



Economics of
Climate
Adaptation

Report 01

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Inception Report

Honduras

Urban Flood Risk



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List of Acronyms

CCA	Climate Change Adaptation
EbA	Ecosystem-based Adaptation
ECA	Economics of Climate Adaptation
GDP	Gross Domestic Product
ISF	InsuResilience Solutions Fund
KfW	German Development Bank
NAP	National Adaptation Plans
NGO	Non-Governmental Organization
PMDM	Development Master Plan of the Municipality
SPS	San Pedro Sula
UNDP	United Nations Development Program
UNU-EHS	United Nations University – Institute for Environment and Human Security

1 Context

The Municipality of San Pedro Sula (SPS) is currently undertaking an ambitious process of transformation and modernization which, amongst others, re-evaluates the silos approach traditionally used for policymaking and proposes a throughout vision for the city they want to have in the next 25 years. For this purpose the current administration of SPS formulated the “Plan Maestro de Desarrollo Municipal” - Development Master Plan of the Municipality (PMDM) which covers and integrates diverse issues, from violence and migration to environmental degradation and climate change. As part of the chapter on climate change adaptation, hazard protection and more specifically adaptation to flood events has been identified as a priority for the municipality.

The United Nations University - Institute for Environment and Human Security (UNU-EHS) in cooperation with and funded by the InsuResilience Solutions Fund (ISF), is implementing the Economics of Climate Adaptation (ECA) methodology in SPS to identify the most cost-effective measures to address flood hazards. The ISF is funded by the German Development Bank (KfW) and commissioned by the German Ministry for Economic Cooperation and Development (BMZ).

Currently, the Economics of Climate Adaptation (ECA) methodology is implemented in two (2) different countries (Honduras and Ethiopia).

The main objectives of the ECA methodology are to support decision-makers in developing their adaptation strategy and climate change adaptation (CCA) investment portfolios, including risk transfer. The ECA methodology offers a systematic and transparent approach that fosters trust and initiates in-depth inter-sectoral stakeholder discussions. The methodology can be flexibly applied from the national down to the local level to different stakeholder groups and different hazards. It further gives guidance on what aspects to focus on during a feasibility study. It provides key information for programme-based approaches, insurance approaches and has the potential to support National Adaptation Plans (NAPs) development.

ECA offers a unique approach towards the flexible identification of cost-effective CCA measures for a variety of projects and sectors. It addresses, in particular, the following questions:

- 1) What is the potential climate-related damage over the coming decades?
- 2) How much of that damage can be averted, using what type of CCA measures?
- 3) What investments - will be required to fund those CCA measures - and will the benefits of these investments outweigh their costs?

A plethora of approaches has already been designed to respond to the complexity and the uncertainty of climate change-related projects. With regard to the implementation of climate change adaptation strategies, they range from climate vulnerability assessments, risk assessments, economic and/or sustainability impact assessments to decision making support tools. Among these, none integrated the full range of processes from risk assessment to a feasibility study of CCA measures. Integration is the

strength of ECA; it is linked to the open-source software CLIMADA. The latter, by using available data, calculates the potential impact of current and future hazards on several selected assets, including the cost/benefits of selected measures.

This report is intended to present the main results of the Economics of Climate Adaptation (ECA) inception workshop organised by UNU-EHS in the Municipality of San Pedro Sula (SPS) in Honduras. We will start by briefly introducing the city of SPS, in all its aspects: location, population, economic activities and weather conditions. Subsequently, environmental hazards in the city are presented, especially in the past decades. Thereafter policies and strategies on how to address climate change issues in SPS are discussed and finally the potential contributions of the ECA methodology to the Master Plan are introduced.

1.1 General Information on San Pedro Sula

San Pedro Sula is the capital of the department of Cortés. It is the second-largest city in Honduras and the industrial and economic capital of the country. Located in the north-west of the country, around 50 km away from the Caribbean Sea, the city is part of the Sula Valley, and the Merendón mountain chain. The latter is a protected area. 45% of the district's area is covered by forest, of which any land with an altitude greater than 1800m.a.s.l is protected. By 2016, SPS had a population of over 754,000 inhabitants, 94% of which can be found within the urban limits. According to the Permanent Committee for Contingency Management (COPECO), around 244,000 of these people live in high flood risk areas¹.

As described in Figure 1, Honduras is one of the countries most at risk due to a high vulnerability and a high exposure to several natural hazards². The high costs of housing added to the rise in migration from rural to urban areas, have increased the number of informal settlements in Honduras, particularly in Tegucigalpa and SPS.

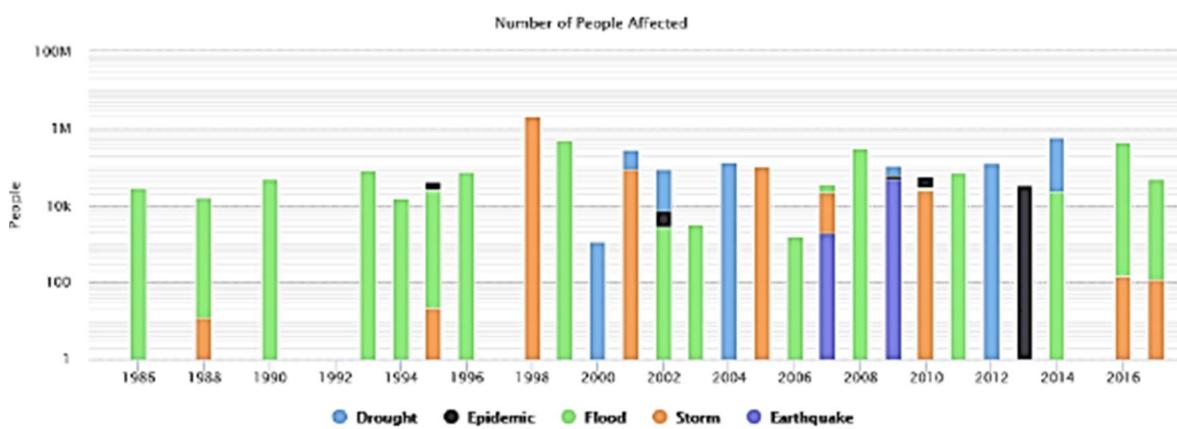


Figure 1 Key Natural Hazard Statistics in Honduras (1985-2018) (World Bank, 2019)

In the case of San Pedro Sula, several of the slums are located on the border of rivers, in areas, where high risks of flooding have been identified. Moreover, the poor level of the existent water management systems enables frequent flooding and water scarcities³.

¹ <https://reliefweb.int/report/honduras/un-mill-n-de-personas-en-el-rea-rural-viven-en-zonas-de-riesgo>

² World Bank (2019) Climate Change Knowledge Portal. Accessed in December 2019.

<https://climateknowledgeportal.worldbank.org/country/honduras>

³ USAID (2017) Climate Risk Profile Honduras, 5pp

As described in Figure 2 hurricanes and floods are the most dangerous hazards in Honduras, as well as in SPS. Flooding will affect not only housing, especially in poor neighbourhoods, but also public infrastructure, with transport systems being most vulnerable. In particular communities in the rural area of SPS that are located in protected areas are mostly affected by flooding, landslides and cracks.

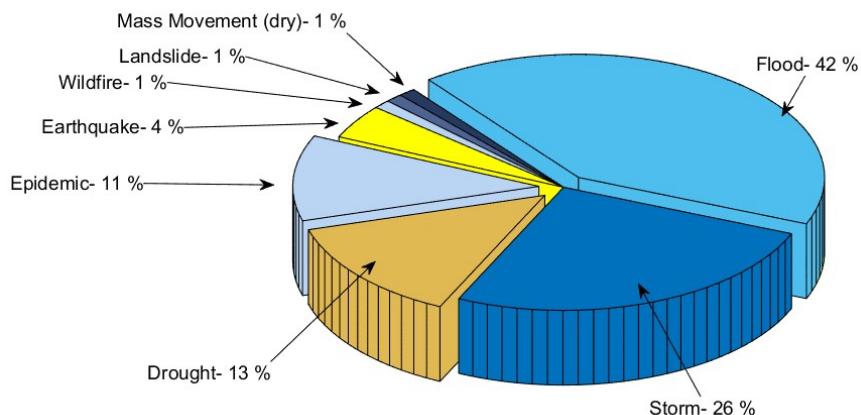


Figure 2 Average Annual Hazard Occurrence in Honduras (1900-2018) based on data from EMDat (2019)

In terms of the economy, the main driving sectors in the municipality are the manufacturing industry and other commercial activity (e.g. wholesale and retail trade), both of which have relatively higher shares in the local economy compared to the national economy. Primary activity, such as agriculture, livestock, forestry, and fishing, are relatively underrepresented in comparison to the national average (Source: Master Plan, p. 48). SPS has a significant production industry. The city is exporting clothes, cotton socks, as well as sewing garments. The city further exports coffee, which remains the country's principal export product, bananas, and palm oil. While the whole Sula Valley contributes roughly 63% to Honduras' GDP, the SPS Master Plan estimates the city's contribution at 40%, although this number would need further verification.

According to the city's Master Plan the total unemployment rate was 8% at the time of writing. The problem of un- and underemployment has increased country wide especially between 2012 and 2016. However, despite an increase of 5% during this period, San Pedro Sula performed much better than the country as a whole, which increased 15% in unemployment.

1.2 Environmental hazards in Honduras and San Pedro Sula

Between 1930 and 2008 the Central American region has suffered 248 major extreme events associated with climate and hydro-meteorological phenomena. Honduras faced the largest number (54). The most recurrent events are floods, storms, landslides and alluviums, just over 85% of the total events⁴.

Between 2014 and 2019, municipality records show that SPS alone was hit by more than 100 events, including fires, droughts, hurricanes, storms, floods, landslides, and earthquakes. Other documents record that SPS was hit by 538 events (excluding fire) between 1976 and 2010⁵. Amongst these recurring events, Hurricane Mitch (1998) caused the biggest damage in the recent history of Honduras. In SPS, flooding

⁴ CEPAL. (2010). La economía del cambio climático en Centroamérica.

⁵ UNDP (2012) Desastres, Riesgos y Desarrollo en Honduras. Unidad de Prospectiva y Estrategia y la Unidad de Medio Ambiente y Gestión de Riesgo del PNUD Honduras. 86pp

events following Hurricane Mitch caused severe damages for the Banana industry and the municipality's infrastructure⁶. As displayed in Figure 3, bridges were particularly affected. Over 60% of the country and hundreds of towns and villages were engulfed by mud and water. More than 70% of the agricultural sector of Honduras was wiped out. It created immediate food shortages and reduced export of bananas, coffee and shrimp.



Figure 3 Hurricane Mitch destroying one of the 92 bridges in Honduras (1998)

In addition, heavy drought events were recorded in the past 20 years, in particular in 1997-1998 and 2009-2010 during very strong El Niño years. More recently, in August 2019, local media reported heavy rain, storms, and floods in SPS. Amongst others, the Mario Rivas Hospital was affected⁷. Besides severe damage in the ground floor, the storm caused the roof of the hospital to collapse and floods affected the Internal Medicine and Emergency areas.

For future adaptation context, climate scenarios indicate that existing water scarcity will be exacerbated by climate change and increasing variability. The main urban areas (Tegucigalpa and San Pedro Sula) and several agricultural areas (Patuca basin) are expected to face increased water scarcity in the near future⁸. Based on several studies^{9,10}, future projected changes in climate include¹¹ an increase in average

⁶ ibid

⁷ Information from different local press releases: Accessed in December 2019:

<https://www.oncenoticias.hn/fuertes-lluvias-san-pedro-sula/>
<https://www.laprensa.hn/honduras/1308713-410/-inunda-sala-pacientes-dengu-hospital-mario-rivas->
<https://reliefweb.int/report/honduras/natural-disasters-monitoring-august-9-2019>

⁸<https://www.adaptation-fund.org/project/addressing-climate-change-risks-on-water-resources-in-honduras-increased-systemic-resilience-and-reduced-vulnerability-of-the-urban-poor/>.

⁹ Smith, Joel B.; Strzepek, Kenneth M.; Cardini, Julio; Castaneda, Mario; Holland, Julie; Quiroz, Carlos et al. (2011): Coping with climate variability and climate change in La Ceiba, Honduras. In *Climatic Change* 108 (3), pp. 457–470. DOI: 10.1007/s10584-011-0161-2.

¹⁰ Tucker, Catherine M.; Eakin, Hallie; Castellanos, Edwin J. (2010): Perceptions of risk and adaptation. Coffee producers, market shocks, and extreme weather in Central America and Mexico. In *Global Environmental Change* 20 (1), pp. 23–32. DOI: 10.1016/j.gloenvcha.2009.07.006.

