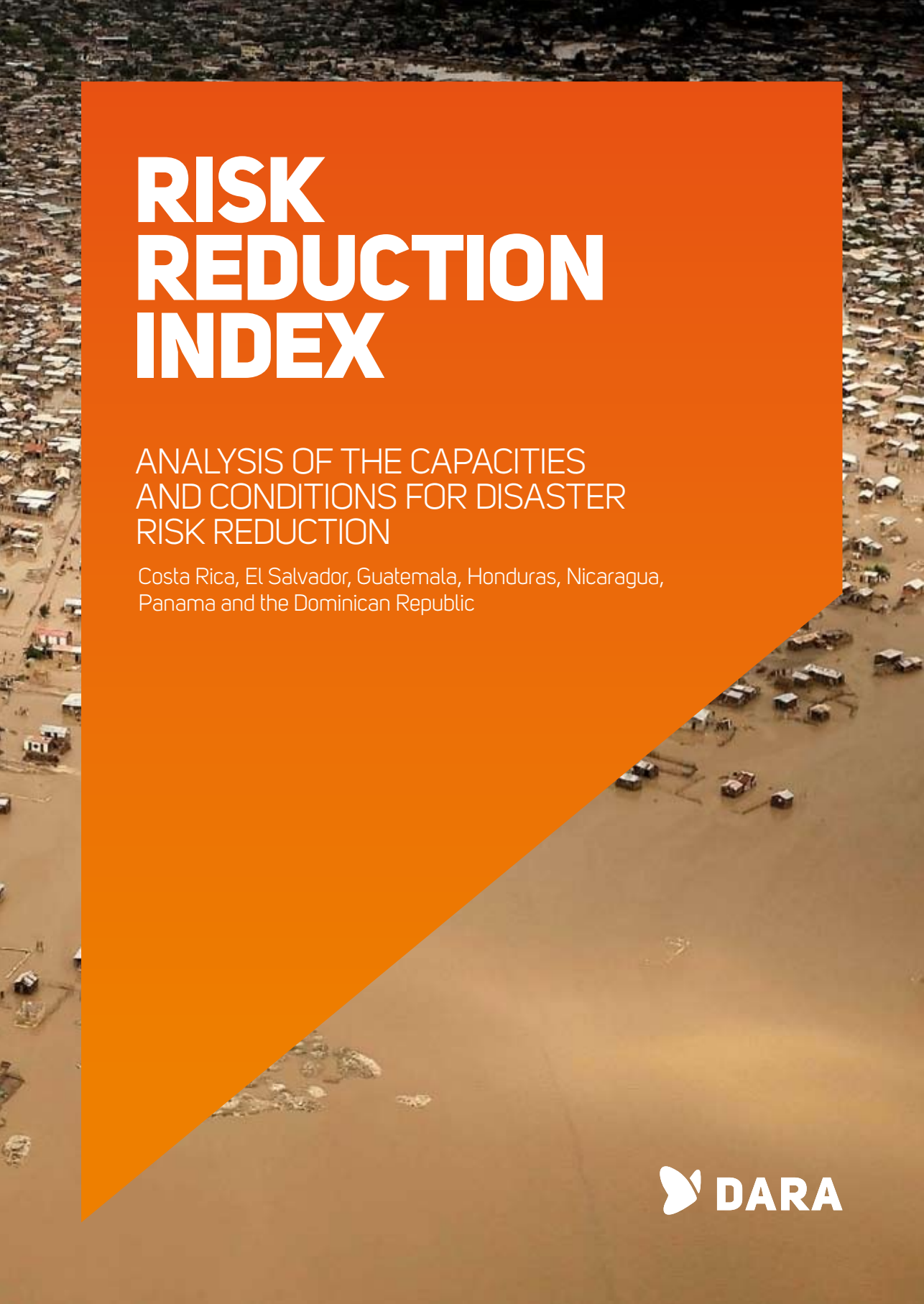

# RISK REDUCTION INDEX

## ANALYSIS OF THE CAPACITIES AND CONDITIONS FOR DISASTER RISK REDUCTION

Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama and the Dominican Republic

DARA

DARA and the Risk Reduction Index (RRI)
Risk Reduction Index (RRI) in Central America and the Caribbean –
Analysis of the Capacities and Conditions for Disaster Risk Reduction

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Summary Report

ANALYSIS OF THE CAPACITIES AND CONDITIONS
FOR DISASTER RISK REDUCTION

# RISK REDUCTION INDEX (RRI) PROJECT

Costa Rica, El Salvador, Guatemala, Honduras,
Nicaragua, Panama and the Dominican Republic

DARA

Madrid, January 2011

# ACKNOWLEDGEMENTS

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In relation to this summary report:

- The conceptual and methodological sections of this report fall under the responsibility of the General Coordinator, Allan Lavell.
- The country profile and RTU summaries are the responsibility of the technical team in Madrid. This report presents an analysis based on certain variables from the national and subnational method database. This information is available in Excel spreadsheets, allowing for a variesty of types and levels of analysis by researchers, decision makers and agencies according to their trends and needs.
- All information is available at www.daraint.org

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**An aerial view of homes flooded by a tropical storm.** Source: UN/ Marco Dormino

# TABLE OF CONTENTS

# 1 INTRODUCTION

In early 2009, DARA received funding from the Spanish Agency for International Cooperation and Development (AECID in its Spanish acronym) and the United Nations Development Programme (UNDP) to carry out the Risk Reduction Index (RRI) project in Central America and the Caribbean. The project, which was implemented in 2009 and 2010 in seven countries of the region (Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama and the Dominican Republic[1]), focuses on the conditions and capacities for disaster risk reduction.

## THE RISK REDUCTION INDEX – AN ANALYSIS OF THE CAPACITIES AND CONDITIONS FOR DISASTER RISK REDUCTION WITH A FOCUS ON PRIORITY # 4 OF THE HYOGO FRAMEWORK FOR ACTION

Since its inception in 2003, DARA has participated in several evaluations, allowing it to identify common elements in different disasters that have occurred in recent years of relevance to this project. These evaluations include the 2005 and 2007 Tsunami Evaluation Coalition (TEC), the 2007 international response to the floods in Mozambique, the 2008 Disaster Preparedness Plans (DIPECHO) in Central America, Red Cross actions in Sri Lanka and Indonesia (2008), the United Nations (UN) response to the floods in southern Mexico (2009) and the international response to the *Ketsana* typhoon in the Philippines (2009). In addition, DARA has conducted studies related to the *Nargis* cyclone in Myanmar (2008) and the earthquakes in China (2008), Pakistan (2008) and Haiti (2010).

The impact of different types of natural hazards is increasing worldwide but to a greater extent in developing countries, mainly due to their higher levels of exposure and vulnerability. Historically, disaster response has been dealt with through humanitarian assistance, partly because disasters were seen as a direct consequence of nature and, therefore, almost inevitable. More recently, however, this perspective has given way to a more integrated approach which recognises that the way in which societies develop, is a major contributing factor to the levels of loss and damage produced in disasters.

The Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters (HFA), agreed and signed by the representatives of 168 countries, provides an integrated framework for governments and other stakeholders to understand disasters and take measures to reduce disaster impacts. To improve disaster risk reduction, the HFA promotes five Priority Actions:

1. Ensure that disaster risk reduction is a national and local priority with a strong institutional basis for implementation.

2. Identify, assess and monitor disaster risks and enhance early warning.

3. Use knowledge, innovation and education to build a culture of safety and resilience at all levels.

4. Reduce the underlying risk factors.

[1] Work in Haiti was also foreseen, but after the January 2010 earthquake, a decision was made not to include this country in the project.

5. Strengthen disaster preparedness for effective response at all levels.

To measure risk and progress on risk management (or reduction), different systems of indicators and instruments have been developed in recent years. Most notable are the "Indicators of Disaster Risk and Risk Management" of the Inter-American Development Bank (IADB-IDEA), indicators of the "Views from the Frontline" project of the Global Network of Civil Society Organisations for Disaster Reduction, and the "HFA Monitor" of the International Strategy for Disaster Reduction (UN/ISDR), among others. However, analysis of these indicators and instruments revealed that none of them adequately measured or considered progress on HFA Priority Action 4 or the capacities and conditions that contribute to the reduction of underlying risk factors. The 2009 *Global Assessment Report on Disaster Risk Reduction* (GAR/DRR) highlights the need for action on Priority Action 4: "At both the international and national levels, the policy and strategy frameworks for disaster risk reduction, poverty reduction and climate change adaptation are not effectively integrated, are not focused on addressing the underlying risk drivers and are insufficiently articulated to and supportive of effective local and sectoral actions".[2]

With this in mind, DARA decided to focus its RRI project on the underlying risk factors (also known as risk drivers), centring the analysis on the capacities and conditions at the national/subnational/local levels needed to achieve an effective management and reduction of risk. However, although the RRI primarily focuses on the analysis of Priority Action 4, it also incorporates relevant aspects of the other HFA priorities.

Inspired by the GAR/DRR 2009, the RRI identifies four categories or risk drivers:

| | |
|---|---|
| **RISK DRIVER 1:** | Environmental degradation and natural resources |
| **RISK DRIVER 2:** | Socioeconomic conditions and livelihoods |
| **RISK DRIVER 3:** | Territorial organisation |
| **RISK DRIVER 4:** | Governance |

Using these four key risk drivers, a picture can be developed of the many aspects (capacities and conditions) that encourage or impede the efficiency and effectiveness of efforts to reduce or manage disaster risk. An analysis of these conditions and capacities, classified according to the four risk drivers, reveals the influence they have in a particular country, and contributes to the creation of a country profile and the identification of specific actions needed to create conditions conducive to risk reduction and climate change adaptation.

The RRI project has therefore been developed as an instrument to support disaster risk reduction (DRR) and climate change adaptation with the intention of its being used by the various institutions charged with this task at international and regional levels.

THIS REPORT ANALYSES THE EXISTING CONDITIONS AND CAPACITIES WITHIN A COUNTRY TO ACHIEVE EFFICIENT RISK MANAGEMENT AND REDUCTION

[2] UN/ISDR (2009: 15) *Risk and poverty in a changing climate. Investing today for a safer tomorrow,* Geneva: United Nations International Strategy for Disaster Reduction.

# 2 APPLICABILITY AND PURPOSE

The RRI recognises the need to develop a methodology to measure the conditions and capacities for DRR which is applicable to different risk contexts around the world. It should therefore be subject to contextualisation and constant modification for its improvement and transformation into a comprehensive and rigorous method.

The RRI project has three main objectives:

- To generate information about the factors that encourage or hinder DRR in each country, from the national level to specific regions of risk;
- To generate information from various sectors or regions and from specific social actors, to serve as a guide for decision-making on issues of DRR and climate change adaptation;
- To use the information generated as a basis for measuring future progress (or setbacks) in specific factors influencing risk reduction.

By generating and disseminating this information, the aim is to influence long and medium-term development processes to achieve more sustainable development patterns and protect the most vulnerable.

The information generated, at national, subnational and local levels, and the preliminary analysis carried out by DARA, should serve as input for further research projects to be conducted by social researchers and decision makers.

THE INFORMATION GENERATED SERVES AS A BASELINE FOR MEASURING FUTURE ADVANCES OR SETBACKS AND IS USEFUL FOR DECISION MAKING ON DRR AND CLIMATE CHANGE ADAPTATION

**A father carries his daughter after a tropical storm causes heavy rains.** Source: UN/Logan Abassi

# 3 CONCEPTS

The RRI capitalises on a number of existing concepts and approaches developed by researchers and practitioners working in disaster risk reduction and risk management, in order to conceptualise, analyse and categorise different elements related to DRR.

## Disaster Risk

Disaster risk is the estimation of damages, losses and disruption that can be expected in the future when phenomena of different natural origins (i.e. earthquakes, hurricanes, tornadoes, etc.) occur within certain conditions of social vulnerability. The risk becomes a disaster when it materialises in a particular territory, affecting social groups, basic infrastructure, productive sectors, etc. Disaster risk is therefore territorially defined and delimited and when a disaster occurs, it manifests itself through the actual losses and damages distributed in a specific geographical area.

## Disaster Risk Reduction (DRR)

According to UN/ISDR, DRR relates to "the concept and practice of reducing disaster risks through systematic efforts to analyse and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events".[3]

## Risk Drivers

The notion of risk drivers refers to a set of processes, both physical and social, that significantly contribute to the construction, creation and existence of disaster risk. As noted above, the RRI identifies four risk drivers that capture a number of different processes: environmental degradation and natural resources; socioeconomic conditions and livelihoods; territorial planning; and governance.

