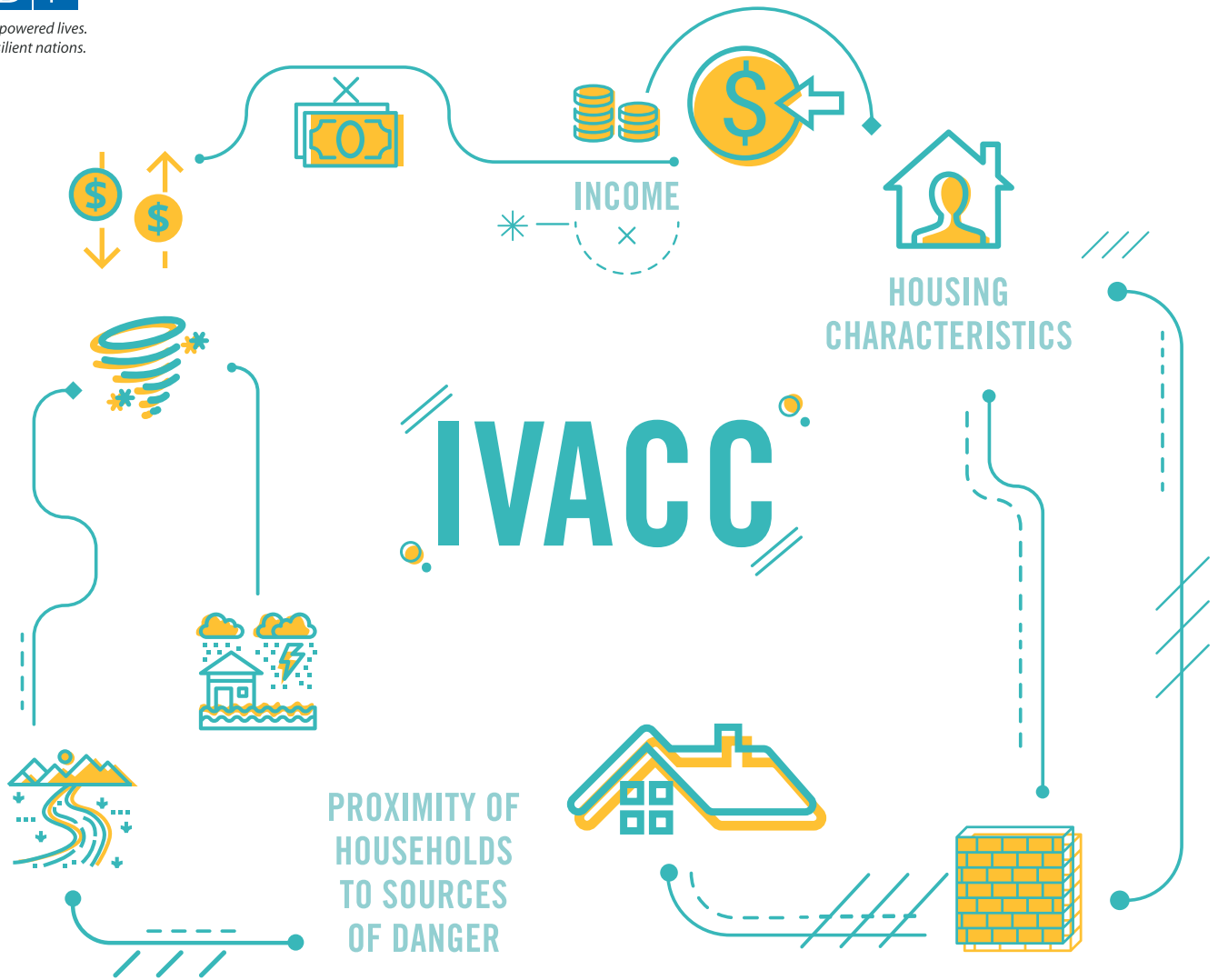




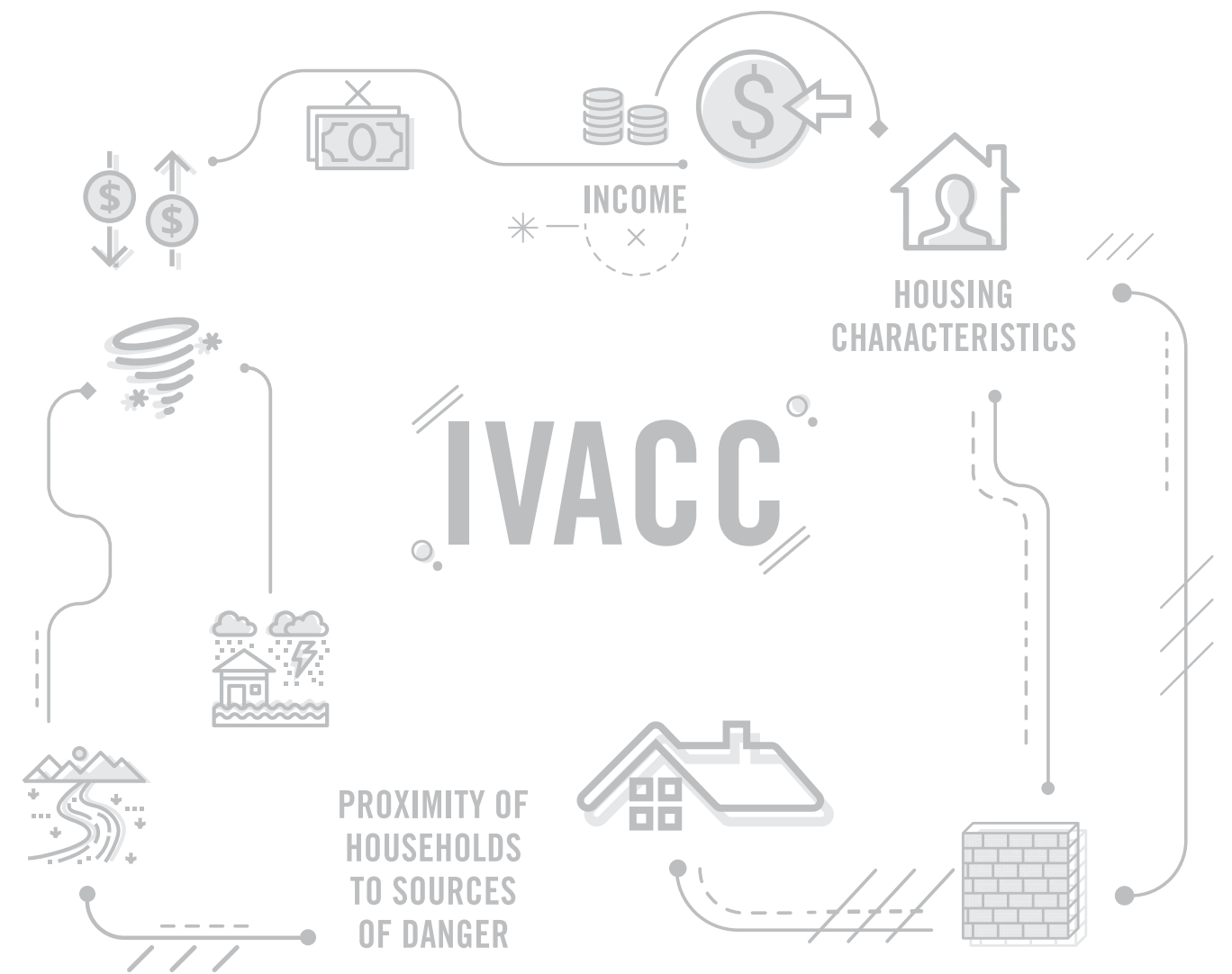
Empowered lives.  
Resilient nations.



# VULNERABILITY TO CLIMATE HAZARDS INDEX

LESSONS LEARNED AND SYSTEMATIZATION OF THE DESIGN PROCESS  
AND APPLICATION OF THE **IVACC INDEX - DOMINICAN REPUBLIC**

POVERTY-ENVIRONMENT INITIATIVE



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#### Authors and contributions

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The document has also received contributions from Sócrates Barinas, Melissa Breton and Ana María Pérez from the UNDP office in the Dominican Republic and Piedad Martín, Jaime Mira Salama and Pilar Román of the joint UNDP-UN Environment team of the Poverty-Environment Initiative (PEI).

#### Editors

Piedad Martín and Pilar Román.



#### Design and layout

.PuntoAparte

#### About this initiative:

The Poverty-Environment Initiative (PEI), a joint initiative of UNDP and UN Environment, aims to support countries in the implementation of policies, instruments, plans and budgets that bring together effective environmental management and poverty reduction to contribute to sustainable development. The program also contributes to the strengthening of capacities, at national and local levels, to create policies, plans and budgets that are favorable for the poor, inclusive, gender sensitive and sustainable for natural resources.

UN Environment's "Regional Gateway for Technology Transfer and Climate Change Action in Latin America and the Caribbean" (REGATTA) is designed to assist in the coordination of efforts related to climate change through the building of capacities among key institutions at regional and national levels. To this end, an integrated and coherent approach is employed, which provides support through a wide range of activities for the development of capacities.

This document was commissioned by the PEI and REGATTA team in Latin America and the Caribbean in order to provide strategic inputs for discussion among the main development actors in the region.

This publication was made possible thanks to the inputs of the following institutions in the Dominican Republic that participated in structured interviews and the socialization and lessons learned workshop in February of 2018 in Santo Domingo.

#### National institutions

Administradora de Subsidios Sociales  
Comisión Nacional de Emergencias  
Consejo Nacional para la Niñez y la Adolescencia  
Defensa Civil  
Dirección General de Programas Especiales de la Presidencia  
Dirección General de Cooperación Multilateral  
Instituto Nacional de Aguas Potables y Alcantarillados  
Instituto Nacional de la Vivienda, Ministerio de Agricultura  
Ministerio de Educación  
Ministerio de Economía Planificación y Desarrollo  
Ministerio de Hacienda,  
Ministerio Medio Ambiente  
Ministerio de Salud  
Oficina Nacional de Meteorología  
Programa Progresando con Solidaridad  
Sistema Único de Beneficiarios

#### Academic institutions

Instituto Tecnológico de Santo Domingo  
Facultad Latinoamericana de Ciencias Sociales

#### Cooperation agencies

Spanish Agency for International Development Cooperation (AECID)

#### United Nations agencies and programs

United Nations Development Programme  
United Nations Environment Programme  
World Food Programme  
United Nations Population Fund

#### NGOs and foundations

Plan Internacional  
Plenitud

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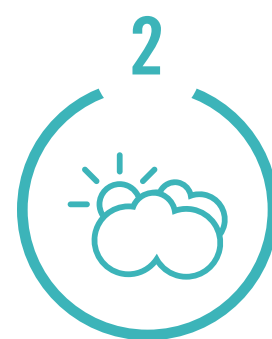


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  - 1.2. Measuring risk, vulnerability and the impact of disasters



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# ACRONYMS AND ABBREVIATIONS

<b>ADESS</b>	Administradora de Subsidios Sociales
<b>WB</b>	World Bank
<b>CERF</b>	Fondo Central de Acción en Casos de Emergencias de las Naciones Unidas
<b>CC</b>	Climate change
<b>CNE</b>	Comisión Nacional de Emergencia
<b>COE</b>	Centro de Operaciones de Emergencias
<b>CEPAL</b>	Comisión Económica para América Latina y el Caribe
<b>DR</b>	Dominican Republic
<b>DRF</b>	Disaster Recovery Framework
<b>EDAN</b>	Evaluación de daños y análisis de necesidades
<b>END</b>	Estrategia Nacional de Desarrollo 2030 República Dominicana
<b>GCPS</b>	Gabinete de Coordinación de las Políticas Sociales
<b>QLI</b>	Quality of Life Index
<b>MPI</b>	Multidimensional Poverty Index
<b>IVACC</b>	Índice de Vulnerabilidad Ante Choques Climáticos
<b>PEI</b>	Poverty-Environment Initiative
<b>MEPYD</b>	Ministerio de Economía, Planificación y Desarrollo
<b>SDG</b>	Sustainable Development Goal
<b>UN Environment</b>	United Nations Environment Programme
<b>PMR</b>	Prevention, Mitigation and Response
<b>UNDP</b>	United Nations Development Programme
<b>PROSOLI</b>	Progresando con Solidaridad
<b>WFP</b>	World Food Programme
<b>REGATTA</b>	Portal Regional para la Transferencia de Tecnología y la Acción Frente al Cambio Climático en América Latina y el Caribe. ON Environment
<b>SIUBEN</b>	Sistema de Identificación Único de Beneficiarios
<b>UNS</b>	United Nations System
<b>SNPMR</b>	Sistema Nacional de Prevención, Mitigación y Respuesta ante Desastres





# PREFACE

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## The "National Program for the incorporation of environmental variables for development and reduction of vulnerability to climate hazards among poor rural households in the Dominican Republic"

was developed in the Dominican Republic between 2014 and 2017. The main objective of this initiative was to integrate the links between poverty, the environment and adaptation to climate change in planning and development processes, as well as social protection strategies, in order to reduce the level of vulnerability among poor rural households and to increase their resilience to climate hazards, such as tropical storms, droughts and floods. It was a joint program of the United Nations Development Programme (UNDP) and the United Nations Environment Programme (UN Environment), carried out within the framework of the Poverty-Environment Initiative (PEI) and the Regional Gateway for Technology Transfer and Climate Change Action in Latin America and the Caribbean (REGATTA) and executed with the financial support of the Spanish Agency for International Development Cooperation (AECID). The leadership of the national counterparts for its execution and political relevance was key, highlighting the role of the Office of the Vice Presidency and the National System of Beneficiaries (SIUBEN).

