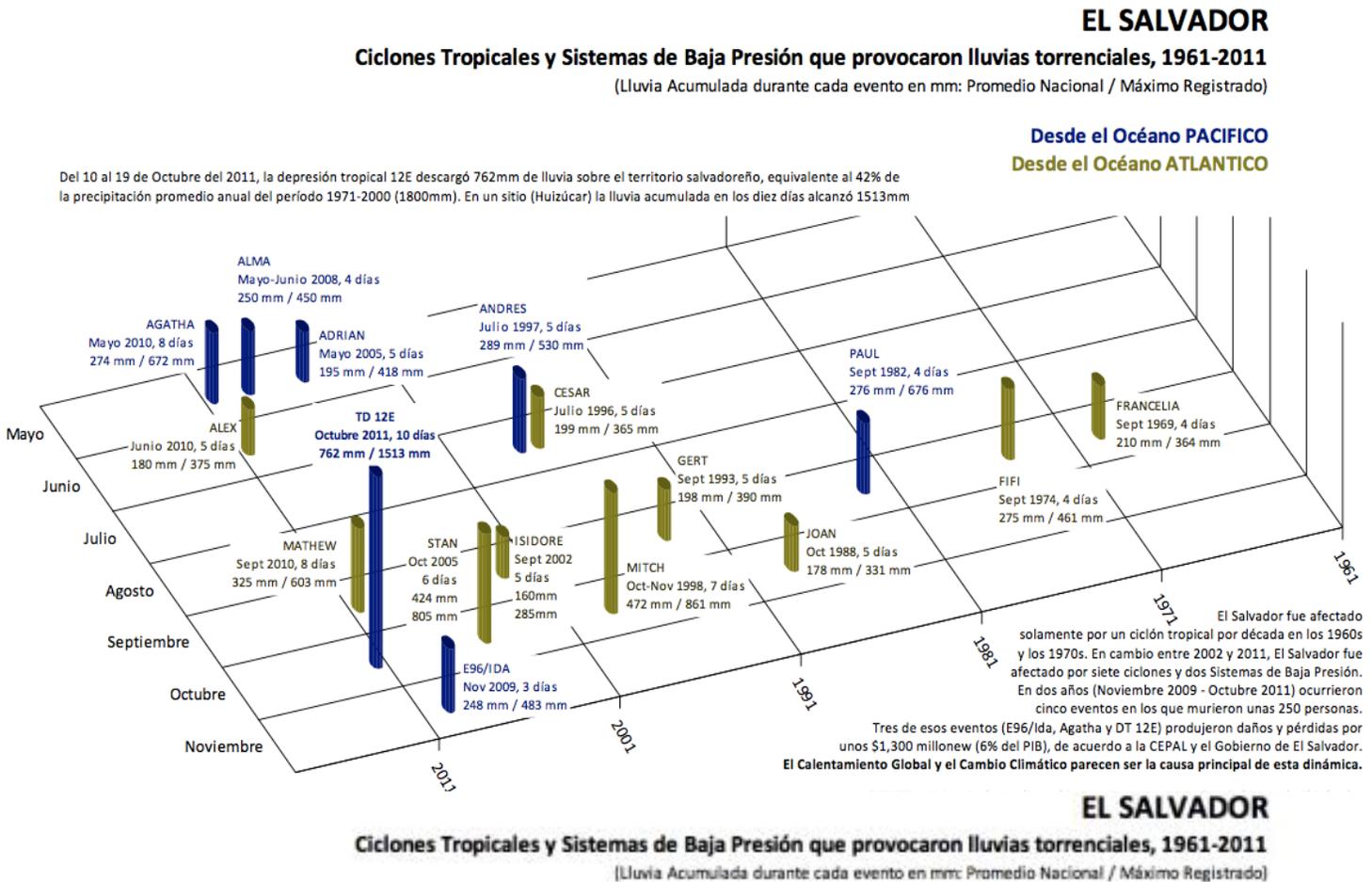
- <200 mm
- 200-400 mm
- 400-600 mm

- 600-800 mm
- 800-1000 mm
- >1000 mm

The frequency of extreme events that directly affected the country increased extraordinarily in recent years.³ In the 1960s and 1970s, events that caused extreme rains and flooding were

not that frequent.⁴ Since the 1990s, there has been an increase in the frequency and duration of storms as well as an extreme change in the pattern of occurrence,⁵ as shown in Figure 1.

Figure 1 [TRANSLATION IN “CDKN Gráficos” doc.]



³ In November 2009, a record was set for 6-hour accumulated rainfall (350mm on San Vicente Volcano) during low pressure system E96/Ida. In May 2010, Tropical Storm Agatha broke the record for 24-hour accumulated rainfall: 484mm at La Hachadura station on the Paz River in western El Salvador. In 2010, a new record was also set for annual rainfall, with a national average of 2549mm, 41% above the average for 1971-2000 (1812mm). In October 2011, Tropical Depression 12-E broke the record on duration of accumulated rainfall (1513mm on the Cordillera del Bálamo, in 10 days).

⁴ In the 1960s and 1970s, El Salvador was struck by Hurricane Francelia in 1969 and Fifi in 1974; in the 1980s, two hurricanes hit El Salvador, including Paul (1982), the first to hit the country that originated in the Pacific Ocean.

⁵ In the 1990s, the number rose to four, including Andrés (1997), which originated in the Pacific, and Mitch (1998), in the Atlantic. In the first decade of this century, El Salvador was struck by eight events, half from the Atlantic, including Stan (2005), and the other half from the Pacific, including low pressure event E96 associated with Ida (2009), and Tropical Storm Agatha (2010). The current decade started with the devastating Tropical Depression 12-E (2011).

Until the early 1990s, recorded events occurred in September (1969, 1974, 1982 and 1993) and October (1988), but those occurring from the mid-1990s to the present happened in six different months: Adrian (2005), Alma (2008) and Agatha (2010) in May; Alex in June 2010; Cesar (1996) and Andrés (1997) in July; Isidore (2002) and Mathew (2010) in September; Stan (2005) and TD12-E (2011) in October; and E96/Ida (2009) in November.

These data show the drastic change in climate and climate variability that El Salvador is already experiencing. As a result, it should come as no surprise that El Salvador is being more frequently categorized as one of the world's most vulnerable countries to the impact of climate variability and change (see Table 2).

Table 2. Risk Classifications

2005	The country with the second greatest risk of mortality due to three or more hazards, with 78% of the population living in risk areas (Global Risk Analysis, World Bank, 2005: 8)
2006	First place as the country with the highest vulnerability, given that 96.4% of its Gross Domestic Product is produced in risk areas (Report of the Independent Evaluation Group IEG, World Bank, 2006: 130)
2009	First place on the Global Climate Risk Index (Germanwatch, 2010: 7)
2009	Second place among the 10 countries in the world that had the highest levels of damages as a proportion of Gross Domestic Product as a result of disasters (Annual Disaster Statistical Review of the Center for Research on the Epidemiology of Disasters CRED-WHO-UCL, 2010)
2010	First place for Disaster Reduction and Recovery, with 89% of its land area at risk; 95% of its population living in risk zones; and 96% of its Gross Domestic Product produced in risk zones (Global Facility for Disaster Reduction and Recovery, 2010: 96)

At the same time, El Salvador has undergone far-reaching social, economic, political and environmental changes. The consequences of these changes are complex and in combination have made certain marginalized segments of the population (such as women, children, the elderly and the poor in general) and other sectors (such as agriculture and the country's coastal areas) more vulnerable to suffering harm from any type of shock, not only climate events. This underlying vulnerability, together with the country's location and its geomorphology, make it one of the most disaster-prone countries in the world. CRED, the World Bank and the Inter-American Development Bank, among others, have noted that from 1970 to 2011, El Salvador was affected by 42 disasters.

When a climate event occurs, vulnerable populations and critical sectors and ecosystems suffer loss of life and serious damage. For example, agriculture is particularly vulnerable to climate variability, since many farmers are dependent on subsistence agriculture. The status of land tenure; current practices, which lead to soil erosion; contamination of water courses with agrochemicals and cattle waste; and deforestation, through uncontrolled burning, among other factors, make farmers less able to cope with rapid and drastic climate fluctuations.

As a result of these underlying causes of vulnerability and increasingly frequent extreme events, annual agricultural production in El Salvador fluctuates widely. While in 2010, losses to agriculture from flooding exceeded \$100 million, in the same year, losses from drought were \$38 million. Other sectors and population groups are negatively affected by growing climate vulnerability, as in the case of the rise in vector-borne diseases such as dengue fever. According to the World Bank, since 1972, natural disasters have caused almost 6,500 deaths and an estimated US\$16 billion in economic costs (Banco Mundial, 2010: 1). The following chart shows the magnitude and costs for losses and damages caused by events occurring from 2009 to 2011.

LOSSES/DAMAGE	E96/IDA Nov. 2009	AGATHA MAY 2010	TD 12-E OCT. 2011
Economic	\$315 million	\$112 million	\$840 million
Agriculture	\$28 million	\$11 million	\$105 million
Bridges	24 collapsed 55 damaged	25 damaged	8 collapsed 26 damaged
Roads	132 damaged	61 damaged	40% damaged
Schools	111 damaged	378 damaged	947 damaged
Deaths	198	12	34

Box. The Economics of Climate Change in Central America

In late 2010, ECLAC released its study “The Economics of Climate Change in Central America,” which makes economic forecasts for the costs and impacts of climate change in the countries of the region. Efforts to assess impact were concentrated in five sectors that, because of their direct relationship with natural resources, are susceptible to feeling the greatest effects associated with climate change: water resources, agriculture, biodiversity, occurrence of extreme weather events and energy. The study presents projections through the end of the century, based on the current situation and considering IPCC scenarios A2 and B2.