[3] UN/ISDR (2009: 4) 'Terminology on Disaster Risk Reduction', Geneva: United Nations International Strategy for Disaster Reduction.

**An urban search and rescue team responds to an earthquake.** Source: USAID

## Capacities and Conditions

The conditions and capacities for DRR are the factors that affect the ability of stakeholders to reduce and control risk in an effective and efficient manner in different countries and locations. This notion is based on the idea that a country or area must have certain social, economic, environmental, organisational and/or governance characteristics to be able to effectively reduce risk. The design and implementation of a method that can be applied to understand these conditions and capacities and measure changes in them over time, is quite complex; however, the RRI has simplified this task by classifying these conditions and capacities in to the four risk drivers identified above.

## Representative Territorial Unit (RTU)

RTU is a new concept that refers to a geographically defined area within a country made up of similar hazards and patterns of vulnerability that, in turn, are representative of other areas in the same country with similar characteristics. An RTU can exceed the limits of a municipality or any other political or administrative division within a country, but its boundaries must be clearly defined in terms of risk type.

# 4 METHODOLOGY

The RRI methodology allows for a study to be undertaken at different levels within a country (national, subnational and/or local) with the objective of obtaining a clear and detailed picture of the capacities and conditions affecting DRR. Two methods are used to analyse these conditions and capacities: a subnational-level analysis (mixing qualitative and quantitative methods) and a national-level analysis (quantitative method).

## 4.1 SUBNATIONAL-LEVEL ANALYSIS

The subnational-level analysis is developed using the concept of RTU. A number of RTUs are selected in each country to examine the conditions and capacities for DRR. A survey is conducted with key informants who have extensive knowledge of the risks in the selected areas (RTU).

A summary of the criteria used to delimit the RTUs and an example of a risk typology are outlined below:

| RTU TYPOLOGY | RISK TYPOLOGY |
|---|---|
| • Urban areas (marginalised areas within large urban centres, metropolitan areas); | • Exposure to high intensity, low recurrence threats with potential for intensive losses (i.e. earthquakes, volcanic eruptions or hurricanes that could produce severe losses in small areas). |
| • Rural areas (rural areas with subsistence agriculture); | |
| • Urban expansion areas (service centres, centres for trade, production and tourism). | • Exposure to low-to-medium intensity, high recurrence hazards with potential for extensive losses (i.e. floods or landslides that regularly produce limited losses in large areas). |

THE METHODOLOGY IS BASED ON TWO LEVELS OF ANALYSIS: THE SUBNATIONAL AND NATIONAL LEVELS, WHICH ARE COMPLEMENTARY IN THAT THEY OFFER DIFFERENT PERSPECTIVES ON, AND VIEWS OF, THE SAME INFORMATION

# A WORKSHOP IS ORGANISED WITHIN EACH COUNTRY TO PRESENT PRELIMINARY QUESTIONNAIRE RESULTS, EXPLORE CASUAL RELATIONSHIPS AND PROPOSE FUTURE ACTION

Representatives from different sectors in each RTU provide information for the subnational-level analysis on the conditions and capacities that encourage or hinder effective risk management. The key informants that are selected (preferably 20 per RTU) represent five sectors and meet the characteristics detailed below.

The information is collected from key informants through a questionnaire consisting of 118 questions and divided into five sections. The first four sections are devoted to the analysis of the conditions and capacities for DRR, organised into sections based on the four risk drivers (environmental degradation and natural resources, socioeconomic conditions and livelihoods, territorial planning and governance). The fifth section measures the relative importance of each driver to DRR.

The questionnaire contains a response and rating scale of one to nine, where one is the worst score of conditions and capacities for DRR and nine the best or maximum condition or capacity. Five represents the midpoint or neutral score, and zero is the option for "not applicable / does not exist". The informants can also select the "I do not know" option.

After the information has been analysed, a national workshop is organised with the participation of the key informants from each RTU to present, explore and validate preliminary results of the questionnaire and to propose actions and areas for future collaboration.

| SECTORS | CHARACTERISTICS |
|---|---|
| • National public sector; | • Direct or indirect presence in the RTU with a balance between sectoral and territorial aspects; |
| • Local and/or subnational public sector; | • Balance between sectoral and territorial, social and productive aspects; |
| • Private sector; | • Multi-national, local and national enterprises; |
| • NGO; | • National, local or international; |
| • Civil Society. | • Grassroots organisations, universities and churches. |

## 4.2 NATIONAL-LEVEL ANALYSIS

The national-level analysis is made up of 38 quantitative indicators (or "proxy indicators") that represent different conditions and capacities for DRR grouped into four risk drivers. These indicators are classified into groups and subgroups within each risk driver to obtain more detailed information and capture the most essential conditions and capacities for DRR in a country.

The indicators are selected according to the following criteria:

- Must capture the essence of the range of existing factors that affect risk reduction;
- Must be recognised as official statistics worldwide;
- Must be available for as many countries as possible;
- Must be updated on a regular basis;
- Must be available in international databases, accessible on-line and free of charge.

These 38 indicators are the result of an exhaustive search and review of at least 80 databases, developed by various international agencies, universities and public and private organisations. From this search and selection of indicators, a unique database has been generated containing information on 184 countries (there is at least 60% of information available for these countries).

The use of two methods (subnational and national) permits a multi-level analysis of the conditions and capacities needed to reduce disaster risk (HFA Priority 4). At the national level, an overview of the capacities and the conditions for DRR in the country is obtained; while at the subnational level, where risk and the drivers of risk manifest themselves, a much more detailed picture of the conditions and capacities for DRR can be obtained and, in some cases, the risk construction processes can also be better understood. Therefore, both levels of analysis complement each other by offering different views of the same problem and allowing a comparison of the information obtained.

Briefly, the main characteristics of the RRI are:

- It provides new and original elements for the promotion of DRR by focusing on conditions and capacities;
- It considers the root causes or underlying risk factors (risk drivers);
- It offers a comprehensive overview of the capacities and conditions needed in order to deal with increases in disaster risk;
- It identifies aspects of development processes and institutional structures that need to be addressed in DRR.

THE NATIONAL-LEVEL ANALYSIS CONSISTS OF A DATABASE WITH 38 INDICATORS ON 184 COUNTRIES

**Children play in front of a temporary shelter amid the rubble of buildings destroyed by an earthquake.** Source: USAID/ Kendra Helmer

**Children wash clothes during a torrential downpour, against a backdrop of flooding.** Source: USAID

# 5 SUBNATIONAL-LEVEL ANALYSIS

## OF THE CONDITIONS AND CAPACITIES FOR RISK REDUCTION IN SEVEN CENTRAL AMERICAN AND CARIBBEAN COUNTRIES

### Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama and the Dominican Republic.

The subnational-level analysis was undertaken in seven Central American and Caribbean countries: Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama and the Dominican Republic.

In total, 21 RTUs (three in each country) were analysed, six workshops[4] were conducted and 366 key informants participated in the seven countries.

In the following section, a summary of the characteristics of the seven countries studied in Central America and the Caribbean is presented.

First, the three RTUs that were selected and studied are described; then the questionnaire results are presented in terms of the four risk drivers: environmental degradation, socioeconomic conditions, territorial organisation and governance, and their relation to DRR. Finally, the impressions and perceptions shared by the participants throughout the process are summarised and recommendations identified at the closing workshop of the subnational analysis are provided.

[4] The workshop programmed in Guatemala was cancelled as a result of the emergency situation created by Hurricane Agatha and Volcano Pacaya, May 2010.

# COSTA RICA

## COUNTRY PROFILE

5.1

Costa Rica has experienced a period of rapid macroeconomic growth in recent years. However, certain structural processes today represent a latent threat to the sustainability of its development model.

### 5.1.1 SELECTED RTU


**RTU Liberia-Carrillo**

The municipalities of Liberia, Carrillo and Santa Cruz (the Chorotega region) are the most urbanised due to a growing demand for tourism in recent years. These municipalities periodically flood when rivers in the Tempisque basin overflow. This situation has worsened due to deforestation, prompted by rapid urban growth and an increasing demand for resources.

### RTU Volcán Turrialba

The Turrialba volcano, located 16 kilometres from the city of the same name, has morphological features and an explosive potential that sets it apart as one of the most dangerous volcanoes. It constitutes multiple risks based on floods, avalanches, pyroclastic flows and ash fall that have the potential to affect a large part of the population. The concentration of toxic gases in the atmosphere is already beginning to affect crops and livestock, heralding a significant and immediate impact on the area's economy, which relies on farming and rural ecological tourism.

### RTU Río Burío–Quebrada Seca

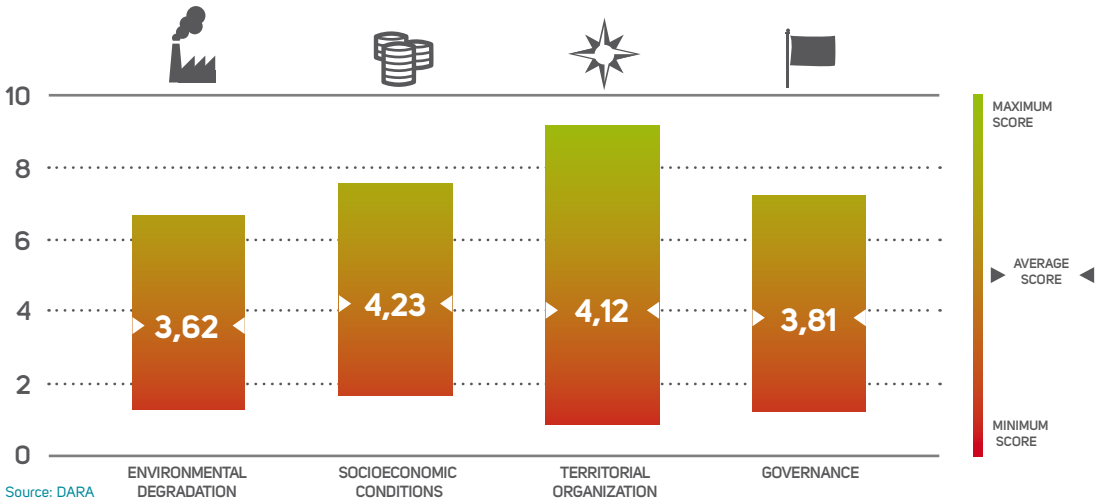
The overflow of these two river basins occurs on a recurring basis each year. The 2004 and 2007 floods, in particular, had a strong impact on bridges and dwellings, disabled a viaduct under construction and affected both the lower (municipality of Belén) and upper parts of the river basin (municipalities of Barva, Heredia and San Rafael). In this RTU, risk is small scale. However, damage is severe due to urban growth and demographic pressure on vital resources such as water, land and forests. In cities such as Heredia, agricultural activities (mainly coffee) have been substituted by industrial, commercial and residential activities, reproducing many of the unsustainable development patterns observed in other urban areas of the country.

## 5.1.2 RISK DRIVERS

### RISK DRIVER 1: Environmental Degradation

Within this risk driver, the overexploitation of land is highlighted in all three RTUs as the main factor hindering effective risk management, although the federal government sets itself apart from local/subnational authorities in terms of its performance in reducing environmental degradation. However, DRR is not considered to be adequately incorporated in territorial organisation or urban planning (location of housing, infrastructure, services and productive activities), at any level. An additional factor of importance in this risk driver is climatic variation over the last 10 years: informants have observed changes in the average and extreme temperatures, the frequency of droughts and the intensification of storms (RTU Liberia-Carrillo), as well as in the precipitation cycle (RTU Volcán Turrialba).

CHART A: QUESTIONNAIRE RESULTS IN COSTA RICA BY RISK DRIVER




Source: DARA

## RISK DRIVER 2: Socioeconomic Conditions

In the three RTUs, poverty and unemployment are highlighted as the most important conditions that hinder DRR. Other socioeconomic conditions highlighted are the environmental insalubrities (RTU Río Burio-Quebrada Seca, and RTU Liberia-Carrillo) and the limited access to health services (RTU Volcán Turrialba). Moreover, the deficiency and lack of road infrastructure in the three RTUs is not only identified as a serious problem for economic and social development, it also hinders successful risk management by, for example, making it more difficult to communicate risk.

## RISK DRIVER 3: Territorial Organisation

There are large differences between urban and rural areas within the three RTUs and numerous problems related to the location and function of infrastructure, which affect risk reduction in the RTUs. In the RTU Río Burio-Quebrada Seca, land occupation in unsafe or fragile areas and the inappropriate location and poor construction of housing and vital infrastructure are identified as major problems; in the RTU Liberia-Carrillo, the main problems identified are inappropriate location and poor quality housing as well as land occupation in unsafe areas; and, in the Turrialba Volcano RTU, land occupation in unsafe areas and the infringement of construction codes are the main challenges.