Among the many actions within the scope of this program, the creation of the Vulnerability to Climate

Hazards Index (VCHI, or in Spanish IVACC) stands out for its relevance. This tool was developed under the national leadership of the National System of Beneficiaries (SIUBEN), an institution attached to the Social Policy Coordination Cabinet (GCPS), which operates under the direct responsibility of the Vice Presidency of the Republic. The main function of SIUBEN is to identify, characterize, register and prioritize families living in poverty for the application and targeting of social policies. IVACC complements the criteria for identifying vulnerable households with variables related to their exposure to environmental hazards and socioeconomic fragility.

The IVACC index is a tool that is garnering interest among a number of countries in the region due to its concrete application possibilities. It is a tool that can provide support, in an informed manner, for the targeting of public policies, given that it contains information at the household level. It also allows for the coordination and cooperative action of social and environmental policies, since it includes variables related to the environment and poverty. Moreover, it provides information, at the household level, on the conditions of vulnerability or susceptibility to damages, as



well as aggregating it on different geographical scales, such as community, municipality, province or nation. This possibility, previously inexistent on a national scale, allows for the identification of vulnerable households, the comparison and prioritization of households according to their vulnerability, the differentiation of vulnerabilities by region and the differentiation of vulnerabilities by gender of heads of households, among others.

Currently, the IVACC index has a practical application for the targeting of Conditional Cash Transfer programs and for the reactive management of emergencies. On the one hand, it is a tool that allows for the identification of households that have a greater degree of vulnerability and less resilience and, thus, can be used to prioritize social programs. On the other hand, it has important applications for the prioritization of the interventions of the National System for Prevention, Mitigation and Response, as well as for defining the policy and response procedures of the country's social protection system for preparation and post-disaster recovery and reconstruction processes aimed at poverty reduction<sup>1</sup>.

With IVACC, the Dominican Republic has become a global pioneer in the development and implementation of environmental vulnerability indices applied to households that allow for geographical disaggregation on any cartographic scale.

The objective of this systematization is to disseminate the IVACC index and the institutional development process in which it is framed, as well as to present an analysis of its possible applications, from the perspective of those who participated in its development.

This systematization is intended for a wide group of readers, particularly those responsible for policies and social protection programs, organizations in charge of development planning entities, environmental entities, researchers and development organizations.

## IVACC and Sustainable Development Goals

IVACC is part of the national effort to implement the 2030 Agenda in the Dominican Republic. The development of the IVACC index and its implementation has created bridges between various sectors to develop a coherent policy framework (SDG 17) that ensures the identification, prioritization and targeting of social programs for poor households (SDG 1 and SDG 2) in risk areas. IVACC is also an important tool for the development of public policies to increase resilience to the effects of climate hazards (SDG 13). In addition, due to its focus on identifying the most vulnerable households, it is an instrument that contributes to the goal of "leave no one behind."

<sup>1</sup> The Dominican Republic has defined a National Protocol for Social Protection against Hazards and has implemented a Pilot Program, in fourteen provinces, for the development of capacities of the GCPS (Social Policy Coordination Cabinet) for this purpose.



NO  
POVERTY



ZERO  
HUNGER



CLIMATE  
ACTION



PARTNERSHIPS  
FOR THE GOALS





# PART I

THE RELATIONSHIP BETWEEN POVERTY  
**AND THE ENVIRONMENT**



# PART I

## WHY DEVELOP A VULNERABILITY TO CLIMATE HAZARDS INDEX?

### 1.1. CLIMATE HAZARD AND POVERTY IN THE DOMINICAN REPUBLIC

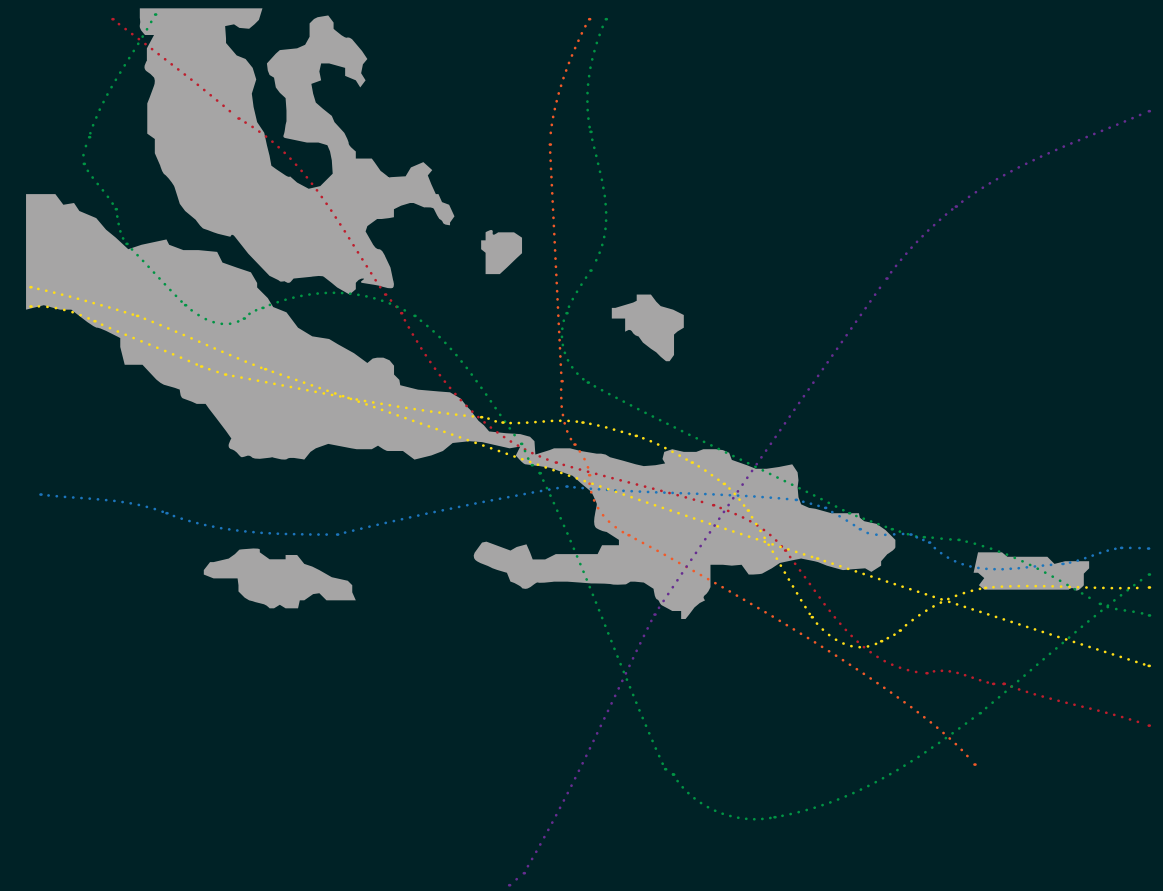
Over the last two decades, the Dominican Republic has undergone a significant transformation in economic and social terms. According to data from the Ministry of Economy, Planning and Development (MEPyD), for example, both moderate poverty and extreme poverty decreased considerably from 2012 to 2016<sup>2</sup>, from 42.2% to 30% and 10% to 6.5%, respectively.

Nevertheless, income distribution and access to quality basic social services remains unequal, limiting the possibilities and opportunities of large segments of the population to achieve sustainable human development. The country still has unacceptable rates of poverty, infant mortality (29 per 1,000 births), maternal

mortality (178 per 100,000 live births)<sup>3</sup>, teen pregnancy<sup>4</sup> and gender violence. The dimensions of income, education and health register higher levels of inequality, underlining the regional differences in access to services and opportunities, as well as gender inequality.

Additionally, according to data obtained precisely from the IVACC index, 30% of the population is very vulnerable to extreme events. The Dominican Republic is highly affected by weather events, particularly climate hazards related to severe excesses and deficits of water. In fact, according to the German Watch 2018 Global Index, it is one of the countries most affected by extreme weather events in the world.

The **Dominican Republic** lies in the path of **hurricanes** and tropical storms and is affected from June 1 to November 30 every year.



➤ **IMAGE 1.** Hurricane trajectories from 1930 to 2007.

#### DR IN THE PATH OF HURRICANES

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<span style="display:inline-block; width:15px; height:15px; background-color:darkorange; border:1px solid black;"></span> FREDERIC 1979	<span style="display:inline-block; width:15px; height:15px; background-color:teal; border:1px solid black;"></span> JEANNE 2004	<span style="display:inline-block; width:15px; height:15px; background-color:cyan; border:1px solid black;"></span> OLGA 2007

2. Source: <http://www.bancomundial.org/es/country/dominicanrepublic/overview>

3. Source: [https://www.unicef.org/republicadominicana/children\\_3672.html](https://www.unicef.org/republicadominicana/children_3672.html)

4. The Dominican Republic is among the five countries with the highest incidence of teen pregnancies in Latin America. The birth rate among adolescents aged 15 to 19 in the country is 90 per 1,000, almost double the world average of 51 per 1,000. Almost one in four women (24%) between 20 and 49 had a child before the age of 18 and almost half (41%) before 20. Source: UNFPA 2017

## The Dominican Republic is the second most vulnerable country to seismic and meteorological events in the Caribbean, after Haiti.

Its location on hurricane paths (see image 1), and its status as a small island state, contribute to the country's exposure to potentially disastrous extreme weather events, such as hurricanes, tropical storms and their consequences, including floods, droughts and landslides. Furthermore, two major fault systems, the Septentrional and Enriquillo, cut through the island and have been responsible for generating earthquakes as high as 8 on the Richter scale.

Between 1980 and 2012, the Dominican Republic was affected by 28 hurricanes and tropical storms and 20 floods, resulting in the loss of 2,000 lives. Disasters result in significant impacts globally. For example, according to information from the Central Bank (2017), the fiscal costs associated with recent weather events represent an average expenditure that ranges between 0.60% and 1.80% of GDP. Of all the disastrous events in the country since 1970, 79% correspond to events associated with climate risks, such as floods, droughts and landslides.

This underscores the need to stop processes of environmental degradation that generate risks. Additionally, and given that these extreme events have had an especially severe impact on poor and vulnerable populations, the factors that generate

this vulnerability are due to hydro-meteorological phenomena, which are increasing in intensity and frequency due to climate change and variability.

In this regard, the Dominican Republic needs to advance in its economic growth, environmental sustainability and in the reduction of social inequality in order to guarantee that advances in development are sustainable and, especially, resilient to the climate risks that frequently threaten the country. This implies implementing comprehensive policies to reduce the number of people considered economically vulnerable, which has increased 18.4% since 2003 (UNDP, 2016) and which represents a considerable challenge for public policy.

The relationship between poverty and risk conditions, particularly hurricanes, tropical storms and floods, was analyzed using the 2017 Household Social Survey. At the national level, 16.8% of multidimensionally poor households are in proximity to some source of danger (understood in the survey as a river, stream, watercourse or ravine). However, this percentage drops to 12.3% in the metropolitan area and increases to 21.7% in other urban areas. In rural areas, 13.7% of households living in poverty are considered close to a source of danger.



# 1.2

## MEASURING RISK, VULNERABILITY AND THE IMPACT OF DISASTERS

Traditional indicators for the impacts of disasters or socio-environmental hazards are mainly related to reporting the total number of dead, injured, missing or affected persons, as well as the effects on housing, infrastructure and productive assets (see the Sendai Framework for Action indicators<sup>5</sup>). They are adequate indicators to assess the effects and direct and measurable impacts in the short term; however, they present limitations for analyzing the risk conditions that led to these situations, as well as the indirect impacts of disasters and their temporal projection. Thus, other types of measurements are necessary to identify and focus preventive actions to reduce the impacts of these disasters.

The second concept underpinning the current thinking on climate hazards relates to risk. Risk is understood as the likelihood of damage from a potentially dangerous event and depends on threat (T) and vulnerability (V).

**Risk** = likelihood of damage

**Risk** = f (Threat x Vulnerability)

**Vulnerability** = f (E, S, C)

Threat is the likelihood of the occurrence of a potentially dangerous phenomenon. Vulnerability is the degree of exposure (E), susceptibility (S) and capabilities (C) that people, goods or systems have to be affected by the threat. Exposure, for example, refers to the population, properties, systems or other elements present in areas where there are threats, and which, therefore, may experience potential losses.

The need to identify, evaluate and communicate risk is one of the greatest challenges for the community that addresses these issues. This includes the challenge of finding suitable indicators to express them. Traditionally, calculating vulnerability presents methodological limitations due to factors such as the multiplicity of variables<sup>6</sup> and the difficulty of gathering information at the level of the household or neighborhood.

5. Sendai Framework: <https://www.unisdr.org/conferences/2017/globalplatform/es/key-documents>

6. Some vulnerability analyses classify physical, functional, social, economic, institutional, political, cultural, financial and environmental vulnerabilities where each of them can have a large number of indicators for their measurement.

