



PRE-CONCEPT FOR A REGIONAL PROJECT/PROGRAMME

PART I: PROJECT/PROGRAMME INFORMATION

| | |
|------------------------------------|---|
| Title of Project/Programme: | Enhancing the climate resilience of coastal communities in Limon, Costa Rica and Bocas del Toro, Panama through Nature-based Solutions for local livelihoods |
| Countries: | Costa Rica and Panama |
| Thematic Focal Area ¹ : | Disaster risk reduction and early warning systems |
| Type of Implementing Entity: | International |
| Implementing Entity: | United Nations Environmental Program (UNEP) |
| Executing Entities: | Fundación Natura and Fundecooperación |
| Amount of Financing Requested: | 11.9M (in U.S Dollars Equivalent) |

Project / Programme Background and Context:

1. Limon and Bocas del Toro cover 13,846 km², are home to 607.407 people², and conform a bi-national continuous bio-geographic region³ that is already impacted by extreme events and climate variability (main hazards being heavy rainfall episodes, strong winds), as well as by slow-onset climate change (main hazards being sea level rise causing coastal erosion), resulting in sudden rapid events such as landslides, overflow of rivers, inland and coastal flooding and storm surge.
2. Normally, these events are associated with hurricanes in the Caribbean that severely impact local economies as systems (infrastructure and social) are not able to cope with, nor respond to increased levels and magnitude of rain, winds, and storm surges. Drownings, damage to households (including damage to infrastructure or complete destruction), communities' isolation, loss of croplands, critical public infrastructure damage, and electricity and freshwater supply failure, are the most common reported consequences associated with such events^{4,5}. As with other similar events, during Eta and Iota hurricanes (2020) coastal settlements and hundreds of hectares of cropland flooded or production was unable to reach markets. Only in Bocas del Toro, 19 people died during storm surge, flash floods and intensive rains. Land subsidence has also been attributed to the amount of rainfall⁶. Historical records register similar life-threatening impacts of several hurricanes since 1851^{7,8,9}; for example, in 1988, Joan severely impacted the coastal regions of Limon and Bocas del Toro. Costa Rica estimated 3.5 billion USD in losses due to hydro-meteorological events between 1998-2018, 500 million USD calculated for the province of Limon¹⁰. Similar estimates do not exist for Panama; furthermore, the lack of reporting at the local level, both in Limon and Bocas del Toro has made it difficult to assess the damages of these and other events, although such impact is present in the testimonies of inhabitants¹¹.
3. Future climate projections based on RCP 8.5 and RCP 4.5 scenarios for Limon, suggest an increase on precipitation intensity of 60 to +100mm/h respectively by 2070, potentially increasing even further landslides, flash floods, and flood risks during the rainy season. Annual precipitations could rank between 2000-4500 mm/year in the mid and long term. Coastal areas with potential flood hazard (either due to sea level rise or

¹ Thematic areas are: Food security; Disaster risk reduction and early warning systems; Transboundary water management; Innovation in adaptation finance.

² Costa Rica household survey 2020 & Panama Census 2010

³ Biogeographical region sharing climate, hazard exposure, short watersheds, abrupt relief, seagrass-coral-mangrove ecosystem mosaic, rich continental and marine biodiversity, home of charismatic and endemic species

⁴ DesInventar dataset (<https://www.desinventar.net>) Reports for Costa Rica (1968-2019) and for Panama (1933-2020)

⁵ Hazards identified by the National Climate Change Directions.

⁶ Cathalac 2020 Impactos del Huracán Eta e Iota en Panama <https://www.servir.net/servir-en-accion/analisis-de-desastres/1134-impacto-del-huracan-eta-en-panama-noviembre-del-2020.html>

⁷ Martha 1969; Cesar, 1996; Lenny, 1999; Otto, 2016; Mathew, 2016; Nate 2017

⁸ Solano et al 2011 Impacto de los Ciclones Tropicales del Atlántico en América Central, Temporada de 1968 y 1969. Diálogos rev. electr. hist vol.12 n.1 San Pedro Aug. 2011

⁹ Lizano Rodríguez, O. and Mora Escalante, R. 2019. Simulación de las condiciones oceanográficas de los huracanes que han pasado más cerca de Costa Rica. *Revista En Torno a la Prevención*, No. 22: 22-31

¹⁰ Costa Rica impacto de los fenómenos naturales para el período 1988-2018, por sectores, provincias, cantones y distritos : compendio / Ministerio de Planificación Nacional y Política Económica, Ministerio de Agricultura y Ganadería. Secretaría Ejecutiva de Planificación Sectorial Agropecuaria. -- San José, CR : MIDEPLAN, 2019

¹¹ Idem 8

precipitation)¹² and under intense coastal erosion¹³ have been identified. For Panama, CATHALAC climate models for water security suggest abnormalities in precipitation and temperature patterns for the medium and long term¹⁴ with very high levels of uncertainty, hence a much-needed effort to better understand the local dynamics and interactions with climate stressors. Regional assessments place the Caribbean coasts of Costa Rica and Panama under much greater exposure to climate related risks, including of hurricanes, not due to the direct hit, but to sea level rise combined with the storm surges associated with hurricanes¹⁵.

4. Change in precipitation patterns, floods, landslides, flash floods and coastal erosion are already reflected/integrated in national and local (Costa Rica) planning instruments¹⁶. Other climate change associated risks that could be impacting coastal populations but are not being addressed include: saline intrusion, ocean acidification, increase in temperature (land & sea surface) and wave elevation. Climate change related uncertainty together with the limited understanding of local systems (that contribute to this uncertainty) result in an enormous challenge for resilient planning and decision making. Uncertainty and often misconception about current and future risk, together with the absence of reporting and information to monitor changes, is already resulting in missinterpretation among the public on how to mitigate such risks¹⁷, and tensions among stakeholders¹⁸.
5. Project pre-consultations (see Annex 1 for more detail) with local communities in the Panamanian side to better understand their climate adaptation needs provided a worrying scenario in which climate change impacts are being attributed to their own actions (*“there are more recurrent floods because we have not treated nature nicely”*) or there is a total misconception of causes and consequences (*“solar panels cause disasters”*, *“we don’t understand why Orey trees are dying”*, *“what can we do for the sea to stop rising?”*). Part of the problem is the lack of understanding and monitoring of local dynamics and how these are being impacted by a changing climate together with deficient communication to local communities.
6. Limon and Bocas del Toro also share a similar biogeography and rich cultural diversity (including transboundary indigenous territories and afro-Antillean communities) and face similar interlinked socio-economic, land planning and environmental challenges (see Annex 2 for more detail about non-climatic drivers of vulnerability). Indigenous groups, youth, and women, -particularly women head of families- have been identified in both regions among the most vulnerable populations due to lack of formal employment, limited access to technical training opportunities and overall limited capacity to diversify their livelihoods^{19,20}. The Covid pandemic increased such vulnerability, particularly because the tourism sector, which is the one that normally provides informal non-skilled employment, was inactive for many months²¹.
7. Agriculture is the main activity in the area²², but techniques used do not consider climate aspects or adaptation practices. Banana, the most important crop, is mainly produced by large companies for export, increasing the pressure for monocropping. The regions’ subsistence agriculture is highly inefficient, non-reliable and highly vulnerable to climate variability. Tourism is the next most relevant economic activity for both provinces, and, as mentioned before, it is also the source of employment for the more vulnerable and less qualified members of the communities^{14,23,24}. Even though it is broadly recognized that tourism is a relevant source of income and development, local communities, business, and authorities have not yet been able to harmonise the industry with its impacts to the environment; furthermore, climate change associated risks are not being considered in tourism development and the role of healthy ecosystems and soils to protect and increase the resilience of local communities is neglected in land use and economic development planning. Livestock and fisheries are also important livelihoods in the area. The fishery is mostly artisanal, and its main destinations are local trade (e.g., for tourism), self-consumption, and direct sales. Sport fishing, linked to tourism, is also relevant in some areas²⁵. Despite both countries having national policies promoting “farm-to-table” tourism to empower and strengthen the link between local production and tourism, the reality is that local productive sectors are not aligned. A few communities have built on agro-tourism, but these are

¹² Areas: Parímina, Boca Facuare, Limon, Todruk, Talamanca and the river deltas (Colorado, Tortuguero, Matina, Banano, La Estrella y Sixaola). Source: Borge et al 2018 Plan-A: Territorios Resilientes ante el Cambio Climático. MINAE. Costa Rica

¹³ Areas: Limón, SE Westfalia, Cahuita, Puerto Vargas, Manzanillo and Gandoca. Source: Barrantes and Sandoval 2021. Cambios en la línea de costa en el Caribe Sur de Costa Rica durante el periodo 2005-2016

¹⁴ Comité de Alto Nivel de Seguridad Hídrica 2016. Plan Nacional de Seguridad Hídrica 2015-2050: Agua para Todos. Panamá, República de Panamá.

¹⁵ IHUC, CEPAL 2012 Efectos del CC en las costas de America Latina y el Caribe

¹⁶ Idem 7

¹⁷ Camargo Velandia et al. 2016. Variabilidad climática y desarrollo de capacidad adaptativa en el Archipiélago Bocas del Toro en Panamá. ESAICA: 2 7-11

¹⁸ Pre-consultation processes with local communities in Panama May 2020 (see Annex 1)

¹⁹ Variabilidad climática y desarrollo de capacidad adaptativa en el Archipiélago Bocas del Toro en Panamá 2016

²⁰ Plan Regional de Competitividad Territorial Region Huetar Atlantica Vision 2012-2022+

²¹ PNUD 2020. Impactos del COVID en Panama

²² Diagnóstico Huetar Caribe 2021 (internal document)

²³ Plan Maestro de Turismo Sostenible de Panama 2020-2025

²⁴ Region Huetar Caribe Plan de Desarrollo 2030

²⁵ Towards the transboundary Integrated Water Resource Management (IWRM) of the Sixaola River Basin shared by Costa Rica and Panama. GEF PIF.

exceptions, as local products are not reaching the markets and are not normally supplying neither tourists nor communities.