## RISK DRIVER 4: Governance

In all three RTUs, high levels of bureaucracy and the lack of coordination among government authorities (national and local/ subnational) are the aspects of governance that most hinder DRR. There is a lack of knowledge in all three RTUs of participatory mechanisms for risk management and a lack of transparency in existing legal mechanisms to control and reduce risk.

**Workers building an irrigation canal.**
Source: USAID/ Herve Jean-Charles

# ACCELERATED URBAN GROWTH, DEMOGRAPHIC PRESSURE ON ALREADY LIMITED NATURAL RESOURCES, AND THE REPRODUCTION OF UNSUSTAINABLE ECONOMIC DEVELOPMENT ARE CREATING NUMEROUS RISK ENVIRONMENTS

## 5.1.3 SUMMARY

The questionnaire results in the three RTUs reveal that there are many conditions and capacities in all four risk drivers constraining efforts to reduce disaster risk in Costa Rica. However, governance is identified as being the most influential driver because the lack of coordination among different levels of government has direct implications for other issues relevant to risk management, including the implementation of land use plans and deficiencies in environmental management.

In the workshop held in Costa Rica, the participants made the following recommendations for effective DRR in all three RTUs:

- Education: the promotion of risk reduction should focus on educating and training the population in order to be able to undertake effective and efficient risk management activities.
- Territorial organisation: highlight the importance of using land-use regulations in development planning.
- Legislation: create laws and regulations on DRR and ensure authorities comply with existing legislation.

With regards to coordination among different levels of government, the workshop identified the following actions:

- The National Emergency Commission must present the new Emergency Plan to local groups (development associations, churches, schools, etc.) and include civil society in the National Forum to be held each year.
- Municipalities must ensure compliance with regulations, and also ensure that communities participate in decision-making.
- Government interventions aimed at risk reduction should be adjusted to each situation and not adopt one-size-fits-all measures; each agency must assume tasks to deal with the problem according to their specific role and must find synergies with other agencies; decisions must be based on technical and scientifically rigorous criteria.

# EL SALVADOR

## COUNTRY PROFILE

5.2

El Salvador has achieved significant progress since the early 1990s in terms of poverty reduction, improving basic education, reducing child mortality and improving access to health care, water and sanitation. However, as a result of the current global economic crisis, El Salvador has seen a significant decrease in foreign direct investment and inflows of remittances.

## 5.2.1 SELECTED RTU


### RTU Bajo Lempa

Bajo Lempa consists of the municipalities of Zacatecoluca (Department of La Paz) and Tecolucam (Department of San Vicente). It is an agriculture-based rural area with a growing textile industry (*maquila*). The overflow of the Lempa River and hundreds of rivers and streams, which drain into it from the central volcanic chain to the Pacific coastal plain, causes recurrent flooding. Drought also has a significant impact and is the cause of the majority of agricultural losses. Earthquakes are characterised by their low recurrence and moderate impact.

### RTU Área Metropolitana de San Salvador (AMSS)

The communities of El Cañito, Cristo Redentor and Nueva Israel, located in a marginal urban area of the municipality of San Salvador, are densely populated but have good infrastructure services. However, because of inadequate development in these communities (a non-existent drainage system and a high degree of contamination from garbage and sewage) and the lack of environmental and risk reduction planning, floods are recurrent. In addition to this risk, these communities have a high prevalence of crime against individuals and private property.

### RTU Los Izalcos and Juayúa

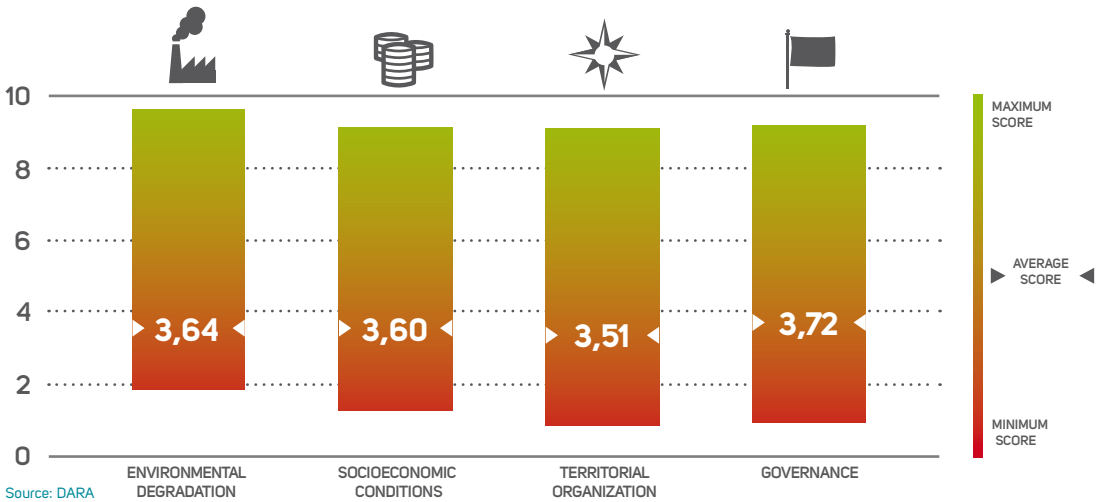
Los Izalcos and Juayúa are two micro-regions (in the Department of Sonsonate) made up of various municipalities. Los Izalcos is on a plain with small pockets of farmers practicing subsistence agriculture. Juayúa is in a mountainous area with a low population density and a thriving tourism sector. The recurring extreme environmental events in this RTU are floods, droughts, volcanic eruptions, earthquakes and landslides. In October 2005, a large phreatic explosion and ash rainfall in the *Parque Nacional los Volcanes* affected dozens of municipalities in both micro-regions, coinciding with Hurricane Stan.

## 5.2.2 RISK DRIVERS

### RISK DRIVER 1: Environmental Degradation

Informants in the three RTUs consider environmental degradation processes to be hindering effective risk reduction and highlight, in particular, the overexploitation of water resources (RTU AMSS) and deforestation. Government intervention to revert environmental degradation processes is ineffective in all three. In addition, severe climate variations have been observed for several years, including changes in average and extreme temperatures, in the precipitation cycle (RTU AMSS) and the intensity of storms and hurricanes (RTU Bajo Lempa), representing a problem for the sustainable development of communities.

CHART B: QUESTIONNAIRE RESULTS IN EL SALVADOR BY RISK DRIVER




Source: DARA

**The Izalco Volcano is a natural draw for tourists.** Source: USAID/Angela Rucker

## RISK DRIVER 2: Socioeconomic Conditions

Food insecurity, unemployment, poverty and limited access to health services and education have been identified in the three RTUs (AMSS, Bajo Lempa, Los Izalcos y Juayúa) as the socioeconomic conditions that most limit effective risk management. There are too few economic incentives and too little adequate social protection to reduce poverty and food insecurity. Road infrastructure is inefficient and very few DRR initiatives are promoted by community associations and social organisations.

## RISK DRIVER 3: Territorial Organisation

In the three RTUs, some elements of territorial organisation have been identified as serious impediments to DRR, including occupation of unsafe or fragile land, inadequately located and low quality housing. Land use plans do not incorporate risk reduction measures effectively, and public and private investments are made in infringement of construction codes.

## RISK DRIVER 4: Governance

The weak capacity of government institutions (RTU AMSS and RTU Los Izalcos y Jauyúa), centralisation in decision-making (RTU Bajo Lempa), lack of coordination and consultation among levels of government, high levels of bureaucracy and lack of compliance with legislation (RTU Bajo Lempa and RTU Los Izalcos y Juayúa) are the aspects of governance that most hinder effective risk management in the three RTUs. The lack of participatory mechanisms for budget allocation, limited social participation in development processes and lack of transparency in decision-making are other elements that do not favour risk reduction.

## 5.2.3 SUMMARY

The results of the questionnaire carried out in El Salvador suggest that all four risk drivers contain specific elements that are detrimental to risk reduction to varying degrees in all three RTUs. Some of the most prominent elements are low incomes, lack of education, environmental degradation and inappropriate land use.

THE OVERFLOW OF RIVERS THAT CROSS THE COUNTRY, FROM THE VOLCANIC CHAIN TO THE PACIFIC COASTAL PLAIN, CAUSE RECURRENT FLOODS AND SEVERE LOSSES

In the El Salvador workshop, the participants validated the results of the questionnaire and identified common opinions and recommendations for risk reduction:

- Increase participation of all stakeholders.
- Governments must follow through with the creation and implementation of measures to reduce vulnerability.
- The empowerment of the local population is vital to achieve objectives.
- Greater levels of awareness and participation are necessary, given that this motivates members of at-risk communities to enhance public safety and emergency preparedness.
- Risk reduction orientation and planning should be systematic.
- Coordination between Civil Protection and the Ministry of Environment needs to improve.
- Dissemination of research and knowledge is fundamental to understand risk and disasters, while general education is needed to improve prevention and preparedness practices.
- There must be an exchange and flow of information so that government institutions are better coordinated.

As a result of the previous recommendations, three specific actions are suggested to improve risk reduction:

- Create working methods and advocacy tools to raise awareness.
- In education, launch an intensive education process aimed at youth and children, and design a specific course on environmental education for use in schools.
- Develop early-warning systems and keep the population informed on a regular and permanent basis.

# GUATEMALA

## COUNTRY PROFILE

5.3

In recent years, Guatemala has suffered a severe economic downturn, and the current international crisis has only worsened the situation by significantly reducing exports, remittances, foreign direct investment and tourism. In addition, poverty, insecurity, crime, social inequality and malnutrition indicators have all increased.

During the preparation of this study, the three selected RTUs in Guatemala experienced two simultaneous events: the eruption of the Pacaya Volcano (May 27, 2010), which brought ash and sand fall that affected Escuitla and the Metropolitan Area of Guatemala; and Tropical Storm Agatha (May 28-30, 2010), which was accompanied by floods and landslides in all three selected RTUs. Given the context, it was impossible to organise a workshop in Guatemala.

### 5.3.1 SELECTED RTU

### RTU Área Metropolitana de Guatemala (MAG)

This RTU includes the northern area of the Chinautla and Las Vacas rivers, and part of Guatemala City and Chinautla (Department of Guatemala). Hazards are of low or medium intensity, but have a high recurrence and loss potential particularly phenomena such as floods and landslides. There are also high intensity hazards such as earthquakes, but they usually have low recurrence rates. This RTU is an urban area with a high population density and industrial concentration, it lacks a sewage system, has precarious settlements and a high level of environmental pollution.

### RTU Altiplano Occidental

This RTU consists of the basin of Lake Atitlan and the municipalities of San Andrés Semetabaj, Santa Catarina Palopó and Panajachel (Department of Sololá). The inhabitants of this RTU are mainly indigenous, devoted to subsistence farming and trade on a small scale. Over the years, small urban centres have developed that are primarily focused on tourism and the production and marketing of handicrafts. In this area, hazards of low or medium intensity with high recurrence and great loss potential predominate, particularly during the rainy season (floods caused by overflowing rivers and landslides). However, these less hazardous phenomena combine with high intensity hazards, as demonstrated by the heavy damage caused by Tropical Storm Stan in October, 2005.

### RTU Costa Sur

This RTU consists of the middle and lower sections of the Achiguate river basin and parts of the municipalities of Escuintla, Masagua and San José (Department of Escuintla). In this area, sugar cane production and extensive cattle ranching are the dominant economic activities, but there are also small and scattered groups of peasants engaged in small-scale production of basic grains and the cultivation of vegetables and fruits for consumption or local trade. The population in this RTU is exposed to floods from the overflow of rivers and streams; a hazard that is considered of low-to-medium intensity, but with high recurrence and a huge loss potential. In the area, there are active volcanoes (Santiago, Fuego, Pacaya) that could cause instability of the rivers and flooding if they erupted at the same time during the rainy season. However, with the growth of new urban centres (mainly in Escuintla), flooding is also caused by the lack of a sewage system and the discharge of waste into streams and rivers, presenting serious environmental and health risks.