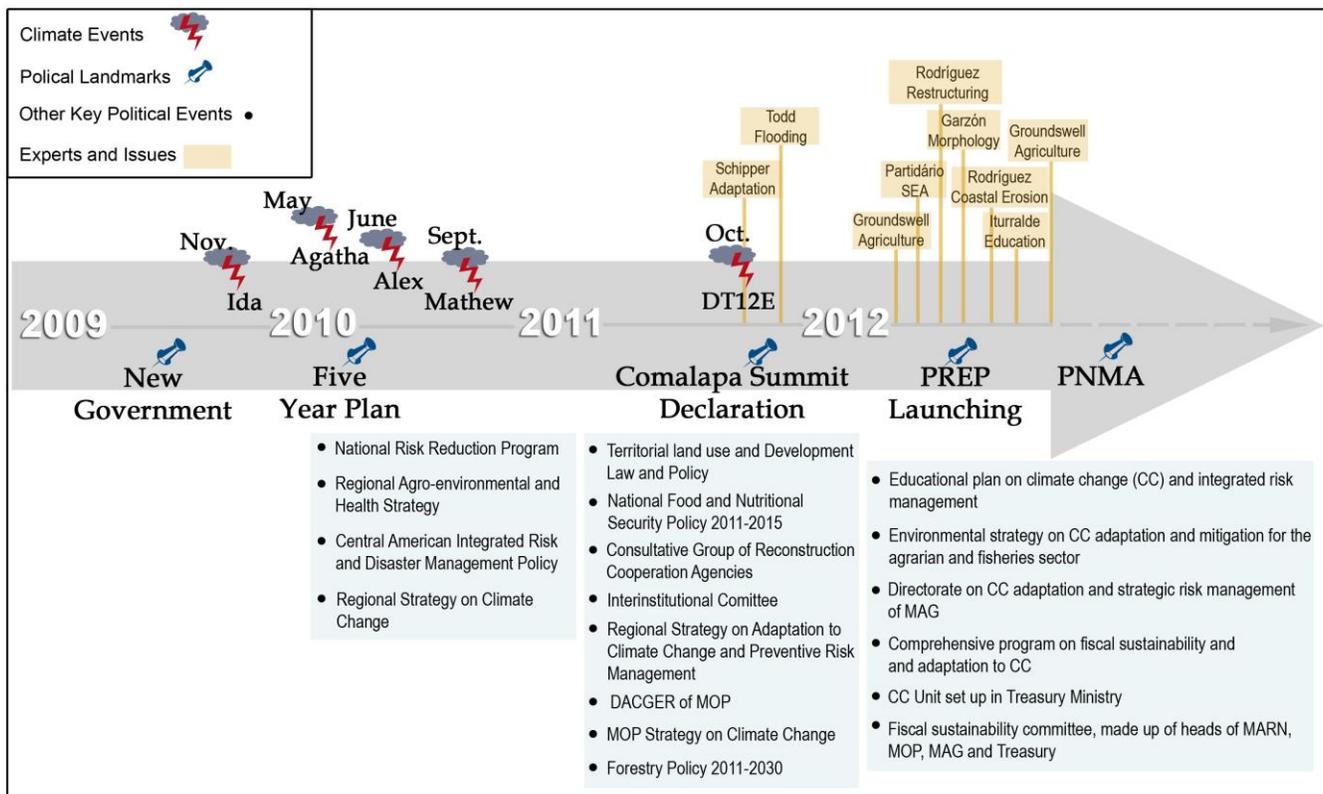
In the case of water resources, considering their different uses (consumption, agriculture, industrial, energy), a considerable reduction in their availability is anticipated, especially toward the end of the century (63% in A2 and 35% in B2), which together with the increase in the intensity of their use would represent a serious threat to this resource. In both situations, the country most affected would be El Salvador with projected reductions of 82% and 50% respectively (ECLAC, 2010). Furthermore, variations in temperature and in precipitation patterns will negatively influence national and regional agricultural production levels and yields, primarily for basic grains (corn, beans and rice), increasingly compromising food security in each of the countries. With regard to biodiversity, considerable reductions are anticipated for all countries of the region, with Nicaragua and Guatemala being the most affected. Furthermore, although there is no consensus on the relationship between climate change and the frequency of extreme hydrometeorological events (storms, hurricanes), its influence on the intensity of these phenomena has been demonstrated, which could lead to a 4% to 12% increase in this aspect in the current century, which would involve, consequently, the generation of greater levels of risk from threats of this type. The scenarios for the energy sector foresee an increase in demand of up to five times over current consumption during the century, where transportation and industrial activities will require the greatest attention, accounting for 48% and 30% of demand by 2100, respectively (ECLAC, 2010). According to the study, the anticipated impact in the GDP of the countries, based on the cost for four of the sectors considered, would be the following:

SECTOR	COSTS REFLECTED IN CENTRAL AMERICA’S GDP BY 2100
Water Resources	9.8% in A2; 5.4% in B2. El Salvador, Belize and Nicaragua would be the countries with the greatest costs
Agriculture	11% in A2; 7% in B2, increasing rapidly after 2050
Biodiversity	18% in A2; 12% in B2. Greatest costs: Nicaragua Least costs: El Salvador
Extreme Events	With a 5% increase in intensity: from 7.64% to 8% (B2), with the greatest costs in Belize and Honduras

Source: Authors, based on data from ECLAC, 2010.

An Iterative Process to Develop a Response to Climate Change in El Salvador

Process Diagram
Advancing Toward a Response to Climate Change



Source: Authors

Political context for climate change and disaster risk reduction in El Salvador

Since the late 1990s, with the creation of the Ministry of Environment and Natural Resources (MARN), El Salvador has been promoting the integration of climate change into the country's development policy frameworks. The initial attempts were aimed at fulfillment of the country's commitments resulting from ratification of the United Nations Framework Convention on Climate

Change (UNFCCC) and the Kyoto Protocol, which framed the content, orientation and results of these attempts. A decade later, El Salvador had been struck by a series of extreme events associated with climate variability and change, which in a short time have sparked obvious haste to develop a policy framework that integrates the reality of high vulnerability and risk reduction with regard to the impact of climate change.

Public policies related to climate change, in El Salvador, are changing. In prior efforts to integrate the climate change dimension into

public policies, the predominant line of thinking revolved around fulfillment of the country's commitments, with regard to the UNFCCC, and taking advantage of the potential opportunities linked to mitigation, based on the Clean Development Mechanism under the Kyoto Protocol. These efforts turned out to have limited results.

A number of efforts and initiatives are currently being promoted in El Salvador that are reshaping the policy framework; not only environmental policies, but also sectoral (productive, social), territorial and even fiscal ones. These efforts and initiatives are strongly influenced by the severe impact of extreme events associated with climate variability and change. The economic impact caused by the latest five extreme events (November 2009 to October 2011) has made its influence felt in the already complicated conditions of El Salvador's public finances.

In fact, low pressure system E96, associated with Hurricane Ida (November 2009), marked a turning point that compelled the government to begin to resolutely incorporate risk reduction into government activities. As this is also occurring in a context of economic crisis, and fiscal and institutional constraints, it has meant that the policy responses have been swifter. In addition, this is taking place in a country where environmental degradation reached critical thresholds several decades ago, a situation that has been magnified by the impact of climate variability and change.

Even though El Salvador does not yet have a formal National Climate Change Policy (NCCP), in practice a relatively broad set of policy frameworks, programs and instruments is being developed, characterized by a clear sense of urgency in the face of climate variability, which quite probably is not matched by any of the other Central American countries. The sense of urgency with which

these frameworks is being developed and implemented is fundamental. In contrast to the past, present-day efforts to integrate climate change into public policy are not oriented toward mitigation or formal fulfillment of country obligations under the UNFCCC, but are instead oriented, clearly, toward the challenges of adaptation to climate change. These challenges, in practice, inevitably assume the short-term challenges aimed at risk and vulnerability reduction.

Advances in emergency response and risk management, although essential to protect the public, do not prevent economic losses caused by flooding, soil loss, landslides, gullies, or silting of drainage outlets, dams and ports, nor from degradation of mangroves, rivers, lakes, estuaries and bays. The climate threat will continue to grow, along with economic losses, if El Salvador does not gradually yet profoundly change the bad practices that are intensifying climate risk.

Progress on the National Strategy on Climate Change

Support from CDKN for the development of a National Strategy on Climate Change (NSCC) began in late 2011. It was originally designed as a process aimed at providing specialized research and analysis in five priority areas: water, agriculture, education, health and infrastructure. Its purpose was to contribute to setting priorities and making recommendations about how to readdress the climate change issue within each of these sectors, which, later, would form the foundation for a comprehensive strategy on climate change. Along these lines, the objective was to provide support that would enable different sectors to assimilate the extreme importance of the issue in the development of their programs and policies, beginning with those sectors that are more open and sensitive to this linkage. As such, the

inputs provided by the experts were meant as high level technical inputs that would complement an effort at policy-making by the Minister of Environment and Natural Resources (MARN) along with other cabinet members.