¹¹https://www.climatelinks.org/sites/default/files/asset/document/2017_USAID%20ATLAS_Climate%20Change%20Risk%20Profile_Honduras.pdf.

temperature of up to 2.5°C by 2050 leading to drought periods of longer duration¹². With regards to rainfall, an average decrease of 9-14% p.a. by 2050 is expected, with large seasonal variations (up to -25% in June-August)¹³. At the same time, by 2050, extreme rainfall volumes are expected to raise by 25%, leading to an increase in flood events p.a. by 60%. This is induced by an increase of extreme weather events, especially in the Northeast of the country. Sea level rise, causing saltwater intrusion, is likely to increase by 0.4-0.86m by 2100¹⁴.



Figure 4 Images of floods in SPS courtesy of La Prensa Diario

1.3 Policies and strategies to address Climate Change in San Pedro Sula

There is a wide legal framework that mandates that local and regional governments protect the landscapes and the communities from environmental degradation and climate change in Honduras. The decree 104-93 or General Environmental Law (Ley General del Ambiente) in addition to the decree 297-2013 or Climate Change Law (Ley de Cambio Climático), provide municipal authorities with enough legal tools to make the necessary efforts to guarantee the sustainable development of their territories.

The strategy that San Pedro Sula developed for achieving sustainable development is framed within the Master Plan for Municipal Development (PMDM)¹⁵, which the administration is seeking to implement with public and private partners. The PMDM is in line with the National Strategy for Climate Change (ENCC) and focuses on water resources, forests & biodiversity and human security. Similarly, the Master Plan sticks to the existent delimitation of protected areas (Zonas de Reserva) within SPS, like El Merendon, Cuyamel and the Cusuco National Park.

A central document of the city of San Pedro Sula for future planning is the Development Master Plan of the Municipality (PMDM). The plan comprises a planning period from 2017 to 2042, and aims to “plan, guide and define the organized development of the municipality in a sustainable, participative, inclusive

¹² Argeñal, F. (2010) Variabilidad Climática y Cambio Climático en Honduras. UNDP, November 2010

¹³ Imbach P, Chou SC, Lyra A, Rodrigues D, Rodriguez D, et al. (2018) Future climate change scenarios in Central America at high spatial resolution. PLOS ONE 13(4): e0193570.

<https://doi.org/10.1371/journal.pone.0193570>

¹⁴

https://www.climatelinks.org/sites/default/files/asset/document/2017_USAID%20ATLAS_Climate%20Change%20Risk%20Profile_Honduras.pdf.

¹⁵ Available in ANNEX 13 in digital form

and human-centred manner". The Master Plan supports the city of San Pedro Sula to transform into a competitive urban centre while being environmentally sustainable and resilient against climate-related disasters. Important components of this plan with high relevance for the ECA studies are Component 1: Municipal land-use plan, Component 2: Legal tools for zoning & urbanization and Component 3: Municipal sustainable development plan. The components explicitly mention concepts of environmental risk reduction and strategies for enhanced disaster risk management, with a specific focus on floods.

The PMDM incorporates holistic guidelines for different aspects of sustainable development including:

- citizen engagement with government, environment,
- land uses and spatial planning,
- multimodal mobility,
- economy and growth,
- education,
- safety and security,
- infrastructure development,
- water and waste management,
- energy,
- technology integration.

As part of the Master Plan, the Mayor's Office of San Pedro Sula signed an agreement with the World Bank through the mechanism of reimbursable advisory services (RAS). RAS programs operate at the request of the client country to receive, in addition to funds, advisory, analysis services, and implementation support.

The results of the ECA study will offer a basis for the underlying spatial planning of the Master Plan. It also offers insights for the implementation of the Sustainable Development Plan of SPS, which aims at reducing the vulnerability of the district and its inhabitants against climate impacts. Potential adaptation measures include all types of grey and green infrastructure for rainwater management, ecosystem-based adaptation (EbA) measures, measures to improve the resilience of buildings, spatial planning and early warning systems etc.

Furthermore, the ECA study results can be used as an input to prioritize the adaptation measures in future investment programs be it with domestic or international funding. For instance, the German Development Bank (KfW) is considering to extend the successful regional program "Urban Climate Adaptation in Central America" to SPS. This program focuses on grey and green infrastructure investments to increase the adaptive capacity of poor urban neighborhoods and the risk management capacities of the involved institutions.

1.4 Selection of projects relevant to the ECA Study

In this section, we list projects that are currently implemented in Honduras and SPS. This list is not exhaustive and reflects the best of our knowledge.

Table 1 Projects currently implemented in Honduras with relevance to the ECA Study

Donor	Project Name	Timeline	Budget	Scope
World Bank Group ¹⁶	Disaster Risk Management Project	2012 - 2020	US\$ 30 million	The Disaster Risk Management (DRM) project is being implemented by Honduras' national DRM agency COPECOP with the objectives to continue strengthening Honduras' capacity for integrated disaster risk management at the municipal and national levels and to improve capacity for prompt and effective disaster response.
World Bank Group ¹⁷	Catastrophe Deferred Drawdown Option (Cat DDO)	Board Date 2020	US\$ 119 million	Cat DDO aims to strengthen the legal and institutional DRM framework to increase Honduras's resilience to natural hazards. The proposed contingency credit option will support the GoH with different approaches for both post-disaster response (liquidity) and comprehensive DRM aimed at enhancing resilience in focus areas, such as disaster risk financing, urban resilience, emergency preparedness, including health related crisis and water security. Pillar A focuses on improving public financial management and fiscal resilience against disaster risk; Pillar B aims to strengthen the institutional framework for disaster preparedness and response; and Pillar C focuses on strengthening the legal and institutional framework for DRM and CCA in critical sectors.
KfW / German Federal Ministry for Economic Cooperation and Development (BMZ) ¹⁸	Adaptation to Urban Climate Change	2018 - Ongoing	EUR 8 million	KfW's urban climate change adaptation program aims to target 150,000 particularly affected, poor residents of the capital Tegucigalpa. The program will invest into urban infrastructure such as retaining walls, drainage ditches and reforestation, strengthen the central institutions for risk management and adapting to the impacts of climate change, as well as establish standards and processes for controlling and monitoring measures.
Municipality of San Pedro Sula	Master Plan for Municipal Development (PMDM)	Published in 2017		The PMDM is a set of coherent and integrated strategies that target different needs of the Municipality while promoting sustainable development. The goal of the Master Plan is to lead SPS into a vision of a safe, equitable, sustainable, healthy and smart city, supported by state of the art technological platforms that multiply opportunities for well-being and progress for all. The implementation of the PMDM is a long term process and the administration is currently investing in a set of priorities including institutional modernization and international cooperation.
USAID ¹⁹	Gobernanza en Ecosistemas, Medios de Vida y Agua	2016 – 2020	US \$23.7 million	n/a
USAID and GOH ²⁰	Dry Corridor Alliance (ACS)	2015 – 2020	US \$35 million	n/a
Global Agriculture and Food Security Program ²¹	Corredor Seco Food Security Project	2015 – 2021	US \$1.04 million	n/a

¹⁶ <https://projects.worldbank.org/en/projects-operations/project-detail/P131094> (06.02.2020)

¹⁷ <http://documents.worldbank.org/curated/en/839271573764710294/Concept-Program-Information-Document-PID-Honduras-DRM-Development-Policy-Credit-with-a-Catastrophe-Deferred-Drawdown-Option-Cat-DDO-P172567> (06.02.2020)

¹⁸ https://www.kfw.de/KfW-Group/Newsroom/Latest-News/Pressemitteilungen-Details_472320.html (06.02.2020)

¹⁹ https://www.climatelinks.org/sites/default/files/asset/document/2017_USAID%20ATLAS_Climate%20Change%20Risk%20Profile_Honduras.pdf (06.02.2020)

²⁰ *ibid*

²¹ *ibid*

2 Preparation of the workshop

2.1 Summary of meetings

As a first step of an overall participative strategy, a joint scoping discussion was organized among representatives of the Municipality of San Pedro Sula, the United Nations University (UNU-EHS), the InsuResilience Solutions Fund (ISF) and the German Development Bank (KfW) on the 8th of October 2019. The following departments from the municipality and their representatives took part in the discussion: Gerente de Competitividad [*Competitiveness Manager*], Gerencia de Ambiente [*Environmental Manager*], Director del Plan Estratégico del Plan Maestro de Desarrollo Municipal and the Departamento Técnico en Gestión de Riesgo [*Director of the Strategic Plan of the Master Plan for Municipal Development and the Technical Department in Risk Management*].

2.2 Defining the key stakeholders

During the preparation of the kick-off workshop, five (5) stakeholder groups have been identified coming from (1) Government/Municipality, (2) Int. Organizations, (3) Academia, (4) NGOs/CSOs, and (5) Private Sector (see **ANNEX 1** for the Workshop Participation List). The municipality sent the official invitation to the stakeholders, signed by the mayor of San Pedro Sula. A sample of the invitation can be found in **ANNEX 2**. Some pictures of the final setup of the room can be found in ANNEX 3.

3 Workshop

3.1 Objectives

The objectives of the inception workshop were threefold. First, it is crucial to define a common understanding of the ECA study, the method and the expected results between all participants. Second, the scope of the study should be defined using a participative approach. The scope of the study determines what hazards are selected, which area(s) will be studied, and what categories of assets are relevant. Time horizons and scenarios will also be discussed. The third objective of the inception workshop is to identify what datasets are available and where.

To achieve these objectives the workshop has been divided in **three different sessions**.

The first session contextualised the ECA study with the work of the municipality, especially with regards to present priorities. It also highlighted the existing adaptation measures and aimed at setting the scene for the selection of hazards in SPS. The ECA methodology was presented in detail, with an example from former studies. Space for questions was allocated. Eventually, different focus groups were created. Each group was formed according to the participants' particular stakeholder group (Government, Academia, NGOs and International Organization, Communities, Private Sector). Each group was tasked with three different questions:

- * What are the stakeholder group's main concerns regarding climate change?
- * What CCA measures is the stakeholder group already undertaking?
- * What role can the stakeholder group play in promoting CCA?

Participants were subsequently invited to report in plenary session. At the end of the activity the main concerns of each group, as well as their opportunities to address such risks were clear for the whole room.

The second session aimed at defining the scope of the study. To achieve this objective, participants were divided in five (5) different tables and tasked with the following questions:

- * Table 1: Which climate threats are of the greatest importance for the study?
- * Table 2: Which areas of the city require more study attention?
- * Table 3: Which groups and assets require greater protection?
- * Table 4: What are the biggest challenges to implement CCA locally (physical, social, political...)?
- * Table 5: What are the greatest opportunities for the implementation of CCA measures in the region?

Participants were subsequently invited to report in plenary session. The detail of participants per Table is listed in **ANNEX 4**.

The third session of the workshop was dedicated to explain what data are necessary and to identify which institutions are able to provide them. The method used includes discussion about the data required to conduct the study with the scope agreed upon during day 1 and the gaps with the data obtained so far. Subsequently, the so-called Data Gallery was open to participants, who were asked to write institutions and contacts for every type of dataset identified. Pathways were identified to get the missing information.

During a plenary session, gaps were filled until all data locations were identified.

3.2 Agenda

The following agenda has been proposed based on the objectives described above. A full agenda is available in **ANNEX 5**.

DAY 1

Time	Activity	Description
Reception and welcome	Registration of attendees	
	Welcome from government representatives	
	Welcome from ISF and UNU representatives	
Common Understanding		
Morning	Background to the study	Contextualization of the work carried out in the municipality so far with respect to Climate Change Adaptation (CCA) measures.
	Introduction to the ECA methodology and the ECA Studies team	General presentation on the ECA methodology and its added value on similar tools
Break		
Morning	Expectations and interests of the stakeholder groups present at the workshop	Activity designed to identify the different needs of the stakeholder groups convened in reference to CCA measures, and the roles that these stakeholder groups are currently playing and those that could play in the upcoming stages of the ECA methodology and in the implementation of the measures proposed by the study.
Lunch Break		
Scope of the Study		
Afternoon	Identifying key study areas and groups	Activity designed to define the scope of the study. Which climate hazards are most relevant to the city? Which areas are key to the study? Which population needs more intervention to increase its resilience?
Break		
Afternoon	Agreement on the scope of the study	Brief discussion on the agreements reached during the day.

DAY 2

Time	Activity	Description
	Welcome	Objectives
		Dataset
Morning	Data Gallery	Discussion of the data required to conduct the study to the extent agreed on day 1 and the gap with the data obtained so far. Routes are identified to get the missing information.
	Chronology of the project and steps to follow	Presentation of the agreements made during the workshop, the chronogram of project activities and the steps to follow. Closure of the workshop.