8. Through the proposed project, Nature-based Solutions (NbS) will be applied for climate risk mitigation and resilient local livelihoods (tourism and associated agriculture, fishing practices) while strengthening enabling conditions for coastal communities' climate adaptation. Considering the variety of climate change associated risks and that not all of them have been considered at the national level, despite being observed at the local level, the project will address the current lack of understanding of climate change associated risks, their mitigation via Nature-based Solutions (NbS) and will aim to increase coping capacity by addressing key vulnerability drivers and strengthening information and capacity for decision making in a changing climate. To achieve this, on one hand, NbS need to support resilient livelihoods and ecosystems, while using local evidence for risk mitigation, and on the other hand, enabling mechanisms (policy, finance, information, capacity) must be ensured so communities and institutions can act informed. The project will directly address the challenges mentioned and build on the region's resilience opportunities²⁶.
9. Indigenous groups, youth, and women, particularly women head of families have been identified in both regions among the most vulnerable populations due to lack of formal employment, reduced access to education and technical training opportunities and overall reduced capacity to diversify their livelihoods^{8,27,28}.
10. The proposal is aligned with the national adaptation priorities and contextualized to the regional current and potential climate change impacts and needs, and associated uncertainties. Costa Rica and Panama's national climate adaptation policy instruments, both emphasize the integration of climate adaptation within sustainable development frameworks, and its mainstreaming in all sectors of the economy including disaster and risk reduction (DRR)^{29,30}. As such, adaptation initiatives are required to be framed within sustainable development contexts and be aligned with each country's adaptation priorities. Watershed management, biodiversity, productive systems, infrastructure, climate information and health are all adaptation priorities for both, Panama and Costa Rica. For Costa Rica, tourism, capacity building, land/coastal/marine planning, investment, and financial security are also key adaptation priorities. For Panama, cities, marine and coastal systems, circular economy, measuring monitoring and verification risk reduction are also key adaptation priorities. More detail about alignment with national adaptation priorities can be found on Annex 3.
11. The project aims to influence climate resilience conditions for communities within the coastal provinces of Limon (9,189 km²) and Bocas del Toro (4,657 km²³¹), as well as directly into settlements and rural areas with subsistence agriculture that potentially could be linked to tourism and around 4016.2 km² of protected areas (marine and continental) that would increase ecosystem connectivity³². In Costa Rica, a preliminary selection of the focus populations within Limon provinces includes the urban and rural localities of Limon, Puerto Viejo de Talamanca, and rural coastal areas of Pococi (including Tortuguero National Park), Siquirres, and Matina, of which the project would target around 166,000 people. Over 40% of the population in the province lives in rural areas³³. According to MTSS (2002), there is a lack of formal employment for women, rural youth, and people with disabilities. By 2020, only 28% of women in the province were formally occupied, which was below the male average (over 50%). Unemployment is closely linked to poverty, with 46% of the poor households in the province being headed by women by mid-2020³⁴. In Talamanca and Matina cantons, between 48-49% of the population is female, more than 60% is between 15 and 64 years-old, and between 50-60% have at least one unmet basic need. Additionally, Talamanca has one of the highest rates of illiteracy in the country, with most cases being women (8% vs 5.9% male)³⁵. In general, the

²⁶ Conditions that could enable climate resilience: rich cultural, landscape and biological diversity; well-identified environmental problems around intensive agriculture; well-documented land-use history; well-documented impacts of tourism activities; sound understanding of coastal ecosystems' and charismatic species' ecology; highly biodiverse systems; local successes agrotourism; protected area network; relatively short watersheds; local communities and authorities, as well as national authorities aligned in nature-based tourism as an alternative for regional sustainable development and mutual acknowledgement from Panama and Costa Rica to learn from each other successes.

²⁷ Variabilidad climática y desarrollo de capacidad adaptativa en el Archipiélago Bocas del Toro en Panamá 2016

²⁸ Plan Regional de Competitividad Territorial Region Huetar Atlantica Vision 2012-2022+

²⁹ Gobierno de Costa Rica. Política Nacional de Adaptación al Cambio Climático 2018-2030. 2018 <https://cambioclimatico.go.cr/wp-content/uploads/2019/01/Politica-Nacional-de-Adaptacion-al-Cambio-Climatico-Costa-Rica-2018-2030.pdf?x64720>

³⁰ Gobierno de la Republica de Panama. 2020. Contribución Determinada a Nivel Nacional de Panama (CDNI). Actualización.

<https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Panama%20First/CDN1%20Actualizada%20Rep%C3%BAblica%20de%20Panam%C3%A1.pdf>

³¹ This value is an estimation and does not include marine areas where the project will also be implemented. During the proposal design marine areas will be estimated.

³² A preliminary selection of the focus populations includes the Costa Rican localities of Tortuguero in the northern part of Limon, and Cahuita -Puerto Viejo, in the southern part; and Panamanian localities of the archipelago of Bocas del Toro, and coastal communities of Bocas del Toro province.

³³ MIDEPLAN y MAG. 2013. Informe Sistematización de la Información del Impacto de los Fenómenos Naturales en Costa Rica. Periodo 2005-2011. Available in: <https://reliefweb.int/sites/reliefweb.int/files/resources/Informe%20sistematizacion%20de%20la%20informacion%20del%20impacto%20de%20los%20fenomenos%20naturales%20en%20Costa%20Rica.pdf>

³⁴ Diagnóstico Región Huetar Caribe. MINAE.

³⁵ Retana et al. 2017. Riesgo ante eventos hidrometeorológicos extremos en Liberia, Carrillo, Matina y Talamanca. Instituto Meteorológico Nacional, MINAE-AECID-MIDEPLAN. Available in: <http://cglobal.imn.ac.cr/documentos/publicaciones/RiesgoEventosHMExtremos/offline/download.pdf>

province has been considered the most vulnerable in the country, in great part due to its population/social conditions (more than its climate hazards)³⁶. For Panama, preliminarily considered townships within Bocas del Toro province include Bocas de Toro, Bastimentos, Changuinola, Chiriqui Grande, Almirante, among others. These townships account for more than 83,000 people, of which over 48% is female, around 48% is younger than 18 years old, and over 66% is living in poverty and considered vulnerable³⁷. The province occupied the 4th place in Panama's Multidimensional Poverty Index 2018, which measures poverty not only based on income, but also on education, housing, basic services, access to internet, health, and employment³⁸.

Project / Programme Objectives:

12. The objective of the project is to increase the climate change resilience of coastal communities of Limon and Bocas del Toro to cope with both rapid and slow-onset climate change events by strengthening and integrating local livelihoods around nature-based solutions to reduce vulnerability and build adaptive capacity. This will be achieved by:
 - a) Ensuring the ecological resilience and integrity of ecosystems supporting sustainable livelihoods and reducing climate risks.
 - b) Enhancing nature-based livelihoods and value chains' coping capacity, and access to financial mechanisms that support adaptation processes.
 - c) Increasing key stakeholder's information access and use, and cross-sectoral capacity for decision making in a changing climate.

Project / Programme Components and Financing:

| Project / Programme Components | Expected Outcomes | Expected Outputs | Countries | Amount (US\$) |
|--|---|--|---------------------|---------------|
| 1. Nature based solutions for adaptation benefits | 1. Increased ecosystem resilience in response to climate variability and climate change. | 1.1 Climate risk and vulnerability assessments developed to identify a portfolio of potential nature-based climate resilient livelihoods (products and services). 1.2 Area managed to withstand climate change through NbS pilots (applied to watershed management, coastal protection, and climate resilient local livelihoods). | Costa Rica & Panama | 4.0M |
| 2. Strengthening livelihoods to promote climate change resilience. | 2. Strengthened livelihoods and sources of income for vulnerable communities in targeted areas. | 2.1 Strengthened nature-based climate resilient local livelihoods and value chains (tourism, agriculture, and fisheries as relevant). 2.2 Financial products and mechanisms supporting the transition to nature-based climate resilient local livelihoods. 2.3 Standards for resilient (nature-based) tourism developed. 2.4 Strengthened capacities of local stakeholders on nature-based resilient livelihoods. | Costa Rica & Panama | 4.0M |

³⁶ MINAE, IMN, PNUD. 2011. Análisis de riesgo actual del sector hídrico de Costa Rica ante el cambio climático.

³⁷ Censo 2010 de Panama.