However, even before the project's start-up, the aid was changed, to be more flexible so that it could respond more quickly to events occurring during the process, which opened the door to a more well-grounded roll-out of a possible National Strategy and Plan on Climate Change. Thus, it was decided that the contributions from the experts should provide the basis for the development of practices and instruments oriented toward decision-making processes, both at the inter-institutional level and between territorial actors and the central government.

The role of the first expert consultant was to contribute to the development of a conceptual framework containing the critical elements (sectoral and territorial) for the National Strategy on Climate Change and a Plan for Adaptation to Climate Change, with particular emphasis on the dimension of local institutional linkages. However, the focus of the consultant's work shifted to providing supporting and guidance to the Minister of Environment and Natural Resources, Herman Rosa Chávez, on a Reconstruction Plan, since the consultancy coincided with the days following the national emergency from Tropical Depression 12-E. In fact, during the second day of her visit, a special meeting was held of presidents of the Central American Integration System (SICA) at El Salvador's Comalapa International Airport to evaluate the damage caused by the storm in the region. The meeting opened with a briefing by the Minister of Environment and Natural Resources of El Salvador on damage caused by the precipitation, showing that El Salvador was the only country in SICA where historical records had been broken. Furthermore,

President of El Salvador Mauricio Funes stated that *"without any exaggeration, we are suffering the greatest disaster in our recent history caused by intense rains, with regard to infrastructure damaged and crop losses."* The region's leaders unanimously agreed to highlight the challenges of climate change in their call to convene a special Consultative Group to address *"the work of rehabilitation and reconstruction in the affected areas, as well as integrated risk management and adaptation to climate change"* (Declaration of Comalapa, 25 October 2011).

With these events, the issues of risk management, vulnerability reduction and adaptation to climate change were put on the national agenda at the highest political level. This fact not only supported the relevance of a national strategy and plan to address climate change, but also created an opportunity to insert the issue into the national reconstruction effort. However, this leap forward led to new challenges:

- **How can interest be maintained in the issue when extreme weather events are not occurring?**
- **What does adaptation mean?**
- **How can a concrete emergency response from an adaptation perspective be quickly deployed?**
- **How can the underlying causes of vulnerability be addressed?**

As was highlighted in the general review done by Dr. Lisa Schipper, the first consultant, there have been few true examples of risk reduction and even fewer of adaptation integrated into sustainable development processes. However, based on the lessons learned in El Salvador following Hurricane Mitch in 1998, the following conclusions can be drawn: reduction of climate risk, as a preventive strategy, is crucial to prevent backsliding in the development process; additionally, *reduction*

of climate risk takes time and requires the buy-in and involvement of diverse actors; and finally, reduction of climate risk requires accepting climate variability and change as recurrent events.

The nation's interest in developing a Rehabilitation and Reconstruction Plan opened several windows of opportunity simultaneously for incorporating the perspective of risk management, vulnerability reduction and adaptation to climate variability and change. Some of these opportunities represent new initiatives (such as the creation of an Inter-institutional Committee for the Reconstruction of the Lower Lempa), while others have given a boost and/or have transformed programs and investments that were already underway even before Tropical Depression 12-E, such as the National Program for Ecosystem and Landscape Restoration (PREP), the Family Agriculture Plan (PAF), the Development Strategy for the Coastal Marine Area and FOMILENIO II,⁶ among others.

Inter-institutional development and management

Immediately after the national emergency was lifted and the National Rehabilitation and Reconstruction Committee formed, the government, with support from ECLAC, did a rapid assessment of sectoral damages and losses and an estimate of the needs caused by Tropical Depression 12-E,⁷ a document that itself was the result of inter-ministerial coordination.

Territorializing the Rehabilitation and Reconstruction Plan: The Lower Lempa Inter-institutional Committee

⁶ FOMILENIO II: The Millennium Challenge Corporation (MCC) of the United States government chose El Salvador to receive Millennium Funds, for an as-yet-unknown amount, but which will be focused on development of the country's coastal marine area.

The intense rains caused disproportionate damage in some specific areas, particularly along coastal areas that flooded. In the Lower Lempa region, the Lempa River overflowed its banks and approximately 95% of the region was flooded, by as much as four meters in places, depending on the local topography. In some locations, flooding lasted almost five weeks. Households and livelihoods were seriously destabilized; there were enormous losses in crops, cattle, fisheries and other economic activities. In response to the situation, and to the organized demands of local residents, the government formed the Lower Lempa Inter-institutional Committee, to which different public agencies were invited (STP, CEL, MAG, MOP, MARN) to propose reconstruction actions.

The government charged the committee with developing a two-phase program to respond to the devastating flooding in the Lower Lempa area. During Phase I (December 2011 to April 2012), actions were to concentrate on measures to protect the area from "normal" flooding and prevent blockage of drainage outlets before the beginning of the 2012 rainy season. Then, Phase II (2012-2014) would involve implementation of a two-year program to reduce vulnerability to flooding in the Lower Lempa area and would begin adaptation measures required in the area, taking into account climate change.

Given the importance of flood management, the involvement of different sectors in addressing this issue and the challenge of ensuring that short-term reconstruction efforts would contribute to long-term adaptation, MARN decided to bring in an international expert to provide know-how on flood

⁷ For more detailed information on the impact of Tropical Depression 12-E see the document "El Salvador: Evaluación de daños y pérdidas sectoriales, y estimación de necesidades por la Depresión Tropical 12-E," November 2011.

management, with a focus on adaptation based on experiences in other parts of the world, for the purpose of contributing to developing recommendations for the government on reconstruction plans for the Lower Lempa. During his visit, the expert, Ian Todd, participated in meetings with authorities from MARN, Ministry of Public Works (MOP), Ministry of Agriculture (MAG), Directorate General of Civil Protection (DGPC), Lempa River Executive Hydroelectric Commission of El Salvador (CEL) and Ministry of National Defense, with their respective technical teams; with the members of the Inter-institutional Reconstruction Committee; and with representatives of the residents of the Lower Lempa area.

His advisory services were particularly timely for raising awareness and teaching the different institutions and Lower Lempa residents about adaptation measures for flooding, as well as for facilitating the negotiation of response priorities between the government and residents given financial constraints. The expert explained that the situation produced by climate change requires adjustments for learning to live with a new reality characterized by constant changes. In the case of flooding, the phenomena associated with climate change aggravate aspects such as periodicity, duration and intensity of floods, increase the likelihood of contamination of surface and underground waters, and at the same time are factors that affect soil erosion, obstruction of drainage structures and water saturation.

Along these lines, it was expressed that both structural and non-structural measures need to be taken to respond to these problems. Structural measures mentioned include building retaining walls to control circulating water, providing for drainage systems and the elevation of communities (homes, fields) above flood zone levels. In turn, the non-structural measures proposed focused on

increasing resilience of livelihoods, for example, by new farming practices and the implementation of public policies, such as disaster insurance and compensation programs. A number of cross-cutting themes that should be addressed were also highlighted, including: *institutional structure*, with the involvement of different actors—public, private and community—and the need to promote coordinated interventions; *funding*, especially when resources are limited; *gender*, due to the particular impact of these phenomena on women and on household functioning; and *response time*, because there is a need to identify immediate actions, along with medium- and long-term ones.

Requirements for knowledge and instruments for inter-institutional management

In identifying responses to Tropical Depression 12-E, it became obvious that the government ministries needed information and instruments to promote effective and efficient actions, given that both natural factors and human activity contribute to river and ocean flooding and landslides during storms. As previously mentioned, with the creation of a monitoring center, MARN has made significant progress with the systematic observation and analysis of hazards. However, management of, and adaptation to, climate risks involve planning under uncertain conditions. It is not surprising then, that several ministries—in particular, MOP—would request environmental guidelines from MARN that would serve as a reference for the reconstruction of bridges and other infrastructure damaged by overflowing rivers. Furthermore, it was even more urgent for MARN to develop its Policy for Regulation of the Use of Coastal Marine Resources, a crucial tool for informing and guiding the drafting of the Development Strategy for the Coastal Marine Area and the proposal for the FOMILENIO II program, under the responsibility of the Technical Secretariat of

the Presidency (STP). These instruments and others became critical and urgent elements for ensuring that from the outset the Rehabilitation and Reconstruction Plan would use a perspective of long-term vulnerability reduction and adaptation to climate change.

In this context, MARN mobilized the support of experts in fluvial geomorphology, coastal erosion and strategic environmental assessment (SEA). In fact, before TD12-E hit, MARN was conducting hydraulic modeling for different rivers in the coastal area to produce flood maps for different return periods, which identify detailed flooding threats, for the purpose of providing direction on environmental management and guidelines. However, these models refer to liquid flow and do not cover modeling of solid flow, which must be done to establish the dynamics of geomorphological change induced by the ongoing extraction of material in some river basins. This geomorphological modeling complements the hydraulic modeling and enables designing guidelines aimed at reestablishment of the river's hydro-geomorphological equilibrium, a decrease in the risk to the population, and at the same time, the creation of water and environmental protection zones.

Box 1. Management Proposals for the Jiboa River Alluvial Fan

Flood management on alluvial fans is hotly debated because it involves combining the occupation and exploitation of a floodplain with a dynamic of high mobility and sedimentation, but, especially, with a channel that is elevated above its flood zone. Here, more than in other types of rivers, land management is a priority, since structures or modification of the channel will only be stopgap measures and could even lead to opposing effects. Planning should address a number of aspects:

- Monitoring and maintenance of the efficiency of the main channels.
- Respect the river's high influence area, either the meander belt or levee construction area.
- Enable spillways in the case of violent events.
- Prepare flood retention basins in front of the coastal barrier.
- Condition channels for river drainage and possible sea inflow.
- Consider making the river mouth area into a special protection area due to active changes.