## 5.3.2 RISK DRIVERS

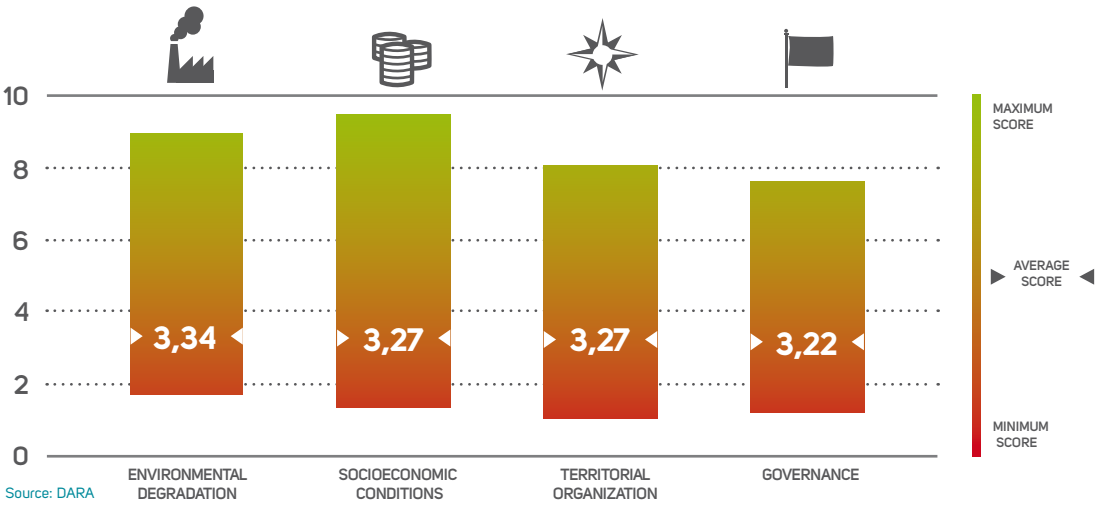
### RISK DRIVER 1: Environmental Degradation

With regard to this risk driver in the three RTUs, the overexploitation of water resources, the overexploitation of land and deforestation are identified as the main conditions hindering effective risk management. In recent years, there have been significant climate variations in the three RTUs, especially in the precipitation cycles and, to a lesser extent, in the frequency and intensity of storms and hurricanes. Government authorities, especially within the federal government, do not intervene effectively to ensure environmental protection.

### RISK DRIVER 2: Socioeconomic Conditions

Poverty, environmental pollution, unemployment, limited access to health and education and deficiencies in road infrastructure are the socioeconomic conditions that most hinder risk management in the three RTUs and government interventions to deal with these processes are insufficient. Initiatives to improve risk management at the local/subnational level are also insufficient in all three RTUs.

CHART C: RESULTS OF THE QUESTIONNAIRE IN GUATEMALA BY RISK DRIVER




Source: DARA

## RISK DRIVER 3: Territorial Organisation

In the three RTUs, urban and rural development processes have occurred in such a way as to prevent risk reduction, with occupation of land in unsafe and fragile areas and inappropriate location and poor construction of housing being the most critical factors. The inadequate incorporation of DRR in local land use plans and public investment and the lack or inadequacy of construction codes, are also noteworthy.

## RISK DRIVER 4: Governance

The aspects of governance that are most detrimental to effective risk management in the three RTUs include the poor coordination and communication among different levels of government and their limited capacity. High levels of bureaucracy, centralisation in decision-making, corruption and the infringement of the law are also highlighted as being problematic, although existing legislation to control or reduce disaster risk is considered efficient.

FLOODED AREAS ARE GREATER DUE TO THE LACK OF DRAINAGE AND WASTE SPILLING INTO TRIBUTARIES AND RIVERS, PROVOKING SERIOUS ENVIRONMENTAL AND HEALTH HAZARDS

## 5.3.3 SUMMARY

Major deficiencies hindering disaster risk reduction are identified in the three RTUs. The RTU AMG faces multiple challenges associated with urbanisation and high population density, high levels of poverty and irregular settlements threatened by frequent floods and landslides. In particular, environmental factors, such as the overuse of water, are highlighted as major causes of health problems in disaster.

In the RTU Altiplano Occidental, environmental protection measures are being undertaken thanks to the presence of NGOs promoting sustainable development in the area. However, road infrastructure is considered inadequate and is provoking inappropriate land use in areas prone to flooding and landslides.

The factor in the RTU Costa Sur that most hinders risk management is the lack of enforcement of construction codes and, thus, poor quality housing in an area with high population growth. It is also important to highlight the increased risk of floods associated with the influence of the agricultural export sector. Decisions to divert the trajectory of certain rivers, the production of waste and the construction of dykes to protect private farms, have led to flooding in surrounding rural communities and increased environmental pollution. Here it is worth mentioning that federal and municipal government authorities are unable or unwilling to control these processes.

Destroyed buildings and other structures in Central America during the hurricane season. Source: USAID

# HONDURAS

## COUNTRY PROFILE

5.4

Honduras has one of the highest levels of social inequality in the region and most of the population lives in conditions of extreme poverty. In recent years, the decline in exports due to rising food and oil prices in the international market has aggravated the situation of the most vulnerable. A number of initiatives exist to reduce tax evasion and improve the administration of tax collection, along with other commitments to multilateral institutions.

### 5.4.1 SELECTED RTU

## RTU Distrito Central

This region is the most populous in the country and consists of the cities of Tegucigalpa and Comayagüela (Department of Francisco Morazán). The economy is composed of trade and services with a textile industry (*maquila*) and a large sector of small and medium-sized enterprises. The area has various streams that divide Tegucigalpa from Comayagüela and divide the capital into the old city and a new commercial district. There is a diverse economic infrastructure, public institutions and human settlements located on the river banks, and the whole area is affected by recurrent floods.

## RTU Puerto Cortés

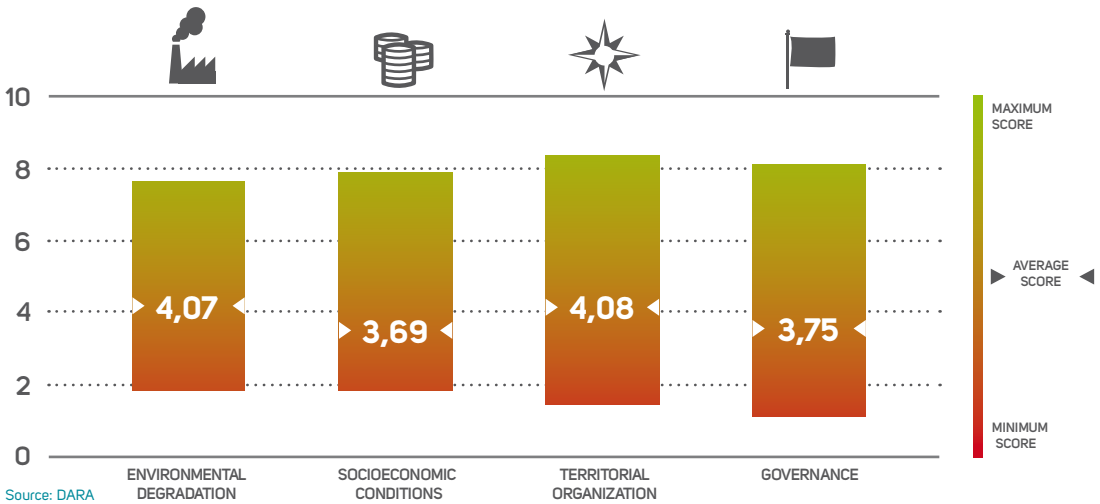
Puerto Cortés is the second largest city in the country and is divided in two very distinct areas: the peninsula, an area of wetlands at sea level, where most of the population lives today; and the port area, where the refinery and main industrial activities of the country are located. Hurricanes, floods and technological accidents are among the most frequent hazards. The municipal government decided to use income from the port administration to undertake improvements in the sewage system, water supply and treatment, road pavement and the relocation of settlements. Additionally, a considerable investment in education was made, making Puerto Cortés the first municipality in the country with no illiteracy.

## RTU Valle de los Ángeles

This municipality is made up of small farms in steep terrain, located in the so-called *La Tigra* National Park (Department of Francisco Morazan), a protected nature reserve. With its attractive natural landscape, this municipality has become an important tourist destination and this population growth has created greater exposure to risks from flooding, landslides, avalanches, wildfires and earthquakes.

## 5.4.2 RISK DRIVERS

CHART D: QUESTIONNAIRE RESULTS IN HONDURAS BY RISK DRIVER




Source: DARA

## RISK DRIVER 1: Environmental Degradation

In the three RTUs, local government efforts to reduce environmental degradation are applauded. However, certain factors impede successful risk reduction, including the overexploitation of water resources, deforestation and the overexploitation of land (RTU Distrito Central and RTU Puerto Cortés). The lack of available resources at the local and/or subnational level also presents a problem for risk management.

## RISK DRIVER 2: Socioeconomic Conditions

The main socioeconomic factors impeding risk management in the three RTUs include poverty, limited access to drinking water, drainage services and education, unemployment and food insecurity. Furthermore, the social protection mechanisms and the economic incentives used by the federal government are insufficient to deal with these problems. There are also few community initiatives to reduce disaster risk.

THE DECENTRALISATION OF TECHNICAL, ECONOMIC AND PROFESSIONAL RESOURCES FAVOURS AN IMPROVEMENT IN CAPACITIES AND CONDITIONS FOR DISASTER RISK REDUCTION

## RISK DRIVER 3: Territorial Organisation

In all three RTUs, the occupation of unsafe or fragile land and poor quality housing are identified as factors that undermine risk management. DRR is incorporated in local land use plans but it is not integrated sufficiently into public investment decisions or construction codes.

## RISK DRIVER 4: Governance

The aspects of governance that most undermine risk reduction in the three RTUs are corruption, lack of coordination among different levels of government and high levels of bureaucracy. In the RTU Puerto Cortés, there are low levels of satisfaction with existing mechanisms and standards to control or reduce risk and in the RTU Distrito Central, the limited capacity of institutions and centralisation in decision-making are considered to be particularly negative factors. In the RTU Valle de los Ángeles, the level of citizen participation in local development and DRR measures is considered insufficient.

**Workers prepare materials for temporary shelters.** Source: USAID/Kendra Helmer

## 5.4.3 SUMMARY

According to the questionnaire results in Honduras, there are aspects of all four risk drivers that impede risk reduction in the three RTUs, especially in the RTU Distrito Central. In this RTU, the precariousness of urban settlements, poor location of housing and lack of a sewage system increase the vulnerability of the population to flooding. The RTU Puerto Cortés stands out as a special case in Honduras because the local government has access to decentralised resources from management of the seaport. In Puerto Cortés there is a land-use plans and comprehensive land management programme, which forms part of the *Land Management Programme* of the European Union (URB-AL). The RTU Valle de los Ángeles is part of a tourist route called *La Tigra* trails, designed by the National Institute of Tourism to promote rural and adventure tourism in the area.

In the workshop held in Honduras, participants highlighted their main concerns and recommendations for risk management in the country:

- It is necessary to open up political spaces in order to identify the legal and institutional gaps in prevention and disaster response.
- Responsibilities for risk management should be decentralised.
- There is great concern about response and mitigation capacities.
- There is need for greater clarity in the definition of responsibilities of different actors.
- Effective DRR actions can only be achieved through multi-sectoral action.

One specific action related to decentralisation is recommended:

- Extend the decentralisation of technical, economic and professional resources to the whole of the country in order to improve the capacities and conditions to better manage different risks.

# NICARAGUA

## COUNTRY PROFILE

5.5

Nicaragua depends in grand part on international remittances and aid funding. The weakness of fundamental characteristics of its institutions has been demonstrated in events such as the 1998 impact of Hurricane Mitch.

## 5.5.1 SELECTED RTU


### RTU Managua

Disorganised rapid urban growth in the absence of planning criteria, has led to the creation of many human settlements located in high-risk areas. Due to its location on a system of faults (Stadium and Tiscapa), Managua has the highest exposure of any city in the country to earthquakes, and has been destroyed on two occasions (1931 and 1972). The risks associated with volcanoes are also very high due to the RTU´s proximity to the volcanic lagoons of Tiscapa, Nejapa, Asososca and Apoyeque. The recurrence of flooding, consequence of the rivers that flow through the city on their way to Lake Managua, has increased with deforestation, soil erosion, a deficient sewage system and inadequate waste treatment, among other factors.