³⁸ PNUD, MIDES. 2020. Índice de Pobreza Multidimensional (IPM-C). Available in: https://mppn.org/wp-content/uploads/2020/10/Panama-IPM_Digital_3-30-9-2020-final.pdf

| | | | | |
|--|---|--|---------------------|--------------|
| 3. Information and knowledge for resilient decision making. | 3. Improved knowledge, information and policies that promote and enforce resilience measures. | 3.1 Bi-national climate resilience local information system in place for project Monitoring, Evaluation and Learning. 3.2 Climate change adaptation mainstreamed into local planning and businesses' management, aligned with local DRR strategies. 3.3 Knowledge management products incorporated in bi-national system to capture project results, lessons learned, training material, etc. 3.4 Awareness-raising strategy in place focused on climate change impacts on local communities, and Nature-based climate resilient local livelihoods. | Costa Rica & Panama | 2.0M |
| 6. Project/Programme Execution cost | | | | 0.95M |
| 7. Total Project/Programme Cost | | | | 10.95M |
| 8. Project/Programme Cycle Management Fee charged by the Implementing Entity (if applicable) | | | | 0.93M |
| Amount of Financing Requested | | | | 11.9M |

Project Duration: 4 years (48 months)

PART II: PROJECT / PROGRAMME JUSTIFICATION

13. The current development trajectory Limon and Bocas del Toro is leading to increased vulnerabilities to climate change due to a combination of: i) lack of understanding of climate change associated risks (climate-blind business-as-usual development with no associated planning), ii) uncertainty related to climate risks, and iii) lack of technical capacity that can increase coastal communities' resilience and coping capacity to climate change and environmental degradation.
14. Both, **Limon and Bocas del Toro are geographically and culturally diverse, facing similar socio-economic challenges and resilience opportunities for development.** Both follow a similar mosaic of coastal ecosystems (ridge-to-reef) that are under similar pressures (climate and human driven) and are being promoted and recognized as key inputs for tourism and more recently for sustainable agriculture³⁹. The provinces have **similarities (in challenges and opportunities) and a shared vision on adaptation underpinned on sustainable economical development based in a rich natural capital, particularly focussed on local livelihoods. A joint effort towards such goal would ensure a common approach to ecosystem management for disaster risk reduction and climate change adaptation. A regional approach would also contribute to a better understanding of local coastal dynamics, as well to align development goals towards resilient** sustainable communities and livelihoods, while acknowledging differences in local contexts and taking full advantage of the country-to-country learning opportunities and south-to-south cooperation.
15. Additionally, the regional approach is cost-effective precisely because this south-south cooperation and exchange of experiences will **accelerate the provinces/countries' learning processes and transferring of strengths to tackle similar adaptation challenges, making it cost-efficient.** For example, Costa Rica's more advance stage in their NAP process (e.g. vulnerability diagnoses developed, planning for risk assessments, execution of adaptation measures) can help enhance the planning capacities of Panama and guide the type of studies needed. Similarly, Bocas del Toro's more developed touristic products and services can be useful for Limon. Also, given the above-mentioned geographical/ecological connectivity⁴⁰, other

³⁹ The regions already share the La Amistad protected area, the Sixaola delta and important areas for conservation; and are part of the ecosystems existing biological corridors that enable and strengthen ecological resilience, across the southern Caribbean coastal zone and attract national and international tourists for wildlife observation, indigenous communities, agro-tourism, scientific tourism and mostly for adventure and beach and sun tourism

⁴⁰ As mentioned in the previous footnote, the two provinces share a binational watershed (Sixaola), a binational protected area (La Amistad) and their coasts both belong to the Caribbean Large Marine Ecosystem (CLME) region.

initiatives/projects target the area as one, which **allows the allocation of funds to strategic activities, catalyzing actions, and harnessing synergies**. The cost-effectiveness also increases when activities are complemented and aligned with existing regional programs/strategies. Costs will be shared throughout all activities, such as to produce knowledge products (output 3.3) that capture project results and lessons learned, including data about cost-effectiveness itself (e.g., of the pilots in output 1.2).

16. Project Component 1 aims to reduce communities' vulnerability by enhancing the ecological resilience of land and coastal ecosystems present in both regions (fundamental for the provision of protective and regulative services) and by strengthening the functions that allow provision of other key services for Nature-based local resilient livelihoods. Outputs in this component will allow a better understanding of ecosystems functionalities associated with mitigating climate risks and, via pilots, the identification of innovative ways in which nature and ecosystems can provide sustainable and resilient services and livelihoods to communities, including those services related to climate risks mitigation.
17. Specific adaptation activities for the pilots will be defined in further formulation stages. Potential NbS at the watershed and landscape (coastal) levels include starting/continuing reforestation and forest conversion processes, wetland's restoration, increased bio-retention and infiltration through green spaces, strengthening protected areas management plans, including and/or updating local flood management plans to include NbS (Eco-DRR) based on the project pilots (output 1.2). The project would engage with stakeholders across selected watersheds to promote sustainable agriculture practices -such as agroforestry, regenerative agriculture, etc. depending on context- to ensure forest cover restoration and conservation. Potential NbS practices for agriculture include upper watershed forest protection (including working with landowners and authorities for awareness raising, as in output 3.4), soils' biodiversity restoration (reducing chemicals and fertilizers, pest management plans revision), soil conditioning to reduce erosion, increased forest cover in farms, agroforestry, water retention and infiltration areas, among others. These solutions would need to be combined with more efficient farm management, financially viable sustainable practices, and increased access to finance (pilots in output 1.2, aligned with 2.1, 2.2, 2.4). As mentioned, the proposed project focuses on tourism and agriculture as the two main livelihoods. Other livelihoods (e.g. fisheries) will be characterized during concept/full proposal formulation if relevant/critical for the specific targeted localities. Further analysis will then be done to determine other pertinent NbS, which might include the restoration of mangroves, coral reefs or coastal ecosystems in general.
18. Component 2 aims to increase livelihoods and value chains' coping capacities. Climate resilient livelihoods (tourism and associated value chains in agriculture and fisheries) depend not only on healthy systems, but also on innovative, cost-effective and affordable alternatives to business-as-usual practices. A large input into technical capacity is also needed, focused on the implementation of NbS and how they can increase efficiency of local production, including improved access to financial mechanisms and guided by standards for resilient development. The pilots in component 1, and activities in component 2 will aim to strengthen and integrate economic activities around NbS in order to diversify livelihoods and reduce vulnerability to climate change. Training in NbS applied to local livelihoods (tourism services and supporting productive sectors) will increase communities' coping capacity and resilience opportunities.
19. Component 3's elements will **improve decision making, as well as local and sector planning while also collecting data and information to better understand the impacts of climate variability and other climate change related risks in local economies, including registering and reporting losses**. A better understanding of the climate risks and impacts associated with sea level rise, saline intrusion, ocean acidification, storm surges and climate variability will allow all stakeholders to take more informed decisions regarding land use and actions to mitigate climate change related risks. The Binational climate resilience local information system, output 3.1, will feed from previous outputs and will become the **monitoring, evaluation and learning** tool for the project, incorporating not only environmental information, hazards and losses, specifics of areas and types of interventions, in order to steer the project accordingly with emerging challenges and opportunities, and ensure its continuity post 2027 (4 years after potential start of project implementation).
20. Annex 5 expands on the proposed outputs and interlinks between them, referencing cases to portray the cost-effectiveness of the approach. Those cases are listed, proving the **cost-effectiveness of concrete Nature-based Solutions in Latin America and the Caribbean**. There is a need to grow the evidence base for NbS, but according to Watkiss et al. (2019), even in data-poor or data-limited settings, no-regret or low-regret NbS options can be prioritized, including wetland rehabilitation in areas of high flood risk and establishment of protected areas for vulnerable habitats and threatened species, providing multiple co-

benefits to communities and ecosystems. In general, NbS provide a triple benefit in terms of mitigating climate change, building agricultural production and resilience, and enhancing nature and biodiversity^{41,42}.

21. To achieve the **region's goal on nature-based sustainable growth** (including Climate resilient economic growth), natural capital thresholds need to be understood (as in output 1.1), both in relation to pressures from a changing climate and to sustainable use, information that is still scarce for most tropical coastal marine ecosystems despite several global efforts attempting to solve key questions⁴³. **Through a combined effort of activities from all components, the project aims to provide evidence-based adaptation solutions that are sustainable, financially viable and enhance services provided by tropical coastal ecosystems. The project will provide innovative contextualised approaches** for Limon and Bocas del Toro, and these could also be applicable in other tropical areas. Given the effort required for this transition and the diversity of stakeholders involved in it, **knowledge products** resulting from components 1 and 2 and developed through component 3 will be designed to target different audiences across all sectors, including the financial, education, commerce, infrastructure and planning sectors.
22. Although both countries are prioritizing sustainable tourism, the sector has not yet integrated climate change impacts into its development policies^{44,45}. Furthermore, despite the exposure and communities' observations⁴⁶, national agriculture, land planning and biodiversity policies face challenges mainstreaming climate change adaptation strategies within sectorial instruments, either because the policies are incomplete, lack funding for implementation or have completely excluded climate change. Activities in output 3.4 will aim to create **awareness and capacity across national and local agencies, including authorities of tourism, and even transport and infrastructure as relevant**. The project will work with relevant national and local authorities, so that officials in charge of **development plans and policy development** have the tools to address the impacts of a changing climate. As previously mentioned, even though both countries have national policies promoting "farm-to-table" tourism to empower and strengthen the link between local products and tourism, such cases are exceptional, as local production is not reaching the markets and does not provide to neither tourists nor communities. **NbS incorporated to achieve resilient local livelihoods including tourism, agriculture, and fisheries (output 1.2), as well as capacity building (output 2.4) are proposed to increase farms and productive systems' efficiencies**.
23. In a changing climate, and particularly in a post-Covid scenario, there are not many formal sustainable economic alternatives for developing regions that still have a wealth of natural capital, that value biodiversity and natural ecosystems and are highly dependent on them, while facing unemployment, poverty, and inequity, such as Limon and Bocas del Toro (**women and youth in particular**)⁴⁷. In that sense, a focus on **Nature-based climate resilient local livelihoods as proposed in this project is innovative as it not only guarantees safeguarding ecosystems but also strengthens local economies by increasing communities coping capacity and integrating productive systems in Limon and Bocas del Toro. Strengthening the link between tourism and productive value chains will bring communities together and meet the agriculture and tourism goals set by both governments, ensuring sustainability**. For more detail, Annex 4 lists more benefits of supporting local livelihoods in a changing climate, including the relevance of integrating the tourism sector with agriculture and fisheries. Biodiversity-dependent economies' resilience rely on ensuring solid supply chains that better integrate their dependencies on biodiversity and climate (including the impacts of climate change) into long-term land planning and business plans. **The long-term survival of a number of livelihoods and business (including tourism, agriculture and fisheries) in Limon and Bocas del Toro regions, depends directly on biodiversity and well-functioning ecosystems, which at the same time reduce exposure and mitigate risks related with a changing climate**.
24. The sustainability of project actions will be secured because communities will be involved in all three outputs of the project. Output 1's pilots will be co-designed with local stakeholders. The strengthening of local livelihoods, value chains and integration of local markets (output 2) will also be done in consultation with

⁴¹ Miralles-Wilhelm and Iseman. 2021. Nature-based solutions in agriculture: The case and Pathway for Adoption. FAO. Available in: <http://www.fao.org/3/cb3141en/CB3141EN.pdf>

⁴² Leecerf et al. 2021. Coastal and marine ecosystems as Nature-based Solutions in new or updated Nationally Determined Contributions. Ocean & Climate Platform, Conservation International, IUCN, GIZ, Rare, The Nature Conservancy and WWF. Available in: <https://ocean-climate.org/wp-content/uploads/2021/06/coastal-and-marine-ecosystem-2806.pdf>

⁴³ Sudmeier, et al. 2021 Ecosystems for disaster risk reduction: an analysis of the scientific evidence. Nature sustainability.