Recalling the recommendations of Collins and Dunne (1990) on extraction locations and rates for extraction in channels, it is important to determine these on the basis of:

- The rate of replenishment, the average annual rate of which can be difficult to determine, since it varies greatly from year to year.
- Whether the riverbed elevation under undisturbed conditions remains unchanged over the course of decades.
- Historical patterns of sediment transport, bar growth and bank erosion. Extraction is not recommended in rivers that have a recent history of eroding bars or banks or of riverbed incision.
- Prediction of local effects based on known effects of gravel extraction at different rates.
- Desirability or acceptability of anticipated effects.
- Administration of gravel extraction operations to minimize harm to riverbanks and aquatic habitats.
- The quantity of gravel extracted from the bed should be limited to prevent long-term impact on channel morphology.

(Extract from the report: *Analysis of Geomorphological Issues in the Jiboa River Alluvial Fan and their Management vis-à-vis Flooding*)

During the visit of geomorphology expert Dr. Guillermina Garzón, a training and advisory program was held on fluvial morphodynamics in flood zones for technical personnel from MARN, MOP and MAG.⁸ One of the main conclusions was the importance of territorial management, as one of the most important factors to consider in the Jiboa River case, beyond infrastructure works (e.g. levees), which might be only a stopgap measure or even produce other types of problems (see Box 1).

Recommendations include, among other things, that planning should include aspects such as monitoring and maintenance of the principal channels, enabling spillways to deal with extreme events, installation of flood retention basins in front of the coastal barrier and enabling outlet channels, along with consideration of the river mouth area as a special protection area.

At the same time, to aid the STP with drafting of the Development Strategy for the Coastal Marine Area and the FOMILENIO II program

included 20 classroom hours, 12 practical hours and field trips to the two rivers chosen for this exercise (Jiboa and Angue). Training topics included: i) changes in rivers from anthropogenic causes and flooding; ii) GIS techniques and prediction of migration rates; iii) riverbank management and restoration; and iv) morphodynamics of a river-beach complex under anthropogenic constraints.

⁸ From MAG: a technician from the Watersheds Unit. From MOP: two representatives from the Directorate of Climate Change Adaptation and Strategic Risk Management. From MARN: technical staff from the Environmental Observatory, Hydrology, Land Use Planning, Evaluation and Fulfillment, and other departments. The course

proposal for the coastal area, MARN sought a specialist in analysis of coastal area sedimentation and erosion, both to define the research methods and procedures that should be used and to identify the types of structural and non-structural interventions that can be carried out in zones of greater erosion or sedimentation impact (see Box 2). The study done by the expert Ridel Rodríguez about El

Espino Beach (Usulután Department) is a key input for the planning of investments anticipated in the FOMILENIO II program. The objective of this research study was to determine the magnitude of erosion processes at El Espino Beach, the possible causes and the areas under the greatest threat, as well as possible solutions to address these problems,

Box 2. Causes of Erosion

Studies done around the world have found a wide variety of causes that produce or intensify erosion processes in coastal areas. Among the main causes are the construction of river dams, which can drastically reduce the quantity of sediment that reaches the coast, producing severe erosion in beach areas.

In contrast, deforestation, agriculture and open-air mining, which occur in interior regions in countries, can increase the quantity of sediment reaching the coast. Transport patterns and rates of replenishment of sand and sediment to the coast can be altered, in addition, by the construction of dikes and breakwaters, which can produce changes in the coastline, until once again it reaches an equilibrium configuration.

Another important cause is population growth and the development of tourism in coastal areas in an increasingly narrow strip, with the occupation and destruction of dunes and coastal vegetation and substitution with exotic species and local crops. Extraction of sand from dunes and beach berm to use in construction, as well as dredging on the shelf to obtain sand, have been frequently practiced in the majority of riparian states in the world and still persist. The imbalance caused by this activity, in most cases, cannot be corrected, due to the lack of replenishment material from the producing river basins.

But the problems of erosion affecting the beaches and coasts of the world are not only the result of human interference in coastal ecosystems, but also of natural factors. Important among these natural factors are high energy waves associated with extreme hydrometeorological events, very particularly tropical storms and hurricanes, which, according to several studies, are becoming increasingly intense, large and frequent. In other cases, these waves are related to changes in sediment transport due to changes in general ocean circulation patterns from different causes.

Elevation above sea level, associated with climate change, is another natural factor that influences the intensification of erosion. Brunn (1988) shows that with changes in sea level, the beach profile tries to gradually adapt to the conditions, seeking an equilibrium configuration. These changes in the morphology of the profile require an additional quantity of sedimentation, which, if not obtained by a net input of sand into the profile, is then extracted, eroding the beach.

Tectonic processes are another important factor. With changes in sea level produced by tectonic activity, the beach tries to gradually adapt to the new conditions, seeking an equilibrium configuration, just as what occurs with elevation above sea level. In the case of uplift, this requires an additional quantity of sediment, which, if not obtained by a net input of sand to the profile, is then extracted, thereby eroding the beach.

In the case of the Salvadoran coast, there are no specific studies on the process of erosion of its beaches and coastline in general. However, according to observations, it seems to be a generalized phenomenon along coastal beaches, closely related to the occupation of coastal areas and infrastructure development without considering the dynamic idiosyncrasies of these ecosystems.

Extract of the report: Study of Erosion and Sedimentation Processes at El Espino Beach, El Salvador

aspects that constitute fundamental elements to be considered in land use planning.

According to Mr. Rodríguez's study results, the most important causes of erosion at El Espino Beach appear to be:

- **The dynamics typical of barrier islands.** Barrier islands tend to be active and even ephemeral, migrating constantly, at times widening and at others growing narrower.
- **Construction of all types on the beach.** The construction of structure and walls on the beach has increased the magnitude of erosion. Wave energy does not dissipate by running over the face of the beach, but rather by extracting sand from the beach upon hitting the structures.
- **The effect of extreme hydrometeorological events.** The high energy surf associated with extreme events has greater erosive potential from hitting structures with greater force and from travelling farther inland.
- **Elimination of natural vegetation.** Natural vegetation contributes to retaining finer sediment, which would otherwise be lost, as it is not stable at the usual energy levels of the beach.
- **Decrease in sediment supply from the Lempa and Grande de San Miguel rivers.** With the construction of the dams on the

Lempa River and irrigation systems on the Grande de San Miguel River, less sediment can arrive at the coast than that which is lost as a result of the dynamic activity of the area. In addition, sand is mined from the riverbeds.

- **The hydrodynamic regimen of the Salvadoran coastline.** During spring tides, waves penetrate tens and hundreds of meters farther inland, increasing the erosive power of the waves.

The study showed that if the current dynamics continue, within 30 years there will be a decrease in the coastline in El Espino, with an inland advance of 105 m from where the beach line currently is. Given the scale of the erosion, the study's principal conclusions point out that the processes of erosion and sedimentation are primarily the result of anthropogenic actions and that the effectiveness of measures to address the situation will depend, to a large extent, on an effective legal and institutional framework. The primary recommendations are to: i) expand the number of monitoring stations to study the morphodynamic processes in greater detail; ii) create a legal and institutional foundation for management of the coastal marine area from a development perspective, iii) ensure opportunities for conservation and buffering of resources; and iv) use native vegetation as the primary option to control erosion (see Box 3).

Box 3. Key Aspects for a Regulatory Framework

The biggest drawbacks of 'hard' solutions are their negative impacts on the landscape and restrictions on recreation and navigation, in addition to frequently extending the problem of erosion to other areas of the coastline (Figure 1). Significant ecological damage is often caused in surrounding ecosystems, especially when these structures are oversized or are placed in sensitive ecological areas.

The implementation of the actions referred to above will not be enough if they are not coupled with the development and implementation of regulatory measures. This regulatory framework should include, inter alia, the following aspects:

- Establish minimum distance for construction on coastal land, taking into account annual rates of retreat.
- Promote building on stilts, taking into account the maximum flood level.
- Establish an area under public domain of variable width according to the type of coastline where development will not be allowed, except structures that are lightweight, demountable, and do not involve permanent occupation of the coast.
- Restrict projects involving lodging or housing in the flood zone for equinoctial spring tides and extreme hydrometeorological events.
- Establish a 30 m minimum buffer zone around rivers, streams, estuaries, creeks and other waterways and promote reforestation projects to restore gallery forests.
- Avoid using 'hard' solutions (jetties, breakwaters and walls) as an alternative for coastal protection.
- Encourage the use of 'soft' and non-structural solutions on the beach and coastal areas (artificial sand supply, reforestation and relocation of facilities).
- Regulate extraction of aggregates (sand, gravel and pebbles) in river basins that replenish sediment directly to the coast. As an indispensable requirement for new use, require mined areas to have been rehabilitated, including restoration of the gallery forest.
- Encourage urban and tourist developments to be built in the form of a wedge, fanning out toward the shore, ensuring buffer areas on both sides and natural landscape conservation.
- Establish conservation areas in the nesting areas of turtles and other species of national, regional or international importance.
- Ban vehicle traffic on beaches, including public beaches.
- Ban removal of natural vegetation in public areas, including sand dunes.
- Ban sand mining in beach zones. Extraction shall be permitted only on the continental shelf in areas that are not natural supply sources for neighboring beaches or for the recovery or improvement of the beach itself.
- Promote projects to restore the public coastal area, which should be designed according to the type of coast.
- Promote community conservation organizations focused on environmental education and environmental rescue of beaches, mangroves and other degraded coastal ecosystems.
- Encourage the development of reforestation projects in beach and mangrove areas using species from these ecosystems.
- Ban wastewater disposal in beach areas and coastlines where currents wash it ashore. Arrangements that are authorized must meet the quality requirements established in current law.
- New development projects must authorize wastewater collection, disposal and treatment, and solid waste collection and disposal.