## RTU Río Grande de Matagalpa

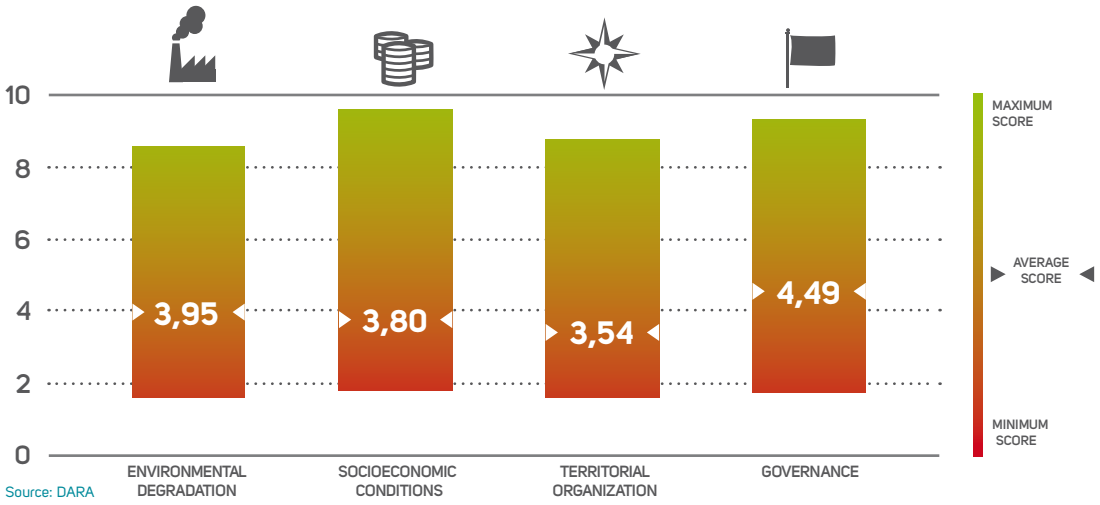
The most common hazards are floods caused by overflowing rivers and streams, hurricanes, tropical storms and drought. Risks associated with these hazards are higher because of an irregular topography as well as the effects of bad livestock management and agricultural practices, such as the disposal of waste and pollutants in rivers and streams. Deforestation, improper land use and the location of human settlements on unstable hillsides also contribute to increased risks to a growing population from landslides and debris avalanches.

## RTU Región Autónoma del Atlántico Norte (RAAN)

This region lies on a coastal plateau crossed by numerous rivers that drain into the Caribbean. It is a region with important natural resources and the highest frequency of rainfall in the country. With a humid tropical rainforest climate, floods caused by saturated soils and overflowing rivers, lakes and streams, are recurrent. Infrastructure and housing are particularly vulnerable, as they are not built in accordance with construction regulations and are made of traditional materials that are less resistant to hurricanes. The lack of access roads to many communities makes it difficult to reach these communities and carry out evacuations. Thus, a large part of the population remains isolated with limited access to basic services provided by government authorities and/or international agencies.

# 5.5.2 RISK DRIVERS

CHART E: QUESTIONNAIRE RESULTS IN NICARAGUA BY RISK DRIVER




Source: DARA

## RISK DRIVER 1: Environmental Degradation

The most detrimental elements of environmental degradation for risk reduction in all three RTUs are deforestation and the overexploitation of land and water resources. Local authorities are doing more to tackle environmental degradation problems, but there are limitations due to lack of resources and environmental management capacity. Climatic variations such as increased temperature, drought periods, and increased intensity and frequency of storms and hurricanes have been observed in recent years.

**Infrastructure destroyed in Central America during the hurricane season.** Source: USAID

## RISK DRIVER 2: Socioeconomic Conditions

In the three RTUs, poverty, food insecurity, limited access to water/drainage services and unemployment are identified as the socioeconomic conditions that most adversely affect risk management. Social protection mechanisms and financial support are felt to be beneficial, although in the RTU RAAN, social and community initiatives are insufficient. In addition, in this RTU, there are particular problems with lack of communications infrastructure and financial mechanisms to address socioeconomic problems.

## RISK DRIVER 3: Territorial Organisation

The low quality of housing and its inappropriate location in unsafe areas are the territorial organisation conditions that are least conducive to risk reduction in the three RTUs. In the RTU Río Grande de Matagalpa, land use plans and public investment decisions incorporate DRR measures, although in the RTU Managua, these measures are considered insufficient. In the three RTUs, construction codes are commonly disregarded.

## RISK DRIVER 4: Governance

Particular aspects of governance that impede risk management include limited institutional capacity, centralisation in decision-making, high levels of bureaucracy, non-compliance of regulations and corruption. Coordination and cooperation among different levels of government are considered more efficient in the RTUs Río Grande de Matagalpa and Managua than in the RTU RAAN. In all three RTUs, there are instruments and regulations that can be used to control risk, but their application is insufficient.

## 5.5.3 SUMMARY

In the three RTUs in Nicaragua, the governance driver is considered the most influential, affecting other drivers. Improvements in this risk driver would therefore result in positive changes in the other risk drivers. Specifically, strengthening governmental institutions throughout the country is identified as the most important recommendation, as this can help ensure that existing regulations are applied in order to achieve effective risk reduction.

THE LACK OF ROADS TO COMMUNITIES MAKES THEM DIFFICULT TO ACCESS, IMPEDES EVACUATIONS AND ISOLATES A LARGE PART OF THE POPULATION

In the workshop held in Nicaragua, the main challenges to improving the effectiveness of disaster risk reduction were discussed. From this debate, several concrete actions were defined for each of the RTUs:

RTU RAAN
- Strengthen the coordination and cooperation among different levels of government (territorial, local, regional and federal).
- Create a comprehensive agenda for risk management in the autonomous regions.
- Promote community participation in development processes, with a focus on comprehensive risk management.

RTU Río Grande de Matagalpa
- Implement land use plans at the municipal level. This is particularly important with regard to the water resources plan.
- Promote the construction of affordable housing, respecting land use plans and relocating dwellings situated in high-risk areas.
- Ensure inter-agency coordination to improve land use planning and advocate for the approval of a land use planning law.

RTU Managua
- Regulate the informal private sector and ensure compliance with legislation.
- Coordinate among agencies to avoid the duplication of efforts.
- Promote the development of plans and training for disaster response situations.

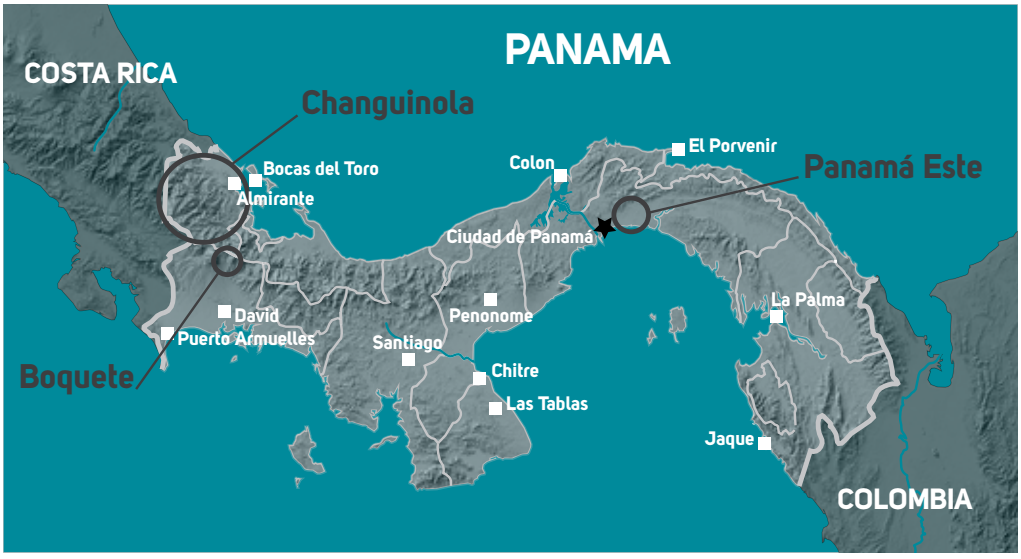
# PANAMA

## COUNTRY PROFILE

5.6

Its inter-oceanic geographical position makes Panama the commercial centre of the region, not only by attracting foreign investment, but also in the generation of an important tourist industry. Despite the country's solid economic development, more than a third of the population lives in conditions of poverty or social exclusion and these people are the most vulnerable to disasters.

## 5.6.1 SELECTED RTU




### RTU Panamá Este

Panama City and the metropolitan area it forms part of have experienced a rapid expansion process, particularly in the eastern and western parts of the city. This RTU is made up of different areas and activities including residential areas, business centres, wooden shacks (frequently destroyed by fires) and low-lying areas prone to recurrent flooding. The large urban development projects on land reclaimed from the canal (formerly US military bases), the canal expansion project and the construction of a subway system will all influence the dynamics of the city and the nature of risk.

## BUREAUCRACY, LACK OF COORDINATION, NONCOMPLIANCE WITH LEGISLATION AND THE CENTRALISATION OF DECISION MAKING, ARE ALL GOVERNANCE FACTORS THAT HINDER RISK CONTROL AND REDUCTION

### RTU Boquete

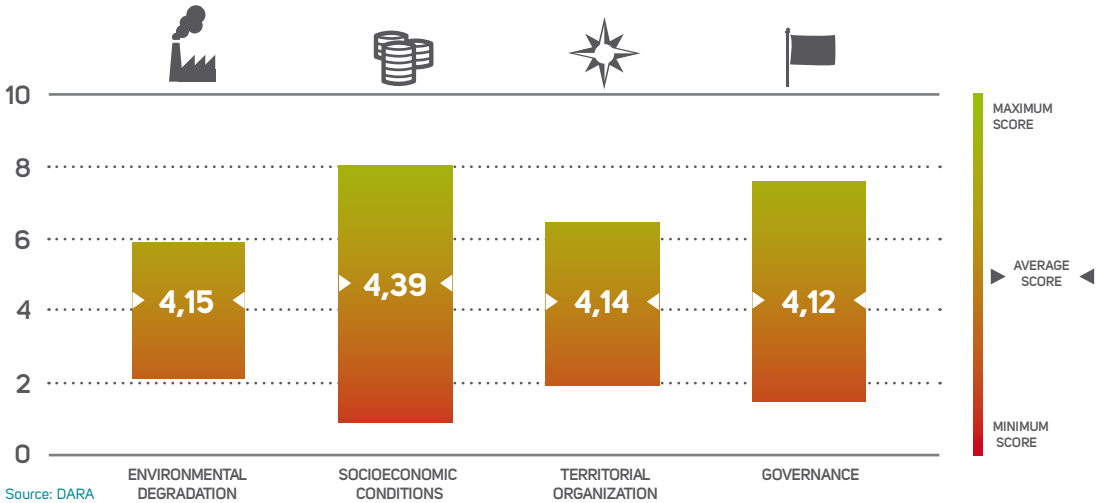
This region, made up of the districts of Volcán and Boquete (Province of Chiriquí), is a mountainous area in the west of the country, through which several rivers flow into the Pacific. The area is prone to floods and landslides and has a medium-to-high degree of seismic risk. The cultivation of coffee for export is the main economic activity in the area and in recent years, there has been a strong process of urban expansion due to the influx of foreign and national immigrants attracted by the climate and proximity to beaches on the Pacific coast. As a result, there has been significant growth in the hotel industry, the development of new residential areas and an expansion of services to meet the needs of a growing population.

### RTU Changuinola

This western region lies within the river basins of the Sixaola and Changuinola rivers (Province of Bocas del Toro) near the border with Costa Rica. Here, the population is largely rural, indigenous and dedicated to farming activities. In the Changuinola district, most of the population is Ngöbe and Bugles, Bokota, Naso Teribe and Bri Bri. The area is prone to earthquakes and floods, reporting the greatest damage from this type of phenomenon in the country. Nevertheless, this region benefits from a number of risk and environmental management projects, including initiatives focused on the bi-national Sixaola river basin.

## 5.6.2 RISK DRIVERS

CHART F: QUESTIONNAIRE RESULTS IN PANAMA BY RISK DRIVER




Source: DARA

## RISK DRIVER 1: Environmental Degradation

In the three RTUs, overexploitation of soil, deforestation and the overexploitation of water resources are identified as the environmental degradation factors that most hinder effective risk reduction. Regarding the performance of government authorities to protect the environment, local authorities are generally more efficient than their national or subnational counterparts in controlling environmental degradation, although there is a lack of technical and professional capacity and financial resources limiting their good performance. In relation to climate variations, significant changes have been perceived over last 10 years in drought and precipitation cycles and average and extreme temperatures.

## RISK DRIVER 2: Socioeconomic Conditions

In the three RTUs, particular socioeconomic conditions are thought to hinder risk management, including poverty, unemployment, limited access to water and drainage services, lack of communications infrastructure and food insecurity. The social protection mechanisms and financial support needed to reduce poverty and food insecurity are generally considered deficient in all three RTUs.

## RISK DRIVER 3: Territorial Organisation

Certain conditions related to territorial organisation prevent effective risk reduction in all three RTUs including: land occupation in unsafe and fragile areas in both urban and rural contexts; and unsuitable location and poor quality of housing, mainly in rural areas. Regarding the inclusion of DRR initiatives in land use plans, it was felt that there are inadequate funds to do so and that these plans are insufficient in the three RTUs.