THUS, THE MAIN JUSTIFICATIONS FOR THE DEVELOPMENT OF A VULNERABILITY TO CLIMATE HAZARDS INDEX IN THE DOMINICAN REPUBLIC ARE BASED ON THE NEED TO HAVE INDICATORS THAT ALLOW FOR:



Efficient evaluation and communication of the vulnerability conditions.



Determining vulnerability at the level of households and other aggregate levels, based on household information (such as neighborhood, municipality, country).



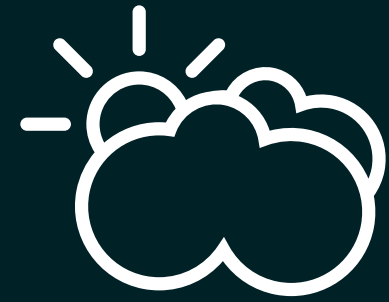
Identification, differentiation, prioritization, monitoring and evaluation of vulnerable households and regions and applied policies.



Adequately expressing the likelihood of a household being affected, based on a simple model, with few variables, but sufficiently robust.



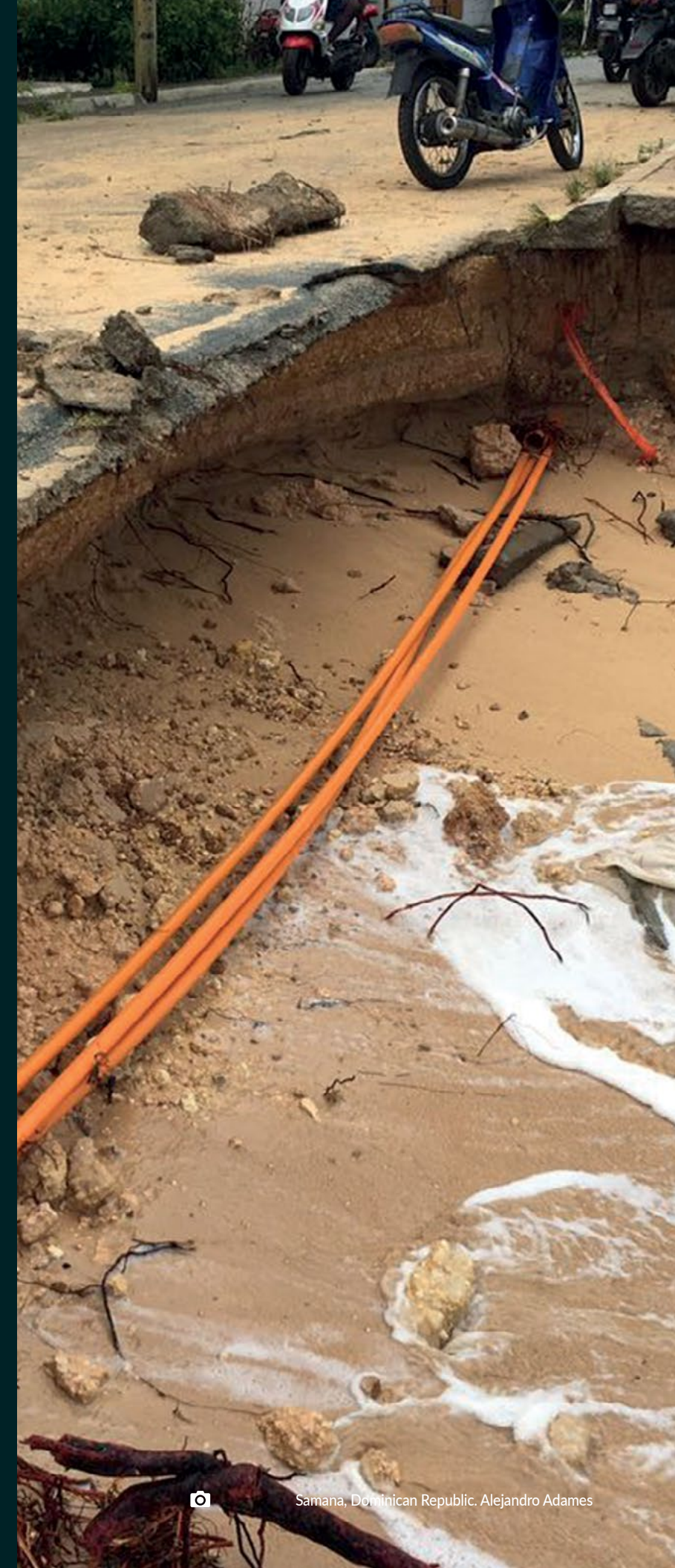
Articulating the relationship between the environment and the economy.



# PART II

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THE VULNERABILITY TO  
CLIMATE HAZARDS INDEX: IVACC



# PART 2

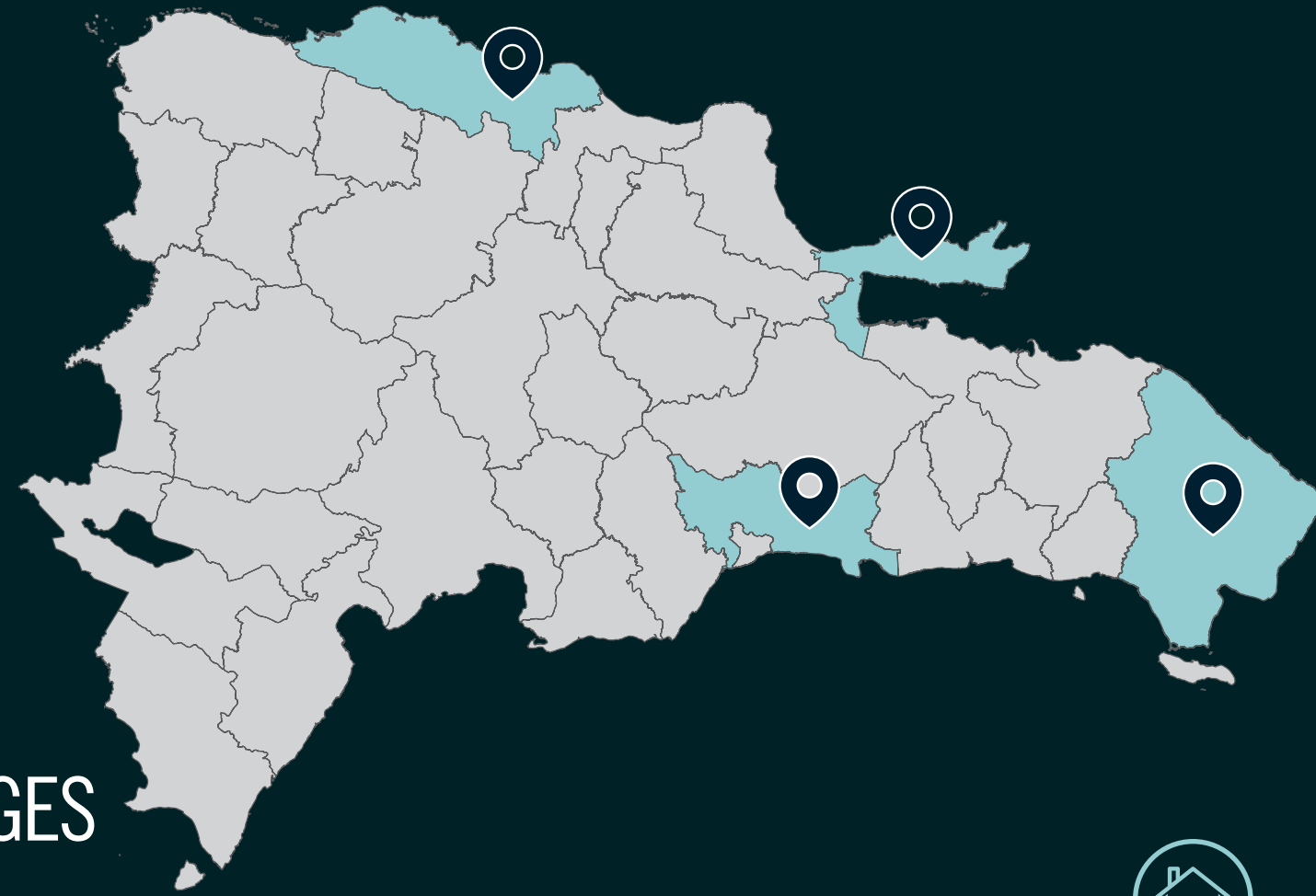
## WHAT IS IVACC?

IVACC is an environmental vulnerability index that reflects the likelihood of a household being affected by a natural phenomenon. To achieve this end, it uses data from a survey applied to households in conjunction with information provided by the National System of Beneficiaries (SIUBEN). This system has a coverage of 8,579,852 people, equivalent to 85.5% of the country's population as projected by the National Statistics Office (ONE) in 2015.

**IVACC, APPLIED TO THE SIUBEN HOUSEHOLD DATABASE, PROVIDES THE QUANTIFICATION OF THE LIKELIHOOD THAT A HOUSEHOLD IS VULNERABLE TO HURRICANES, STORMS AND FLOODS, GIVEN CERTAIN SOCIOECONOMIC CHARACTERISTICS.**

IVACC allows for a **geographical disaggregation, from the country to the household level.**

➤ **IMAGE 2.** Utility scale of geographical disaggregation of IVACC



## THE MAIN ADVANTAGES OF IVACC:



It is a synthetic model that is both simple and that employs few variables because it includes only those that have demonstrated their potential to affect vulnerability.



By identifying the vulnerability of each household, it allows public authorities, cooperation agencies and other entities to prioritize and target households and communities that require preferred support and social protection policies and programs.



It has the necessary inter-operability across civil protection and rescue institutions so that IVACC can be effectively used in disaster planning. Currently, a number of national and international institutions use the IVACC index as an input in their evaluations.



It allows for making comparisons between households, between regions and other aggregate variables. Unlike previous vulnerability indices, which have a country or regional scale, IVACC is based on a household-level model that allows for the calculation of a vulnerability index that incorporates all the dimensions and determinants of vulnerability in a single variable that can be monitored in time and space.

# 2.1

## WHAT IS ENVIRONMENTAL VULNERABILITY?

Environmental vulnerability refers to the possibility of natural phenomena such as storms, floods, droughts or earthquakes adversely affecting households, both physically and socioeconomically, resulting in damages that include the loss of property, employment and sources of income or physical harm to people (López-Marrero and Wisner, 2012).

Vulnerability comes from the Latin word *vulnerare*, which means damage, or the capacity to be damaged. Adger (2006) defines it as the possibility of suffering damage due to exposure to a stress associated with environmental and/or climate change in conjunction with low adaptive capacity. This means that vulnerability is a pre-existing condition that characterizes an individual, household, community or country.

Given this condition, an event can cause different kinds of damages to each person. Thus, for example, a family with low income per capita and living in a household located near a river or lake has a greater degree of vulnerability compared to a high-income family living in

a house located the same distance from the same river or lake. Likewise, a household with permanent access to clean drinking water or health services is less prone to disease (such as cholera) following a hazard or climate event.

Knowing the determinants of vulnerability allows us to understand why some natural phenomena cause severe damage to some people, homes, communities or countries, while, for others, the damage is minimal, as well as reflecting their ability to recover after the natural phenomenon.

Individuals, households and communities have different degrees of vulnerability based on a number of variables, including their economic situation, level of education, state of health, gender, age and other social, cultural, institutional and environmental factors.

The challenge, then, is to identify which variables have the most weight to determine vulnerability, their relevance and, eventually, how to group these variables so that information may be obtained, presented and communicated in an efficient and useful manner.

### ↓ Determinants of Environmental Vulnerability



## ENVIRONMENTAL AND PHYSICAL

VULNERABLE ZONES  
FLOODING, HOUSING, HURRICANE PATHS



## SOCIAL

DEMOGRAPHICS, GOVERNANCE, CULTURE, INSTITUTIONS  
EDUCATION, HEALTH, SOCIAL WELFARE



## ECONOMIC

ECONOMIC DEVELOPMENT  
INCOME

## 2.2 WHAT ARE THE VARIABLES USED BY IVACC?

The information collected for the IVACC index includes the main determinants of environmental vulnerability according to the econometric tests of correlation of variables of greater weight for the Dominican Republic, obtained after a process of reviewing numerous variables.

IVACC uses variables that are obtained from the observation of the conditions of each household, based on information from household surveys. It collects information concerning: a) the physical characteristics of the home, b) the average labor income of the household, and c) the proximity of the household to sources of danger.

TABLE 1. THE IVACC VARIABLES

Dimension	Variables
Housing - characteristics	Walls and roof
Income	Average household labor income
Proximity of the home to sources of danger	River, ravine or watercourse

### IVACC DIMENSIONS AND VARIABLES



HOUSING CHARACTERISTICS  
WALLS - ROOF



INCOME  
LABOR INCOME - AVERAGE  
HOUSEHOLD INCOME



PROXIMITY OF HOUSEHOLD  
TO A SOURCE OF DANGER  
RIVER - WATER COURSE OR RAVINE

## 2.3 WHAT IS THE SCALE AND ECONOMETRIC MODEL OF IVACC?

The IVACC index employs a scale of 0 to 1 in which households with values close to 0 are considered less vulnerable and households with values close to 1 are more vulnerable.