⁴⁴ Plan Maestro de Turismo Sostenible

⁴⁵ Municipalidad de Limón. Proceso Desarrollo Integral del Territorio. Diseño de la propuesta de plan regulador y su reglamentación ZMT -. https://www.municlimon.go.cr/images/normativa/legal/manualProcedimiento/DIRECCION%20INGENIERIA/Planificaci%C3%B3n%20territorial/DIT-020-060_Dise%C3%B1o_de_la_propuesta_de_plan_regulador_y_su_reglamentacion_ZMT.pdf

⁴⁶ Preliminary consultations with coastal communities in Panama to better understand their adaptation needs and that will continue during project proposal

⁴⁷ Estimates accumulated losses for the tourism sector in Central America and Mexico between 2020-2023 of US \$ 89 million with abrupt consequences in women employment, given that women represent 61% of work force in accommodation and food services in the region. Comisión Económica para América Latina y el Caribe (CEPAL). 2020. "Evaluación de los efectos e impactos de la pandemia de COVID-19 sobre el turismo en América Latina y el Caribe: aplicación de la metodología para la evaluación de desastres (DaLA)". Documentos de Proyectos (LC/TS.2020/162), Santiago, Chile

local associations, communities, and local authorities. Capacity building, awareness creation and DRR in output 3 will also be designed along with local communities to reflect their specific needs. Communities' involvement will be guaranteed by ensuring an adequate representation of women, indigenous population, and other vulnerable or marginalized groups at all stages (including further consultations for project formulation). Their participation in trainings and coordination processes will be encouraged and facilitated by adequately disseminating communication and by ensuring means for their participation. In fact, relevant materials or knowledge products (e.g. output 3) will consider approaches and tools that ensure ease of use (e.g. to tackle low-literacy if necessary). Moreover, their specific vulnerability to climate risks will also be considered when assessing potential NbS, as well as when designing monitoring systems and indicators. The project also considers a reasonable duration to ensure enough time for a sense of ownership to be developed through community engagement, and active participation in all processes. By year 1, community-level implementation plans will be designed in a participatory manner.

25. Another key issue for communities' ownership and empowering is ensuring that the resilient solutions brought forward are financially viable for them, that their benefits are clear, and that the investment risk for the transition is shared. Activities related to pilots in output 1, as well as output 2 aim to strengthen the "business case" of the solutions to be prioritized and implemented, both for local producers but also to attract potential investors/partners in those solutions, who would ensure sustainability. Capacity building (e.g. output 2.4) will, therefore, not be limited to community individuals or governments, but also to local organizations.
26. **Consultation processes** and local and regional meetings among key stakeholders will be conducted for the two provinces/countries throughout project formulation, in addition to the pre-consultation held in Panama. These will strengthen dialogue with the stakeholders and focus on better understanding the shared visions of the communities, planning authorities and economic sectors' for the regions' future. Those held with locals will aim to better comprehend the relation between communities' livelihoods, ecosystems and perceived climate risks; while those held with policy makers will aim to further understand potential for policies' alignment⁴⁸. In general, consultations will provide more information regarding vulnerable groups, which is especially important given the provinces' vulnerability and potential ethnic diversity in the area. For example, Talamanca, one of the preliminarily targeted cantons in Costa Rica, is the most ethnically diverse in the country, with 48% of the people belonging to a native population (mainly Bribri, Cabécar and Guaymí)⁴⁹. Concept development will include an initial review of environmental and social impacts, which will be further developed during full proposal formulation into an Environmental and Social Management Framework, as well as a Gender Plan, in line with the Environmental and Social policy of the Adaptation Fund, respecting Free, Prior, and Informed Consent (FPIC) at all levels.
27. If action is not taken now, communities' already limited adaptive capacity will worsen in the face of intensified climate variability and unpredictability, reducing thus their resilience capabilities, and further increasing the vulnerability of coastal communities.

PART III: IMPLEMENTATION ARRANGEMENTS

28. The project will be implemented by UNEP. Countries' NIE, Fundecooperación (Costa Rica) and Fundación Natura (Panama), are expected to be the executing entities (EE) supported by national, regional and local climate authorities, as well as tourism and environmental institutions. Local partners are expected to include NGOs, Indigenous Peoples, associations and community groups. The identification and selection of partners will be defined in further phases. A tentative list of potential local partners that will be contacted to explore collaboration opportunities include:
 - Costa Rica: Pococí Tourist Business Services Association, Tours Win Ka-Bribri Indigenous Territory, SOMOS CARIBE (platform of public and private entities), Raising Corals.
 - Panama: Bocas Alliance (coalition of organizations, institutions and communities), Bocas Dolphines, PROMAR Foundation, PANCETACEA, Bocas del Toro Community Tourism Network (REDTUCOMBO), Panamanian Foundation for Sustainable Tourism.

⁴⁸ Consultation meetings in Bocas del Toro were very successful in the sense that communities in the coastal districts are aligned with the national government in the need to invest in integral development around tourism and reducing pressure on natural resources.

⁴⁹ Retana et al. 2017. Riesgo ante eventos hidrometeorológicos extremos en Liberia, Carrillo, Matina y Talamanca. Instituto Meteorológico Nacional, MINAE-AECID-MIDEPLAN. Available in: <http://cglobal.imn.ac.cr/documentos/publicaciones/RiesgoEventosHMExtremos/offline/download.pdf>

- Fundecooperación has been the Costa Rican partner of UNEP’s MEBa multi-country programme on microfinance. There is potential for synergies with the national microfinance networks of Costa Rica (REDCOM) and Panama (REDPAMIF), and the regional network (REDCAMIF).
 - National Tourism Authority / Institute will be involved in the execution of the project, as well as territorial and local authorities starting on the concept development. Other tourism associations that will be contacted for potential involvement include: Somos Caribe and Pococí tourism business services association in Costa Rica, and tour operators of indigenous territories.
29. The formulation stage will draft a coherent governance/implementation structure from the regional to the local levels, based on lessons learned from previous projects. A Regional Project Steering Committee will be established as part of the implementation arrangements to facilitate cooperation between all project partners and other related initiatives in the region. The national EE will coordinate the work of local partners through cooperation agreements. Local partners will be identified during consultations in project formulation. Partners will have experience in the area and in relevant topics for the project. Since the project intends to be built on the active participation of communities and local organizations, local governance structures will be formed to co-lead/design activities on the ground and mobilize communities for greater reach.
30. The project also plans to build on UNEP’s Global Programme on Sustainable Tourism’s experience and related networks and will explore synergies with the One Planet Network, the framework of programmes on sustainable consumption and production (Secretariat is hosted by UNEP), in alignment with its programme “Transforming tourism”, including the Network’s vision for responsible recovery post-Covid.

PART IV: ENDORSEMENT BY GOVERNMENTS AND CERTIFICATION BY THE IMPLEMENTING ENTITY

A. Record of endorsement on behalf of the government⁵⁰ *Provide the name and position of the government official and indicate date of endorsement for each country participating in the proposed project/programme. Add more lines as necessary. The endorsement letters should be attached as annexes to the project/programme proposal.*

| | |
|---|----------------------------|
| <i>Milciades Concepción, Minister, Ministry of Environment, Panama</i> | <i>Date: July 30, 2021</i> |
| <i>Patricia Campos, Director, Direction of Climate Change, Ministry of Environment and Energy, Costa Rica</i> | <i>Date: July 29, 2021</i> |

B. Implementing Entity certification *Provide the name and signature of the Implementing Entity Coordinator and the date of signature. Provide also the project/programme contact person’s name, telephone number and email address*

I certify that this proposal has been prepared in accordance with guidelines provided by the Adaptation Fund Board, and prevailing National Development and Adaptation Plans and subject to the approval by the Adaptation Fund Board, commit to implementing the project/programme in compliance with the Environmental and Social Policy of the Adaptation Fund and on the understanding that the Implementing Entity will be fully (legally and financially) responsible for the implementation of this project/programme.



Gustavo Máñez
Implementing Entity Coordinator

| | |
|---|---|
| Date: August 9, 2021 | Tel. and email: +50761406202 / gustavo.manez@un.org |
| Project Contact Person: Marta Moneo Lain | |
| Tel. And Email: +50760388570 / marta.moneo@un.org | |

⁵⁰ Each Party shall designate and communicate to the secretariat the authority that will endorse on behalf of the national government the projects and programmes proposed by the implementing entities.