3.3 Participants

In total, fifty nine (59 on day 1 and 52 on day 2) participants attended the workshop in San Pedro Sula, with representatives from the municipality including the Mayor and his deputy, representatives from the communities, representatives from the private sector, universities, NGOs, and international organisations. A list of participants is available in **ANNEX 1**, along with a list of invited institutions. Their active contributions were documented for this report but also recorded in a video for the future use of the municipality.

Despite the high turnout of participants, the intended diversity in representation was not met. Before the workshop, a classification of the invitees into stakeholders groups was proposed based on the nature of the institution they worked for and their role in such institution. According to this classification and the registration list shown in **ANNEX 1**, the actual attendees came 46% from the public sector, 22% from the private sector and the rest was almost evenly distributed between NGO/international organisations, academia and community leaders. Furthermore, according to the results from question 1 of the feedback survey, over 70% of the respondents identified as part of the public sector while none answered academia to the same question, see **ANNEX 11**. The survey was taken by 31 participants.

4 Results

4.1 Appropriation by stakeholders

To successfully design and implement any (climate) risk management plan, policymakers must rely heavily on the commitment of the different stakeholders that will be benefiting from it. Projects led by third parties, or building on a purely top-down approach, have high chances of excluding the knowledge and concerns of key groups and of developing biases when designing monitoring systems to measure the effectiveness of the adaptation measures. Keeping this in mind, the first objective of the ECA methodology is to involve stakeholders who can disseminate the results amongst all relevant groups, and empower them with an equal voice when defining the scope of the study and with the possibility to propose contributions to improve the final results of it.

For the inception workshop in San Pedro Sula, the task of motivating the group and explaining the importance of the active participation of all attendees was undertaken by the mayor of the municipality, Mr. Armando Calidonio (Figure 5). His address linked the output of the ECA study with the future that the city has envisioned for itself in the upcoming decades, described in detail in the Development Master Plan of the Municipality (PMDM). He opened by discussing the threat that climate change poses for SPS and reflected on how challenges like mass migration and poverty, that lead to violence and insecurity, are exacerbated by extreme weather events and drastic changes in regular weather patterns. Mr Calidonio emphasised the concept of resilience, as the ability of the municipality to face and recover from disastrous events.



Figure 5 Mayor Armando Calidonio introducing the workshop

The Mayor joined the participants during the whole one and a half day, which not only reminded the room of the importance of the topics discussed but also set the tone for a very committed engagement from all the attendees in the different activities of the agenda.

4.2 Defining expectations

The first session of the workshop aimed at enabling a transparent conversation on climate risk management amongst participants. The results of each table are presented in the three sections below, with the entries shown in alphabetic order as no prioritization was requested at this point. Go to **ANNEX 6, 7 and 8** for the pictures of the boards and notes of the workshop.

4.2.1 Which are the main concerns regarding climate change adaptations?

The common thread amongst all five (5) groups of stakeholders were “floods”. The subject of hazards related to water resources, for both excess and scarcity scenarios was presented by all participants. Some were focusing more on the ramifications of the events, like landslides and the destruction of infrastructure and landscapes, and others stating the needs for investments in measures like improving the drainage system and other infrastructure.

The second most common concern, suggested by four (4) of the stakeholder groups, is related to forest management. Issues with deforestation and the rise in outbreaks of invasive species like weevil have become a threat for local flora, fauna and rural livelihoods. See Table 2 for further disaggregation.

Table 2 Climate-related concerns from participants by stakeholder group

Government	NGOs / International organisations	Academia	Community Leaders	Private Sector
Atmospheric pollution	Droughts	Deforestation	Deforestation	A decrease in credit funds for vulnerable areas to climate change
Decline in crop yields	Environmental Impact	Floods (city drainage)	Diseases	Destruction of infrastructure
Floods	Fires Zacatecas	Human settlements in protected areas	Drought	Floods
Forest fires	Floods	Human settlements in vulnerable areas	Economic development	Greenhouse Gases
Water insecurity	Food security	Solid waste management	Energy security	Investment risks
High vulnerability to natural disasters	Forest fires	Use of pesticides	Floods	Long drought periods
Landslides	Landslides	Water resources	Flora and fauna	Losses in real estate assets
Low environmental literacy amongst the population	Low budget for sustainability projects and risk management		Food security	Rise in the vulnerability of the population
Rise in epidemics (Dengue, Zika...)			Infrastructure	Social conflicts lead by the unavailability of resources
Rise in plagues			Landslides	
Rural migration to cities			Low literacy and commitment	Water availability

Temperature rises	Migration
Unfollowed regulations	Negative attitude
	Outbreaks
	Pollution
	Reduction in purchase power
	Social organizations
	Temperature
	Use of plastics
	Water (excess and deficiency of rain)

4.2.2 Which climate adaptation measures were or have been implemented by stakeholder group?

Reforestation and capacity building initiatives are the preferred measures by most stakeholder groups. A majority of stakeholders highlighted their support on the reforesting activities organized by the municipality in response to the droughts and weevil outbreaks in the past months. Capacity building efforts are implemented by the government, NGOs and academia to empower different groups with tools to prepare and respond to emergency situations. Community leaders welcome such efforts and seek further engagement. See Table 3 with all the input from the participants.

Table 3 Climate adaptation measures already implemented by stakeholder group

Government	NGOs / International organizations	Academia	Community Leaders	Private Sector
Establishment of community-based institutions	Capacity building for the emergency committee	Capacity building on basin management for reducing soil erosion	Commitment to increase the level of formal education	Change in fuels and reduction in transport units
Forest Management	Infrastructure projects (drainage)	Capacity building on energy use (energy efficiency)	Community participation in reforestation projects	Enforce compensation frameworks for environmental and social infractions
Improving Early Warning Systems	Mapping of companies with a history of support for emergency relief	Capacity building on reforestation and afforestation for locals in El Merendón, as well as deforestation prevention campaigns	Joint efforts with the local government	Increased efficiency in general processes
Infrastructure projects (Collectors, contingency walls...)	Reforestation	Capacity building on the proper use of dielectric oils to avoid soil contamination	Logistics of community organisation and capacity building	Integrated basin management: Agroforestry systems, forest protection and environmental literacy
Reforestation	Establish alternative routes for delivery of emergency supplies funded by the private sector	Environmental literacy within university programs: Water Management (The 3 Rs)	Protection of no-building areas	Investments in new technologies

Securing infiltration zones	Good practices for waste management	Verifiable collective commitment	Investments in renewable energies
Technical assistance for farmers in El Merendón			Mapping of risk areas
Waste management			Reforestation

Risk analyses for investment projects

4.2.3 Which role can your stakeholder group play in fostering climate change adaptation measures? Awareness raising is the most common activity that stakeholders outside of the government consider as a potential part of their role to address climate change. Capacity building and self-assessments of vulnerability are also on the top of mind of several stakeholder groups that find in them empowering tools that allow them to rely on their own capacities to respond to emergency events. See Table 4 for further details.

Table 4 Self-defined roles for climate change adaptation by stakeholder group

Government	NGOs / International organizations	Academia	Community Leaders	Private Sector
Adapting legislation	Assessing the most vulnerable areas	Developing prevention literacy	Awareness-raising campaigns to boost the commitment of the community	Campaigning for rational use of water
Assigning resources	Campaigning for risk prevention	Disseminate the ECA methodology and the policies with students	Be part of the solution (take an active role)	Collecting precipitation data (monitoring)
Boosting the participation of communities	Developing key indicators to monitor projects	Disseminating climate change as a culture which requires everybody's engagement	Design and new infrastructure with an environmental focus	Developing a groundwater model
Developing and enforce legal frameworks for public policy	Empowering companies and citizens with the risk management plans	Further embrace the subject of climate change within academic programs	Environmental literacy campaigns in schools for children and young people	Generating information
Monitoring and verifying	Supporting institutional alignment to avoid effort repetition	Training and consulting through inclusive frameworks: academy + citizens + government (disseminate results with the population)	The massive participation of the community in reforestation initiatives (priority in basin protection)	Investing on "green financial products"

Planning	Strengthening the organization of the community	Key partnerships between state and private sector for managing resources like water and energy
	Supporting communities with local action plans	Recycle programs

4.3 Scope of the study

One of the foremost advantages of the ECA methodology is its flexibility. It can be applied for all sorts of climate-related hazards including floods, droughts, tropical storms, and storm surges and can cover everything from full regions to particular locations. But given time constraints and the high data requirements, the project needs a clear scope before any further step is taken and it must be defined by the stakeholders as it will shape the final results that they should expect after the study has concluded.

For this purpose, the participants were randomly assigned to five (5) tables, each with the task of defining an element of the scope:

1. Hazard,
2. Focus areas and time horizon,
3. Assets,
4. Local challenges for adaptation measures and
5. Local opportunities for adaptation measures.

After they prepared their points within the table, a member of each team presented the results to the rest of the participants. Given that in this activity we were looking for a consensus among the stakeholders, after each presentation, the plenary was asked whether the arguments given were convincing for everyone or not, and a discussion was encouraged until a final decision was reached on each point.

The results of the activity are summarized in Table 5. For each element, the considerations taken by each group when making their decisions and the final decision made by them are shown. The selected elements for the study include floods as key hazards, the time horizon 25 years and nine categories of assets were chosen. For the pictures of the boards and notes of the workshop see **ANNEX 9**.

Table 5 Scope of the study

Group's Focus	Discussion	Decision
Hazard	<ul style="list-style-type: none"> * Impact level * Frequency * Economic effects * Social effects * Recovery period * Understanding of the phenomenon 	1. Floods 2. Droughts 3. Strong winds 4. Mudslides 4. Landslides

Focus area	Private Sector	* Destruction of assets * Reduction of income * Losses for employees * Impacts on transportation infrastructure
	Local Government	* Emergency response * Supporting the community * Outbreak control * Step backs in development efforts
	Civil Society	* Losses in lives and assets * Reduction of income * Rise in diseases
	National Government	* Financial resources a location * Outbreak control * Logistics for emergency relief * Prioritize mitigation measures
	Time horizon	In line with the Development Master Plan of the Municipality (PMDM) 25 years
Assets	Floods:	* Vulnerable population * Damages in houses and sudden river overflow * Inefficient communication infrastructure and monitoring system * Public assets * Damages in drainage * Solid waste accumulation in lakes * Damages for informal businesses * Damages on transportation infrastructure * Damages on energy infrastructure
	Droughts:	* Communities in El Merendón * Forests * Cattle * Water resources * Crops * Vulnerable population * Households (Cat I., Cat. II, Cat. III) * Road infrastructure * Electric infrastructure * Public assets (hospitals, schools...) * Shorelines of the river * Drainage system

Adaptation measures - Challenges

- Physical:**
 - * Rain and wastewater drainage
 - * Water treatment plants
 - * Limited protection infrastructure
 - * Digital assets
 - * Lack of resources
 - * Forest Protection
 - * Urban flora management
- Social:**
 - * Limited environmental awareness
 - * Forced migration (Informal settlements)
 - * Robbery to public assets
 - * Low numbers of professionals in CC issues
 - * Lack of community engagement
 - * Real-time communication between government and the population
 - * Limited environmental research
 - * Lack of financial resources
 - * Low stakeholder engagement
 - * Need for further promotion of sustainable development in El Merendón
- Political:**
 - * Proper implementation of long term plans to address CC
 - * Institutional coordination
 - * Low compliance to the existent regulatory framework
 - * Lack of financial -resources

Adaptation measures - Opportunities

- Physical:**
 - * Geographical location of the municipality
 - * Infrastructure
 - * Planning of mitigation and prevention projects
 - * Availability of natural resources
 - * Weather
- Social:**
 - * Resilient crops as business opportunities
 - * Fostering ecologic solutions (clean energy), agroforestry investments
 - * Community engagement
 - * Involving technical experts with the communities
 - * Job creation
 - * Capacity building
- Political:**
 - * Development Master Plan of the Municipality (PMDM)
 - * Trust in local government
 - * The mayor of San Pedro Sula is also leading the assembly for the whole Sula Valley
 - * Access to green funds
 - * Support of international agencies
- Proximity to forestry resources**
- Legally binding documents promoting sustainability in the municipality**
- Closeness of the communities and the government**
- Openness of the administration to collaborate with international agencies**

4.4 Data needs and sources

The final activity of the workshop is related to data gathering. Despite good sources of data are available online or can be reached through partner organizations, having a set of key stakeholders sitting together

who know the data infrastructure of the municipality is a great opportunity to get the names and contact information of people that can facilitate navigating such infrastructure. At the same time, it reminds the participants about the need of commitment of the ECA methodology and offers them another opportunity to actively contribute to the quality of the final result.

Some of the fields of data requested include:

- Aerial images/ satellite,
- Cadastre and infrastructure,
- City water supply,
- Data on cost of recuperation,
- Governance and institutions,
- Historical data on damages (images),
- Household data,
- Hydrology and floods,
- Impact catastrophic events,
- Infrastructure (Road infrastructure, drainage, bridges...),
- Meteorological data,
- Municipal markets,
- Municipal policies and strategies,
- Recovery of degraded ecosystems,
- Risk management,
- Social infrastructure,
- Social organizations,
- Socio-economic factors,
- Urban patterns.