© María Trinidad Sánchez, Dominican Republic. Mario Peiró





## IVACC Vulnerability to climate hazards index

### What does this enable?

The identification and prioritizing of regions and households that are more exposed, susceptible or likely to be impacted by a disastrous event, such as a flood.

BASED ON DATA ON EVERY HOUSEHOLD IN RELATION TO:



VULNERABILITY OF HOUSING TO FLOODING OR OTHER EVENTS



INCOME



EXPOSURE OF LOCATION OR SITE TO EVENTS

### Why?

To facilitate and focus state aid aimed at preventing and protecting households from climate shocks.



#### THE ECONOMETRIC MODEL

$$IVACC = \frac{e^{\beta_0 + \beta_1 \text{Roof} + \beta_2 \text{Wall} + \beta_3 \text{Income} + \beta_4 \text{Flood}}}{1 + e^{\beta_0 + \beta_1 \text{Roof} + \beta_2 \text{Wall} + \beta_3 \text{Income} + \beta_4 \text{Flood}}}$$

## 2.4 THE IVACC RESULTS FOR THE DOMINICAN REPUBLIC

The IVACC figures for the Dominican Republic provide a clear idea of the type of aggregate information that can be obtained. The following information can be obtained on a detailed scale for the municipality or community.

The average IVACC value for the Dominican Republic is 0.524. 48.5% of households are above the national index and 30.4% of

households have an IVACC value greater than 0.70. In the country, households with the greatest environmental vulnerability are headed by people between 16 and 17 years of age, with an average index value of 0.551, followed by households headed by older people (66 or older) who have an average vulnerability index value of 0.549.

TABLE 2. MAIN IVACC DATA - DOMINICAN REPUBLIC

Vulnerability	Percentage of people	Number of people
1) Less than 0.524 (IVACC national average)	50.1	3,143,486
2) From 0.524 to 0.700 (intermediate / above average)	19.5	1,223,032
3) Greater than 0.700 (high vulnerability)	30.4	1,903,222
TOTAL	100.0	6,269,740

Source: SIUBEN Certified Database, July 2016

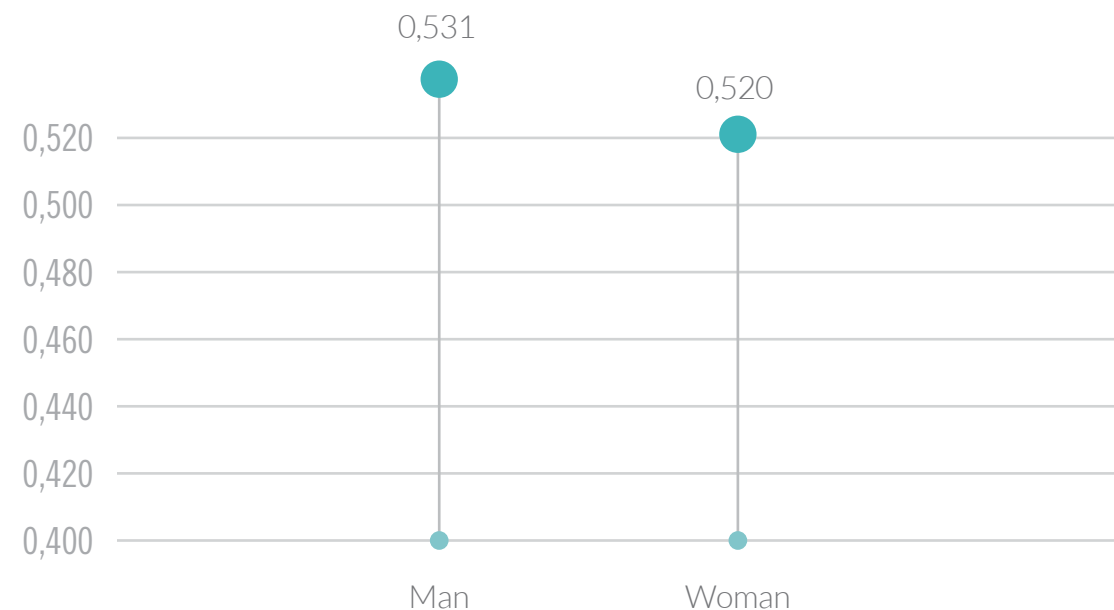
The IVACC index presents the relationship between households with their geographical location. The population living in rural areas has an IVACC value of 0.605, comparatively higher than urban households (with an IVACC value of 0.514) and the metropolitan population (with an IVACC value of 0.450).

In relation to heads of households, it was found that households headed by women are less vulnerable, with an IVACC value of 0.520, compared to households headed by men, with an IVACC value of 0.531.

In relation to the age ranges, it was found that households headed by individuals between 16 and 17 years of age had an IVACC value of 0.551, and households headed by individuals 66 years or older had an IVACC value of 0.549, representing a significant difference in vulnerability when compared to households headed by other age groups, which have an average IVACC value of 0.511 (36 to 50 years of age).

## MAIN RESULTS

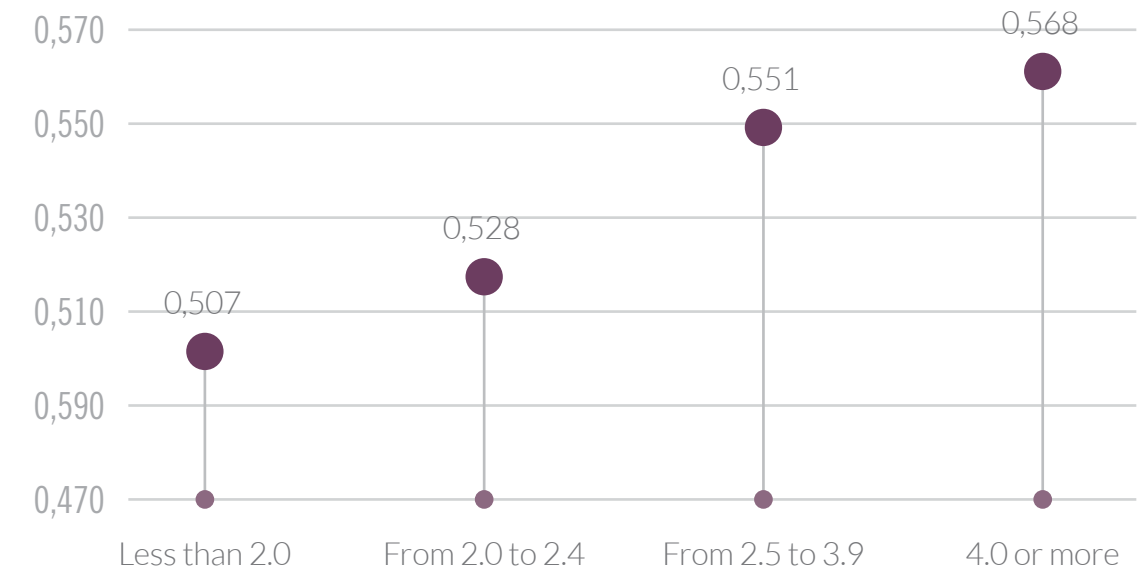
RELATION BETWEEN IVACC AND THE SEX OF THE HEAD OF THE HOUSEHOLD



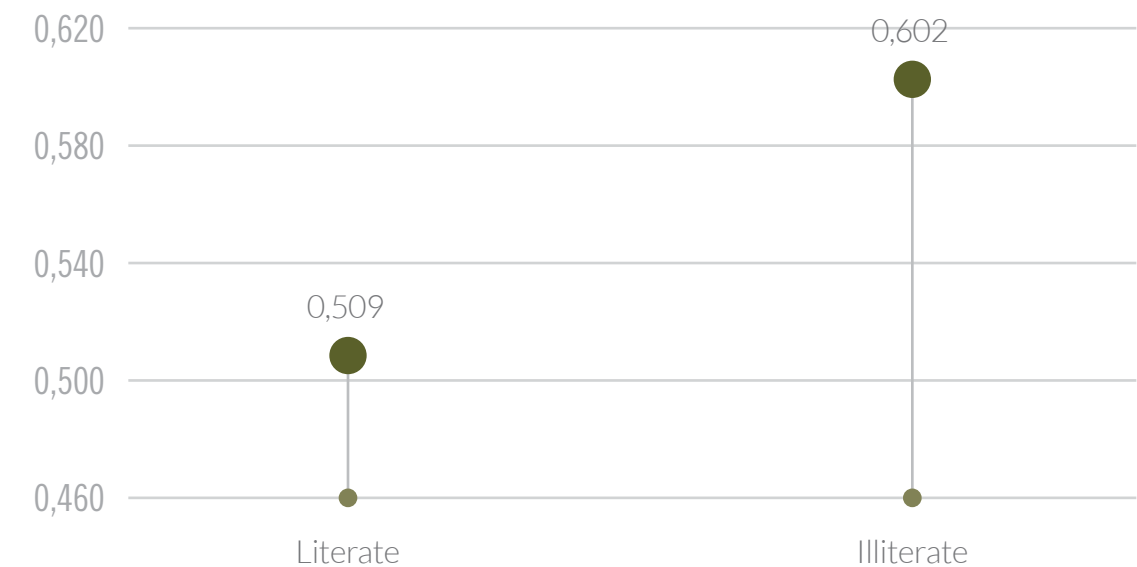
## MAIN RESULTS

MAIN IVACC RESULTS BASED ON THE DIFFERENT CHARACTERISTICS OF HOUSEHOLDS.

RELATION BETWEEN IVACC AND OVERCROWDING (NUMBER OF PEOPLE SHARING BEDROOM)



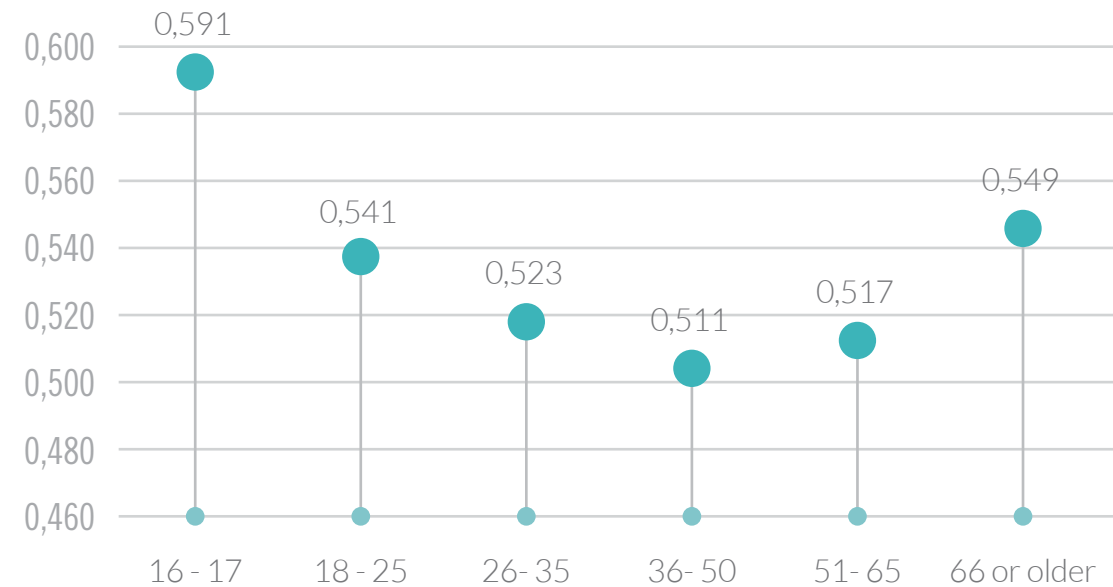
RELATION BETWEEN IVACC AND LITERACY



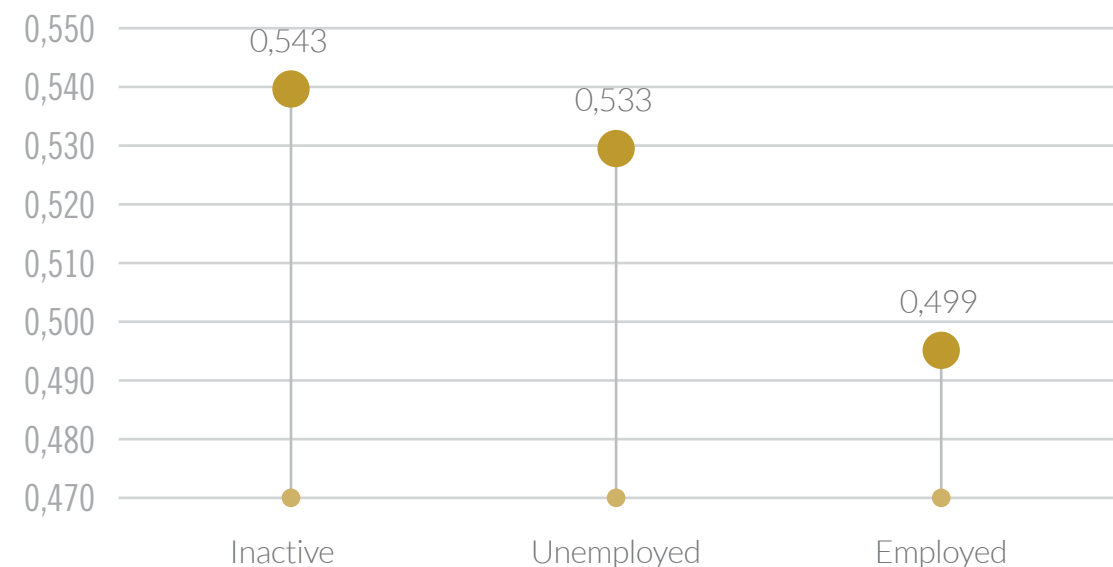
# MAIN RESULTS

MAIN IVACC RESULTS BASED ON THE DIFFERENT CHARACTERISTICS OF HOUSEHOLDS.