Extract from the report *Study of Erosion-Sedimentation Processes at El Espino Beach, El Salvador*.

The coastal area of El Salvador is very complex and sensitive. Multiple objectives intersect there, many of which are in conflict. The speed at which coastal development is progressing, with major investments such as tourism, logistical infrastructure,⁹ agro-industries, and the start-up of the FOMILENIO II program, combined with particular susceptibility and exposure to natural phenomena, has made it clear MARN needs to have more effective instruments at its disposal to mainstream risk management, vulnerability reduction, and adaptation into development processes in the coastal marine area, and more generally into public administration.

Specifically for this reason, MARN sought the counsel of Dr. Maria Rosário Partidário to strengthen the methodology of the Strategic Environmental Assessment (SEA), give that use of this tool in El Salvador is relatively recent¹⁰ and it is often done through primarily descriptive studies with few conclusions to support the decision-making process. The SEA should generate clear guidelines, both for investors and for the design of other management tools such as project evaluations (Environmental Impact Assessment – EIA). The current perception is that the EIA is a mere requirement for the approval of projects, particularly with regard to public hearings. However, this situation should change gradually. Thus, in the national context, the idea is to turn the SEA into a key tool able to influence development and discussion of strategies for action and support on general development options while they are still on the table. From MARN’s perspective, the main challenge is to lay the groundwork for institutionalizing SEA processes.

During her visit, Dr. Partidário carried out a series of exercises with MARN directors and staff (see Boxes 4 and 5), based on two specific SEA examples: i) the Northwestern Area Development Program, and ii) the Development Strategy for the Coastal Marine Area. In each of these cases, the following steps were followed:

Phase 1 - *Strategic focus and context*, aimed at selecting the object of the assessment, understanding the main issues, and identifying critical factors, driving forces, and relevant stakeholders. Tools used during this phase included the Institutional and Strategic Chart, Problem Chart, and Critical Factors for Decision-Making.

Phase 2 - *Possible routes toward sustainability*, in which strategic scenarios and options are presented and trend analysis is carried out while assessment guidelines are determined.

Phase 3 - *Follow-up*, which includes monitoring strategies, and the design and implementation of instruments, such as post-assessment studies.

In addition, a critical review of previous SEAs in the country (Mining, Biofuel, Energy Policy, FOMILENIO I) enabled a number of

⁹ Particularly with the imminent opening of Cutuco Port in La Unión Gulf of Fonseca).

¹⁰ Although this has been included in the Environmental Law since 1998, the first concrete cases did not arise until 2008.

important aspects to be identified for future consideration.¹¹ In the case of the Development Strategy for the Coastal Marine Area, the key recommendations were oriented toward: i) developing a consensus view of the coastal marine area; ii) ensuring creation of an effective governance framework, including all key stakeholders; and iii) adopting parallel processes to develop and implement the Strategy and for implementation and follow-up of the corresponding SEA, ensuring both processes are interacting and systematically linked.

The success of Dr. Partidário’s advice was seen when the Technical Secretariat of the Presidency (STP) agreed to put the FOMILENIO II proposal through an SEA. Actually, following an initial visit, the advisor visited the country on other occasions at the request of the STP, to facilitate the process of preparing the FOMILENIO II SEA, done by the “core group”¹² (an interdisciplinary group created to prepare the FOMILENIO II proposal). Nonetheless, this process has not been easy, precisely because it requires going far beyond bureaucratic procedures, to evaluate sensitive issues related to the consequences of development, which has to take place within the short time before the deadline for applying for Millennium Funds.

Box 4. SEA Strategic Focus (in progress)

VISION FOR THE DEVELOPMENT STRATEGY FOR THE COASTAL MARINE AREA: **Restoration and inclusive and sustainable exploitation of productive coastal marine ecosystems.**

Productive ecosystems are the foundation for the development strategy for the mangrove coastal marine area–relationship between mangrove ecosystem and fisheries.

Six poles of tourism development, based on basic infrastructure (hotels, restaurants, roads, etc.) and natural attractions (beaches–mountains).

CRITICAL FACTORS FOR DECISION-MAKING:

1. **Productive ecosystems (ecosystem services)**
2. **Local economy, in-territory human capital and sanitation**
3. **Safety and risks**
4. **Governance**

PRESSURE ON RESOURCES

Private investment demand
Housing developments
Expansion of agricultural frontier
Loss of open access beaches
Shrimp farming and salt works

Money laundering
Massive sand mining
Cross-border conflicts in the Gulf of Fonseca

DRIVING FORCES

¹¹ Reflections on the preceding processes include: i) evolving from being descriptive to a more strategic focus; ii) the need to work more on scenarios using future environmental and social conditions, based on vetted policies; iii) SEA needs to be seen as an instrument for socio-political and institutional exchange, and as a platform for discussing strategic options; iv) promote training and capacity-building at different levels; and, v) set up follow-up mechanisms.

¹² The “core group” initially comprised specialists from several ministries, including MARN, Ministry of the Economy and Ministry of Public Works, working directly under the Technical Secretariat of the Presidency.

Expansion of sugarcane INSECURITY Drug-trafficking, gangs, extortion	Organizations of Salvadorans abroad Municipal commonwealths Large private investors	
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A new policy and moving toward a new institutional structure

Due to the impact from growing extreme weather events El Salvador, the government, and MARN in particular, have taken on a more active role in environmental management and in public policy-making, to reduce the population's risk and vulnerability to the effects of the climate. The policy role that MARN has taken on has made it clear that it is important for the Ministry to move forward rapidly in two directions: institutional reorganization¹³ and implementation of the National Environmental Policy¹⁴ (NEP), institutionalizing its interactions with other government agencies in order to secure the political-legal support that is required to position the issue on the policy agenda of all sectors in the country.

¹³ The work of one of the experts hired with CDKN support was to "conduct an assessment and prepare an organizational design proposal for the Ministry of Environment and Natural Resources that ensure mainstreaming of adaptation to climate change" (TOR, 2011). The results of this analysis served specifically as the basis for the ensuing support provided to MARN as part of CDKN's cooperation ("Proposal for Strengthening the Environmental Management System in El Salvador," May 2012).

¹⁴ According to the Environmental Law of El Salvador (ELES), the National Environmental Policy must be approved by the Council of Ministers of the Government of El Salvador and be updated at least every five years. However, since it was first approved on 21 September 2000, the policy had not been updated until the present administration.

Box 6

The Environmental Law established the National Environmental Management System (SINAMA) as a public environmental management coordinating mechanism, whose purpose is "to establish, operate and maintain in public sector agencies and institutions the principles, standards, programming, direction and coordination for State-run environmental management." To this end, it provides that "the particular responsibility of senior management of each public sector agency or institution is the establishment, implementation and monitoring of environmental management" (ELES, Art. 6).

Activation of SINAMA is an outstanding debt, and is essential for implementing the 2012 National Environmental Policy and furthering its objectives. Therefore, the authentic activation of SINAMA requires that the highest authorities in each ministry, autonomous agency and municipality fully recognize and accept, as required by the Law, that environmental management is the responsibility of all, not just MARN, which does have responsibility for coordinating SINAMA.

To comply with the Environmental Law under this approach, all ministries, municipalities and autonomous institutions should have environmental units that make up the SINAMA operational level. The units respond directly to senior management of each entity or institution. The person responsible for each environmental unit should have the ideal profile to ensure that environmental management becomes a true cross-cutting theme in the work of each agency. This will integrate the environmental dimension into public policies, plans, programs and projects from their inception, and throughout their implementation, without involving the creation of large structures.

(Extract from the National Environmental Policy, section 7, p. 30)

After a consultation process the year before, the NEP was publicly launched on 6 June 2012, to coincide with World Environment Day.¹⁵ This policy has a steering role over other sectoral policies, since according to the Law, it "should guide the actions of public administration at the central and municipal level in the implementation of development plans and programs" (ELES, Art. 3). The stated overall goal of the policy is "to reverse environmental degradation and reduce vulnerability to climate change." This raises priority lines of action, including the "restoration of degraded ecosystems and landscapes." For the first time, it calls for "climate change adaptation and risk reduction" (NEP, p. 3).

Compliance with the NEP requires effective links between MARN and the different levels of central and local government, and even private enterprise and civil society. At the

governmental level, this clearly represents an institutional challenge, as it involves moving away from sectoral management and operating in an integrated manner to ensure consistency and the integration of the NEP's objectives into different management instruments (policies, plans, programs and projects). To this end, the NEP calls for activation of the National Environmental Management System (SINAMA). (see Box 6)

However, the challenge of governmental inter-institutional coordination, and coordination among the public sector, private sector and civil society, was demonstrated in concrete actions. This is evident in the implementation of a reconstruction and rehabilitation plan following TD12-E.