Pictures of the boards and notes of the workshop are available in **ANNEX 10**.

The specifics of data inventory, gaps and the needs for alternatives to approximate nonexistent data will be part of the data report. This section aims only at illustrating the type of inputs collected during the workshop.

4.5 Satisfaction from participants and feedback

Given the participatory character of the workshop, the feedback of the participants on the relevance of the activities, the clarity of discussed subjects and the use of time and other resources, is key to refine the implementation of the ECA methodology. At the end of the workshop, the link of our online survey was circulated, and the overall results were very positive and yet provide insights on minor shortcomings to be considered in future workshops. The survey was answered by 31 participants, nearly 60% of all the attendees. The details of the survey are presented in **ANNEX 11**.

In general, the perception of the participants of the workshop was very positive. The most common request was related to share the data of all the participants to further discuss the subject of the workshop bilaterally amongst them.

5 Other activities

5.1 Field visit

With the objective of better understanding the areas where climate change adaptation measures have been implemented or are being built, the Municipality of SPS invited some staff members for a field visit after the workshop took place. On Friday, November 15th Mr. Fausto Bográn (*Gerencia de Ambiente*, the Municipal Department for Environment) and Ms. Kary Inestroza (*Gerencia de Competitividad*, the Municipal Department for Competitiveness) guided a visit through El Merendón mountain chain west of the city.

The stops involved several areas where reforestation projects are on-going. This included the visit of a local tree nursery, a research centre for sustainable forestry including training capabilities as means to reduce vulnerability to droughts, and the crop fields of a local farmer who is sustainably producing vegetables for local supermarkets as an example of value creation in the region under green standards. The farmer explained the challenges of satisfying the high demand, while complying with the quality standards, but elaborated on the advantage of producing locally and hence being able to provide fresher products than farmers from other parts of the country or even neighbouring Guatemala. The trip ended with a visit to a public park aiming at exposing especially underprivileged families and children to nature and botany. Pictures can be found in **ANNEX 12**

5.2 Meetings

On the days before and after the workshop the following meetings (see Table 5) took place in order to connect with several focus persons and discuss specific workshop results as well as potential next steps. In general, the meetings helped both sides to gain deeper understanding of the corresponding topics discussed and opened up some contacts, communication channels, and agreements of data sharing. The selection of people and organisations met was made in close cooperation with Ms. Inestroza based on the team's open questions after the workshop. Data shared during the meetings need to be reviewed thoroughly before definite conclusions can be drawn.

Table 6 Summary of visits

Date	Attendees	Results
14/11/19	Armando Calidonio (Mayor SPS), Cristy Raudales, Fausto Bográn (both Municipal Department for Environment), Walter Pedroza (Head of the Technical Department in Risk Management/ Codem), Melissa Barahona, Kary Inestroza (both Municipal Department for Competitiveness), Lena Laux (ISF), Maxime	<ul style="list-style-type: none"> • Introductory meeting • Detailed introduction to the project's timeline and goals • Presentation of SPS' development

Souvignet, Eike Behre, David Daou, Florian Waldschmidt, Alvaro Rojas (all UNU EHS)

18/11/19	Walter Pedroza, Edgardo Jaco (Municipal Statistical and Research Office – DIEM), Luis Da’Costa (National Commission of Sula Valley and Commission against flooding in the Sula Valley), Alex Estevez COPECO	<ul style="list-style-type: none"> Potential survey to gather data on household assets and damages was discussed, an existing survey could be modified -> follow up meeting w/ Edgardo Jaco Walter Pedroza can supply data on infrastructure, public/ cultural assets, water bodies, and informal settlements on riverbanks Economic scenarios may be available at the central bank, Kary Inestroza to follow up
18/11/19	Cristy Raudales, Fausto Bográn (both Municipal Department for Environment)	<ul style="list-style-type: none"> Insights on ongoing and planned ecosystem based adaptation strategies, especially re- and afforestation were shared Importance of waterbodies, i.e. rivers and river banks, and aquifers were stressed
19/11/19	Edgardo Jaco, Statistical Office	<ul style="list-style-type: none"> Follow up on potential survey Edgardo Jaco & Team will provide a draft based on the discussion and a further detailed identification of target neighborhoods (to be provided by Walter Pedroza) Walter Pedroza shall be asked to provide 3-5 different recent flood events as basis for the survey
19/11/19	Mauricio Mejia, WWF	<ul style="list-style-type: none"> Introduction to ECA WWF has access to 5-6 weather stations in SPS, can create user account for the team to access the data WWF very interested in the study and its approach, might want to collaborate Mauricio Mejia provided contacts to colleagues who focus on urban flood events and economic impacts of floods for a follow up call
19/11/19	Litza Bertrand (Municipal Cadaster Department, Buildings and Operations Permits Unit)	<ul style="list-style-type: none"> Provision of municipal AutoCAD maps
19/11/19	Vicente Aguilar (Municipal Cadaster Department)	<ul style="list-style-type: none"> Discussion of what data and maps are needed Municipal Cadaster Department can provide customized data on land and building values
19/11/19	Tatiana Paz (Chamber of Commerce of Cortes – CCIC)	<ul style="list-style-type: none"> Introduction to ECA Brief discussion about the interest and preparedness/ adaptation measures of the private sector So far there is no coordinated effort on contingency plans or adaptation measures

6 Conclusions and next steps

This report describes the Economics of Climate Adaptation (ECA) inception workshop as organised and implemented by UNU-EHS for the city of San Pedro Sula (SPS) in Honduras in November 2019. The city of SPS is planning to implement grey and green adaptation measures to protect poor neighbourhoods in the Central District against landslides and flooding, early warning systems, and capacity development for communities and institutions. The ECA studies main objectives are to support decision-makers of SPS in further developing their adaptation strategy and to develop climate change adaptation (CCA) measures investment portfolios. The results shall help therefore to assess relevance and potential of possible risk transfer solutions and adaptation measures. Such solutions shall be embedded into existing policies and plans of the municipality and contribute to a more informed decision regarding adaptation options in SPS. Direct benefits for the municipality of SPS include but are not limited to i) a better risk analysis, ii) a detailed assessment of potential damages on selected assets, iii) a ranking of adaptation measures, including risk transfer, ecosystem based adaptation, and already planned measures, iv) a detailed and spatial visualisation of benefits (as compared to costs) for the municipality of SPS.

Moreover, the study results are immediately relevant for the project implementation of the KfW program "Urban climate change adaptation in Central America" which is expected to be extended to SPS, based on fund availability.

The overall results of the inception workshop, based on a participatory approach developed by UNU-EHS, include:

- 1) A shared understanding of the ECA methodology, its added value and potential as well as limitation for SPS. This shared understanding is documented in the feedback form filled by participants, as well as by a large attendance of the workshop activities
- 2) A decision by stakeholders regarding the scope of the study. The ECA study will focus on flood risk, in selected areas in the city of SPS. A time horizon has been chosen, along with the categories of relevant assets. A particular emphasis has been made on the role of the environment, as an asset potentially damaged by floods but also on its potential role in flood risk reduction.
- 3) Datasets availability and location has been identified during the data gallery session. Stakeholders have shown a significant commitment to locate and provide all available data necessary to the study. Data collection is on-going.

Specific results of the workshop are detailed below:

Hazard: Flood has been recognised as the hazard to be included in the scope of the study. Several criteria, detailed above were applied to reach this decision.

Focus Area: After discussion with different groups of stakeholders (in groups and in plenary) the following areas have been selected for the study:

- Chamelecón (District 18)
- Rivera Hernández (D. 14 & 15)
- Los Carmenes (D. 16)
- Los Bordos (D. 1,2 & 3) - Informal settlements

Time Horizon: The following time horizon (25 years) has been chosen based on the Municipality Master Plan (PNDM)

Assets: Assets have been discussed in groups and in plenary. The following consensus has been reached:

- Vulnerable population
- Households (Three different categories should be made)
- Road infrastructure
- Electric infrastructure
- Public assets (hospitals, schools...)
- Shorelines of the river
- Drainage system

Adaptation measures: The following challenges and opportunities have been identified in groups and in plenary. Political, ecological and social aspects were considered. The following selection represents the consensus reached by participants during the workshop.

Table 7 Challenges and opportunities for adaptation measures

Entry Points	Limitations
<ul style="list-style-type: none"> • Proximity to forestry resources • Legally binding documents promoting sustainability in the municipality • Closeness of the communities and the government • Openness of the administration to collaborate with international agencies 	<ul style="list-style-type: none"> • Limited social awareness and engagement • Low investments on adaptive capacity for infrastructure • Limited availability of financial resources for adaptation projects • Limited enforcement of regulatory frameworks

In addition, we provide the work plan discussed at the end of the workshop. Figure 6 gives an overview of the main activities, including the main deliverables and milestones. The tentative timeline includes all three phases of the ECA Study, covering the inception phase (delivery of the inception report in Jan-Feb 2020), the vulnerability phase with activities concentrated on modelling hazards, assets and expected damages now and in the future (vulnerability workshop in June-July 2020) and the final workshop with delivery of a feasibility study for selected measures (November 2020). Dates are indicative and subject to change.

Concrete next steps include:

Field survey: (Feb 2020, carried out by the Municipality of SPS) Low income households in slums and other highly vulnerable areas were identified by the participants of the workshop as one of the key assets for the study. The survey aims at estimating potential damages by future flood events. Data on historical events and their associated damages will be collected. In addition, the survey shall collect information on the current state of the homes in these areas and number of inhabitants. The panel size amounts to 700 interviewees in 25 different neighbourhoods (as defined during the inception workshop).

Flood modelling: (March 2020, commissioned by UNU-EHS) Flood risk has been identified as the risk of interest for this study. Given the lack of a reliable flood model for the municipality of SPS and its surrounding, it has been decided that a flood model shall be commissioned within the frame of this study. The flood model will use the best possible available data, with the highest possible resolution in line with available data. The detailed terms of references are being prepared and modelling start is expected in March 2020.

Exchange with Tegucigalpa and synergies: (March 2020, UNU-EHS as partner) The city of Tegucigalpa has voiced its interest to perform a similar study within its municipality. Synergies, in terms of best practice, capacity building and knowledge exchange are expected.

Data report: (March 2020, UNU-EHS) A data report is expected to be circulated in March 2020. It will include all available data as well as existing data gaps. Solution and proxies shall be proposed in order to address these data gaps.

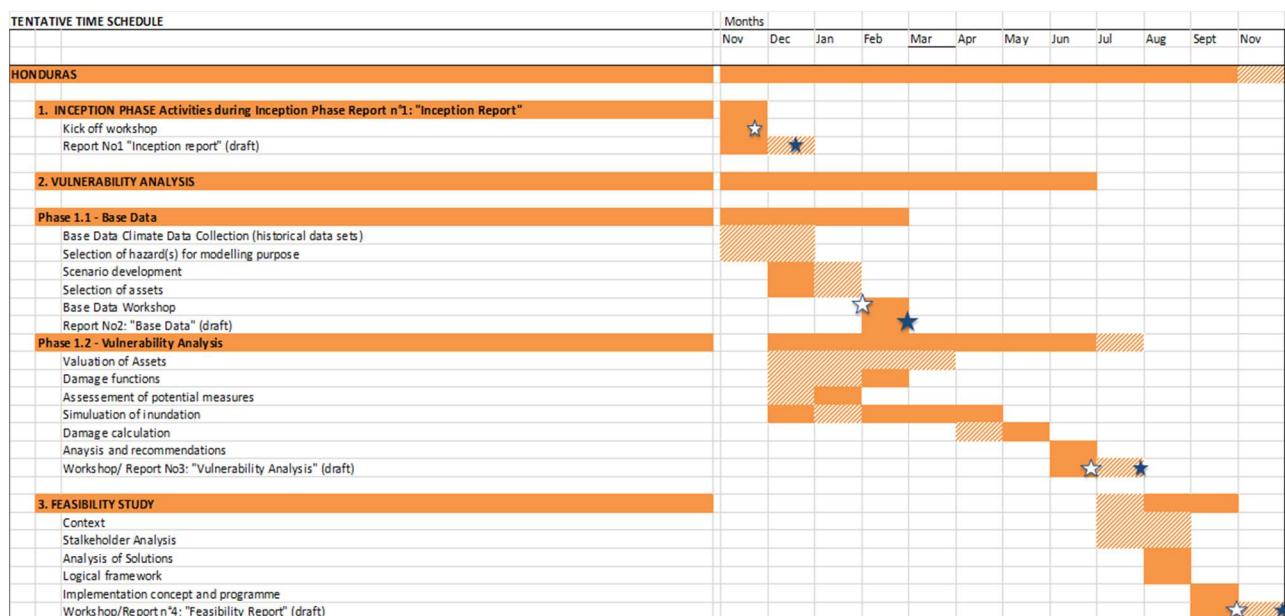


Figure 6 Time plan of the ECA Study in SPS with main workshops (white stars) and deliverables (dark stars).