RELATION BETWEEN IVACC AND AGE RANGES OF HEADS OF HOUSEHOLDS



RELATION BETWEEN IVACC AND EMPLOYMENT STATUS



## 2.5 IVACC AND OTHER INDICES

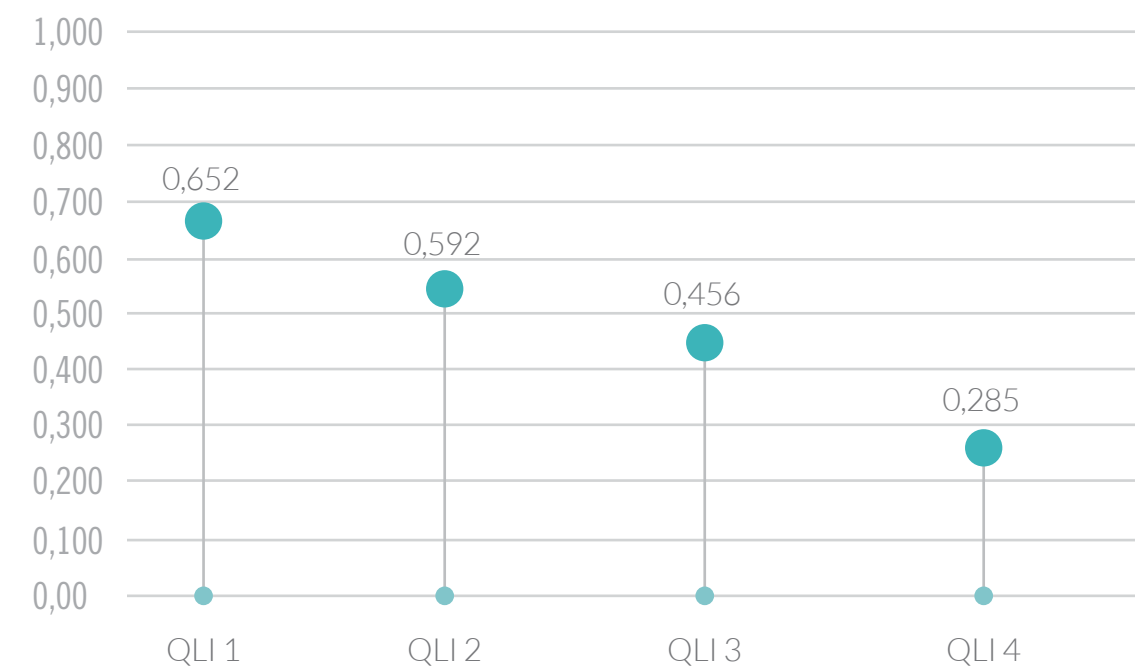
The eligibility instrument developed by SIUBEN is the Quality of Life Index (QLI). The QLI is an algorithm that determines the socioeconomic level of households based on socioeconomic characteristics and the possession of physical assets. It classifies households into four groups: QLI 1, 2, 3 and 4, on a scale of fewer to greater resources.

Households that, in addition to having the characteristics of being poor according to the QLI

and which have a high probability of being affected by natural disasters due to their high IVACC, should be a priority for social programs. In fact, it is observed that when households have a higher QLI value (that is, they are less poor) the vulnerability of the household is lower. However, the IVACC index includes new dimensions of vulnerability, that go beyond the socioeconomic indicators included in the QLI, and that should be considered in order to focus and direct poverty reduction programs.

RELATIONSHIP BETWEEN IVACC AND THE QUALITY OF LIFE INDEX IN THE DOMINICAN REPUBLIC

RELATION BETWEEN IVACC AND QLI



During the IVACC construction process, there were a number of factors that contributed to the success of the index:



It enriched the understanding of the links between environment, poverty and sustainable development and the analytical and investigative capacities in this area.



It has strengthened and consolidated national technical interest in the social protection and poverty reduction agenda, mitigating the impact of hazards due to socio-environmental events.



Changes were made to the 2017 National Household Survey to incorporate environmental variables that improve our knowledge of the links between environment and development.



The creation of a Climate Impact Vulnerability Index model with information processed for 85.5% of the country's households.



Advances in the use of the IVACC index for the interventions of the National Disaster Prevention and Mitigation System and the Social Protection System.



There is a proposal to incorporate a Multidimensional Poverty Index with two indicators that look at the relationship between poverty and the environment: exposure to sources of pollution and exposure to environmental risk zones.



It has strengthened the understanding of adaptive and recovery strategies of households when facing climate hazards.

# 2.6 APPLICATIONS OF THE IVACC INDEX

The practical applications of IVACC have been increasing as its usefulness and functioning are better understood.

Among the applications, it is worth noting that the Social Policy Coordination Cabinet of the Vice-Presidency<sup>7</sup> uses it to complement the QLI index for targeting social policies for households with the most privations.

Furthermore, the National Emergency Commission has made use of the IVACC index for the operation of feeder nodes of the Integrated Information System. The Emergency Operations Center (EOC) used this index as an input for the preparation of tropical storm Erika in August of 2015.

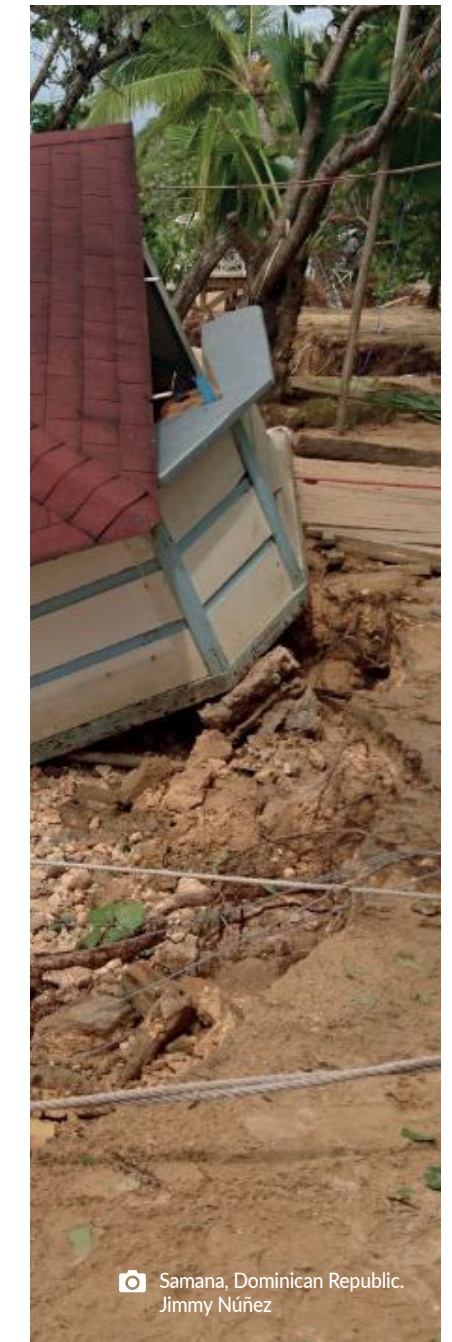
The Pacific Disaster Center (University of Hawaii) has used it as an input for the National Assessment Reference for Disaster Preparedness.

## 2.7.1. USE OF IVACC INDEX IN EMERGENCY SITUATIONS

The IVACC index and the SIUBEN socioeconomic data serve as strategic inputs for the development of national plans for disaster prevention, mitigation and response (PMR). This is because the IVACC helps to:

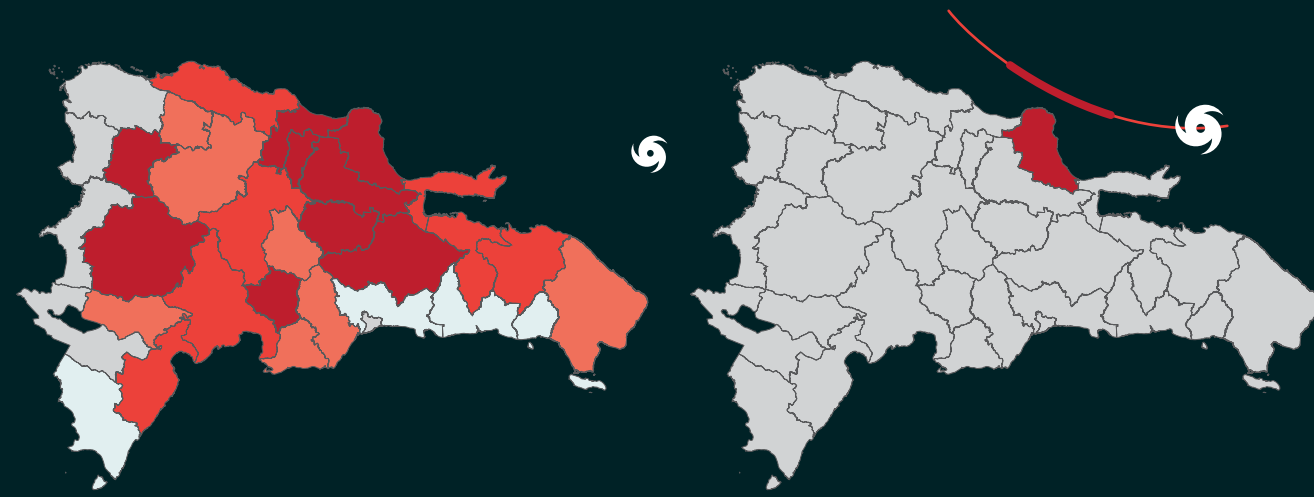
- Identify the areas with the highest risk from natural disasters.
- Focus state actions on the most vulnerable households, thus optimizing resources and using public funds more efficiently.
- Provide information, on a small scale, that is useful for local governments and rescue authorities.

<sup>7</sup> Officials from countries such as Bolivia, Panama, Paraguay, Suriname and Uruguay have shown interest in IVACC.

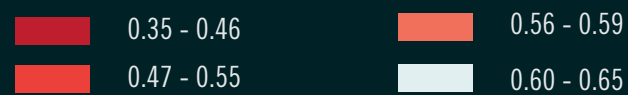


Samana, Dominican Republic. Jimmy Núñez

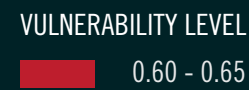
TABLE 3. – SIMULATION OF THE DISAGGREGATION OF THE SCALE BEFORE THE PASSAGE OF A HURRICANE TO IDENTIFY, AT THE COMMUNITY LEVEL, HOUSEHOLDS THAT MAY BE MOST AFFECTED. AS CAN BE OBSERVED, EACH PROVINCE HAS AN AVERAGE IVACC VALUE, WHICH CAN BE DISAGGREGATED AT THE LEVEL OF SETTLEMENT, NEIGHBORHOOD OR ZONE. WITH A HURRICANE WARNING AND ITS DEVELOPMENT, IT IS POSSIBLE TO DETERMINE ITS IMPACT ZONE AND THE VULNERABILITY OF HOUSEHOLDS.



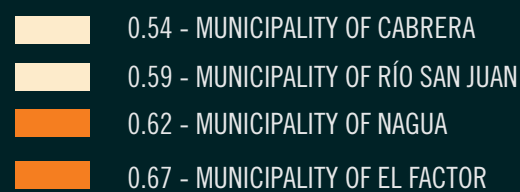
Zones by level of vulnerability dominican republic



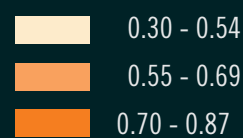
Province María Trinidad Sánchez



Municipalitie of María Trinidad Sánchez



Neighborhoods of María Trinidad Sánchez



María Trinidad Sanchez river



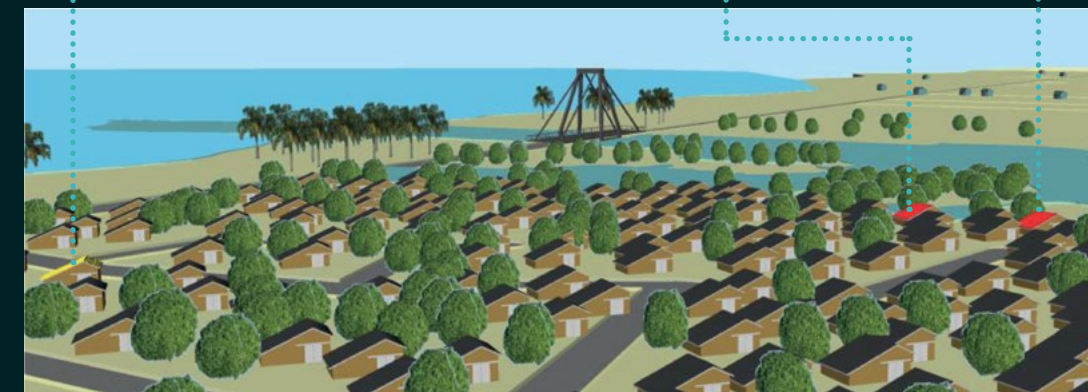
Household head: Altagracia Martínez  
 0.5 to 1 km from the river  
 1 child (from 5 to 9 years of age)  
 1 adolescent (10-14 years of age)  
 Spouse  
 Concrete roof Cinder block walls  
 IVACC: 0.524



Household head:  
 María Gómez 0.5 km from the river  
 2 children ( from 0 to 4 years of age)  
 1 adult  
 Zinc roof  
 Concrete walls



Household head:  
 Juan Pérez  
 0.5 km from the river  
 3 children (from 5 to 9 years of age)  
 Spouse  
 Zinc roof  
 Palm-thatched walls



SOURCE. SIUBEN

The connection between SIUBEN and the national emergency commission (CNE)

SIUBEN and the CNE work together to gather information to prepare contingency plans for emergencies. The interconnection between both institutions provides

a large amount of useful information for the work of response agencies to facilitate assistance actions for residents in the most vulnerable locations. SIUBEN provides a database on

households located in vulnerable areas in the country and the CNE provides support with technical teams to execute the Geographic Information System.