The National Program for Ecosystems and Landscape Restoration (PREP)

¹⁵ CDKN actually supported the public event to launch the National Environmental Policy, lead by the President, as well as publication of a summarized version of the Policy in one of the national newspapers

with greatest readership. The presentation of the NEP is a preparatory and inescapable step making ready for eventually creating the NSCC, given that this focuses discussion on the country's environmental issues and its extreme vulnerability in the face of climate change.

The National Program for Ecosystem and Landscape Restoration (PREP) is the leading MARN program, through which it seeks to contribute to the objective of the National Environmental Policy of reversing environmental degradation and reducing vulnerability to climate change. This program is considered key for reorienting many existing efforts within MARN, and for developing concrete ways to incorporate climate change considerations into the design of policies and programs in other Salvadoran government institutions, and at multiple levels (local, regional, national), through a massive effort to restore the country's main ecosystems and landscapes.

Ecosystem and rural landscape restoration is a strategy for climate change adaptation that allows for mitigation co-benefits, hence the name adaptation-based mitigation (AbM) approach. This consists of the functional restoration of ecosystems and linking of all actors and activities in a landscape to scale up into the wider territory. In addition to its social and environmental benefits, PREP seeks to improve biodiversity and social resilience, taking into account that the restoration would respond to various international commitments in the Framework Convention on Climate Change and the Convention on Biological Diversity, among others. Under this approach, the actions do not seek to maximize forest cover, but to modify agricultural practices,

combining agroforestry with other sustainable agriculture practices, transforming ecosystems and contributing to landscape restoration.

CDKN support made possible the visit of Steve Brescia and Jacqueline Chenier, experts from Groundswell International. They carried out a series of meetings and field visits to identify the main problems and solutions in each of the priority areas (see Box 7), accompanied by the MARN team responsible for PREP implementation and territorial stakeholders from the program's priority areas (La Montaña, Cinquera and the Lower Lempa).

This consultancy resulted in preparation of the report "Recommendations for Promoting and Scaling-up Sustainable Agriculture for Small Farmers for the PREP in El Salvador." The report identifies a number of key elements, including strengthening local opportunities for dialogue and the importance of implementing strategic public investments. It also proposes several options to facilitate the shift from conventional agriculture, for example: i) farmer innovation (soil conservation, seeds, pest control); ii) farmer-to-farmer learning; iii) facilitate access to markets; iv) communication campaigns; and, v) incentives (credit and capitalization, awards for best practices, differential pricing, organic input packages, etc.).

Box 7. Summary of Problems and Solutions in La Montaña

According to studies by PRISMA, the causes of degradation in the forested mountain area of La Montaña are:

1. Fire and uncontrolled burning that degrade the forest and soil.
2. Deforestation throughout the entire area.
3. Lack of environmental awareness.
4. Presence of livestock in the forest.
5. Excessive use of chemicals with consequent contamination of waterways and land degradation.
6. Mismanagement of solid and liquid waste in the different river basins.
7. Hunting and loss of biodiversity.
8. Extraction of fuel from pitch pine (*ocote*) that damages trees and leaves them prone to weevil infestation.
9. Fishing with poison.
10. Weevil infestation in pine forests.
11. Extraction of river material (rocks and sand).

Actions identified as causing the most damage:

- Wildfire.
- Change in land use to conventional farming activities.
- Change in land use to unsustainable livestock grazing.
- The absence of clear, legal responsibility for natural resources, and land tenure (the high level of leasing is an obstacle to investment in sustainable agricultural practices, including soil conservation and diversification).

Other actions listed include illegal logging, forest pests, conflict and internal organizational weaknesses in shared land-holding associations. There is also a lack of information, policies and resources to implement management plans. In contrast, actions that contribute the most to protection of La Montaña are:

- Organization of the civilian population and efforts to control fires.
- The establishment of oversight committees.
- Coverage by rangers.
- Receipt (recently) of two GEF grants for maintenance of La Montaña.

Extract from the report "Recommendations for Promoting and Scaling-up Sustainable Agriculture for Small Farmers for the PREP in El Salvador"

It is crucial to note that adaptation as a priority and rationale will dictate the *what*, *where* and *how* of promoting this process of "revegetation" of the landscape over time and in space, and that this process will contribute to mitigation and not vice versa. Consequently, this AbM approach aims to generate a reduction in CO₂ emissions by reducing emissions from all land uses, including agriculture and other uses that are embedded in the wider landscape. This is especially important in El Salvador, given the

relatively high population density, low forest cover, and the preponderance of landowners who are small farmers.

In order to be effective, the PREP requires a "new way of working" both within the sphere of government and at territorial or landscape levels, to facilitate the massive and coordinated mobilization of local farmers, governments and organizations. As a consequence, the PREP promotes innovation, contributes to interagency coordination, and

uses financial mechanisms to ensure its viability. The Program includes a broad range of actions over the medium term to transform practices, approaches and types of development that deepen human and biophysical exposure and susceptibility to the impacts of climate change.

There are two priority lines of work for the initial phase of PREP: i) efforts to attain high-level inter-ministerial political agreements; and ii) the roll-out of actions in three specific areas with demonstrative value that are representative in terms of the challenges of adaptation and, in turn, have sufficient social, productive and organizational capital to show short-term results. While the first line of action has been led by the heads of MARN and has made significant progress, the second is supported by different institutions and local stakeholders, including MESPABAL (the Lower Lempa stakeholders group), PRISMA and others. In addition, specialized technical studies are being done on, for instance, sugarcane production and its value chain, and advisory services to scale up alternative agricultural practices among small farmers, provided by Groundswell International. Although the results of regional efforts cannot be measured in the short term, they are becoming a cornerstone for a new way of interacting at different scales, something that is essential to adaptation to climate change.

Implementation of the PREP is facing significant institutional challenges, especially considering that MARN is not a ministry with operational capabilities, which other ministries have. For this reason, PREP implementation requires leveraging MARN's own institutional capacities and linking them together with those of other government agencies, such as MAG, and also with existing local and territorial capacities. In essence, this

represents the change in the way of managing the territory that the PREP is promoting.

Intertwining other governmental climate change efforts in El Salvador

Undoubtedly, the impact of extreme weather events has influenced the type of public policies designed to respond to the new context of climate change in the country and in the region. During 2011, there were significant advances, particularly in new policy design and in strengthening coordination between MARN and other ministries, including Agriculture, Public Works and the STP. This has contributed to greater consideration for aspects of climate change and vulnerability reduction in the interventions originating from these institutions. Furthermore, with the creation of the Secretariat for Vulnerability in January 2011, it became clear that the Executive Branch is interested in addressing these issues.¹⁶ Overall, it is expected that this Secretariat will become the main office responsible for actions to prevent and address vulnerability from events caused by natural phenomena and human activity, promoting a strategic and inclusive approach to risk management. In practice, progress has been limited and there have been no advances other than those achieved through the Ministry of the Interior's Directorate General of Civil Protection, aimed primarily at health issues and emergency response.

The Ministry of Public Works (MOPTVDU), in search of more effective responses, raised the need to develop a strategy to reduce the impact of weather events on infrastructure, while making it possible to move from emergency to adaptability. By that logic, the Directorate for Adaptation to Climate Change and Strategic Risk Management (DACGER)

Affairs, Secretariat for Communications, Secretariat for Social Inclusion, Secretariat for Culture, and Private Secretariat.

¹⁶ The other Presidential Secretariats are: Technical Secretariat, Secretariat for Strategic Affairs, Secretariat for Legislative and Legal

was created, with the mission to *“prepare technical and scientific studies to adapt social and productive infrastructure to climate change; design and propose mitigation works as a precautionary measure, to reduce vulnerability and the impact on social and productive infrastructure”* (MOPTVDU, 2011). This Directorate reports directly to the minister and has four sub-directorates: bridges and overpasses, drainage, geotechnics and technical studies.¹⁷

While the main thrust of MOPTVDU focuses on reducing the impacts associated with weather events on the social and productive infrastructure, which is reflected in the concept of “climate change proofing,” it is noteworthy that in a short time there has been a significant shift in strategy. The MOPTVDU approach has now incorporated the role of “gallery forests” in protecting infrastructure, recognizing the importance of combining physical and natural infrastructure. This is relevant in terms of the joint initiatives between this ministry and MARN, particularly on two of the NEP 2012 priorities (inclusive restoration and conservation of ecosystems, and climate change adaptation and risk reduction). In practice, this coordination may come about through the actions included in the PREP.

For its part, on June 15th the Ministry of Agriculture and Livestock (MAG) presented the Environmental Strategy for Adaptation to and Mitigation of Climate Change for the Agriculture, Forestry and Aquaculture Sector, which has the Family Agriculture Program (PAF) as its general framework. Tropical Depression 12E decimated what had been anticipated as a record basic grain harvest

following full implementation of the PAF. In response, at the request of the Minister of the Environment and Natural Resources, President Funes recommended that the government ministries place greater emphasis on addressing the issue of climate change. In this context, MAG created a task force made up of the Office of Sectoral Policy and Planning, Office of Phytosanitary Regulation, Rural Development Office, Forest Planning Office, CENTA and CENDEPESCA (agencies that were in charge of developing the policy, and had the support of MARN staff during the process).