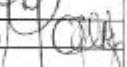
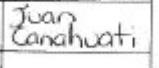
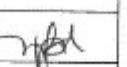
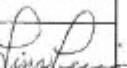
ANNEXES



Economics of
Climate
Adaptation

ANNEX 1

day 1

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day 1

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Méndez	Abraham	Aeropuerto Ramon Villeda Morales de San Pedro Sula	

day 1

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Varela	David Varela	Satelitec	maristany.varela@satelitec.com.hn ✓ D.V.
Rodriguez	Alberto	Corpo de Bomberos	corpo@corpo.com.hn ✓ A.R.
MATA	Anael	Corpo de Bomberos	anael99@gmail.com ✓ A.M.
	EDARCO	ENECE	enev9203@gmail.com ✓ E.E.
Perejil	Hector	ENET	reportillo@enence.hn ✓ H.P.
* Valladares	Alex	VNAIA-VS	alex.valladares@vnaia.com.hn ✓ A.V.
Peralta	Lia	Gildan	lperalta@gildan.com ✓ L.P.



ANNEX 2



1ra. Calle , 4 y 5 Avenida,
Bo. El Centro, S.O.
Tel: +504 2553-4646

San Pedro Sula, 04 de noviembre de 2019

Señor
Rafael Ruiz
Instituto Honureño de Transporte Terrestre
Su oficina.

En nombre de la Honorable Corporación Municipal de San Pedro Sula, el Banco de Crédito para la Reconstrucción (KFW) y el InsuResilience Solutions Fund (ISF) y la Universidad de las Naciones Unidas – Instituto para el Medio Ambiente y la Seguridad Humana (UNU-EHS) tenemos el honor de invitarle al Taller de Introducción “Aplicación de la Metodología ECA para la Identificación y Selección de Medidas Costo-Efectivas de Adaptación al Cambio Climático en el Municipio de San Pedro Sula” los días **miércoles 13 y jueves 14 de noviembre** en el **Salón Cultural de La Plaza de Banderas** (contiguo al Estadio Francisco Morazán) en siguiente horario: **miércoles 13 de 08:30am a 04:30pm y el día jueves 14 de 08:30am a 01:30pm**.

De conformidad con lo establecido en el Plan Maestro de Desarrollo Municipal de San Pedro Sula, con el apoyo de KFW, ISF y la UNU-EHS, se implementará la metodología de **Economía de Adaptación al Cambio Climático (ECA)** para definir dichas medidas comenzando con el taller de introducción y consulta.

Con el incremento en la frecuencia e intensidad de los fenómenos meteorológicos extremos, como inundaciones, tormentas tropicales y sequías, relacionados con el cambio climático, los riesgos de desastres naturales en ciudades a nivel mundial se están haciendo mucho más severos. Identificar medidas concretas y costo-efectivas que reduzcan la vulnerabilidad de comunidades y centros económicos a dichos eventos debe ser entonces una prioridad, y debe involucrar distintos grupos de interés desde el principio para reflejar y abordar adecuadamente las necesidades de todos los ciudadanos.

Su participación en el taller permitirá incorporar su experticia en el sector en el que se desenvuelve y que los resultados de la metodología reflejen adecuadamente sus necesidades y las oportunidades que pueden ofrecer para impulsar la resiliencia en San Pedro Sula.

En caso de dudas o sugerencias por favor comunicarse con melissa.barahona@sanpedrosula.hn, así mismo confirmar su asistencia.

Sin otro particular alguno, me despido muy atentamente,

ARMANDO CALIDONIO ALVARADO
ALCALDE MUNICIPAL

ANNEX 3



ANNEX 4

9

Mesa N° 1: AMENAZAS

Participantes:

Nombre	Institución
Mirna O. Palma	MSPS
Ramiro Castillo	Fundación Mercenarios
Nancy S. Pontón	Asiparsh / Diprode ENR
Anael Alberto Rodríguez	Cuerpo de Bomberos de Honduras
Alberto Varela Molina	Cuerpo de Bomberos
Alex Emilio Vallejo Ham	UNAH-US
Lilia Jiménez Montiel	MSPS
David Vásquez	Comité Satélite
José Héctor Murillo Lava	MSPS
Theodora M. PAZ	Cruz Roja Hond.

Mesa 2: ZONAS DE ESTUDIO & participantes.

ARMANDO CALIDONIO A.	ALCALDIA MUNICIPAL SP.S.
Laura Elizabeth Hernández Fuentes	Alcaldía Municipal SP.S.
Nelson Antonio Fanindretano	INTRASE
Ivette Velásquez Crespo	VINCI
Ricardo Tz. Ruiz.	Teléfonos Pinguino
Lizeth A. Bertrand	EDIFICACIONES Y PERMISOS DE CONSTRUCCIÓN MSPS
Fidelito Díaz (Fito)	Federación del Patronato (Mercenarios)
Oscar Diaz	Alcaldía Bien Pedro J.
Luis Enrique Porras	PGR-COPESCO
Walter Pérez Rincón Caballero	Alcaldía M-SPS DTER

Mesa N° 3: ACTIVOS

Participantes:

Nombre	Institución
Luis O. Díaz DiCosta	Comisión para Gestión de Riesgos y Cambio Climático
Héctor Jesús Phillips C.	Universidad de Costa Rica (UCR)
Ortiz Flores	UNITEC
Saúl Reyes	Aguas de San Pedro
Iván Baggedano	MSPS.
José Ponce	MSPS
Hector Muller	MSPS
Mariela Armas	Bio Ficohsa
Lia Peralta	Gildon

Mesa N° 4: MEDIDAS:RETOS

Participantes:

Nombre	Institución
Tes Odilia Llorente Escobar	UCA Chanchamá (Cerro Río Nandina)
Mario Rose	MSPS
Cristy Raudales	MSPS/Gobernación Ambiental
Nelson Tijón	MSPS / Defensoría de Constitucionalidad
José Roberto Paz	Cervecería Honduras
José A. Díaz	MSPS / Importadora
Eduardo Mata	EFEE
Heberth D. Porfilio	ENEE
José Antonio Rivero	MSPS
Laura Figueroa	MSPS

Mesa N° 5: MEDIDAS:OPORTUNIDADES

Participantes:

Nombre	Institución
Alexander Rojano Pinedo	Fundación Meridión
Jessy Dalia Pérez Gómez	Fundación
Monique Alonso Flores.	Aguas de San Pedro Sula
Williams René Diellana	COPECO RII, San Pedro Sula
Inti C. Alvarado Ramos	Banco del País
Claudio Rojas Santos	TCS PS Fincanias
Fausto D. Bergón C.	MSPS Dirección Generación de Ambiente
Edwin F. Ortiz Vilalta	Cruz Roja Hondureña
Damian Zavala	Municipalidad de San Pedro Sula
Rina Mancia	Municipalidad de San Pedro Sula
Alberto Merino	MSPS Gente de proximo Pueblo y Pueblo Nuevo Comunitario

ANNEX 5

AGENDA

TALLER DE INTRODUCCIÓN:

"Aplicación de la Metodología ECA para la Identificación y Selección de Medidas Costo-Efectivas de Adaptación al Cambio Climático en el Municipio de San Pedro Sula"



**13 y 14 de Noviembre, 2019
San Pedro Sula, Honduras**



MIERCOLES 13 DE NOVIEMBRE

MARCO DE TIEMPO ACTIVIDAD DESCRIPCIÓN

Recepción y Bienvenida	Registro de asistentes Bienvenida por parte de representantes del gobierno Bienvenida por parte de representantes de ISF	Bienvenida a los participantes por representantes del gobierno, breve recuento de la relación entre la entidad y las contrapartes del proyecto ISF y UNU-EHS, y las expectativas para el taller de Introducción del ISF y sus planes y proyectos para la ciudad de Sán Pedro Sula.
Primera sesión por la mañana	Antecedentes del estudio Introducción a ECA y el equipo de ECA Studies	Contextualización del trabajo realizado en la municipalidad hasta el momento respecto a medidas de Adaptación al Cambio Climático (CCA) Presentación general sobre la metodología ECA y su valor agregado sobre herramientas similares
	Coffee Break	
Segunda sesión por la mañana	Expectativas e intereses de los sectores presentes en el taller	Actividad diseñada para identificar las diferentes necesidades de los sectores convocados en referencia a las medidas CCA y los roles que dichos sectores están y podrían jugar en la implementación de las medidas propuestas por la metodología ECA y en las etapas del mismo estudio
	Almuerzo	
Primera sesión por la tarde	Identificando zonas y grupos claves del estudio	Actividad diseñada para definir el alcance del estudio. ¿Cuáles amenazas climáticas son las más relevantes en la ciudad? ¿Cuáles zonas son claves para el estudio? ¿Cuál población requiere mayor intervención para incrementar su resiliencia?
	Coffee Break	
Segunda sesión por la tarde	Acuerdo sobre el alcance del estudio	Breve discusión sobre los acuerdos alcanzados durante el día.

JUEVES 14 DE NOVIEMBRE

MARCO DE TIEMPO ACTIVIDAD DESCRIPCIÓN

Recepción y Bienvenida	Bienvenida del día 2	Presentación de los objetivos del día.
------------------------	----------------------	--

Datos necesarios para ECA

Sesión en la mañana

Requerimiento de los datos

Cronología del proyecto y pasos a seguir

Discusión sobre los datos requeridos para realizar el estudio con el alcance acordado durante el día 1 y la brecha respecto a los datos obtenidos hasta el momento. Se identifican rutas para conseguir la información faltante. Presentación de los acuerdos realizados durante el taller, el cronograma de actividades del proyecto y los pasos a seguir.

Almuerzo

Cierre del Taller



ANNEX 6

1. Mayores preocupaciones

Inseguridad Hídrica (falta de agua)	Incendios Forestales	Frecuente de Plagas
Inundaciones	Aumento de la temperatura	Disminución de la Producción (disminución severa)
Alta Vulnerabilidad Por Riesgo o Desastres	Cumplimiento de Normativa	Migración del área Rural a la Ciudad (crisis social)
Deslizamientos	Contaminación Atmosférica	Aumento de epidemias Dengue, Sika etc.
Falta de educación y Conciencia Ambiental de la Población		

Gobierno

1c) Cuales son las mayores preocupaciones del sector respecto al cambio climático ?

Deslizamientos	Seguridad Alimentaria	INUNDACIONES
Incendios Forestales	TIPO Afecto Ambiental	INCENDIOS ZAQUERAS.
SEQUIAS.		Falta DE Presupuest Para Sostenibilidad de Proyectos. Para Gr. de Riesgos.



- ① **Riesgo Hídrico** (riesgo de inundación)
- Deforestación
 - Asentamientos en áreas protegidas
 - Asentamientos en zonas vulnerables
 - Inundaciones (zonajes de la ciudad)
 - Manejo de desechos sólidos
 - Uso de ríos
- ② **Frontiera Agrícola:**
- Tierra (sustitución sostenible)
 - Manejo de uso de suelo (p.ej: humedad de café y cacao en áreas protegidas)
- ③ **Migración del área rural a la ciudad con impactos en la seguridad alimentaria y crecimiento desordenado:** Chetumal, sin piedra-pula.