Illustration 1: October, 2015 - SIUBEN, CNE and UNDP directors - formalizing an inter-institutional agreement. Source: SIUBEN

"It is fundamental for risk management to have accurate data on communities, because no two contingency plans are the same. Each contingency plan must be tailored to the specific community and, since these surveys are specific to families, it is important to incorporate this information for our future plans and establish the appropriate measures for prevention and mitigation and provide efficient response in disaster emergencies." De Luna Pichirilo, Director of Civil Defense of the National Emergency Commission<sup>8</sup>

<sup>8</sup> <http://siuben.gob.do/2015/03/09/siuben-se-incorporara-comision-nacional-de-emergencia-para-mitigacion-de-desastres/>

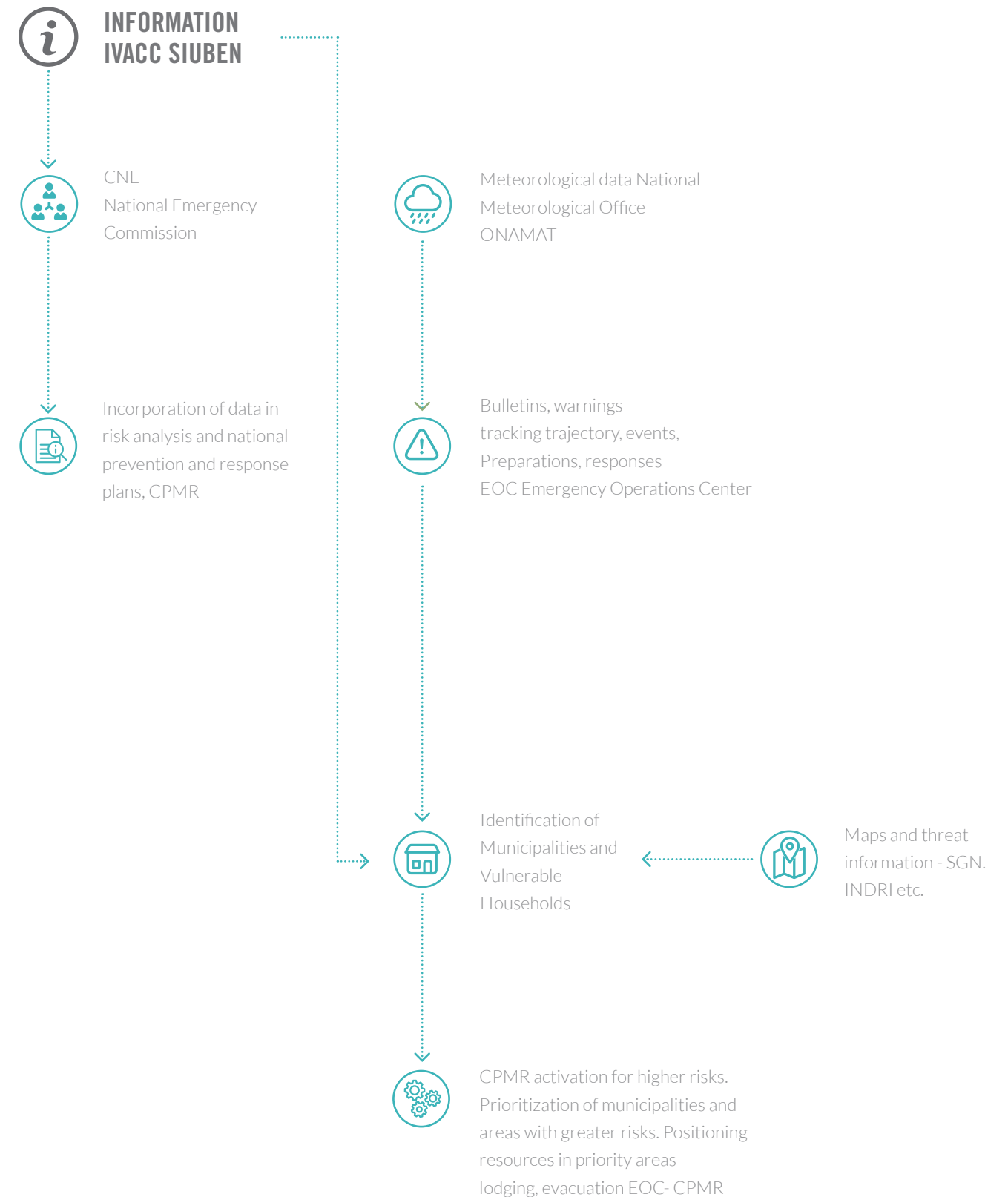


ILLUSTRATION 2. IVACC information flow for emergency preparedness and response

# 2.6.2 NATIONAL ACTION PROTOCOL OF THE SOCIAL POLICY CABINET FOR CLIMATE HAZARDS

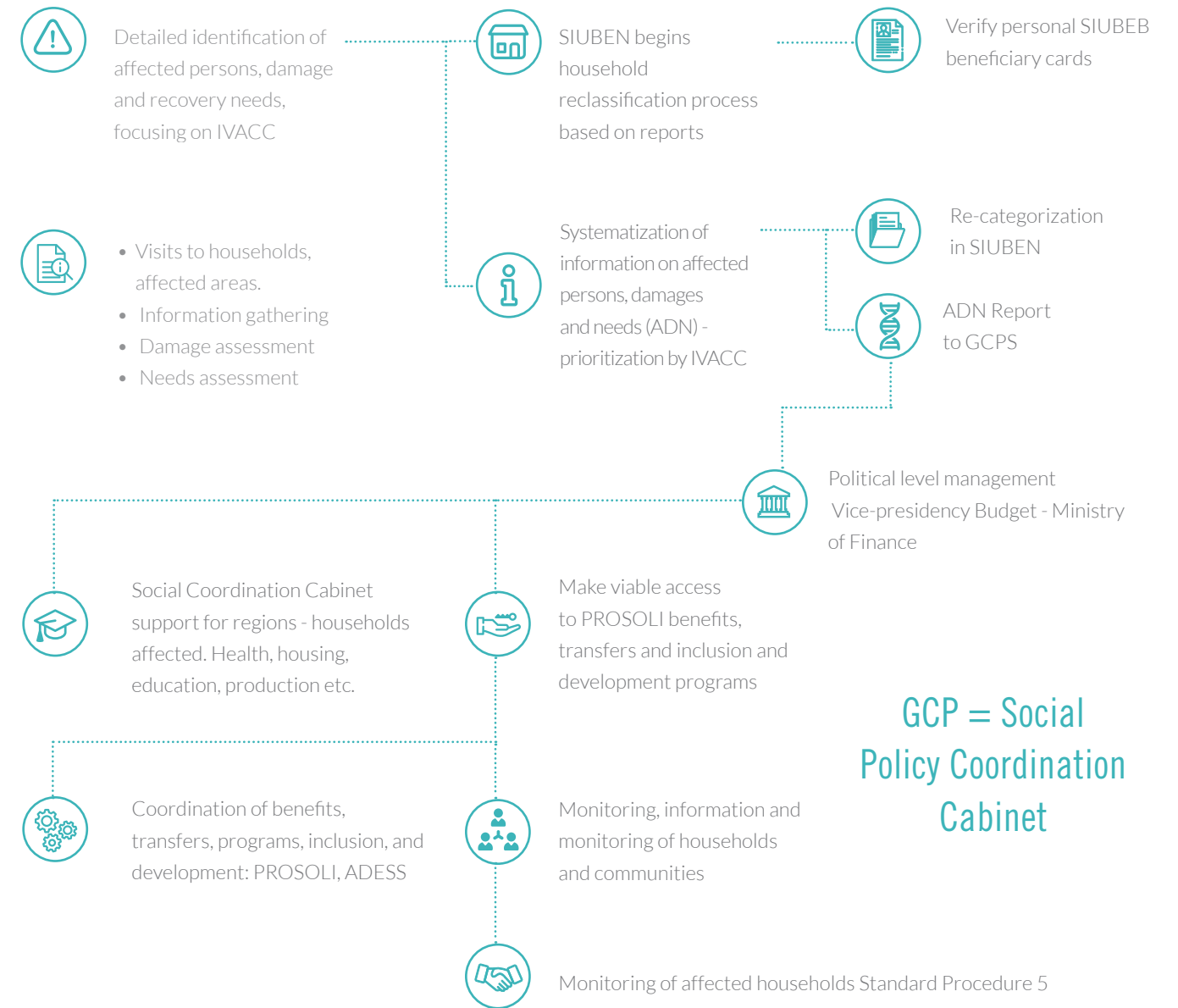
The Social Policy Coordination Cabinet (GCPS) has elaborated a National Action Protocol for climate hazards. This protocol defines the action procedures for all its entities, especially the poverty reduction program Programa Progresando con Solidaridad (PROSOLI), in order to improve the targeting of the beneficiary population, including the provision of a basket of services, cash transfers and social services made available by the government. This protocol involves more than 9,000 employees and volunteer personnel, present in the regions, to provide support to affected households when necessary.

The GCPS has determined that the IVACC index, in conjunction with the QLI index and the Multidimensional Poverty Index (MPI), should be the basis for focusing the national program Progresando Unidos frente a Choques Climáticos [United against Climate Hazards], which contains a poverty exit strategy that provides fifteen additional social programs.

This includes access by households affected by disasters and deemed vulnerable according to the IVACC index to the development of productive projects, training processes and preferential health care, as well as education and housing recovery. In addition, it includes the support of supervisors and members of the PROSOLI network for the assessment of damages and recovery requirements at the household level and identify the possibility to access these programs.

In this way, the IVACC index is used to strengthen the preparations for the operational response of the social protection system in the alert and response to emergencies stage, as well as to cover the institutional gap after the declaration of the end of the emergency. Thus, the social protection action continues for a period of six months after the event, when it is expected that other state mechanisms for medium and long-term recovery and reconstruction are already in operation.

## **i** Sequence of GCPS early recovery actions - social protection and transition to development



**GCP = Social Policy Coordination Cabinet**

- Strategic guidelines for recovery of households.
- Special care of children and adolescents, the disabled, the elderly.
- Gender considerations.
- Promotion of social and community social support networks, psycho-emotional and well-being recovery.
- Recommendations for basic sanitation and self-protection measures.

**ILLUSTRATION 3: FLOWCHART.** IVACC AS A BASIC INSTRUMENT FOR THE PRIORITIZATION OF SOCIAL PROTECTION PROCESSES FOR CLIMATE SHOCKS

Other **IVACC** applications



**PNUD**

UNDP uses the IVACC index to monitor human development indicators at the national level. It is used as an input for the formulation of projects to strengthen local governments and communities to better prepare and respond to climate disasters. It was also used to characterize the areas affected by Hurricane Matthew (September, 2016) and the corresponding situation report.



**IVACC**

IVACC also offers the possibility of carrying out analysis of specific population groups, according to the variables linked to household information, such as the gender of the head of the household, age, education level, location, income, assets and productive activities and other variables employed in the database.



**AN EXAMPLE**

An interesting recent example was the analysis carried out for the Recovery Plan for the province of Monte Cristi in the Dominican Republic, which was affected by floods in 2016. In this Plan, it was observed that gender plays a significant role in disaster risk management in homes. According to IVACC measurements, households headed by women perform better disaster risk management than households headed by men.

An additional benefit of IVACC, besides contributing to emergency response and the application of Conditional Cash Transfers, is its projected scope, which will be even more extensive in the Dominican Republic due to processes that are currently being developed, in particular the social protection policy for climate hazards.

# 2.7

## CONSIDERATIONS FOR THE CONTINUED STRENGTHENING OF THE USE OF IVACC

In February of 2018, UN Environment, UNDP and SIUBEN organized a socialization and lessons learned from IVACC workshop (Annex 2). Sixty people from 24 institutions participated in the workshop, coming from the public sector, educational institutions, donors and NGOs.

During the workshop, strategies were identified and discussed to strengthen the current use of IVACC, as well as potential applications of IVACC for development planning and among different sectors, such as agriculture, education, health and housing.

### Proposals to strengthen the current use of IVACC:



**STRENGTHEN VISIBILITY AND COLLABORATION**

Ensure that IVACC information is shared publicly and that a guide on how to request information from SIUBEN and its application at the sectoral level and different regional scales is made public.