The MAG strategy, considered to be a complement to PAF and a mechanism that helps ensure better implementation of this program, promotes the need to transform agricultural practices in terms of improvement and environmental sustainability of natural resources.¹⁸ Its specific objectives are to: i) promote knowledge management to mainstream environmental actions in production processes; ii) reduce vulnerability to disasters in rural areas; iii) design adaptation and mitigation plans geared towards food security; iv) contribute to the sustainability of the PAF; and v) implement environmental management at all levels of MAG (MAG, 2012). At the institutional level, the Strategy envisages the creation of a Climate Change Division within MAG, which would be under the Directorate of Forestry, Watersheds and Irrigation.

Advances in public policies that address climate change issues have also reached the education sector. In May 2011, Legislative Decrees 714 and 715 amended the Education

¹⁷ According to information from MOPTVDU, DACGER works on progress in the following areas: i) Review and updating of design standards; ii) Assessment of environmental, infrastructure, and human vulnerability; iii) Micro-zoning of vulnerability and risk using georeferenced maps; and iv) Infrastructure reinforcement (MOPTVDU, 2012).

¹⁸ Its strategic priorities are: i) capacity building, ii) innovation and technology transfer, iii) inter-institutional cooperation, iv) institutional strengthening, v) communication, and vi) civic engagement.

Law and Higher Education Law. Their purpose was to include teaching of issues related to risk management, mitigation and adaptation to climate change in the entire education system. At the same time, they mandated that all universities must include subject matter on the impacts and adaptation to climate change in their curricula, research and community outreach.

Since late 2011, the Ministry of Education (MINED) has been developing the Education Plan on Climate Change and Integrated Risk Management 2012-2022, with support and assistance from MARN throughout the process. The central objective of the Plan aims at capacity building for awareness, communication and training in the public education system to contribute to reducing vulnerabilities. In this context, through the CDKN initiative for El Salvador, Dr. Manuel Iturralde came to the country. This specialist was responsible for reviewing and analyzing

the Plan in conjunction with a MINED task force. The main results of this consultancy were: i) a proposed Action Plan to implement the Education Plan (see Table 3); ii) prioritization of strategies and actions to be implemented in the medium term (2014);¹⁹ iii) design of a Comprehensive Risk Management Action Plan with a focus on Climate Change, identifying government agencies and other stakeholders for implementation and the possible budgetary implications of its implementation; and iv) capacity building in MINED, including creation of a team that was responsible for monitoring and evaluation of this Plan, and the continuation of coordination with MARN. In addition, materials from the "Learning to Protect Ourselves" series were reviewed, which will be edited. In addition, it is expected that the "Learning to Protect" series will be created further on, with support from MARN as well.

¹⁹ The Education Plan on Climate Change and Integrated Risk Management initially identified 12 priorities, but only four have been selected for the Action Plan: i) expansion of the curriculum to include issues related to integrated risk management with emphasis on

climate vulnerability; ii) professional development for teachers, through training programs at the Escuela Superior de Maestros; iii) improving school facilities, in coordination with Public Works (MOP); and iv) increased interaction with the community by expansion of the Inclusive Full Time School model.

NOTE: x Start of activity; ≥ Continuation of activity

NO.	TASKS IN THE ACTION PLAN	2012	2013	2014	+2015
1	Government core funding for Plan implementation	X	≥	≥	≥
2	Appoint (by hiring) a specialist to manage the National Coordination Front	X			
3	Search for non-government funding	X	≥	≥	≥
4	Mass media publicity program on the Education Plan and its objectives	X	≥	≥	≥
5	Analyze and evaluate problems linked to school infrastructure with legal authorities, for solution by communities or municipal agencies.	X	≥	≥	≥
6	Propose the My Safe School initiative to the College of Architects and Engineers of El Salvador, to begin to take action at selected schools, depending on availability of resources and donations obtained, on a case-by-case basis.	X	≥	≥	≥
7	Implement curriculum expansion and extra-curricular activities, through the <i>Learning to Protect Ourselves</i> series. Start where the Integrated Full Time System is up and running and in these same schools incorporate other initiatives such as Plant America with a focus on restoring environmental health as a way to reduce natural hazards.	X	≥	≥	≥
8	Train teachers nationwide through self-study guides that accompany the <i>Learning to Protect Ourselves</i> series and other materials that will be developed. In addition, plan short courses and a certificate program in the Escuela Superior de Maestros, especially on the issue of integrated risk management, with emphasis on coping with climate change and climate threats, while addressing other environmental, health, geological, technological, social, etc. threats.	X	≥	≥	≥
9	Gradually complete the printing and distribution of the necessary study materials for teachers and students until national needs are met.		X	≥	≥
10	Conduct the first national evaluation of the effectiveness of the Education Plan and Action Plan. a) Audit of the proper use and distribution of funds. b) Monitor school infrastructure projects. c) Determine the effectiveness of the Education Plan in the educational community through surveys, surprise visits to scheduled activities, and other available procedures covering the community or municipality where the Plan is implemented.			X	
11	Assessment of the results from the national evaluation and design of measures for improvement of the Education Plan and ACTION PLAN.			X	
12	Publicize and implement the results of the national evaluation.			X	
13	Gradually scale up the Integrated Full Time System and Education Plan to include all schools in the country.				≥
14	Conduct a National Evaluation every two or three years including actions resulting from it, as follows: a) Audit of the proper use and distribution of funds. b) Monitor school infrastructure projects. c) Determine the effectiveness of the Education Plan in the educational community through surveys, surprise visits to scheduled activities, and other available procedures covering a representative sample of the municipalities where the Plan is implemented.				≥
15	Apply the results of each national evaluation and redesign measures to improve the Education Plan.				≥

Given the magnitude of the impact of extreme weather events (in particular, the recent TD 12E), governmental finances have been gravely affected due to the need to allocate substantial resources to rehabilitation and reconstruction.²⁰ Likewise, according to IDB projections, the fiscal impact of this event could be almost US\$575 million over the next five years. This could involve an increase in the deficit unless measures are taken to increase tax revenue, efficiency in tax administration, and adequate oversight of public spending, favoring investments that contribute to reducing vulnerability to climate change (IDB, 2011). Given this scenario, on 25 April 2012 the Legislative Assembly of El Salvador approved a US\$200 million IDB-backed loan, which will be used to finance the Comprehensive Fiscal Sustainability and Climate Change Adaptation Program.

This initiative's principal objective is to *"contribute to fiscal sustainability and adaptation to climate change through reduction of physical and natural vulnerability in the country,"* which is to be achieved through four basic components: i) macroeconomic stability; ii) fiscal sustainability; iii) institutional structure; and iv) resilience and adaptation (BID, 2011). With implementation of this program, financial

support is expected for processes that are already in place at different levels of government (e.g., PREP, Climate Change Strategy for the Agricultural Sector, DACGER, and others). To this purpose, a Committee on Climate Change for Fiscal Sustainability is being created, which will be composed of the heads of the Ministries of the Environment and Natural Resources, Public Works, Agriculture, and Treasury.

According to the recently approved NEP, as a result of budget constraints and debt, El Salvador needs to prioritize raising climate funding by means of foreign grants, through innovative proposals that support the various components of a national climate change plan (MARN, 2012). Following this rationale, MARN, the Ministry of Foreign Affairs and the President of the Republic are coordinating actions aimed at establishment of an Inter-Agency Committee on Climate Finance, which would bring together 13 government institutions. At the same time, the Environmental Fund of El Salvador (FONAES) is being redefined to operate as a financial instrument for channeling foreign non-repayable climate grants for which El Salvador could apply.

Reflections on the Scope of the Process, Challenges Ahead and Lessons from El Salvador

Scope of the process and challenges ahead

Although it is premature to gauge the impact of new policies, programs and initiatives related to climate change, it is clear we are blazing new trails in establishing coordination mechanisms for a National Strategy on Climate Change. The most important indicator in this regard is the very formulation of the National Environmental Policy (NEP) and its approval by the Council of Ministers. This reaffirms that "severe environmental degradation and increased vulnerability to climate change represent the central issue to be addressed by the National Environmental Policy 2012" (MARN 2012a). The viability of a national strategy requires coordinated action among the various agencies of the government, and it is precisely for this reason that the NEP proposes the reactivation of the National Environmental Management System (SINAMA) to ensure progress toward the goals therein.

Additionally, in light of international commitments related to climate change, MARN is in the final stages of preparing its Second National Communication on Climate

Change (NCCC), which includes an inventory of greenhouse gases and an update on the institutional climate change context. Furthermore, MARN plans to include vulnerability studies and a draft of the National Climate Change Plan as part of the Second NCCC, which will be presented to the Conference of the Parties COP18 in Qatar this year.

As stated in the NEP, the main effort for any National Strategy on Climate Change (NSCC) is "to reverse environmental degradation" in order to "reduce vulnerability to climate change." This means initiating a determined restoration effort, which has been provided for in the ministry's flagship program, the National Program for Ecosystem and Landscape Restoration (PREP), which is already in its startup phase. Making this ambitious program possible requires MARN entering into political agreements at the inter-ministerial and territorial levels; but it also means having significant funds to facilitate this massive transformation. For this purpose, MARN is actively promoting linking PREP to international goals and commitments, for instance the Bonn Challenge,²¹ REDD+²² and the 2020 Aichi Targets,²³ to name a few.

²¹ The Bonn Challenge refers to a commitment launched on 2 September 2011, in Germany, at a ministerial roundtable. It involves restoring 150 million hectares of degraded land worldwide by 2020. During the Rio+20 Earth Summit, the first signatories and commitments were announced totaling more than 18 million hectares, which represents more than 10% of the 150 million hectare goal set by the Bonn Challenge.