Líderes Comunitarios

- | | | |
|------------------------|------------------------------------|-------------------------------|
| - Agua (lluvias) | - Epidemias | - Deslizamientos - inondación |
| - Temperatura | - Deforestación | - Sequía - PLAST (colores) |
| - Contaminación | - Flora y fauna | - Seguridad alimentaria |
| - Inundaciones | - Enfermedades | - Riesgo energético |
| - Desarrollo económico | - Costo de la vida | - Organización comunitaria |
| - Infraestructura | - Falta de conciencia y compromiso | - Actitud negativa |

① Principales riesgos para la población (desde la frontera de agua)

- disponibilidad del recurso hídrico
- Inundaciones
- Sequía
- Cambio climático

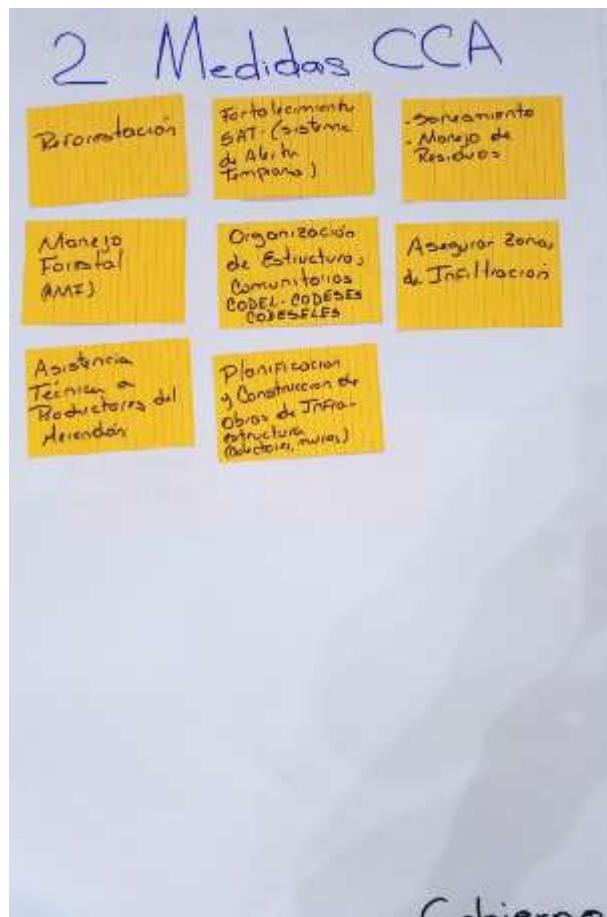
① Disponibilidad del recurso hídrico

- Inundaciones
- Sequía
- Cambio climático

① Principales riesgos para la población (desde la frontera de agua)

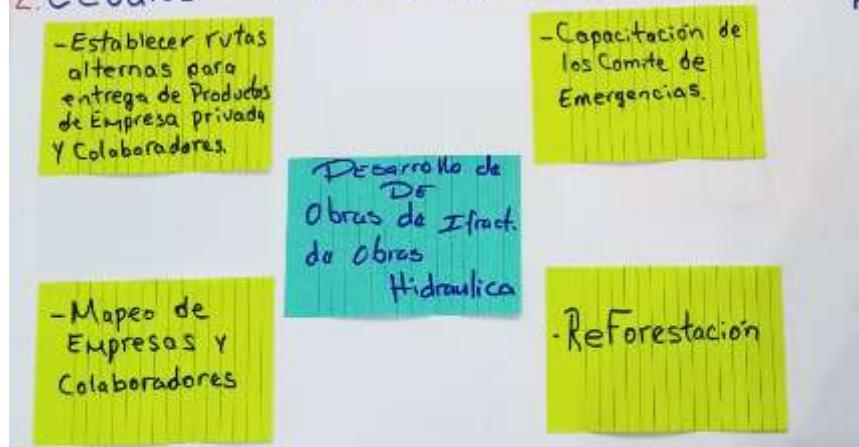
- disponibilidad del recurso hídrico
- Inundaciones
- Sequía
- Cambio climático

ANNEX 7



Gobiernos

2) Cuales medidas CCA está tomando el sector



ONG's



①

- Educación ambiental en la escuela: primaria
Universidades: manejo de agua, tree "E"

- Programas de capacitación de manejo de agua

- Aplicación de las tres "E" - Educar, Reducir, Reciclar

② Buenas Prácticas de manejo de desechos

- Identificación de los tipos de residuos

- Estudiando la disposición para amables de desecho

- Clase sobre reducción de agua: capacitación en protección de acueductos, Reciclaje.

Academia

③ Programa de Educación en el uso de la energía
(Eficiencia energética)

- Manejo de aceites y residuos para evitar la contaminación suelos

- La organización comunitaria y capacitación.

- Participación comunitaria en reforestación

- Trabajo en conjunto con el gobierno local y autoridades

Comunitarios

- Protección de áreas NO EDIFICABLES

- Compromiso colectivo REAL (ejemplo = dengue)

- Compromiso para elevar el nivel de educación formal

Líderes

②

2.0. Reproducción (Plan integral)

Cambio de estilos de vida y dinámica de los líderes al hacerse

Educación en la práctica

②

2.0. Manejo Integrado de Cuencas:

- Sistemas Agroforestales
- Rotación de Bøgny en alianza con la Municipalidad
- Educación Ambiental

* Inversión en reservas tecnológicas
* Inversión en energía renovable

③

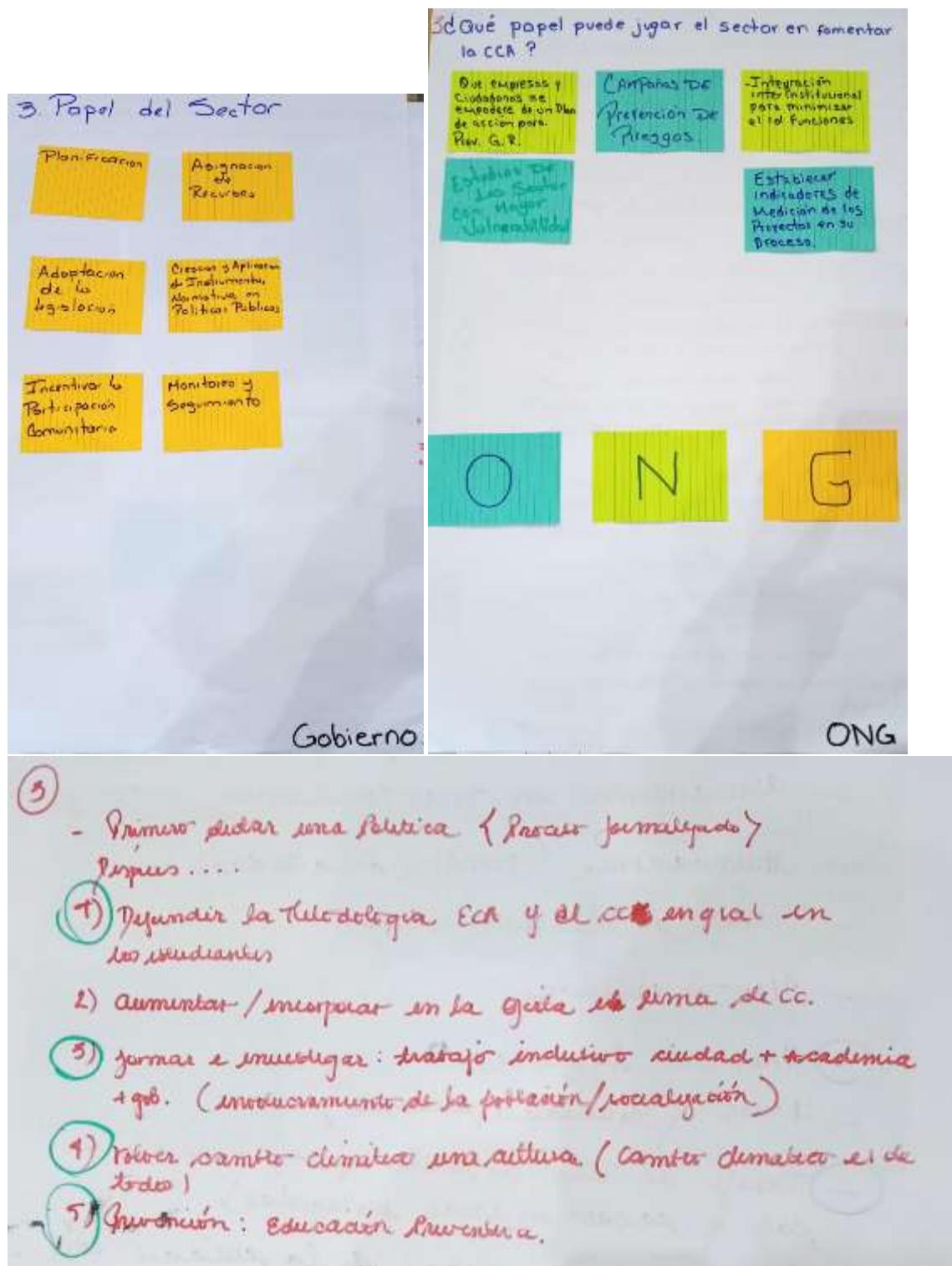
③ Diversificación de riesgos en los cultivos de los pequeños agricultores

③ Telefones y mapas de zonas de riesgo

③ Crear el compromiso de medidas de respuesta ambiental y social



ANNEX 8





- Ser parte de la solución (propositivo) * Fomentar la importancia de reciclar
- Fortalecer la organización comunitaria.
- Comunidades con planes específicos de acción.
- Participación comunitaria masiva en reforestación (prioridad en protección de aves)
- Campañas de concientización para aumentar compromiso en la comunidad.
- Charlas de formación y motivación para temas ambientales en niñas y jóvenes.
escuelas
- Diseño y nuevas obras con enfoque al medio ambiente

PRIVADO

③

3.1. Desarrollo de
Nuevos Mercados de
Aves (Aviarios, aves silvestres)
3.2. Inversión en Reforestación
3.3. Desarrollo de la
Economía del Turismo de
Aves
3.4. Aduanas de Dólares
- Reparación de Puentes
(Inversión)

④
④.1. Inversión en
desarrollo de
páginas web y
aplicaciones
para la
recolección
de datos
en el campo y
en la
ciudad
④.2. Desarrollo de
equipamiento