- Ensure ongoing training for new personnel, especially in cases of high personnel turnover, both at the national level of the technical entities of the Social Cabinet and among regional governments.
- Promote the use of IVACC information, in conjunction with information from SIUBEN and other institutions, to plan prevention and/or response strategies.





**STRENGTHEN THE TARGETING SYSTEM**

Provide adapted versions of the IVACC index that incorporate data on households close to the sea and that express levels of vulnerability to droughts and seismic events.

Take measures to prevent the use of IVACC to generate counterproductive incentives that promote risk-prone attitudes.

Provide an atlas and vulnerability study at the national level as an easily accessible tool. Georeference this atlas to ensure inter-operability, with risk maps provided by technical entities, to identify risk and flood zones or to produce better maps of threats and risks.



**STRENGTHEN RESPONSE**

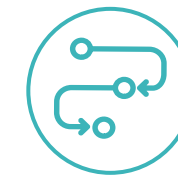
Define response strategies for different types, development rates and magnitudes of hazards and prepare the social protection system to respond to slow development crises as well, such as droughts, which have a significant impact on the livelihoods and food security of the population, resulting in critical humanitarian situations.



**STRENGTHEN THE MODEL**

Incorporate other indicators that reflect the link between environment and development in the most relevant instruments for national, sectoral and regional planning and international cooperation.

Proposals for potential applications of IVACC in national, regional and sectoral planning processes



**NATIONAL DEVELOPMENT STRATEGY 2030**

IVACC can provide significant support for the implementation of the Dominican Republic's National Development Strategy 2030 and its Multi-Year Plan to improve the efficiency of public policies. Its application is recommended for the upcoming United Nations System cooperation frameworks for the Institutional Plan for Climate Change and national and sectoral planning instruments.



**REGIONAL PLANNING**

IVACC provides useful information for the construction of baselines in regional planning processes. The IVACC index allows for the identification of the most vulnerable households in the country, with the information represented cartographically, since it is georeferenced. In 2016, the General Directorate for Planning and Territorial Development created the "Methodological Guide for the Formulation of the Municipal Plan for Regional Planning." This guide includes mechanisms for the broadening of the adaptation strategy for climate change, gender equality, risk management and poverty reduction in regional planning processes. These mechanisms, in conjunction with the specialized IVACC data, facilitate the identification of socio-spatial segregation and exclusion dynamics (phenomena that undermine equality and development), contribute inputs for decision-making, such as compensation by directing public goods and regional development strategies to avoid socio-spatial segregation.



**DIRECTING PUBLIC INVESTMENT**

IVACC allows for establishing priorities for the direction of public investment and the spending of numerous institutional sectors. For the provision of public services, for example, it contributes inputs for decisions on the provision (or not) of public service networks in areas that, having mitigable or non-mitigable risks, should be prioritized by local governments.



## ENVIRONMENTAL MANAGEMENT AND CLIMATE CHANGE ADAPTATION

IVACC data can be cross-linked with environmental data on fragile coastal areas, protected areas, forested zones, protection zones and other sensitive areas (potential from 1 to 7) for the elaboration of environmental protection and management strategies, such as the strengthening of environmental programs, including waste management. In terms of climate change adaptation, IVACC data can serve as a baseline for immediate actions in national planning processes. This includes the National Climate Change Strategy and the National Climate Change Adaptation Plan of the Dominican Republic, among others.

The IVACC index has an important potential to continue strengthening mechanisms for social protection, disaster recovery and preparedness and response to climate hazards, as well as in a number of national planning strategies and tools:

- **In social protection policy planning processes.** It allows for the direction of social services, such as conditional transfers, to areas that have both socioeconomic and environmental vulnerability.
- **In the education sector.** IVACC data can be combined, for example, with data on drop-out and nutrition dynamics. In this sector, it could allow for targeting and prioritizing interventions to strengthen school risk management programs, as well as early childhood care programs.
- **In the housing sector.** IVACC can be used to prioritize programs for vulnerable populations, the improvement of housing and the definition of human resettlements, as well as the training and orientation processes for the location and quality of housing infrastructure.



Samana, Dominican Republic. Jimmy

- **In the health sector.** IVACC can be used to support preventive health actions for emergencies, epidemiology programs and early warning systems in the health area, as well as studies on family and personal violence. Similarly, to ensure food security, IVACC offers an important input for the distribution of capacities and the strengthening of programs among the most vulnerable communities.
- **In the agriculture, livestock and food sectors.** IVACC data can be used to identify vulnerable communities with respect to their productive activities and create strategies to reduce risks in agricultural production and livelihoods. With respect to nutrition, IVACC helps to identify groups and households that require more attention, especially before and during emergencies.
- **In the infrastructure, transport and water resources sectors.** IVACC is an important source of information for actions to prepare for the hurricane season, such as pre-positioning equipment and risk reduction actions.



# PART III

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## THE IVACC ELABORATION PROCESS



# 3

## THE IVACC CONSTRUCTION PROCESS

### 3.1 THE INSTITUTIONAL FRAMEWORK IN WHICH IVACC WAS DEVELOPED AND IS APPLIED

IVACC was made possible thanks to an institutional context and capacities that made its creation and application feasible. The basis is a policy and institutional structure for social protection and risk management policies that have generated interest in these kinds of indicators, as well as the capacity to undertake surveys at the household level, which were fundamental to make its development feasible.

In the Dominican Republic, the Vice Presidency of the Republic is allied with the Social Policy Coordination Cabinet through a Technical Directorate. Within the institutional structure

of this Cabinet, the role of the Progresando con Solidaridad (PROSOLI) program is important. PROSOLI is a social protection program that combines conditional cash transfers (CCTs)<sup>9</sup> with capacity-building actions, social and family support and the link to the social services offered by the State and civil society. For example, it provides support for access to health services and school meal incentives and food programs, as well as programs for capacity building and improving the living conditions of poor and vulnerable households.

SIUBEN is a key institution for the creation and adoption of IVACC. SIUBEN is a national registry

<sup>9</sup> In addition to those directly implemented by the GCPS, there are other non-contributory social protection programs which offer social protection services. The programs of the Presidency of the Republic include: Comedores Económicos (subsidized restaurants), which prepare and sell hot meals at subsidized prices; the Social Assistance Plan, which mainly provides assistance in kind (goods or services); the National Institute for Comprehensive Early Child Care (INAIPI), which provides services for child care (up to 5 years of age); the school meal program of the National Institute for Student Welfare (INABIE); and the Subsidized Health System. Unlike in much of the region, non-contributory social protection programs do not provide cash payments. The GCPS programs transfer the money electronically to the Progresando con Solidaridad card, which can be used by beneficiaries in authorized stores (they are specific-use transfers). The Presidency programs often make transfers in kind (unprepared and prepared foods and basic necessities). The Social Plan of the Presidency has the the greatest administrative capacity for the provision of assistance in kind. Regarding the distribution of cooked meals, the mobile units of the Comedores Económicos are particularly relevant for emergency response.



María Trinidad Sánchez, Dominican Republic, Mario Peiró

of vulnerable households that determines their eligibility to access health and CCT subsidies. It is responsible for the identification and categorization of poor households, the Household Registry and eligible people and provides socioeconomic and demographic information on households in poverty conditions to contribute to the social policy decision-making process.

The SIUBEN database covers 85.5% of the population of the Dominican Republic, collecting data from 8,579,652 people.

SIUBEN periodically reviews and validates socioeconomic household forms to include additions and other updates of households corresponding to different types of processes.

SIUBEN's Department of Socioeconomic Information designs and updates models for data analysis and the elaboration of aggregate indicators, based on the household database. It also supported the National Emergency Committee in the preparation of flood maps (rainfall from April 22 to 26, 2017). With the new SIUBEN indicator system, which includes the IVACC, QLI and MPI indices, the targeting of beneficiaries and the diagnosis of households have been improved.

Since 2017, all households have been georeferenced, including photographs of the house façade and the head of household (Central Electoral Board standard).

# 3.2

## STEPS FOR THE ELABORATION OF IVACC: THE PILOT TESTS IN LAKE ENRIQUILLO

The IVACC index elaboration process was based on the evaluation of the impacts of environmental vulnerability on household income, with the goal of verifying the existence of a vicious cycle between poverty and environmental vulnerability. In this sense, it was based on a participatory process and the search for data from indices that incorporated both environmental and climatic variables, as well as poverty, and which identified similar experiences at international and national levels, at different scales and among different sectors. Subsequently, data sources at the household level were identified and combined with a specialized data survey.

The design of the Index involved the application of a survey in a sample of households in the Lake Enriquillo area, an area of the country particularly affected by socio-environmental disasters over the last decade. (PEI, 2014).

The Lake Enriquillo zone is close to the Haitian border, where, between 2007 and 2015, there were approximately ten natural disasters, especially floods and droughts. This first stage of the analysis was of a qualitative nature and was aimed at collecting the testimonies and life stories of the population, and what they expressed concerning the impacts of the hazards on their homes.

This preliminary process was important because it allowed for the identification of variables and the formulation of hypotheses on the links between poverty and climate hazards, as well as identifying dynamics not previously reported in the literature on the impacts of disasters on households (PEI, 2014).

Based on this preliminary work, the first survey format was elaborated. This format included a wide range of questions that were tested by the SIUBEN branch office in the province of Barahona among a group of 40 households to validate the clarity of the questions and the response options.

The range of questions included household reports on the disastrous events that had affected them, especially housing quality, the evolution of consumption, income and assets of households, the strategies undertaken by households for each reported hazard and the current situation of households.

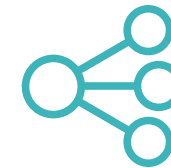
Subsequently, the survey was applied to the sample group of households in Lake Enriquillo. The results were systematized and the database was refined. With this database, the econometric analysis was performed, which determined the statistically relevant variables that showed a significant correlation.

### IVACC methodology and construction



#### LAKE ENRIQUILLO

Data collection at Lake Enríquillo to determine variables and phenomena that explain climate vulnerability in the DR



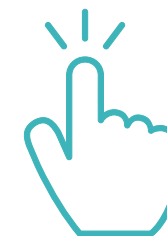
#### MODEL

Determining the best econometric model (logistic model)



#### VERIFICATION

Application of the model with a SIUBEN sample to check robustness



#### DATABASE

Application of the model with the complete and certified SIUBEN database



#### RESULTS

Every household in the SIUBEN database has a calculated vulnerability index



Once validated, the Index model was applied to a sample of SIUBEN data of 260,260 households out of a total population of 1,808,088 households that make up the complete database. The national IVACC revealed a value of 0.524, with 30.4% of the population with an IVACC index greater than 0.700.

TABLE 4. STEPS FOR THE ELABORATION OF THE IVACC INDEX - DOMINICAN REPUBLIC

Technical steps to develop the Index		
No.	Description	The IVACC experience in the Dominican Republic
1	Identification of a specific environmental problem that is believed to influence the condition of poverty. Qualitative analysis of risk and poverty conditions to identify variables that may be significant and be determinants of vulnerability in the region under study (country, department, municipality).	The problem of flooding and the impact of storms was selected in an area of the Dominican Republic that was clearly affected. A qualitative analysis was undertaken in the Lake Enriquillo zone (western part of the country), which was communicated in the publication <i>Cuando los Desastres se Quedan</i> [When Disasters Occur].
2	Design of the survey form and sample with questions that define vulnerabilities that are estimated to have more impact on wellbeing. The variables should express the vulnerability condition, reflecting exposure, susceptibilities and capacities (E, S, C).	A survey form was designed, including questions about proximity to sources of danger (river or lake), vulnerability of housing and a broad set of variables related to exposure to events, susceptibility and capabilities.
3	Analysis of the information to obtain socio-environmental vulnerability data.	A question form was designed and the survey was applied to a sample of 296 households in the municipalities of the Lake Enriquillo area.
4	Analysis of data collected.	Analysis of database.
5	With the results obtained, the variables that showed the strongest correlation and statistical significance were identified.	With the results obtained, the variables that presented the strongest correlation were identified.

6	We identified variables grouped with other variables.	For example, the income variable also included education level (Mincer earnings function). Education is a factor that explains income, and it also influences environmental vulnerability.
7	The variable that reflects wellbeing was identified, that is, the dependent variable. Independent variables were also selected.	The wellbeing variable corresponds to income, and the independent variables are: housing (floor and roof materials), income and proximity to sources of danger.
8	With the variables identified, and with the sample data, the most adequate model was selected.	A logistic model was determined as the most adequate model.
9	Verification. The model was applied to a sample to check its robustness.	Verification. The model was applied to a SIUBEN sample, demonstrating its robustness.
10	The values for the sample of the Household Vulnerability Index were determined.	The IVACC values were determined for the 296 households in the sample.
11	When the variables that demonstrated their contribution to the model are present in the sample or the larger population, the model is applied to the complete and certified database.	The model was applied to the complete and certified SIUBEN database.
12	A complete result is obtained, attributing an Index value to each household among the population.	An index value was obtained for each household in the SIUBEN national database.
13	The Vulnerability Index was calculated for each household in the total database and index values were identified by community, municipality and province, and others by gender, age and other variables associated with households in the database.	Each household in the SIUBEN database has a Calculated Vulnerability Index and index values can be identified by community, municipality and province; and others by gender, age and other variables associated with households.