Letter of Endorsement by Government

San José, Costa Rica

July 29, 2021
DCC-133-2021

To: The Adaptation Fund Board
c/o Adaptation Fund Board Secretariat
Email: Secretariat@Adaptation-Fund.org
Fax: 202 522 3240/5

Subject: Endorsement for “Enhancing the climate resilience of coastal communities in Limon, Costa Rica and Bocas del Toro, Panama through Nature-based Solutions for local livelihoods”

In my capacity as designated authority for the Adaptation Fund in Costa Rica, I confirm that the above regional project proposal is in accordance with the government’s priorities in implementing adaptation activities to reduce adverse impacts of, and risks, posed by climate change in the region.

Accordingly, I am pleased to endorse the above project proposal with support from the Adaptation Fund. If approved, the project will be implemented by UN Environment Programme and executed by Costa Rica’s NIE Fundecooperación and Panama’s NIE Fundación Natura.

Sincerely,

Patricia Campos Mesén
Director
Direction of Climate Change
Ministry of Environment and Energy

Cc: Andrea Meza Murillo, Minister MINAE
Archivo / consecutivo
msu



Panamá, 30 de julio de 2021
DM-1437-2021

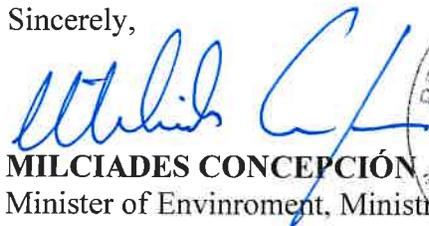
The Adaptation Fund Board
c/o Adaptation Fund Board Secretariat
Email: Secretariat@Adaptation-Fund.org
Fax: 202 522 3240/5

Subject: Endorsement for “Enhancing the climate resilience of coastal communities in Limon, Costa Rica and Bocas del Toro, Panama through Nature-based Solutions for local livelihoods”

In my capacity as designated authority for the Adaptation Fund in Panama, I confirm that the above regional project proposal is in accordance with the government’s priorities in implementing adaptation activities to reduce adverse impacts of, and risks, posed by climate change in the region.

Accordingly, I am pleased to endorse the above project proposal with support from the Adaptation Fund. If approved, the project will be implemented by UN Environment Programme and executed by Costa Rica’s NIE Fundcooperación and Panama’s NIE Fundación Natura.

Sincerely,


MILCIADES CONCEPCIÓN
Minister of Environment, Ministry of Environment



MC/JUQ/LC

Albrook, Calle Broberg, Edificio 804
República de Panamá
Tel.: (507) 500-0855

www.miambiente.gob.pa



Project Formulation Grant (PFG)

Submission Date: August 9, 2021

Adaptation Fund Project ID: N/A

Country/ies: Costa Rica and Panama

Title of Project/Programme: Enhancing the climate resilience of coastal communities in Limon, Costa Rica and Bocas del Toro, Panama through Nature-based Solutions for local livelihoods

Type of IE (NIE/MIE): MIE

Implementing Entity: United Nations Environment Programme (UNEP)

Executing Entity/ies: Fundecooperación para el Desarrollo Sostenible (Costa Rica) and Fundación Natura (Panama)

A. Project Preparation Timeframe

| | |
|------------------------|------------------|
| Start date of PFG | November 1, 2021 |
| Completion date of PFG | August 1, 2022 |

B. Proposed Project Preparation Activities (\$)

Describe the PFG activities and justifications:

| List of Proposed Project Preparation Activities | Output of the PFG Activities | USD Amount |
|---|--|------------|
| Baseline, vulnerability, risks and needs assessments conducted by two national consultants | Assessments of the target areas performed with recommendations for the intervention strategy and activities | 5,000 |
| Maintain consultations with stakeholders at national, provincial, and territorial level for concept formulation, review and feedback | Received approval, feedback and appropriation of the proposal by the relevant stakeholders at a national, provincial and territorial level | 5,000 |
| Preparation of the concept note with a coordinator consultant (with role also as national consultant for one country) and another national consultant | Concept note and annexes prepared | 10,000 |
| Total Project Formulation Grant | | 20,000 |

C. Implementing Entity

This request has been prepared in accordance with the Adaptation Fund Board's procedures and meets the Adaptation Fund's criteria for project identification and formulation.

| Implementing Entity Coordinator, IE Name | Signature | Date (Month, day, year) | Project Contact Person | Telephone | Email Address |
|--|---|-------------------------|------------------------|--------------|--------------------|
| Gustavo Máñez, UNEP |  | August 9, 2021 | Marta Moneo Lain | +50761406202 | marta.moneo@un.org |

LIST OF ANNEXES

Title of Project: **Enhancing the climate resilience of coastal communities in Limon, Costa Rica and Bocas del Toro, Panama through Nature-based Solutions for local livelihoods**

1. Pre-consultation report for Panama
2. Limon and Bocas del Toro's non-climatic drivers of vulnerability
3. Alignment with national adaptation priorities
4. Benefits of supporting Nature-based climate-resilient local livelihoods in a changing climate.
5. Cost-effectiveness of potential NbS/adaptation approaches

PROCESO DE CONSULTA INFORMADA
PREPARACIÓN NOTA PRE-CONCEPTO PARA PROYECTO AL FONDO DE
ADAPTACIÓN

AYUDA MEMORIA

CONSULTA CON

Ministerio de Desarrollo Agropecuario

Ministerio de Salud

Municipio de Almirante

Municipio de Changuinola

Municipio de Chiriquí Grande

Autoridad de Turismo

Organización Oreba

Comunidad Salt Creek

RESUMEN PROCESO DE CONSULTA

Participación: Detalle de instituciones gubernamentales participantes, autoridades locales, Organizaciones de la sociedad civil, representantes del OBC y de comunidades.

| Fecha | Visita | Entidades | Participantes | | | |
|-----------|----------------------|------------------------------|---------------|---------|-----------|-------|
| | | | Hombres | Mujeres | Sub total | Total |
| 1/6/2021 | Changuinola | MIDA | 2 | 1 | 3 | 7 |
| | | Ministerio de Ambiente | 3 | 1 | 3 | |
| | | Municipio | 1 | | 1 | |
| 2/6/2021 | Org. Oreba Almirante | ACODAAC | 2 | 3 | 5 | 9 |
| | | Ministerio de Ambiente | 3 | 1 | 4 | |
| | Almirante | Municipio Almirante | 2 | | 2 | 6 |
| | | Ministerio de Ambiente | 3 | 1 | 4 | |
| 3/6/2021 | Chiriquí Grande | Municipio de Chiriquí Grande | 2 | | 2 | 4 |
| | | Ministerio de Ambiente | 2 | | 2 | |
| | Bocas del Toro | Municipio de Bocas del Toro | 2 | | 2 | 5 |
| | | Ministerio de Ambiente | 2 | 1 | 3 | |
| | | ATP | | 1 | 1 | 4 |
| | | Ministerio de Ambiente | 2 | 1 | 3 | |
| 35 | | | | | | |

**En la reunión con la Comunidad de Salt Creek, no se tomó lista de asistencia.*

- **Municipio de Changuinola**

Nos reunimos con representantes del Ministerio de Salud (MINSA), Ministerio de Desarrollo Agropecuario (MIDA) y Municipio de Changuinola. Mencionaron que es de suma importancia hacer un análisis de uso de suelo que puede ser incluido en el desarrollo de un Plan de Ordenamiento Territorial a nivel provincial y ya se ha conversado con anterioridad. Esto

permitiría delimitar las áreas donde se puedan cultivar, conservar, explotar las actividades turísticas, entre otros. Además, sugirieron que tomáramos en cuenta al comité Binacional de la cuenca del Sixaola para conocer las actividades que se realizan en el área de esta cuenca.

Por parte del MIDA en la Dirección de Desarrollo Rural, cuentan con el proyecto de agro-turismo y proyecto de turismo rural donde han visualizado la creación de circuitos agroturísticos, además, de proyectos de agroforestales (Café, frutales), establecer una ruta del Cacao. Esto se debe a que debido a que lo ha sucedido con la pandemia buscan diversificar las actividades. Por otro lado, hicieron mención sobre que un tiempo hubo la intención de la creación de granjas de algas para la comercialización, esto mencionaron que fue en **Punta Laurel**.

Están conscientes de que las medidas de pescas que se realizan ahora mismo no son sustentables y han visualizado que se pudiera crear dentro de los componentes agroturísticos, acciones que incluyan a las mujeres productoras con préstamos al 0% para que puedan vender sus productos y se integre diferentes sectores, incluyendo pequeños mercaditos dentro de los circuitos. Ya que actualmente no cuentan con esto.

También han visualizado la introducción de acuicultura en Punta Robalo, donde producen Pámpano y existen cooperativas de pescadores, además, la comercialización del aceite de coco y que ya hay grupos organizados que Isla Zapatilla, Chiriquí grande, cayo de agua (estos ya están identificados). Nos mencionan que tienen el interés de crear alianza con la empresa AES para utilizar el embalse para el cultivo de especies no invasivas. Por otro lado, mencionan que la divulgación sobre las alternativas de actividad turísticas no está implementada, que dentro de la página de la ATP solo muestran las playas.

Las actividades económicas que se realizan son: el cultivo de Banano, cultivo de Plátano y el cacao. A nivel provincial está serían las actividades y no tanto el turismo, este último sería solo para el municipio de Bocas del toro y recomiendan como alternativa el trabajar con las comunidades para la creación de incentivos.

- **Organización Oreba**

Se visitó al grupo que pertenece a la Asociación de conservación de desarrollo Agrícola Artesanal Cultural (ACODAAC) donde trabajan ofreciendo el tour de Cacao con “Oreba” desde hace 13 años. El tour consiste en mostrar el proceso completo de las diferentes etapas de cultivo de cacao y su proceso de producción. Tienen visualizado expandir a la inclusión de otras rutas como lo es el aprovechamiento de las cascadas y el bosque que poseen. Tiene aproximadamente un total de 90 productores entre rio Oeste arriba y Rio Oeste Abajo y en su mayoría son afiliados a la cooperativa de cacao de Almirante, donde este producto es exportado hacia Europa, pero solo es la materia prima.