## RISK DRIVER 4: Governance

High levels of bureaucracy, lack of coordination among different levels of government, non-compliance with regulations, centralisation in decision-making and corruption are identified as governance issues that inhibit effective risk control and reduction in all three RTUs. Additionally, although legal instruments exist to promote DRR, their application is deficient. Moreover, citizen participation in the development and application of local development plans is low.

## 5.6.3 SUMMARY

Recent improvements in socioeconomic conditions due to the growth in tourism in the RTU Boquete may be creating unrealistic optimism. The area has a high risk of flooding, and growth of urban settlements in riverbeds may create problems in the future if appropriate regulations are not applied. In the RTU Changuinola, the factor that most impedes effective risk management is the lack of communications infrastructure and location of many settlements scattered throughout this area. This inaccessibility makes it very difficult to provide social development and capacity building programmes to reduce disaster risk. In the RTU Panamá Este, particular emphasis needs to be placed on the implementation of regulations to control the growth of irregular settlements located in marginal areas of the city at risk from flooding.

In the Panama workshop, the participants validated the questionnaire results and identified a number of recommendations for effective risk management common to all three RTUs:

- Improve knowledge and citizen participation to demand the implementation, compliance and continuity of DRR initiatives.
- Increase institutional coordination to improve monitoring and implementation of DRR programmes in an integrated manner.
- Promote education, disaster culture and training programmes to improve short/medium/long term planning and establish a basis for greater inter-agency participation.
- Channel more resources to local governments for an adequate environmental management. If the problem is approached at a municipal level, there is more likelihood of continuity, monitoring and adaptation to the local environment.

Some specific actions identified in each RTU to improve conditions and capacities for DRR:

RTU Boquete
- Place more emphasis on the collaboration of local authorities with DRR responsibilities with local NGOs.
- Develop specific DRR policies and guidelines at the local level (for example, municipalities need to generate their own risk maps).
- Improve the systematisation of information and existing programmes and coordination among institutions.

RTU Changuinola
- Implement a land use plan.
- Strengthen institutions and local governments through DRR training.
- Promote the empowerment of civil society.

RTU Panamá Este
- Promote integration of DRR in local government plans so that they deal with risk in an integrated manner.
- Strengthen institutional coordination.
- Promote community plans and projects for environmental conservation and natural resource management.

# DOMINICAN REPUBLIC

COUNTRY PROFILE

5.7

After the economic reforms undertaken in recent years in a stable political environment, the Dominican Republic has undergone a sustained pace of economic growth leading to increased domestic consumption. However, the current economic crisis has adversely affected the country because of its dependence, in large part, on foreign investment, remittances from and exports to the United States.

## 5.7.1 SELECTED RTU

### RTU Duarte

A mountain range and the Yuna River run through the Province of Duarte. Composed of seven municipalities, this region has a population dependent primarily on agriculture (coffee, cacao, banana and rice), as well as cattle farming, trade and industry. Frequent floods cause constant damage to productive infrastructure due to poor soil drainage capacity, slope inclines and the low-lying river delta area. These characteristics cause the rivers and streams to overflow, especially in rainy season. There is also a high-risk of earthquakes due to the region's location along the northern fault.

### RTU Barahona

This province, composed of eleven municipalities, is characterised by its strong economic development in agriculture, mining, industry and tourism activities. There are also economic activities related to the industrial port and the textile industry. It is highly exposed to hurricanes, tropical cyclones and floods, caused mainly by deforestation (of particular concern in the *Yaque del Sur* river basin) and its position close to the sea; soil erosion and the proximity of the Cabral lagoon, which is in constant danger of joining with the *Yaque del Sur* River and flooding the towns and communities in between. Desertification is also a serious threat, and although located on the *Trinchera de los Muertos* seismic fault, it is only at a medium risk of earthquakes.

### RTU Distrito Nacional

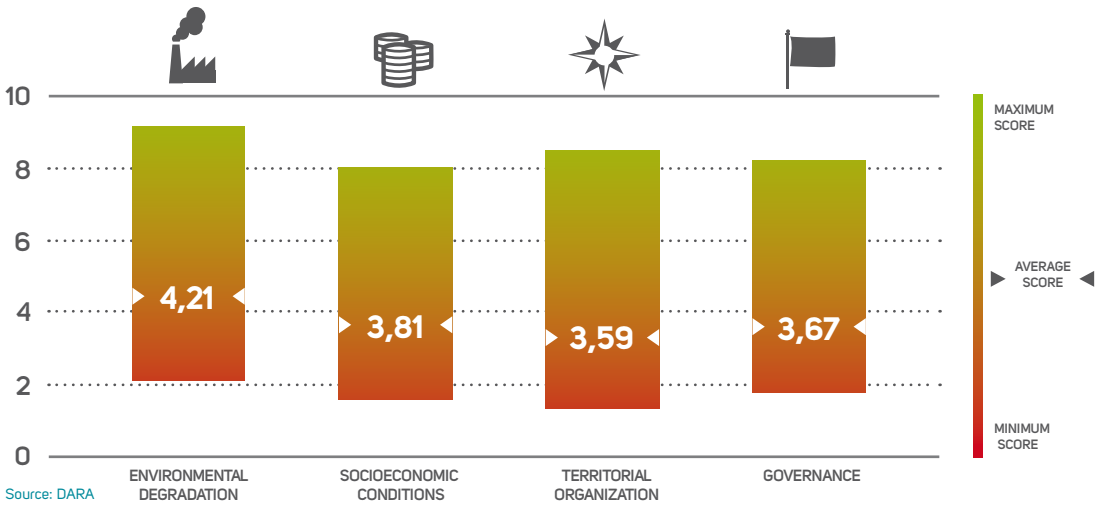
Originally, the capital of the Dominican Republic was Santo Domingo. However, the National District (*Distrito Nacional*) has become the nation's capital, and Santo Domingo is a province consisting of seven municipalities. In this RTU, floods pose a serious threat to the population and infrastructure, especially in the many slums of Santo Domingo located near the *Ozama e Isabela River* and connected creeks and streams. In these areas, the size of the vulnerable population has increased due to rural-urban migration and the construction of improvised shelters with no urban planning or basic water supply and drainage. The earthquake threat in this RTU is medium, despite being on the *Sistema del Sur* seismic fault that extends to the south of Haiti. In this RTU, cyclones and tropical storms are frequent and droughts occur mainly in the southern region caused by rapid urbanisation and the high demand for water from the new population.

## 5.7.2 RISK DRIVERS

### RISK DRIVER 1: Environmental Degradation

In the three RTUs, the aspects of environmental degradation that most affect risk management are identified as the overexploitation of soil, deforestation and overexploitation of water resources. The government's response to environmental degradation is considered inadequate, mainly due to a lack of resources. In the three RTUs, climate variations have been noted, especially in precipitation and drought cycles, and extreme and average temperatures.

CHART G: QUESTIONNAIRE RESULTS IN THE DOMINICAN REPUBLIC BY RISK DRIVER




Source: DARA

## RISK DRIVER 2: Socioeconomic Conditions

The socioeconomic conditions that undermine the success of risk management in the three RTUs are unemployment, poverty and limited access to water and drainage services. Weaknesses in capacity include the ineffectiveness of social protection mechanisms to reduce levels of poverty, lack of economic support to improve food security and insufficient financial security mechanisms (insurance, loans) to promote economic development.

## RISK DRIVER 3: Territorial Organisation

The main factors associated with territorial organisation that prevent effective risk reduction in all three RTUs include the inappropriate location and low quality of housing and land occupation in unsafe or fragile areas. The inadequate incorporation of DRR strategies in land use plans and public investments, and non-compliance with construction codes and norms are also negative factors.

## RISK DRIVER 4: Governance

Corruption, high levels of bureaucracy, lack of coordination among different levels of government, centralisation in decision-making and lack of institutional capacity are highlighted in all three RTUs as having negative effects on risk management. DRR instruments and mechanisms are considered adequate in the three RTUs, but they are not effectively implemented. Additionally, civil society participation in local development processes is low and decision-making on development issues is not considered transparent.

PROBLEMS INCLUDE POOR INTERSECTORAL AND INTERINSTITUTIONAL COORDINATION, LACK OF ENFORCEMENT OF RISK MANAGEMENT REGULATIONS AND TOO FEW RESOURCES FOR THE IMPLEMENTATION OF DRR PLANS

## 5.7.3 SUMMARY

In the Dominican Republic, according to questionnaire results in the three RTUs, the low level of inter-sectoral and inter-institutional coordination (all levels of government have reduction risk plans, but they act independently), poor application of risk management regulations and limited budgets to implement DRR plans were identified as the greatest challenges for DRR.

In the Dominican Republic workshop, participants of all three RTUs agreed on the importance of governmental efficiency and effectiveness and coordination among different levels of government. They identified a number of recommendations at the national level:

- Promote DRR as a cross-cutting issue in public policies and allocate necessary financial resources.
- Ensure correct implementation of risk management regulations.
- Improve the level of inter-sectoral, inter-agency and inter-institutional coordination (there are inter-agency coordination structures, such as the National Emergency Commission and the Provincial and Municipal Committees for Prevention and Disaster Preparedness, but they do not function properly).
- Improve institutional capacity for DRR.
- Promote the creation of national and local land use plans.
- Empower local authorities through the decentralisation of resources and decision-making power to improve the efficiency of risk management activities.
- Promote the roles of the Ministry of Economy, Planning and Development in defining a framework for action on DRR and the Ministry of Finance in integrating DRR in ministry budgets.

Based on these recommendations, a few concrete actions are suggested to improve DRR in each RTU:

RTU Barahona
- Implementation of the Strategic Plan for the Renewal and Development of Barahona and neighbouring areas.
- Recuperation and dredging of Cabral lagoon.
- Support for environmental projects.
- Capacity building and empowerment of citizens.

RTU Duarte
- Technical strengthening of local governments.
- Promotion of land use and development plans.
- Improvement of citizen training on DRR.
- Creation of a fund to promote risk management.

RTU Distrito Nacional
- Improvement of inter-institutional coordination.
- Improvement of public investment in land use planning.
- Improvement of land use management instruments and sanctions.

# 6 COMPARATIVE ANALYSIS

## OF SUBNATIONAL CONDITIONS AND CAPACITIES

Despite their historical, geographical, socioeconomic and political differences, the seven Central American and Caribbean countries analysed have similar characteristics in terms of their conditions and characteristics for DRR. In all countries, aspects of the four risk drivers undermine risk reduction in one way or another. This suggests that when identifying risk reduction activities, multiple factors should be taken into account in order that these efforts are effective. The following is a summary of the results of the consultation based on the four risk drivers: environmental degradation and natural resources; socioeconomic conditions and livelihoods; territorial planning; and governance.

**Rescue operation from an orphanage destroyed by flood waters.** Source: UN/Marco Dormino

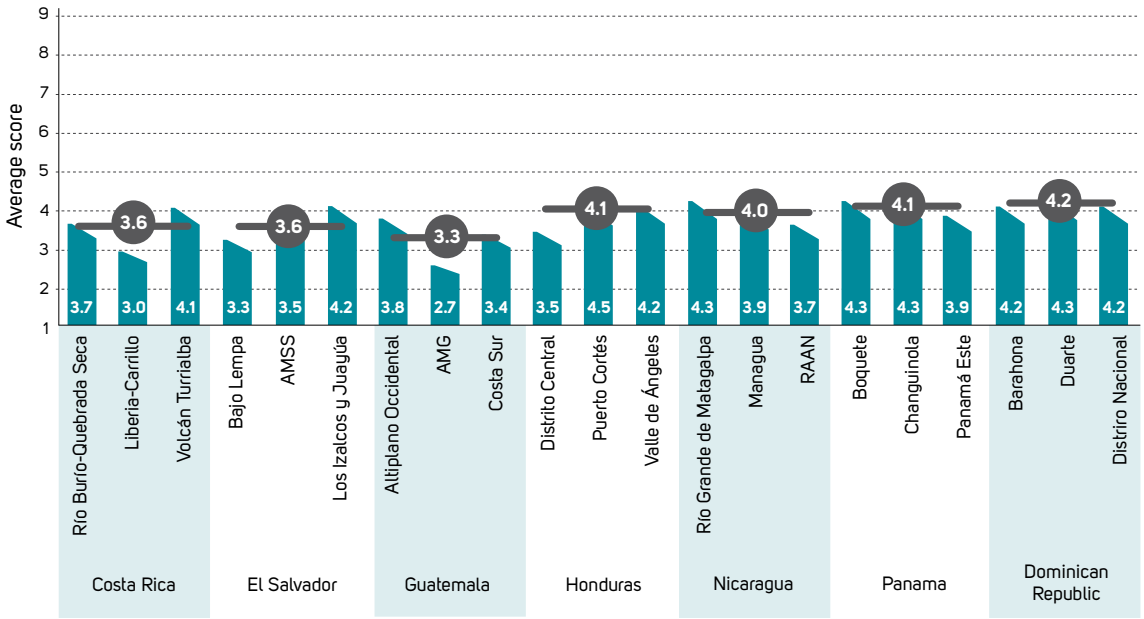
## Environmental degradation

The environmental degradation generally receives low scores and is therefore considered by questionnaire respondents as an important factor influencing the effectiveness of DRR. Within this driver, deforestation was emphasised as being particularly problematic for risk reduction, particularly in areas prone to hydro-meteorological hazards. Deforestation is generating risk in urban, rural and mixed RTUs, by destabilising soil, causing flooding and landslides in the rainy season. Populations with the highest exposure to these threats include those families living in marginal areas on the slopes of mountains and near the rivers and who are unlikely to have sufficient funds to purchase land in safer areas.