# 3.3 COST TO DEVELOP IVACC

↘ The estimated cost to develop the Vulnerability to Climate Hazards Index, up to 2015, was approximately USD 263,000. The costs were:

- Qualitative analysis of risks, disasters and development USD 20.000
- Survey design USD 5.000
- Creation of the survey for the pilot test USD 18.000
- Statistician's work (data processing and model) USD 20.000
- Technical assistance from United Nations agencies USD 200.000

The following two actions, which were carried out by national entities with their personnel, are not included:



ADDITION OF NEW QUESTIONS TO THE NATIONAL HOUSEHOLD SURVEY



PROCESSING AND PRODUCTION OF THE INDEX

# 3.4 LESSONS LEARNED



**The importance of generating practices** and work routines in areas of poverty and climate risk has been recognized in order to promote a change in the current way of understanding and evaluating the impacts of climate-related disasters and to construct a medium and long-term view of indirect impacts at the household level.



**The creation of institutional alliances** has facilitated the articulation of policy analysis and coordination between the institutions responsible for the identification of vulnerable households, social protection systems and systems for disaster risk management and climate adaptation.



**It has been observed** that the best way to sensitize and orient people on the importance of measuring the socioeconomic effects of disasters in homes is through studies that reflect the evidence. This requires improving the measurement of the relation between poverty and disaster risks.



**It is necessary to include** environmental and climate hazard variables in household surveys. The lack of data may be one of the reasons why policymakers have been slow to act on the disaster-development binomial.



**The strategic focus** of post-disaster assessments should be the household. Household evaluations should be conducted by institutions with the capacity to coordinate evaluations at the household level, such as the systems for identifying beneficiaries of social policies.



**It is important to create** broader policy instrument baskets for households according to their dynamic vulnerability, including social security policies for climate hazards.



**It is clear that** post-hazard recovery processes should focus on reducing poverty and increasing equality.





# ANNEX

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# ANNEX 1

## Synthesis of tools and key products in the IVACC design and application process

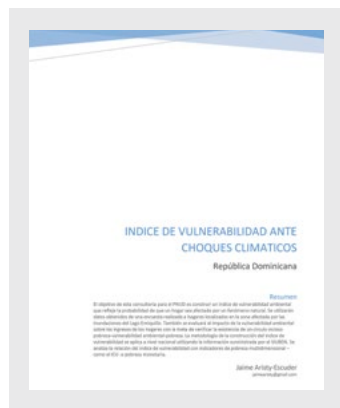


### Product 1

#### Analysis when disasters occur

This document explores the relationships between the dynamics of poverty and disasters, from both a theoretical perspective and the specific context of Lake Enriquillo in the Dominican Republic. It identifies the basis for the construction of policy tools that generate synergies between the objectives of human development, poverty reduction, environmental management and climate adaptation.

- [http://www.do.undp.org/content/dominican\\_republic/es/home/library/poverty/cuando-los-desastres-se-quedan.html](http://www.do.undp.org/content/dominican_republic/es/home/library/poverty/cuando-los-desastres-se-quedan.html)



### Product 2

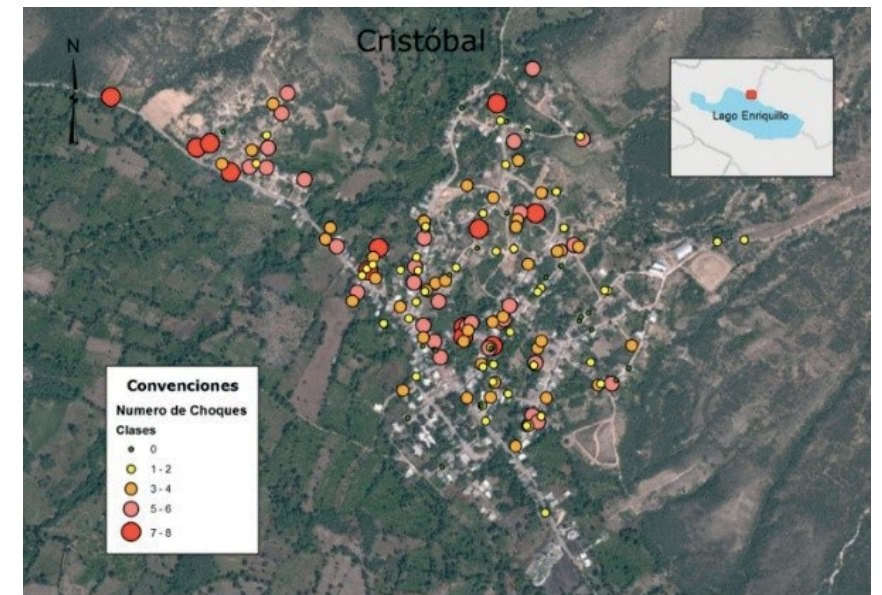
#### Construction of IVACC

This technical document presents the correlations between various social and environmental variables for the construction of an environmental vulnerability index that reflects the likelihood of a household being affected by a natural phenomenon. It uses the data obtained from a household survey in the Lake Enriquillo area affected by floods. The document evaluates the environmental vulnerability and income of households, with the goal of verifying the existence of a vicious cycle of poverty-environmental vulnerability-poverty. The construction methodology of the vulnerability index is applied at the national level, using SIUBEN data, and analyzes the relationship with multidimensional poverty indicators (such as the QLI) and monetary poverty.



### Product 3

#### Lake Enriquillo household survey: poverty - disasters



#### ANEXO

#### HERRAMIENTAS

ENCUESTA SOBRE LA CRISIS SOCIOAMBIENTALES Y LAS ESTRATEGIAS ADAPTIVAS Y DE RECUPERACIÓN EN LOS HOGARES UBICADOS EN EL ÁREA DE INFLUENCIA DEL LAGO ENRIQUILLO

**I-UBICACIÓN GEOGRÁFICA DE LA VIVIENDA**

Provincia.....

Municipio.....

Distrito Municipal.....

Sección, Barrio o Paraje.....

Polígono.....

Área.....

Segmento.....

**II-HOGARES EN LA VIVIENDA**

Dirección de la vivienda:

Calle.....

Número de la vivienda.....

Número de registro de la vivienda.....

Total de Hogares en la vivienda.....

Hogar número.....

Cuestionario.....  de  el hogar.

**GEO POSICIONAMIENTO DE LA VIVIENDA**

Latitud.....

Longitud.....

Altitud.....

**III-CONTROL DE LA VISITA**

	1ra. visita	2da. visita	3ra. visita	Visita final
Fecha				Día <input type="text"/> Mes <input type="text"/>
Nombre del Entrevistador				Año <input type="text"/>
Hora de inicio				
Hora de término				
Resultado de la visita				Resultado Final <input type="checkbox"/>

Código de Resultado: 1-Entrevista completa 2-Entrevista incompleta 3-personas ausentes 4-Entrevista rechazada 5-Otro (Especifique).

34. Por efecto de alguno (s) ev naturales este hogar ha sido damnificado?

1 Si  2 No

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34. Durante que tiempo ha sido damnificado?

1 Menos de una semana

2 Menos de un mes

3 Mas de un mes

### Product 4

Inclusion of a series of questions in instruments for gathering information on a national scale

The Lake Enriquillo household survey aimed to provide information on climate hazards among households and the changes in their income and assets.

It is also a basic tool for understanding the social strategies of households for coping with hazards, their resilience and their adaptive capacity. It was also employed as a tool to better understand vulnerability conditions, including risks and possible strategies to bolster resilience.



### Product 5

Fair of solutions and projects for the population affected by climate hazards in Lake Enriquillo

**Proyecto Frontera**  
(Unidad de Medio Ambiente del PNUD):

Buena apoyar en la reducción de los efectos adversos del terremoto en Haití sobre la población localizada en la zona de la frontera, y mitigar los impactos asociados a tal evento sobre el desarrollo sostenible en la República Dominicana.

En estos momentos, sus acciones están concentradas fundamentalmente en las provincias fronterizas Bahoruco e Independencia, dos de las provincias de mas bajo índice de desarrollo humano del país donde se encuentra el Lago Enriquillo y que han venido acumulando los efectos de varios desastres severos ocurridos en el último decenio (Fleada de Jimaní, Tormentas Noel y Olga, los efectos del terremoto del 2010 en Haití, la Tormenta Isaac y el huracán Sandy).

El evento que reviste mayor gravedad es el derivado de la crecida del Lago Enriquillo pues se ha presentado un incremento sostenido de su nivel, a razón de un metro por año.

**Instituciones Participantes**

**Gobierno Nacional**  
Ministerio Administrativo de la Presidencia de la República  
Ministerio de Agricultura  
Instituto de Innovación Biotecnología e Industria (IBI)  
Fondo Especial para el Desarrollo Agropecuario (FEDA)  
Instituto Agrario Dominicano (IAD)  
Instituto Nacional De Recursos Hídricos (INDRH)  
Fuerzas Armadas  
Comedores Económicos  
Instituto Dominicano de Investigaciones Agropecuarias y Forestales (IDIAF)  
Unidad de Electrificación Rural y Sub-Urbana (UERS)  
Unidad de Emergencias Ministerio de Salud Pública  
Ministerio de Educación

**Gobierno Subnacional**  
Federación Dominicana de Municipios (FEDOMU)  
Asociación de Municipios de la Región Enriquillo (ASOMURE)  
Alcalde Jimaní  
Alcalde Los Rios  
Alcalde Dorengé  
Alcalde Postre Rio  
Alcalde Villa Jaragua  
Distrito Municipal Las Chavellinas

**ONGs**  
Enriquillo 2030  
Visión Mundial  
CIEPO  
Fundación Agua Pure  
EcoLo  
Oakam  
Habitat  
Fundación Agricultura y Medio Ambiente (FAMA)

**Programa de Pequeños Subsidios (PPS)**  
Red Dominicana de Turismo Rural (REDOTUR)  
Grupo Jaragua  
Cruz Roja

**Casa de Naciones Unidas (ONU)**  
Av. Anacaona #9. Mirador Sur,  
Santo Domingo, D.N. 809 537-0909

**FERIA DE SOLUCIONES Y PROYECTOS PARA LAS COMUNIDADES DEL Lago Enriquillo**  
SÁBADO 6 & DOMINGO 7 JULIO 2013  
LICEO MÁXIMO FLORIAN  
JIMANÍ, PROVINCIA INDEPENDENCIA  
REPUBLICA DOMINICANA

36. Está su vivienda cerca de:

A. Agua estancada.....SI  1 NO  2

B. Acumulacion de basura .....SI  1 NO  2

C. Cañada con basura o agua contaminada ..... SI  1 NO  2

D. Ruido de vehiculos o motores ..... SI  1 NO  2

E. Pociña o granja..... SI  1 NO  2

F. Humo / gases de fábrica o taller..... SI  1 NO  2

G. Ruidos de fábrica o taller.....SI  1 NO  2

H. Desechos de fábrica, taller, clínica, etc ..... SI  1 NO  2

I. Ruidos y humo de planta eléctrica ..... SI  1 NO  2

J. Envasadora de gas ..... SI  1 NO  2

K. Bomba de gasolina .....SI  1 NO  2

L. Música alta de bares, colmados o vecinos .. ..... SI  1 NO  2

**XX. RIESGO DE PROBLEMAS NATURALES Y CONTAMINACION AMBIENTAL**

34. Que tan cerca está su vivienda de río arroyo o cañada

1 Menos de 1/2 Kilometro

2 Un 1 kilometro

3 Mas de 1 kilometro

35. Su hogar ha sido afectado por los siguientes eventos naturales en los últimos 12 meses:

A. Ciclones .....SI  1 NO  2

B. Tormentas .....SI  1 NO  2

C. Derrumbes ..... SI  1 NO  2

D. Inundaciones .....SI  1 NO  2

E. Temblores de tierra ..... SI  1 NO  2

F. Incendios ..... SI  1 NO  2

G. Ventarrones (Tomados)..... SI  1 NO  2

H. Sequia ..... SI  1 NO  2

I. Otro ..... SI  1 NO  2



### Product 6

IVACC video

- <http://www.ecored.org.do/les-invitamos-conocer-mas-sobre-el-ivacc-indice-de-vulnerabilidad-choques-climaticos/>

# ANNEX 2

## Reflections on the socialization and lessons learned workshop, February 2018

During the month of February (2018), a workshop on socialization and lessons learned from IVACC was organized by UNDP, UN Environment and SIUBEN in Santo Domingo. This event was attended by 60 people, representing different national entities (Social Subsidies Administrator, National Emergency Commission, National Council for Childhood and Adolescence, Civil Defense, General Directorate of Special Programs of the Presidency, General Directorate of Multilateral Cooperation, National Institute of Drinking Water and Sewage, National Housing Institute, Ministry of

Agriculture, Ministry of Education, Ministry of Economy, Planning and Development, Ministry of Finance, Ministry of Environment, Ministry of Health, National Meteorological Office, the Progresando con Solidaridad program and SIUBEN), the Spanish Agency for International Development Cooperation (AECID), the academic sector (Technological Institute of Santo Domingo and the Latin American Faculty of Social Sciences), UN agencies and programs (UNDP, UN Environment, World Food Program, United Nations Population Fund), NGOs and foundations (Plan Internacional and Plenitud).





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