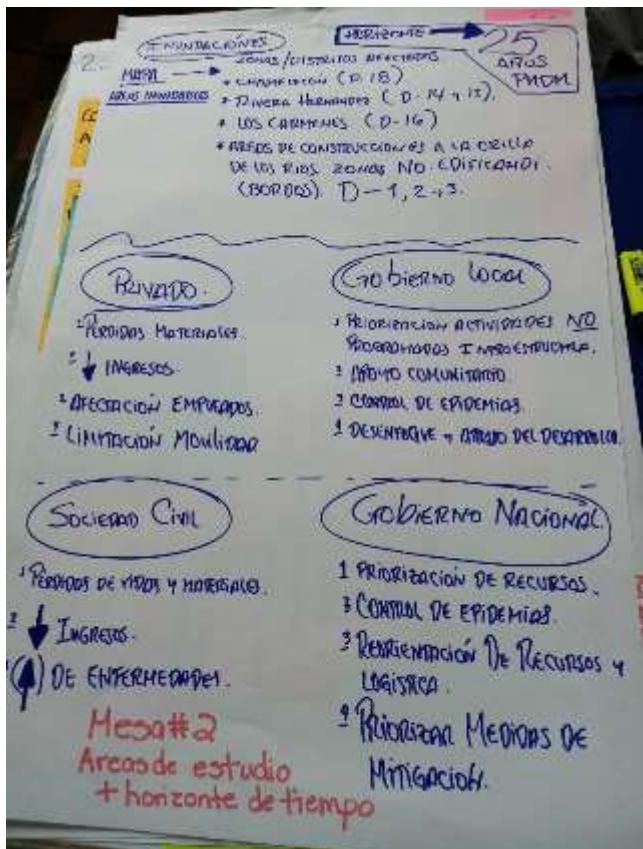
Sector
Privado

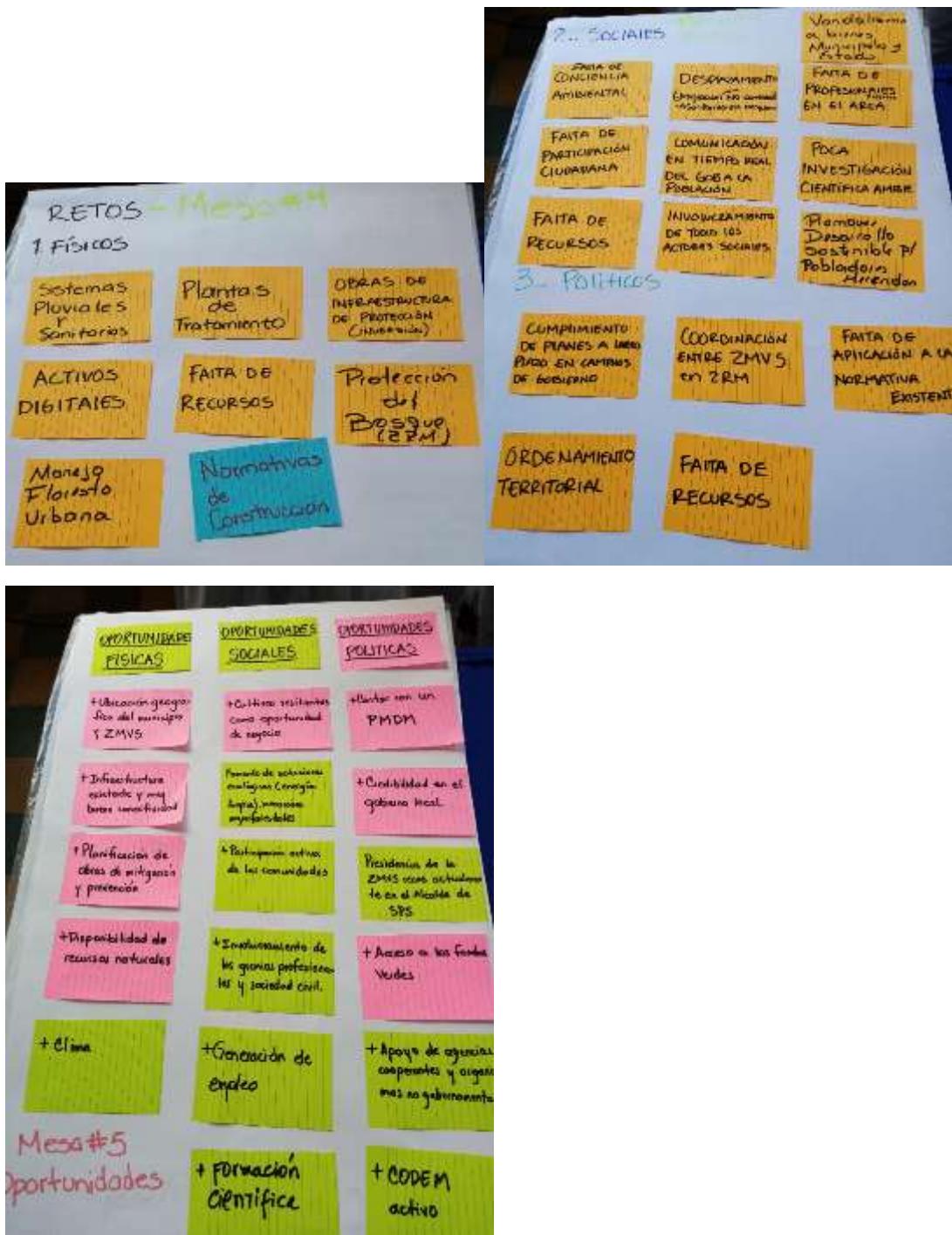


ANNEX 9

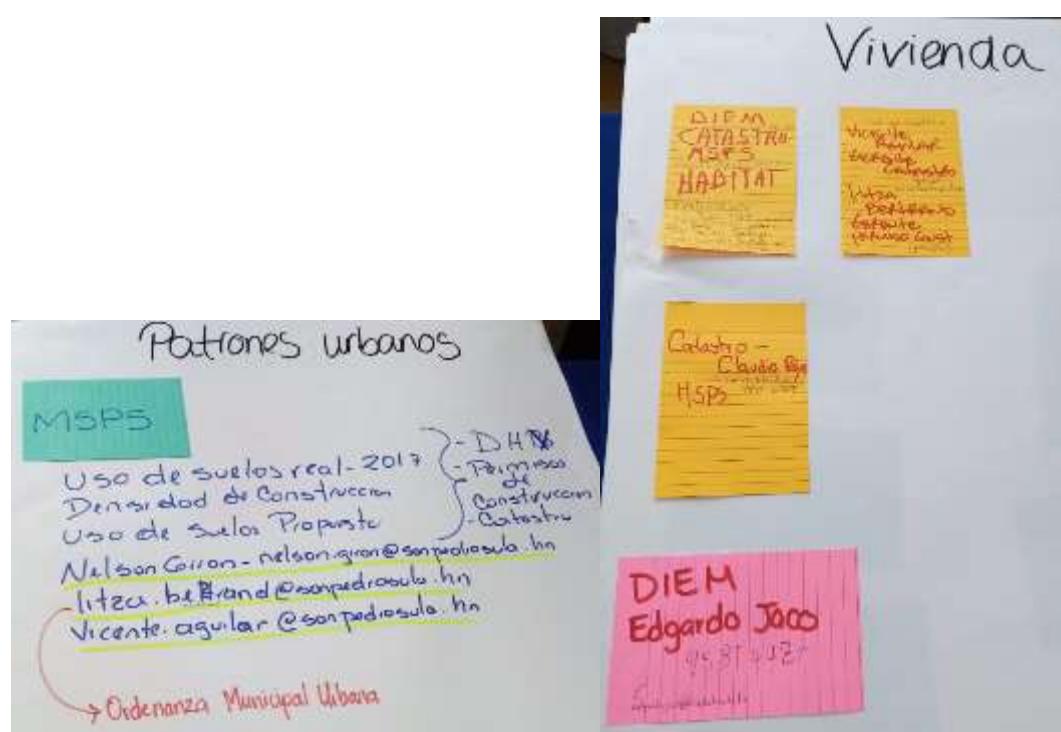
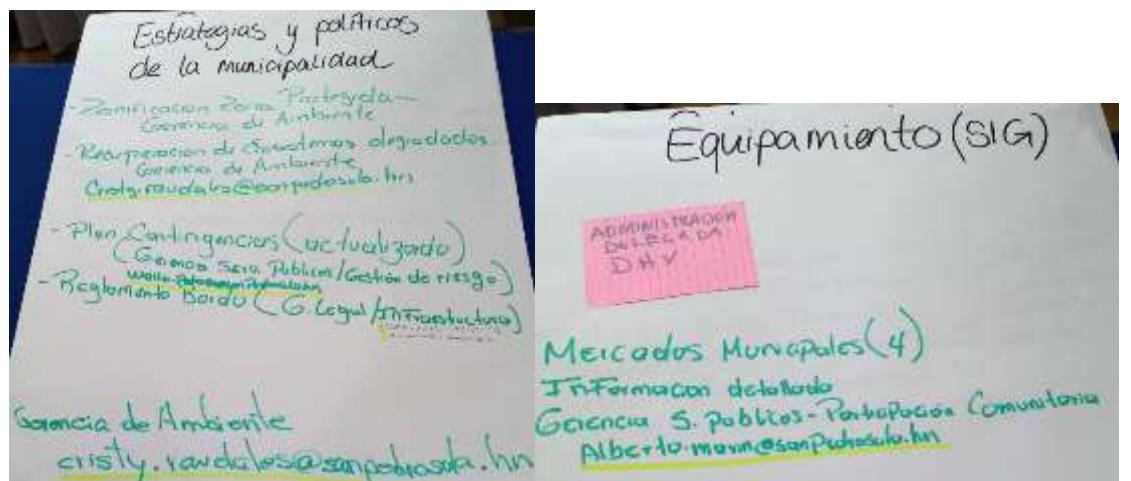
MESA #1 AMENAZAS

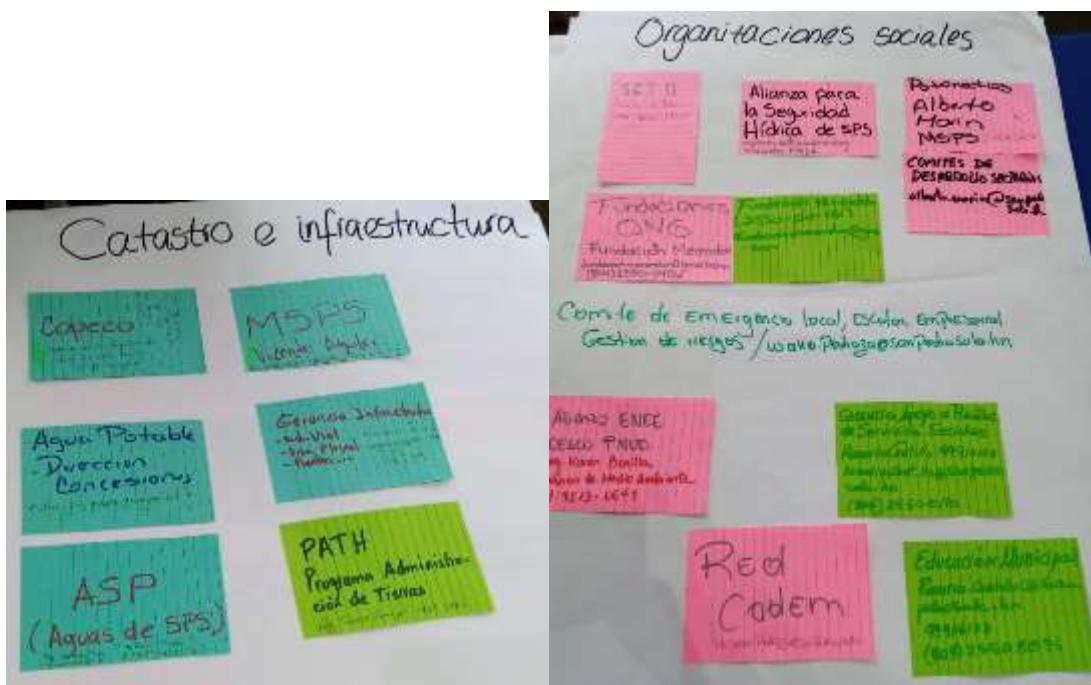
	NIVEL DEL IMPACTO	INTENSIDAD / FRECUENCIA	IMPACTO ECONOMICO	IMPACTO SOCIAL	RESILIENCIA / Periodo Reducción	NIVEL DE CONOCIMIENTO	TOTAL
INUNDACION	3	3	3	3	3	1	16
SEQUIAS	2	2	2	2	2	1	11
VIENTOS	2	1	2	1	2	1	8
DESLIZAMIENTOS ¹	2	1	1	1	1	1	6 ₁₇
ERRUMBES ¹	2	1	1	1	1	1	6 ₁₇





ANNEX 10





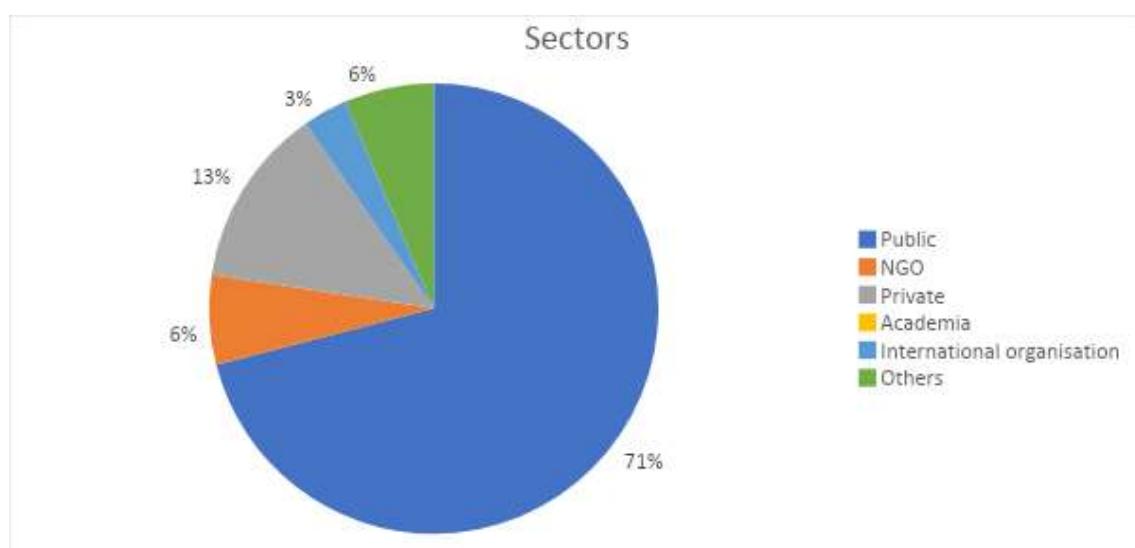


ANNEX 11

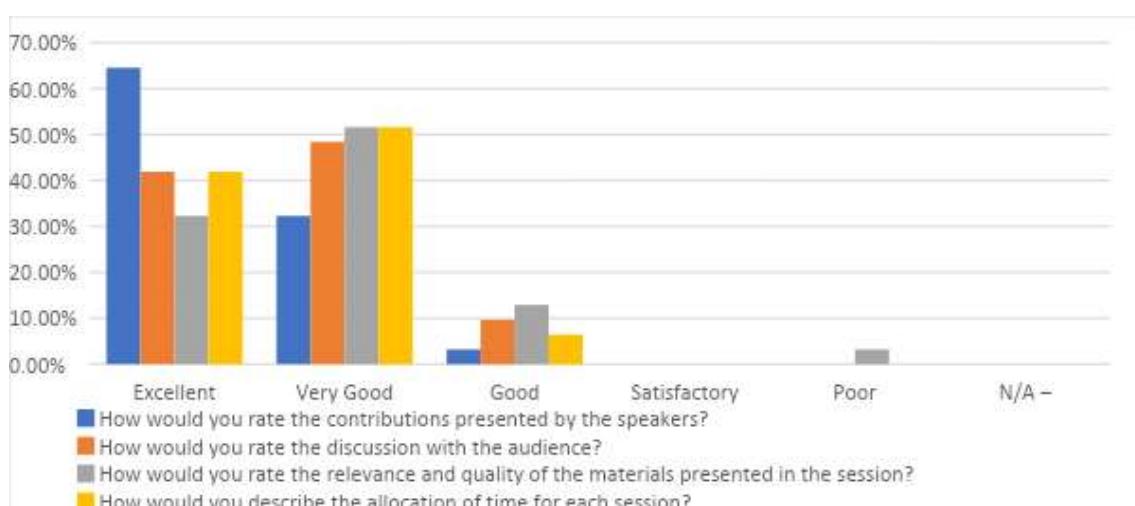
PARTICIPANT FEEDBACK

In order to continuously refine the applied methodologies during the workshops and the stakeholder engagement process the participants were asked to fill a feedback questionnaire. The overall results are very positive and yet provide insights on minor shortcomings to be considered in future workshops. The results are presented in graphs A1 – A7 in more detail. All single choice questions were answered by 31 participants while not all of those responded on open questions for additional comments. Selected comments will be highlighted.