²² REDD+ refers to efforts to reduce emissions from deforestation and forest degradation (REDD) and to promote conservation, sustainable management of forests and enhancement of forest carbon stocks (+) through financial incentives. Discussions on REDD+ mechanisms arose as a result of international interest in the development of new policies to reduce deforestation and forest degradation rates, as they represent approximately 20% of greenhouse gas emissions.

²³ During the tenth meeting of the Conference of the Parties to the Convention on Biological Diversity (CBD), the following were adopted: The Strategic Plan for Biodiversity 2011-2020 and the 2020 Aichi Biodiversity Targets. As noted in a paper by MARN, PREP "shows great consistency with the 2020 Aichi Targets"; in particular, it notes Target 15, which calls for restoration of at least 15 percent of degraded ecosystems in the world by 2020. It further notes Targets 5, 7, 11 and 14, relative to reduction of deforestation and fragmentation of ecosystems, adaptation of productive activities to sustainable processes, management of rural landscapes, and conservation and restoration of ecosystems, respectively (MARN 2012d).

Other ministries have had as many advances as challenges. The most significant progress has been in MAG, MOP and MINED, where inter-institutional coordination has been the most stable. However, continuous coordination and support from MARN is needed, particularly to further understanding and implementation of full-scale sustainable agriculture, put forward by MAG, and committed green infrastructure, by MOP. Undoubtedly, the most important development (exemplary at the global level) is that being undertaken by the Ministry of the Treasury (MH), which explicitly included climate adaptation as one of the major concerns for development of the national budget. A national priority confirmed in the 2013 Budget Policy is: "Halting environmental degradation and promoting climate change adaptation"²⁴ (Ministerio de Hacienda, 2012).

Although there has been success in making the issue a national budgetary concern and in mobilizing financial resources for emergency and rehabilitation activities in response to impacts of extreme weather events, the necessary resources are still not available. For example, while the Education Plan on Climate Change is well polished, there are no funds to implement it yet. Similarly, PREP anticipates a massive restoration effort, which will require significant funding to carry out.

Even in the event that external financial resources were to actually become available relatively quickly, they would still fall short, since coordination efforts are aimed at state agencies internally, with little connection to social and/or territorial stakeholders (with some exceptions). This is a critical policy element for at least two reasons: first, they involve construction processes that require the broadest possible social support; and second,

a significant number of the efforts require the full involvement of producers, municipal governments and communities in the agricultural sector, as outlined in PREP and the Environmental Strategy for Adaptation to and Mitigation of Climate Change. Therefore, tools and mechanisms need to be developed to ensure informed, coordinated and consensual interactions between the territorial and national levels, thus promoting innovation and learning processes at different scales (communities, local governments, unions, ministries, etc.). *Given their nature, these capacities require time, as they are actually processes that come to fruition over the long term.* Thus, a balance is needed between financial management and strengthening capacities and processes to progress in the short range with a long-range perspective.

Even though most efforts are still in the final stages of design, and/or have just begun implementation, together they represent an innovative framework for responses to climate change impacts. But it is essential for other policy frameworks to also be reworked to integrate the environmental dimension in general and climate change in particular, especially given their ability to have a direct impact on social and environmental vulnerability, as could occur with sectoral policy frameworks (promotion and development of tourism, expansion of the power grid, investment attraction and export promotion, promotion of infrastructure and logistical services, among others).

This is particularly relevant, especially considering that these are the sectors in the sights of new programs and policies that seek to overcome structural constraints to economic growth in El Salvador. The new context resulting from the Partnership for Growth, the

and adaptation to climate change" (Ministerio de Hacienda, 2012). This confirms that budget support is anticipated both for the establishment of SINAMA and for PREP, two pillars of a truly national strategy for tackling climate change.

²⁴ The 2013 Budget Policy also states the short-term need to: 36 Promote integration of the national dimension and adaptation to climate change in Executive Branch institutions"; and "Further national programs that contribute (...) to ecosystem restoration (...)

Development Strategy for the Coastal Marine Area and FOMILENIO II seeks to overcome constraints to economic growth and promote and attract new investment. Depending on the nature and policy frameworks that regulate these investments, they could contribute substantially to reducing risk and vulnerability; or conversely, they may further exacerbate them. While the current process of developing a climate change strategy and plan is using innovative and appropriate approaches, on the whole this may be insufficient if other policies continue to be based on traditional frameworks, limiting the scope of these efforts to a logic that is instead compensatory, without major changes in other development policies.

Lessons from El Salvador for the global discussion on climate change and development

El Salvador as an extreme case on climate change

El Salvador is an extreme case. It surpassed critical thresholds of environmental degradation decades ago; its economy transformed radically to the point that in just two decades its foreign exchange base shifted from reliance on agro-exports to reliance on remittances. The government's institutional capacity was weakened and significantly downsized as a result of adjustment policies and economic and sectoral reforms, and in recent years it has been classified as one of the world's most vulnerable countries to the impacts of climate change.

In this context, the way El Salvador is taking on the challenges of climate change reflects not only commitment and political will, which in themselves are essential, but is also evidence of its trailblazing work to integrate the climate change agenda into public policies and new institutional arrangements at various scales.

Policy-making that responds to the country's needs in addressing climate change

The climate change agenda was introduced in El Salvador in the mid-1990s as a result of the country's participation in the United Nations Framework Convention on Climate Change. For nearly 15 years, as part of the National Communications on Climate Change, there have been attempts to build an institutional framework for introducing objectives on mitigation, adaptation and reduction of vulnerability to climate change, with modest results.

The severe repercussions of extreme events associated with climate variability in recent years were influential in making climate change a fundamental element of not only environmental policy, but also of other policy frameworks, with a strong sense of urgency that did not wait for the design or development of a national climate change plan. However, all the initiatives, advances and achievements reflect a strategic combination of policy responses focused on the short term, but that are linked to medium- and long-term policy responses. The extent of environmental degradation in El Salvador magnifies the impact of extreme events. Thus, this sense of urgency refers not only to emergency response, rehabilitation and reconstruction, but also to joint policy actions aimed at risk reduction (National Risk Reduction Program). The impact on agricultural production and infrastructure also influenced the sectoral policy responses of the ministries of public works, agriculture, education and treasury to include objectives on risk and vulnerability reduction, adaptation and mitigation of climate change.

Building an institutional framework to address climate change: Implications for a National Climate Change Plan

Public policies on climate change and development in El Salvador reflect a recent process that is under construction, but which has new and promising pathways for attempting to make government actions and the objectives of adaptation more consistent, in a context characterized by severe environmental degradation and strong institutional, financial and fiscal constraints in one of the world's most vulnerable countries to climate change.

In practice, although El Salvador does not have a National Climate Change Plan, it has made substantial progress in developing a policy framework that far transcends the sphere of MARN. In this regard, the National Climate Change Plan tends to be more a result than a starting point for the country's efforts to strengthen public management on climate change. Implementation of the National Environmental Policy, recently approved by the Council of Ministers, is a fundamental instrument for the other government agencies and municipal governments to include objectives and actions related to climate change challenges in their respective management areas.

Prioritizing climate change adaptation from a territorial perspective: adaptation-based mitigation

In Central America, there is a marked tendency to promote mitigation actions that have little or nothing to do with adaptation objectives. Even countries like Costa Rica have chosen mitigation-based strategies as a route to improving their competitiveness and integration into the international economy. Although Central America is one of the most vulnerable regions of the world, the region is not showing significant progress in

overcoming risk and vulnerability. In this context, progress in El Salvador, despite being recent and insufficient, is displaying extremely useful indicators for building strategic linkages between mitigation and adaptation objectives.

El Salvador has prioritized the objectives of adaptation to climate change. One of the main pillars for advancing adaptation is the National Program for Ecosystem and Landscape Restoration (PREP), which is based on the idea that the main reasons to develop a strategic framework for adaptation are the severe environmental degradation characterized by lack of forest cover and vegetation, and the misuse and degradation of the land (MARN, 2012).

Adaptation is the priority, the framework and the approach that MARN has used to develop an innovative approach that stems from the fact that changes in the frequency, intensity, duration, origin and spatial distribution of rainfall (and possible drought), which are expressions of climate variability, will exacerbate environmental degradation levels and they may become irreversible. Therefore, the PREP framework will promote the following strategic actions: i) prevent deforestation of small forest remnants and agroforestry systems (shade-grown coffee); ii) expand gallery forests and natural forest regeneration; iii) promote biological corridors and hillside agroforestry; and iv) widespread use of soil and water conservation practices and works (MARN, 2012). Given the prevailing conditions in El Salvador, adaptation actions necessarily involve a determined effort at massive restoration of rural landscapes and ecosystems, which is consistent with mitigation goals promoted, for example, under REDD+ schemes to prevent deforestation and reverse forest degradation (including shade-grown coffee plantations and mangroves) and, especially, with the increase and improvement of carbon stocks

(MARN, 2012). In fact, this is the framework that guides El Salvador's proposal to the Forest Carbon Partnership Facility, which states that adaptation actions generate co-benefits in terms of climate change mitigation; hence adaptation-based mitigation.

With this focus, the PREP and the adaptation based-mitigation approach also lead to

strategically integrating the territorial dimension and the diversity of stakeholders and their perspectives, based on which they manage their strategies. Thus, the PREP also has the potential to be a management tool to promote platforms for negotiation, for building citizenship and for improving territorial governance addressing climate change.

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