Debido a la pandemia tuvieron que cerrar y posterior de la apertura del sector han comenzado a recibir visitas, pero es bastante lento el proceso, sin embargo, mencionan que de igual manera el cacao no se perdió ya que la gran mayoría se lleva a la cooperativa de cacao, por lo que no se ha tenido grandes pérdidas. Antes de la pandemia tenían una producción de cacao en alrededor de 150lb mensuales y ahora solo están haciendo unas 40-50 lb y que las visitas son el 95% extranjeros y antes de pandemia recibían alrededor de 150 visitantes al mes. Ellos mencionan que las variaciones en el clima que han ocurrido nos les han afectado de gran manera en las producciones. Identifican que siempre tienen altas y bajas pero que está dentro de lo normal. Además del cacao ellos también tienen otros cultivos como el banano y yuca dentro de las plantaciones de cacao, para el aprovechamiento de los terrenos.

Al final mencionaron que esperan que todo mejore en relación con el COVID y que los turistas vuelvan a visitar las áreas. También mencionan que los hospedajes dentro de la zona son importantes para los turistas se puedan quedar en la misma zona.

- **Municipio de Almirante**

El municipio ya tiene algunos lugares identificados con potencial turístico, como lo es: Ojo de agua, mirador de Nance de Riscó, Bajo esperanza (tienen cultivos de plátano, banano), Boca de culubre (peña blanca) y Valle de agua (Mirador). Existe el Grupo Azafre, hacen reforestaciones, agroforestería y venden artesanías. Tienen esbozado un plan sobre turismo y consiste en crear circuitos turísticos, para involucrar las potencialidades de todo el municipio, tomando en cuenta la diversidad étnica de la provincia.

Cuando se les pregunto si tienen problemas con el ascenso del nivel del mar: Están trabajando con la Org. Alianza bocas y han podido identificar perdidas de los manglares y disminución de las poblaciones de Orey (tipo de árbol que se encuentra atrás de los manglares), esto incide en la pesca artesanal y lo han podido percibir desde el 2008. Relacionado a los impactos por fenómenos climáticos, mencionan que tienen bastantes deslizamientos y que es necesario identificar los parámetros de riesgo, hacer inclusión y educación para empoderar a las poblaciones.

La población en general venta de pesca artesanal y agricultura, pero en su gran mayoría es para subsistencia. Por ejemplo, en Valle Riscó, actualmente la situación es difícil ya que no hay dinero y ofertas laborales. Antes del COVID había comunidades que vendían artesanías en conjunto de los grupos de Cuerpo de Paz y que, en tierra Oscura, han tenido por un tiempo el cultivo de peces en tina, solo que faltó la comercialización, pero las comunidades si estaban interesadas.

- **Municipio de Chiriquí grande**

Han podido observar que el 2020 el aumento del nivel del mar, tuvo un aumento de aproximadamente de 1 pies, afectando los muelles y con esto a las actividades económicas, también con esto se ve en riesgo otras infraestructuras como lo es la casa municipal. Poseen sitios con potencial para diversificar las actividades como son actividades agroturísticas en lugares como Alto del Valle, Miramar, Piña, entre otros ya que hay lugares donde hacen agricultura orgánica y tienen pequeños puestos de venta de artesanías.

El mercado actual del municipio está relacionado a la agricultura de subsistencia, el plátano es el rubro más representativo, pesca de subsistencia y las artesanías. Hay comunidades que se están organizando para realizar actividades relacionadas al aprovechamiento de la naturaleza como lo es Alto Chorro y en Miramar que también se puede visitar las playas.

- **Municipio de Bocas del Toro**

Para este Municipio mencionan que por ejemplo los últimos fenómenos naturales no les han afectado directamente, sino que los impactos han sido en el sentido del suministro e insumos para las actividades turísticas. Si han notado que las temporadas no son como antes, no es claro cuando es verano o invierno y podido observar que el mar está avanzando, hay lugares donde ya no se puede acceder tanto como antes ya que la erosión está afectando y el oleaje inunda. Como, por ejemplo: Bluff, Carenero, Isla Colón y San Cristóbal que han colocado adoquines. También mencionan que cuando llueve mucho y concluye con marea alta, se inunda las calles y provoca un desbordamiento de aguas residuales.

Con relación a el suministro de agua, algunos lugares poseen lagunas que es donde extraen el recuerdo y que en relación con los servicios hoteleros cuentan con reservas de agua potable para los momentos donde se presenta la escasez de agua. Sin embargo, si mencionan que el servicio es cada cuatro veces al día y que no es las 24 horas.

- **Comunidad de Salt Creek**

Se visitó la comunidad de Salt Creek ubicada en Isla Bastimentos, con la organización APRODECO perteneciente a la Alianza de Turismo (ALIATUR), donde nos explicaron acerca de las actividades que les ofrecen a los turistas y sobre los 4 senderos que poseen. Explicaron que el grupo está conformado por alrededor de 30 integrantes todos de la comunidad, sin embargo, ellos identifican que no todos los miembros tienen en el interés y entusiasmo para ofrecer estos servicios con los visitantes, pero a pesar de eso están visualizando la posibilidad de ser una organización legalmente constituida y desean fortalecer esto.

Con respecto a cómo ellos han percibido los cambios ocurridos con el clima, mencionaron el cambio en las temperaturas, el aumento del nivel del mar que está afectando a los manglares, pérdidas de playas y cambios en la calidad de agua.

También mostraron interés por aprender técnicas de reforestaciones de los ecosistemas, los sistemas agrosilvopastoriles, el agroturismo y mostrar su valor cultural.

- **Autoridad de Turismo – Bocas del Toro**

El archipiélago depende de un 99.9% del turismo, donde la mayoría son empresas privadas. En este nuevo periodo de gobernanza se tiene mayor enfoque en la implementación de turismo basado en la naturaleza. Para esto se han establecido 3 pilares esenciales: el Pilar azul, Pilar verde y el Pilar cultural dentro del Plan Maestro Turismo, donde Bocas del Toro es uno de los destinos prioritarios y que se tiene visualizado el trabajar con las comunidades.

Los boteros señalan que las temporadas seca y lluvia han cambiado (fuertes lluvias, frente frío) y con esto se ha visto afectado las actividades que realizan y deben vender otro tipo de alternativas. La isla Colón ya se ha visto afectado con inundaciones con el desbordamiento de las aguas negras, los manglares se han eliminado para la construcción, evitando la absorción de estas aguas. Además, han podido observar que el tipo de construcción ha cambiado como lo es de que hace 20 años las estructuras utilizaban pilotes de 3 pies y en la actualidad los pilotes tienen alrededor de 7 pies de altura, lo que muestra que el nivel del mar está aumentando.

Consideran que es importante la concienciación de la población, darles los conocimientos para que las acciones puedan mejorar, ayudándolos a organizarse. Mencionan que es importante las alianzas con otras instituciones para que se les pueda guiar, como lo es con AMPYME y Tienen visualizado la creación de circuitos en el Parque Bastimento, para brindar alternativas a los turistas. Además, de la creación de una Ruta del Cacao que incluiría tres comunidades: Boca Torito, San Cristóbal y Buena esperanza, incluyendo el componente cultural de la población.

- **Percepciones comunitarias relacionadas al cambio climático**

En las interacciones con las comunidades se hicieron consultas para evaluar más a fondo su percepción del cambio climático y cómo afectaba sus vidas. Entre los comentarios obtenidos, algunos de los más relevantes de los que se tomó nota fueron los siguientes:

- “Últimamente hay más inundaciones porque no hemos tratado bien a la naturaleza”.
- “Los Orey están muriendo y no sabemos por qué”.
- “Los paneles solares causan los desastres”.
- “¿Por qué está creciendo el mar?”.
- “Queremos saber qué podemos hacer para que el mar deje de entrar a las costas”.
- “Los manglares se están yendo, donde había, ya no hay”.

Annex 2. Limon and Bocas del Toro's non-climatic drivers of vulnerability

Social factors increasing vulnerability to climate change in Limon and Bocas del Toro

- Social Inequity, child poverty, homes in which women are head of families among the poorest.
- School abandonment higher than the rest of the county. Inequity in access to schools. Low education level in local communities.
- Indigenous communities with, in general, limited participation in tourism initiatives and land ownership issues.
- Low entrepreneurship capacities and lack of training opportunities.
- Unemployment: women, youth and disabled most affected. Limited employment opportunities
- Women have less employment opportunities or access to land, and have low representation in planning, decision making, etc.
- Low community organization.
- Leishmaniasis, dengue, malaria are recurrent and not considered in CC planning initiatives.
- Low access to health services.
- Low certainty of access to information about CC impacts.
- Population located in risk areas (coastal zones, and river plains).

Economic factors increasing vulnerability to climate change in Limon and Bocas del Toro

- Low investment: limited financial options to invest in economic alternatives.
- High informality.
- SMEs with limited support.
- Low diversity in economic activities and unattached, no linkages within local activities. Agro-export production of banana plantations and oil is important.
- Low economic competitiveness in part due to the reduced connectivity and isolation.
- Promotion of unsustainable practices in agriculture that benefit few and reduce soils and resources.
- No regional strong markets that empower local agriculture economies.
- Areas of subsistence agriculture that could be made more effective as they don't necessarily supply for the local consumption.
- Urgent need to restructure the tourism industry towards products that are sustainable and aligned with local conservation efforts; i.e. dolphin watching or understanding of their value for tourism, boats hitting manatee.
- Tourism sector informality (sometimes even using volunteer tourists to run business), reflecting lack of contact with local communities.
- Tourism sector depends entirely on natural capital but is does not look after the asset.
- In Bocas del Toro: only 50% of population have access to fresh water, 6% to drainage.