Compliance with existing regulations needs to be improved to reduce risk, especially with regard to land use plans. Additionally, according to the experts consulted, it is important to improve environmental awareness.

CHART H: RESULTS OF THE SUBNATIONAL ANALYSIS BY COUNTRY (RTU) FOR RISK DRIVER 1

Risk driver 1: Environmental degradation and natural resources




Source: DARA

Average score by RTU and country

Average score of the three RTUs by country

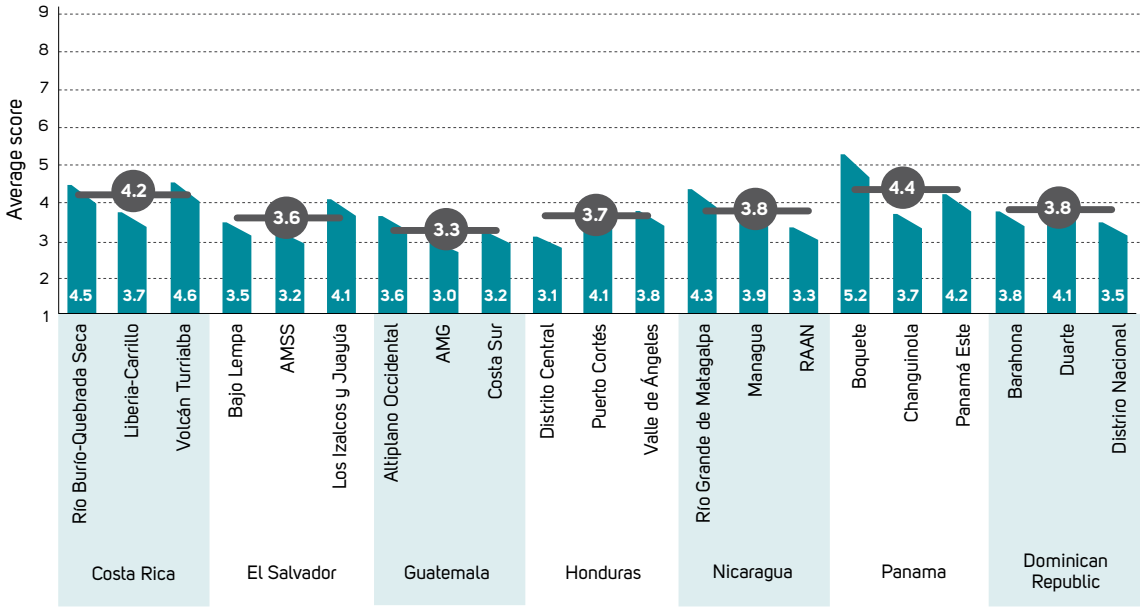
## Socioeconomic conditions

According to the experts consulted, socioeconomic conditions also adversely affect efforts to reduce disaster risk in all of the RTUs. The most influential socioeconomic conditions are poverty, unemployment, limited access to health services and unsanitary conditions. Food insecurity is also a challenge, especially in rural areas. Poverty and unemployment limit the options for marginalised populations to reduce risk and affect the other socioeconomic conditions, as without resources, families do not access health services to prevent infectious diseases and health epidemics caused by unhealthy environments and intensified by disasters.

Socioeconomic improvements and better access to the labour market and public services would contribute positively to risk reduction.

CHART I: RESULTS OF THE SUBNATIONAL ANALYSIS BY COUNTRY (RTU) FOR RISK DRIVER 2

Risk driver 2: Socioeconomic conditions and livelihoods




Source: DARA

Average score by RTU and country

Average score of the three RTUs by country

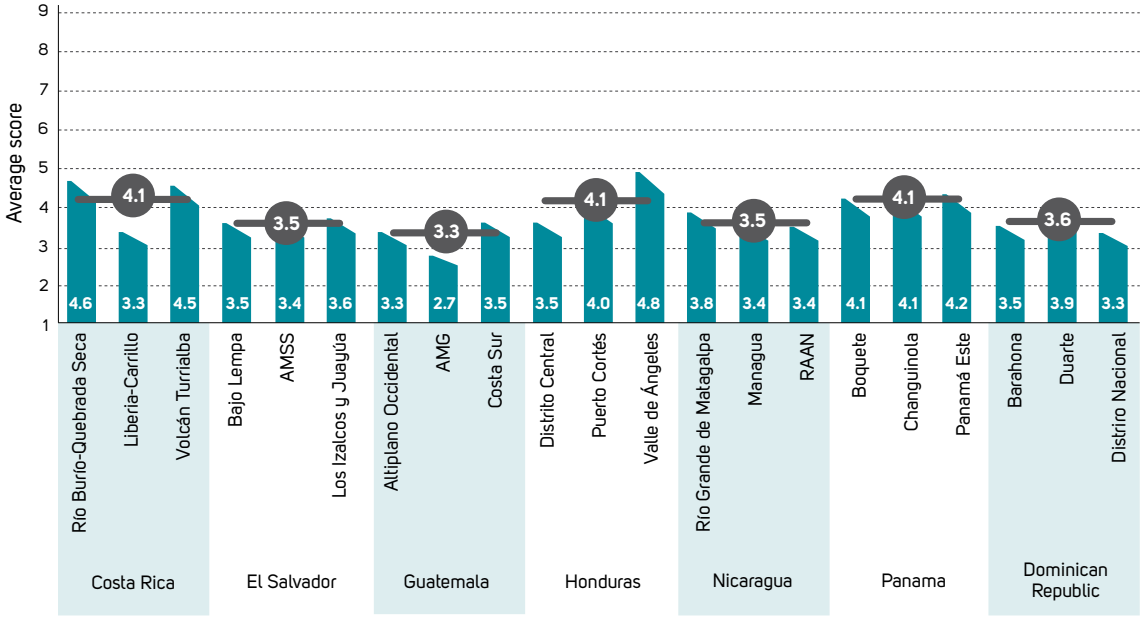
## Territorial Organisation

Territorial organisation as a public policy has had varying degrees of success in Central America and the Caribbean. The results of the questionnaire suggest that for DRR to be effective, the implementation of existing legislation must be a priority, particularly to control the growth of urban settlements in high risk areas. According to respondents, the most challenging factor of all the components of territorial organisation is the inappropriate location and poor construction of housing, especially in urban areas. In almost all of the countries studied, urban areas recorded the lowest scores for this driver because marginalised families in urban areas are forced to live in high risk locations which are rarely able to withstand the onslaught of earthquakes, heavy rains and hurricanes.

This scenario highlights the need for measures to control urbanisation processes, especially those that marginalise poor populations. Access to safe land is essential to risk reduction, especially in urban areas with high population growth.

CHART J: RESULTS OF THE SUBNATIONAL ANALYSIS BY COUNTRY (RTU) FOR RISK DRIVER 3

Risk driver 3: Territorial organization




Source: DARA

Average score by RTU and country

Average score of the three RTUs by country

## Governance

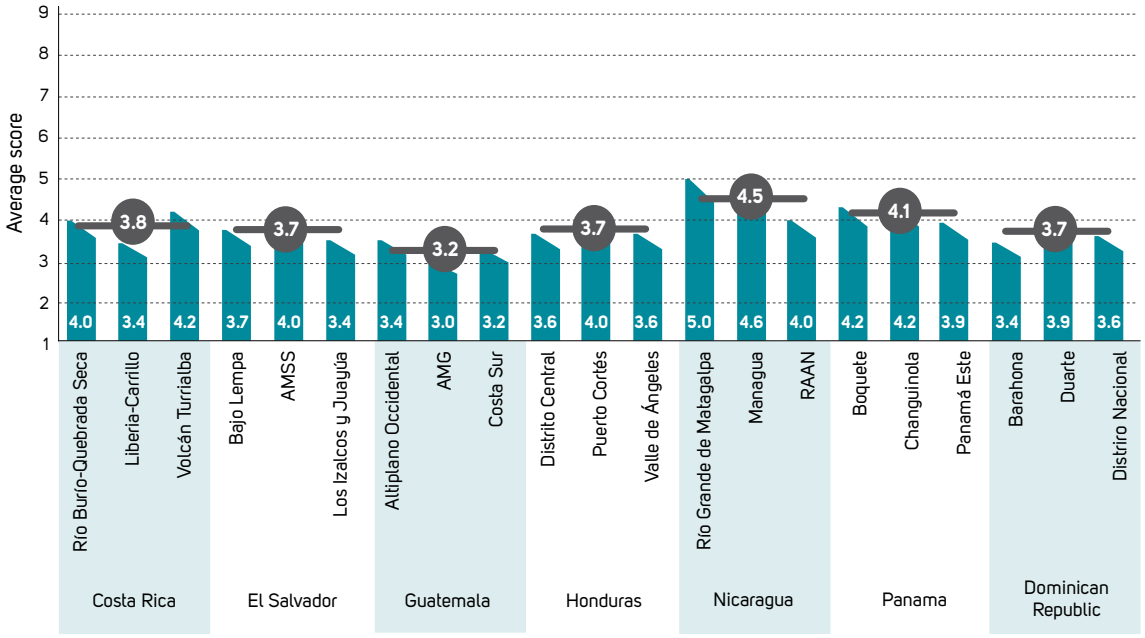
Governance was the most risk driver most emphasised by experts in the seven countries studied. Most respondents noted the link between problems of governance and other risk drivers, although in many cases the scores assigned to other drivers were lower. During the workshops held in each country, participants expressed concerns about the lack of coordination among government agencies, both horizontally (across sectors) and vertically (between levels). Other factors highlighted by experts were the centralisation in decision-making, corruption and infringement of laws. As previously highlighted, these factors have an important effect on other risk drivers: experts noted, for example, that it is very difficult for local governments to implement territorial organisation plans without the support of the central government. Under these conditions, local governments are found to have insufficient capacity to act effectively at the local level.

The governance factor of least concern in all countries is media censorship. None of the respondents in any of the RTUs considered censorship to be a determining factor in preventing risk reduction.

In general, all countries received low scores for governance, especially Guatemala due to its delicate political situation, although in Nicaragua[5] the result was relatively positive.

CHART K: RESULTS OF THE SUBNATIONAL ANALYSIS BY COUNTRY (RTU) FOR RISK DRIVER 4

Risk driver 4: Governance




Source: DARA

Average score by RTU and country

Average score of the three RTUs by country

[5] The questionnaire results in Nicaragua may have some political bias and should be interpreted with caution.