Question 1: Please state your stakeholder group.



Question 2: Relevance of the content provided at the workshop.

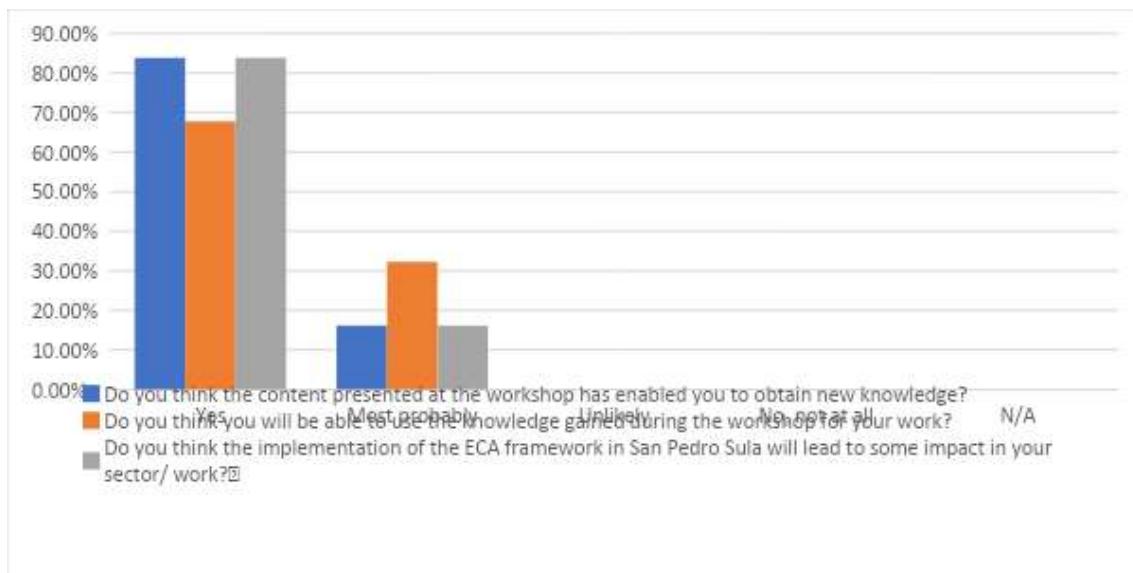


Selected comments:

- Very objective and punctual, time very well distributed.

- It is necessary to dedicate more time to group work.
- All very interesting topics and it would be excellent to put them into practice
- The workshop has been very profitable, it has really surpassed the expectations I had of it.
- Extend the recess time further

Question 3: Impact of the workshop.



Selected comments:

- Raising awareness about climate change and adopting this as a culture will be the engine for new generations to make this a daily occurrence.
- It will facilitate the response to the population and cases of emergencies and will give us lines in which to work in prevention and preparedness.
- Preventing the damage caused by climate change will be of great benefit.
- It will help many sectors and our city.
- It would considerably improve the Risk Management system.

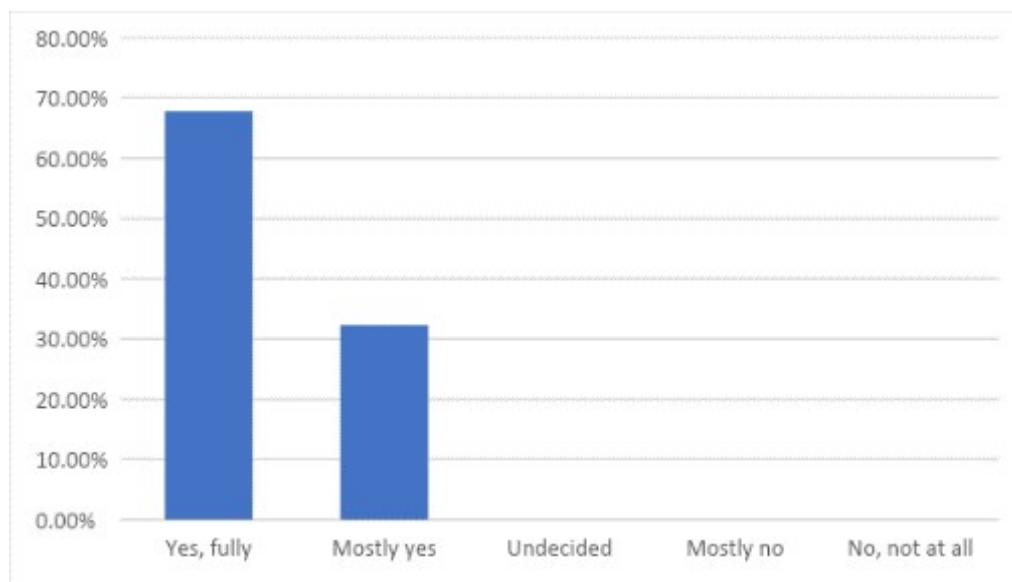
Question 4: Which session should have been more detailed?

This question did not provide predefined options, hence all collected responses are listed here.

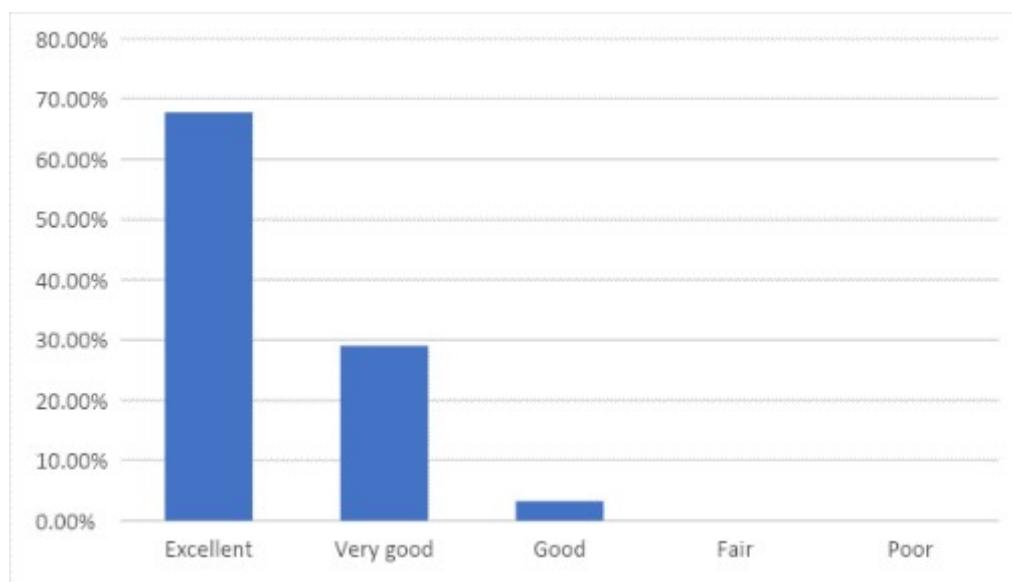
- Everything was well presented.
- Everything went very well and was greatly enriched by the participation of all those present.
- The identification of threats, assets and vulnerabilities
- They were all fine.
- They were all important
- Session 1
- It was good.
- Identification of zones and groups

- Everything was fine.
- They were all fine.
- About the ECA methodology
- Methodology
- Explanation of CLIMADA methodology

Question 5: After this workshop, do you see the potential and added value of applying the ECA framework?



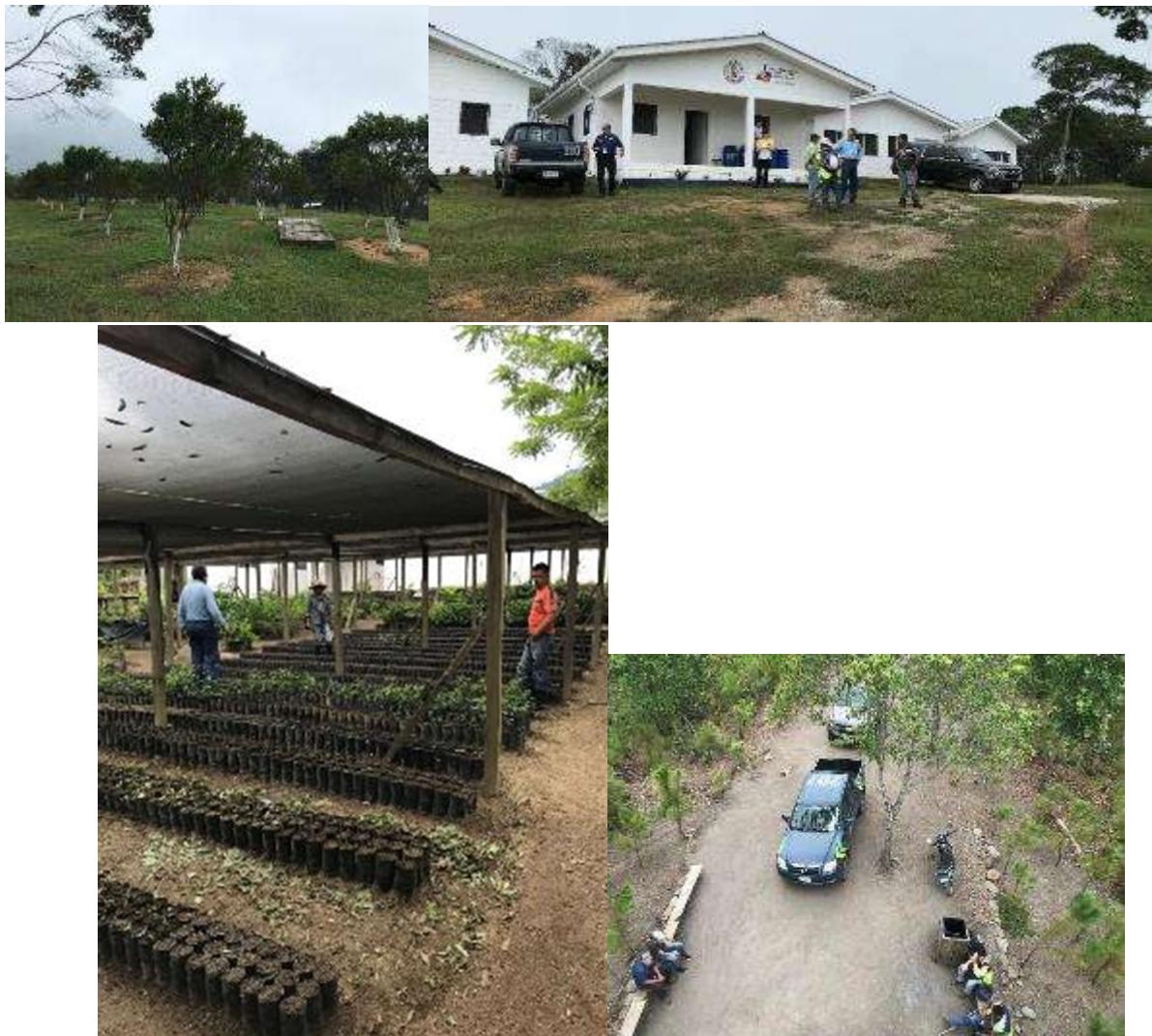
Question 6: Overall, how would you rate the quality of the workshop?



Question 7: Do you have any other comments, questions, or concerns you would like to share with us?

- You could share to our mails the slides or the images with which the workshop was given.
- Contact information of the exhibitors, mine is emv92003@gmail.com
- I consider it necessary to have more knowledge and experience in the implementation of the methodology, in order to have the possibility of making replicas in other municipalities of the zone.
- That this information be replicated with other sectors of interest, and that the indicators of compliance with this study be presented.
- I see the number of stakeholder groups participating in the workshop as positive and relevant. This will allow us to develop a better project.
- I like the inclusion of the water resource as an asset.
- No (2x)
- Not at the moment.
- Thank you for worrying about climate change and disasters in our city.

ANNEX 12





Authors: Alvaro Rojas, David Daou, Florian Waldschmidt, Eike Behre, Zita Sebesvari, Sönke Kreft
and Maxime Souvignet

Design: Aileen Orate (UNU-EHS)

Articles attributed to named authors do not necessarily reflect the views of the UNU-EHS or ISF



Economics of
Climate
Adaptation