Environmental drivers

- Ecosystem fragmentation consequence of unplanned development, leading to decreased connectivity.
- Waterways, soils and downstream ecosystem pollution and environmental degradation from large plantations.
- Agrochemicals (due to the large agro-export plantations of banana, etc) historical cumulative impacts on wetlands, aquifer, etc.
- Wetland's conversion into grasslands: Alteration of natural dynamics (drainage of swamps for agriculture).
- Deforestation (specific sites fully identified).

- Reefs are affected by diseases and bleaching. Loss of hard corals. Damaging corals for dredging for ports.
- Overfishing: High diversity in fishery resources but low abundance.
- Endemic species & endangered species.

Policy drivers

- Climate change and DRR with limited, not practical, or no in-the-field consideration for local & sectoral planning instruments
- Unplanned growth. Deficient land planning policies: short term, political influenced, non-implemented, limited public policy implementation, low capacity to empower productive sectors.
- Low interinstitutional coordination.
- Limited environmental impact assessments.
- Limited capacity at institutional level to fully understand and consider risks associated with climate change for planning.
- Land-ownership issues.

Infrastructure drivers

- Failing and old infrastructure and reduced connectivity. Unstable services (water, electricity), i.e., 42% of surveyed population in Bocas del Toro states power brakes attributed to (old infrastructure, winds, rain, and heat).
- Deficient housing.
- Low connectivity: No alternative routes for communication.
- Tourism infrastructure in risk zones.
- During rainy season communities and markets are isolated due to roads and infrastructure failure.
- Deficient tourism infrastructure: tourism infrastructure not adapted to local environmental conditions.
- Limited/deficient fresh water storing: Deficient freshwater infrastructure.

Annex 3. Alignment with national adaptation priorities

Project integration to Panama's Adaptation priorities:

Panama's updated NDC (2020) considers:

- Climate adaptation and mitigation actions complement each other to achieve resilience and carbon neutrality.
- Adaptation process as an opportunity to address multidimensional issues related to social inequity, gender & intergenerational gaps, and poverty.
- Adaptation as a transformational process of economic, social, and productive dynamics towards circularity, resilience, and emissions reduction
- Sectors prioritized are those more vulnerable but also present an opportunity for economic diversity and planning for adaptation.
- A call for sustainable development incorporating actions across all sectors of the economy towards de-carbonization and post-Covid 2019 recovery.
- Acknowledge ecosystem services support to the national economy and their vulnerability to CC.

Adaptation priorities linked to Project outputs:

- Energy → Tangential by ensuring water availability for hydroelectric.
- Forests → Mitigation co-benefits aligned with the national priorities to restore natural ecosystems. Panama (50,000 ha) by 2050.
- Watersheds integrated management → Prioritized through NbS.
- Marine-coastal systems → With DRR approach integrating coastal/marine ecosystem management (Eco-DRR). There is a need for a general framework for climate resilience that enables and facilitates coordination, coherence, and complementarity of current initiatives. The National Wetland policy aims to restore coastal wetlands, enhance, and strengthen civil society organizations capacity to create business opportunities and other alternatives for the sustainable use of marine biodiversity → Restoration of key areas and biological corridors to strengthen the connectivity of ecosystems.
- Biodiversity: Strengthen protected areas, implement the National Biodiversity Plan 2018-205, Strategy tourism-conservation-research 2020 → Strengthened tourism post-Covid.
- Sustainable agriculture, livestock, and aquaculture. → Credit development for the transition to resilient productive systems, inclusive public policy, agro-climatic information system.
- Resilient human settlements → Public policy for territorial planning towards conservation of natural resources, compact use of the territory, avoid settlements in risk areas.
- Public health → Tangential by ensuring healthy coastal wetlands potentially reducing vectors transmitter of diseases.
- Sustainable infrastructure → Visualizing of the link between green-grey infrastructure, and interactions, particularly in coastal zones, there is a need to transform the way infrastructure has been heavily (in Panama mainly) based in grey infrastructure.
- Circular economy → Across all sectors of the economy incorporating climate resilience and reducing pressures on natural resources.
- Increase capacity building for Climate transparency.
- Monitoring and evaluation of Climate related information to increase decision making.

Approaches promoted related to the Project:

- Non generic Climate policy to measure, validate and report → Participatory approach.
- Integrated mitigation-adaptation approach → Emissions reduction, increase sustainable development, reduce poverty, green recovery, increase health (all related to development).
- Reduce poverty, inequity, and supporting a green and resilient economy.
- Nature based solutions and green infrastructure approach to respond to societal challenges including DRR and climate change.

Project integration to Costa Rica's Adaptation priorities:

In the medium-term, Costa Rica's adaptation policy aims to:

- Reduce the recurrent damages and losses consequence of climate change.
- Generate innovation.
- Guide public and private investments.
- Protect and sustainably use the natural capital.
- Build capacity and enhance opportunities.
- Costa Rica's NDC (2015) commits to: develop a national adaptation plan, link it with DRR national plan, Community based adaptation, ecosystem-based adaptation, local planning for adaptation, public infrastructure, environmental health, build capacity and transfer technology and funding, communication, awareness creation and capacity building.

Adaptation priorities and guiding elements for Project outputs:

- Knowledge and Climate services management and capacity building information for decision making → Information and climate services platforms, scientific research about impacts and adaptation actions, mainstream adaptation across all education curricula, community participation.
- Increase resilience conditions via marine/coastal/continental territorial planning.
- Ecosystems services for adaptation → EbA, biodiversity refuges for climate change and ecosystem services, ensuring water provision.
- Adapted Public services and resilient infrastructure → Guidelines and regulation for public investment, infrastructure protection, services continuity, EWS for agriculture.
- Resilient and eco-competitive productive systems → Public policy to enhance productive systems resilience, create conditions for eco-competitiveness, investment, and innovation, strengthening PPP.
- Investment and financial security → Increase public and private finance for adaptation and risk transfer mechanisms.

National Adaptation Axis for Project outputs:

- Public health.
- Watersheds integrated management.
- Tourism.
- Biodiversity.
- Sustainable infrastructure.
- Agriculture.

Adaptation principles related to the Project:

- Resilience
- Transformation
- Innovation and competitiveness
- Participation and inclusion
- Transparency and reporting
- Social equity
- Universality
- Prevention
- Flexibility
- Continuity
- Sustainability
- Decentralization
- Intersectoral
- Shared responsibilities PPP

Approaches promoted related to the Project:

- Human rights
- Gender equality
- Indigenous communities
- Integrated adaptation (ecosystems, communities and DRR)

Annex 4. Benefits of supporting Nature-based climate-resilient local livelihoods in a changing climate.

- Adequate management of wildlife observation is a considerable source of revenue for local economies and reduction of poaching and illegal hunting (benefits people and natural resources). Providing constant legal revenue reduces communities' vulnerability and conserving wildlife and natural ecosystems can increase ecological resilience.
- Global Coral reef tourism generates US\$ 36 billion annually. Although there are no national estimates, the project will improve information to measure and guide development initiatives. Income derived from adequate management reefs could directly increase communities' coping capacity.
- Local development is benefited by creating formal jobs, including within protected areas, opens new markets for local services and products including sales of crafts, cultural services, food, and drinks. It can also bring social infrastructure (health, telecommunications, roads) benefiting tourist and local communities.
- Tourism is a particular important sector for women. Given that women in both regions have greater unemployment rates than the national average, a focus on building capacity in women can be achieved; directly related with project communities' vulnerability reduction.
- Where tourism operators commit to hire and train local people, the poverty reduction benefits are much greater; hence a need to increase local capacity.
- Globally, agriculture expansion and intensification are a major threat for biodiversity, and national technical reports from both countries highlight the same trend in Limon and Bocas del Toro. The project aims to slow this trend by strengthening capacities and engaging communities involved in agriculture with a Nature-based Solutions approach.
- Floods are the most damaging event impacting Bocas del Toro and Limon, affecting communities and croplands. Sustainable agriculture practices mainstreaming climate change, restore soil conditions and reduce sediment outputs to rivers and maintain water levels, hence reducing floods risks.
- Apart from reducing exposure to climate related risks, Nature-based solutions could increase natural ecosystems connectivity, which in turn would increase ecosystem's resilience to extremes, providing greater protection to communities.
- Climate resilient agriculture practices mitigate the impacts of climate variability and extremes by improving soil moisture and fertility, while increasing farmers coping capacity by reducing inputs costs, increasing quality of products, household's income, and local food security.
- Sustainable fishing practices maintain ecosystems (reefs, seagrasses) integrity and connectivity, thus maintaining their coastal protection services. Regional Central American programs promoting traceability schemes, strengthening fishers' communities' business capacity, diversifying fisheries, and integrating communities, have proven successful in increasing fishing communities coping capacity but also on reducing pressure on the resources and improving fishing practices. These in turn, result in healthier ecosystems capable to respond better to changes on environmental conditions.

Annex 5. Cost-effectiveness of potential NbS/adaptation approaches

This annex:

- Expands on the proposed outputs and interlinks between them, referencing cases to portray the cost-effectiveness of the approach.
- Lists those concrete cases, showing the cost-effectiveness of Nature-based Solutions for Latin America and the Caribbean.