**Disaster relief workers standing in the midst of rubble before clearing.** Source: USAID/Herve Jean-Charles

## Summary of subnational-level analysis

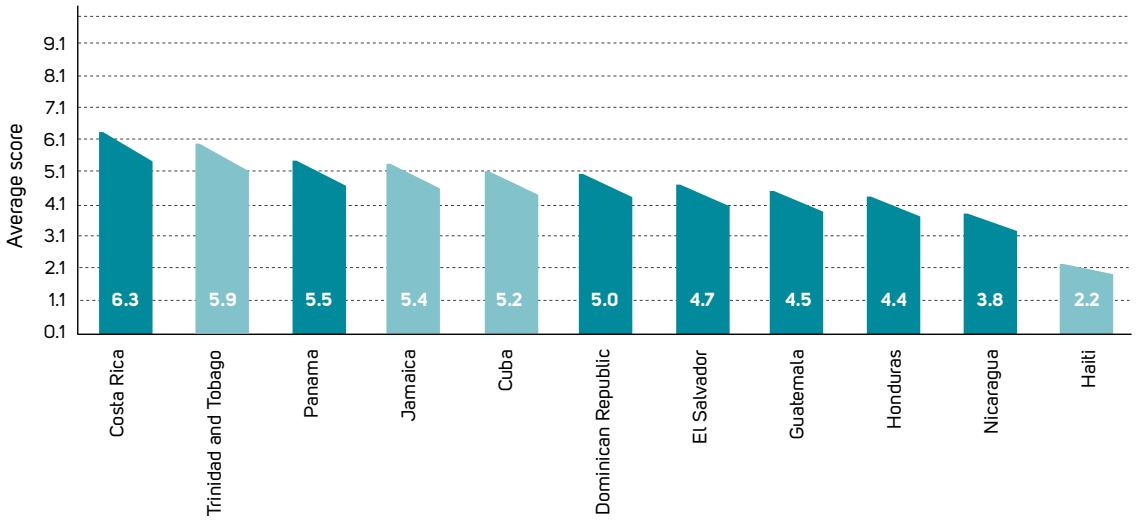
In summary, the results of the subnational analysis in these seven countries demonstrates that, according to key informants, a number of conditions and capacities within the four risk drivers prevent effective risk reduction. However, among and within these countries, there is significant variation in the importance of the four risk drivers. Thus, in Costa Rica, the most prominent factor is environmental degradation; and in El Salvador and Nicaragua, experts believe that governance is of less concern than other drivers, while in Honduras and the Dominican Republic, governance is of greater concern. In general, experts in Panama attach less importance to all four drivers than those in other countries, particularly socioeconomic conditions. In Guatemala, on the other hand, experts consider all four drivers to be important and equally influential. Nonetheless, it is worth noting that in all of the countries, there is not one factor that according to experts does not represent an obstacle to risk reduction.

# 7 NATIONAL-LEVEL ANALYSIS

Based on the method for aggregation of quantitative indicators explained in the first part of this report, values for a national index[6] were calculated. The graph below displays the results of this analysis for eleven selected countries in the Caribbean and Central America (Costa Rica, Cuba, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Nicaragua, Panama, the Dominican Republic and Trinidad and Tobago).

## CHART L: RESULTS OF NATIONAL-LEVEL ANALYSIS BY COUNTRY

National Index




Source: DARA

The national-level data provides information that is insufficiently detailed to identify risk reduction policies or actions, but the scores produced do offer guidance as to where more attention is required. The indicators that have been selected are approximations, not precise indicators, of national conditions and capacities for DRR, and in order to fully understand the context for risk reduction in each country, the results must be, where possible, accompanied by a qualitative analysis that interprets these national trends.

In this since, the national analysis is not a result in and of itself and does not measure the conditions

[5] This resulted in a composite index of 184 countries.

and capacities for DRR, but rather it can be used as a reference for analysing trends and changes over time at the national level. It can be seen from the final results of analysis in eleven countries presented in Chart L that the values vary significantly, indicating that at the national level there are a number of factors influencing risk reduction, positively or negatively. The national-level data reveals different tendencies in relation to the four risk drivers and it is notable that those countries in the region considered pioneers in the area of DRR have the highest scores (Costa Rica), while those that are thought to be more vulnerable, have lower scores (Haiti).

## 7.1 NATIONAL-SUBNATIONAL COMPARATIVE ANALYSIS

Indicators, whether at the subnational or national level, represent different scenarios that will influence any attempt to reduce risk and so present an overview of the context needed for DRR. However, the configuration of risk varies by country and depends very much on local conditions (geography, infrastructure, political institutions and level of economic development), so the subnational results offer more detailed information on the characteristics of diverse areas facing different hazards. This level of detail cannot be achieved through the national analysis (see Chart M for a visual comparison of national and subnational data).

Analysis of the subnational results reveals a number of challenges within each RTU and indirectly points to a number of measures that local and national governments could adopt to help reduce disaster risk. These results also indicate which factors, according to the assessment of experts, have less influence on risk reduction.

In summary, a comparison of the results of the national and subnational analysis demonstrates the importance of reducing the scale analysis in order to capture the detail and relevant processes within the local areas - or RTUs. The national results are useful for encouraging and advocating for the mainstreaming of risk reduction in development, but they cannot replace an *in situ* analysis of risk and options to mitigate damage or reduce risk. However, the results also confirm that risk reduction should be seen as a vertical continuum of efforts and activities, in which local, subnational and national levels are linked and coordinated, mutually reinforcing relevant capacities and conditions at different levels. The recognition that multiple and causal horizontal factors affect risk reduction, and therefore climate change adaptation, is more likely to result in DRR being addressed in a comprehensive and multi-sectoral manner.

In summary, a number of actions were recommended by experts and participants in the country workshops, including:

- Prioritise the implementation of land use plans, especially in areas of urban growth with a high risk of landslides.
- Promote social participation in policy making and build consensus and coordination between national and local levels of government to ensure compliance with plans and regulations.
- Jointly plan and articulate development processes and existing economic activities, to help reduce the specific risk conditions of populations affected by recurrent flooding.

# 8 FINAL CONCLUSIONS

Disaster risk is now commonly thought to have different causes and manifestations in different areas of any region or country. Thus, the success of a national risk management strategy will depend on the existence of an enabling environment, which in turn is determined by the conditions and capacities at the national level, and more specifically, at the subnational/local level. The success of a risk management strategy is also influenced by the ability of authorities to implement appropriate measures that take into account the different risk contexts within a country.

With this in mind, the RRI seeks to improve the systematisation of information in order to produce an accurate picture of the existence or absence of conditions and capacities that facilitate risk reduction in different areas studied.

The method applied, data collected and analysis undertaken offer several benefits and opportunities for expanding the RRI project in the future. The method for calculating the national index is applicable and reproducible in other geographical locations and risk settings due to the reliability of information and reputation of the sources used. Like any new initiative, the RRI is subject to future improvements and to a reduction or expansion of the indicators used, however, it should continue to build on the conceptual framework that captures the distinct processes or drivers of risk.

IN ORDER TO IMPLEMENT ADEQUATE DRR MEASURES, IT IS NECESSARY TO UNDERSTAND THE DIFFERENT RISK ENVIRONMENTS WITHIN A COUNTRY

The questionnaire and its application in RTUs is innovative in four respects: firstly, for the scale and scientific basis of the questions, which cover a wide range of factors relating to the risk drivers; secondly, for the wide range of the experts from different sectors and thematic areas and specialisations that were consulted; thirdly, for its role in stimulating reflection and discussion on DRR and climate change adaptation issues among experts from different sectors, from a more comprehensive and holistic perspective; and fourthly, because it offers a view from the subnational level that allows one to make connections between specific community characteristics and broad and diverse country characteristics, thus showing that although risk has to be tackled at the subnational level, it is affected by interventions at the national level.

The index has a modular structure, allowing the end user or analyst to see the general situation in terms of the relative importance of different factors influencing risk reduction, but also permitting one to analyse particular conditions and capacities associated with each risk driver and their contribution to the problem of disaster risk management.

Thanks to the way in which data are presented and the range of information obtained, further research and data analysis can be undertaken in the future: from a global, regional or sectoral perspective; by group of experts; as a comparative or individual study; and, eventually, of a diachronic in nature.

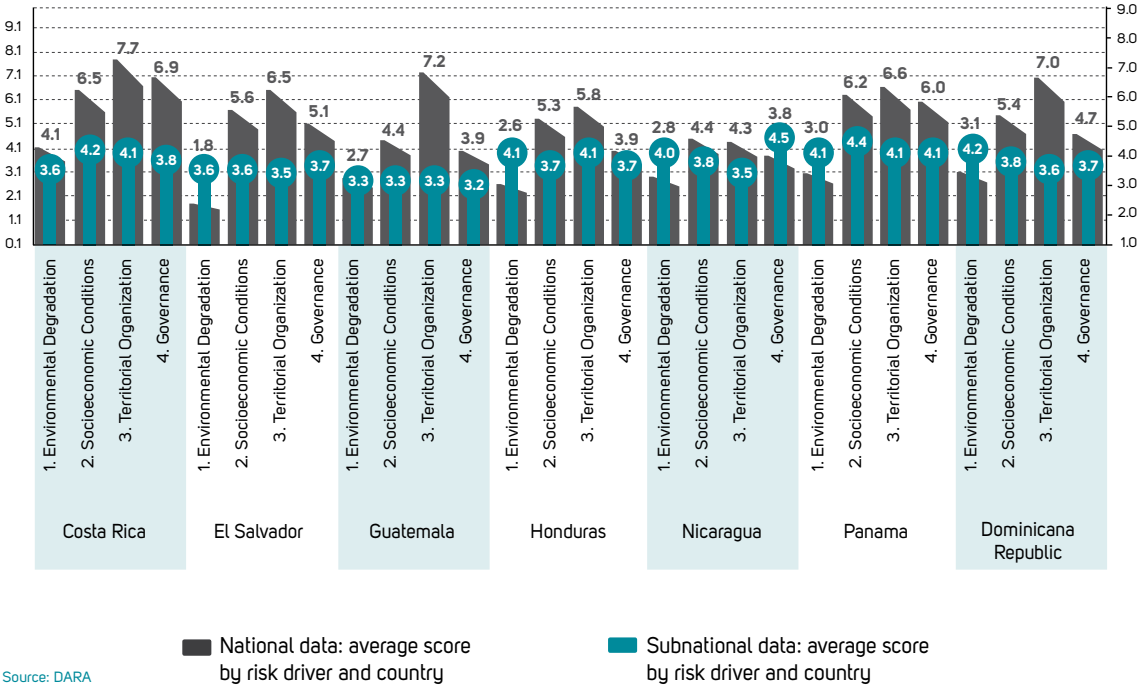
# THE INFORMATION DRAWN FROM THIS STUDY IN SEVEN CENTRAL AMERICAN AND CARIBBEAN COUNTRIES CAN BE USED FOR FURTHER ANALYSIS AND OFFERS OPPORTUNITIES FOR FUTURE STUDIES

The application of the questionnaire in seven countries generated a series of reflections and expectations. The experts consulted, including those who participated in the methodological process (peer reviewers) and those who participated in the national workshops, approved the method and many commented that filling in the questionnaire had produced a positive experience of analysis and deliberation. For some, the concept of risk reduction was new and for others it provided an opportunity to further reflect upon the link between local development policies and the generation of risk. For example, participants in the Costa Rica national workshop noted that:

*"... after answering the questionnaire individually or collectively, [the expert] has a more comprehensive idea of - and has many questions with regard to - the four drivers and their relevance in the RTU, and begins to question the development model that is being promoted."*

The first phase of the RRI was developed in seven Central American and Caribbean countries and there is little doubt that it produced new ways of examining and understanding the issue of risk reduction, particularly among the experts who participated in the process. Nevertheless, there is still considerable potential to generate more information and conclusions and recommendations that can be better operationalised.

## CHART M. RESULTS OF THE NATIONAL AND SUBNATIONAL ANALYSIS




Source: DARA

# ACRONYMS

AECID
Spanish Agency for International Cooperation and Development

AMG
Área Metropolitana de Guatemala

AMSS
Área Metropolitana de San Salvador

CAM
Madrid Government

CDEMA
Caribbean Disaster and Emergency Management Agency

CEPREDENAC
Centre for the Coordination and Prevention of Natural Disasters in Central America

DIPECHO
Disaster Preparedness Plan of the European Commission Humanitarian Aid Department

DRR
Disaster Risk Reduction

GAR/DRR
Global Assessment Report on Disaster Risk Reduction

HFA
Hyogo Framework for Action

IUCN
International Union for Conservation of Nature

OAS
Organization of American States

RAAN
North Atlantic Autonomous Region (Nicaragua)

RRI
Risk Reduction Index: Analysis of the capacities and conditions for disaster risk reduction

RTU
Representative Territorial Unit

SNET
National Territories Studies Service (El Salvador)

TEC
Tsunami Evaluation Coalition

UN/ISDR
United Nations International Strategy for Disaster Reduction

UNDP
United Nations Development Programme

URB-AL
The European Union Urban Regional Aid Programme

# ANALYSIS OF THE CAPACITIES AND CONDITIONS FOR DISASTER RISK REDUCTION

## Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama and the Dominican Republic

Environmental degradation, socioeconomic conditions, territorial planning and governance... Which factors are affecting risk reduction in countries that suffer the devastating effects of disasters? What needs to be done to ensure that risk management is effective?

The ***Risk Reduction Index***, has been developed in Central America and the Caribbean to generate information on the factors affecting disaster risk reduction. This information can help guide decision making on risk reduction and adaptation, to make certain that it addresses the challenges posed by climate change and development in the region.

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