I. Proposed outputs and interlinks

1. Output 1: Aims to better understand the vulnerability, risks, ecosystems status and their role in both supporting livelihoods associated to tourism, agriculture, etc., and for disaster risk reduction. This output will contribute to an increased ecological resilience of natural ecosystems that provide livelihoods to coastal communities and that reduce climate change impacts through Nature-based Solutions. It is worth noting that, as the World Bank (2017) stated, an effective application of NbS requires a comprehensive assessment and implementation process. NbS, however, are often implemented on an ad-hoc basis, and while there have been significant advances in the design and testing protocols for ecosystems and their role in risk mitigation, these solutions have yet to be fully evaluated and standardized. As a result, some nature-based projects for climate adaptation and disaster risk reduction have not been designed properly, leading to ineffective and unsustainable results. There is no 'one size fits all' approach given that climatic, ecological, and hazard characteristics are variable and are often poorly understood¹. For that reason, concrete adaptation actions / NbS pilots will be defined in further formulation stages, as these need to be designed with the communities, aligned with specific local contexts.
 - Eco-DRR and SbN cost-effectiveness assessment for tropical coastal areas are scarce and even more for the continental Caribbean and South America². However, the alternatives are much more costly, don't guarantee success. and do not provide any other benefits for local communities or increased copying capacity. Calculations of the various aspects of biodiversity and ecosystem services related to seagrasses' global nutrient cycling is US\$ 1.9 trillion annually and related to coral reef tourism up to 362 billion annually. See cases A, D, E, J.
 - Resilient (or nature-based) tourism livelihood: Linking biodiversity conservation with poverty alleviation -being poverty a crucial vulnerability driver- in biodiversity dependent economies has been subject of several papers and technical reviews. According to the CBD³, NbT can be a pathway out of poverty when there are attractions, there in infrastructure, ecosystems are healthy and local people benefit directly⁴. The last two would be directly tackled by this project. See case B.
 - Resilient agriculture livelihood: Sustainable agriculture practices based on nature, which include regenerative agriculture, conservation agriculture, agro-ecology, among many others, have proven effective in crops and rural communities across the region. See cases C, F, G, H.
 - Sustainable fisheries livelihood: Improved fisheries management is the most common climate adaptation strategy for artisanal fisheries. Protected areas plans' implementation, gear and effort control and value chain improvement -including accountancy and business management improvement- have proven to reduce pressures on the resources and improve fishers' income. See case I, B.
2. Output 2: Aims to strengthen climate resilient livelihoods and value chains. Results from pilots and diagnoses (outputs 1 and 2) will lead to identifying what type of practices are better suited for the relevant livelihoods. Technical documentation and policies from both countries make it clear that

¹ World Bank. 2017. Implementing nature-based flood protection: Principles and implementation guidance. Available in: <https://documents1.worldbank.org/curated/en/739421509427698706/pdf/Implementing-nature-based-flood-protection-principles-and-implementation-guidance.pdf>

² Sudmeier, et al. 2021 Ecosystems for disaster risk reduction: an analysis of the scientific evidence. Nature sustainability

³ CBD 2012. Linking Biodiversity Conservation and Poverty Alleviation: A State of Knowledge Review. Technical series N55

there is a need to integrate all sectors' approaches at the local level. Furthermore, viable financing mechanisms could be the instrument that allow upscaling. See cases F, G, H, I.

3. Output 3: Information management, capacity building and policy as enabling mechanisms that will ensure activities in output 1 and 2 are successful and sustainable through time, even post project completion. Unfortunately, cost-effectiveness of these type of activities are difficult to find. Most scientific literature refers to this type of activities as "highly dependent on the context". From the listed cases, B to I have this type of component.

II. Cost effectiveness of NbS cases in Latin America and the Caribbean

- A. To tackle slow onset impacts such as sea level rise, NbS such as mangrove and coral reef restoration have proven to be more cost-efficient in the long run than the alternative grey infrastructure for coastal protection strategies to manage saline intrusion and flooding. In fact, the Resilient Islands project found that in the Caribbean, coral reefs and mangroves together protect millions of people and over a billion dollars of property every year from coastal flood damages from storms and hurricanes. Coral reef and mangrove restoration projects in the Caribbean are ten to one hundred times cheaper than artificial coastal defenses. On average mangrove restoration in the Caribbean (excluding Florida) costs US\$23,000 per hectare. Coral reef restoration costs around US\$1 Million per linear kilometer across the Caribbean. Artificial structures for coastal protection such as seawalls and levees, on the other hand, cost nearly US\$19 Million per linear kilometer. Additionally, mangrove restoration projects show strong economies of scale: restoration becomes three times cheaper per hectare for projects larger than 10 hectares⁵.
- B. In Panama, past mangrove restoration projects resulted in positive impacts to local livelihoods, including increased incomes to local populations from tourist-based activities (US\$ 270,000 per year) and increased fishing stock (valued at US\$ 2 million per year)⁶.
- C. In Costa Rica, the Adapta2+ programme has achieved an improved productivity for farmers by at least 5% (and a small decrease in cost of production for certain crops) through EbA and financial mechanisms to reduce the vulnerability of coastal areas, agriculture, and water resources⁷.
- D. The Manglar Vivo project in Cuba, which recovered mangroves and applied EbA measures for local livelihoods to protect coastal communities from flooding, erosion and saline intrusion, developed a cost-benefit analysis and reported benefit/cost ratios of at least 6.66 (and up to 14.91), showing that NbS are cost-efficient for adaptation and disaster risk management⁸.
- E. The GCF and the government of Cuba are investing approximately US\$ 42 million across 1,300 km of coastline, and 28,000 km² marine and coastal aiming to strengthen coastal communities' climate resilience through ecosystems restoration and monitoring, communities' capacity building and institutional strengthening. The alternative option, sea walls and dikes across rivers would cost between US\$ 243 million and US\$ 851 million for only 61 km and would have only contributed to temporarily reduce coastal erosion related risks but would not have included capacity building nor institutional strengthening⁹.
- F. Silvopasture and regenerative agriculture practices have increased milk quality and productivity of cattle ranchers (up to 28%) in Nicaragua even the driest years. The project generated incremental sales worth is US\$ 27.4 million in 4 years¹⁰.
- G. In Colombia, a combination of organic practices, micro-watershed management, soil restoration, migrant birds as biological pest control, water management training and capacity building, have

⁵ Resilient Islands project. 2019. Coastal protection: A cost comparison between natural and artificial structures. Available in:

https://media.coastalresilience.org/Resilient_Islands/CoastalProtection_TechReport.pdf

⁶ Strengthening the adaptive capacity of coastal communities of Cuba and Panama to climate change through the binational exchange of best practices for climate management and local food security. 2021. Project concept.

⁷ Increasing the resilience of vulnerable populations in Costa Rica by scaling up Adapta2+. 2017. Project concept.

⁸ Aguilar. 2020. Valoración Económica de Bienes y Servicios Ecosistémicos para el Proyecto Manglar Vivo. Parte 2. Reporte de Consultoría para la Agencia del Medio Ambiente, Fundación Neotrópica. Available in: https://www.researchgate.net/profile/Bernardo-Aguilar/publication/341105713_Valoracion_Economica_de_Bienes_y_Servicios_Ecosistemicos_para_el_Proyecto_Manglar_Vivo_Parte_2/links/5eadc9d945851592d6b4a29d/Valoracion-Economica-de-Bienes-y-Servicios-Ecosistemicos-para-el-Proyecto-Manglar-Vivo-Parte-2.pdf

⁹ Coastal Resilience to Climate Change in Cuba through Ecosystem Based Adaptation - MI COSTA. 2021. Funding proposal to the GCF.

¹⁰ Technoserve ND. GANE project.

doubled rice productivity and decreased production cost by half per hectare for small-holder rice producers¹¹.

- H. Adapta Sertão project, supported by NDF and BID LAB, among other national and international partners invested US\$ 5 million between 2006-2018 in capacity building, regenerative practices, sustainable small cattle management, training, cooperatives strengthening, enhancing strategic market alliances and policy, and access to finance for small holders. As a result, farmers implementing the package of solutions achieved productivity increases of 30-100%¹².
- I. Nature Conservancy, as part of the ResCA program, has been working with lobster fisher communities in Belize promoting sustainable practices to strengthen their resilience to climate change impacts by diversifying livelihoods, designing, and implementing traceability schemes, supporting fisheries policy updating, training, and building capacity, among others. Due to its success, the Sustainable Oceans Fund (SOF) is in conversations to design an impact investment mechanism to continue with the ongoing efforts by the enterprises and cooperatives¹³.
- J. Ferrario et al. (2014) also provided insight into the cost effectiveness of coral reef restoration when compared to the building of traditional breakwaters. The observed wave attenuation values by coral reefs in the field were similar to those of constructed low-crested breakwaters. In their review, the median project cost of tropical breakwaters was a US\$ 19,791 per meter, while the median project cost of structural coral reef restoration was US\$ 1,290 per meter. These findings are consistent with analyses from the re-insurance industry on the economics of climate adaptation in eight Caribbean nations (CCRIF 2010), where the costs and benefits of 20 approaches for coastal risk reduction, including adaptation, reef restoration, engineered defenses, and policy changes, were examined. They found that reef restoration was always more cost effective than breakwaters across all eight nations. Estimates indicate that more than 200 million people benefit from reduced risk of coastal flooding as a result of coral reefs¹⁴.

¹¹ NDF IADB. 2020. Private markets for climate resilience. Helsinki. Finland.

¹² FONTAGRO, 2016. Innovaciones de impacto: lecciones sobre adaptación al cambio climático de la agricultura familiar en América Latina y el Caribe. Washington USA

¹³ Several documentations from ResCA U.S. State Department, Resilient Central America Program (ResCA), The Nature Conservancy. 2019-2021

¹⁴ World Bank. 2016. Managing Coasts with Natural Solutions: Guidelines for Measuring and Valuing the Coastal Protection Services of Mangroves and Coral Reefs. Available in: <https://documents1.worldbank.org/curated/en/995341467995379786/pdf/Managing-coasts-with-natural-solutions-guidelines-for-measuring-and-valuing-the-coastal-protection-services-of-mangroves-and-coral-reefs.pdf>