Nature-based solutions in Mesoamerica and the Paris Agreement

Nature-based Solutions (NbS) are defined as protection actions, sustainable management or restoration of natural or modified ecosystems to face the most pressing human challenges (e.g. climate change, water and food security, or disasters generated by natural events).¹

This concept is recent and makes a valuable contribution to address three of the most important challenges of climate change:

1) Mitigation of greenhouse gas (GHG) emissions.

2) Adaptation to current and projected changes in climate.

3) Risk reduction due to extreme weather events.

Good or bad use and management of ecosystems and the services they provide can increase or alleviate these challenges. Below are some examples of how Nature-based Solutions can contribute to address the challenges of climate change and in particular to remedy them (see infographic 1).

Ecosystem-based mitigation (EbM)

Climate change mitigation is defined as “human intervention aimed at reducing the sources or enhancing the sinks of greenhouse gases”. For its part, the EbM highlights the importance of forest ecosystems (e.g. with avoided deforestation, reforestation and afforestation actions), of peat bog, and of marine and coastal ecosystems (e.g. mangroves, salt marshes, forest algae, and seagrasses) that contribute to the mitigation of climate change.

A good ecosystem management can greatly contribute to reduce greenhouse gas (GHG) emissions from deforestation and forest degradation, as well as increasing carbon sinks in ecosystems such as forests, mangroves, or reefs. Emissions from deforestation and forest degradation total around 12% of global carbon dioxide (CO2) emissions. If the use of land is considered as a large sector (including agricultural use, forestry and other uses) the estimated contribution is around 24% of annual GHG. Therefore, good management of the territory and its natural resources can contribute significantly to national and global efforts to reduce emissions.

In addition, areas occupied by diversified agricultural systems, forest areas and natural ecosystems (for example, protected areas) can play a fundamental role as “natural” carbon sinks by absorbing emissions. It is estimated that approximately 60% of the anthropogenic GHG emissions accumulated since the pre-industrial era have been stored in terrestrial landscapes (plants and soils) as well as in the oceans. Therefore, the good management of forests, wetlands and oceans plays a transcendent role in the regulation of climate on our planet.

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5 Ibid.

6 Ibid.
**Ecosystem-based adaptation (EbA)**

Adaptation is defined as the “process of adjustment to real or projected climate and its effects. In human systems, adaptation tries to moderate or avoid damage or take advantage of beneficial opportunities. In some natural systems, human intervention can facilitate adjustment to the projected climate and its effects.” For its part, based on the definition of the Convention on Biological Diversity, Ecosystem-based Adaptation (EbA) is conceptualized as the use of biodiversity and ecosystem services as part of a comprehensive strategy that helps people reduce their vulnerability to the adverse effects of climate change.

The protection, restoration and sustainable management of ecosystems can help communities reduce their vulnerability and increase their resilience in the face of climate variability and change. This adaptation approach is very relevant for people who depend directly on ecosystem goods and services to maintain their livelihoods, who are often in disadvantaged social conditions. Some examples of EbA measures are the following:

- **Ecosystems protection** through protected areas for the conservation of water sources for different uses.
- **Coastal ecosystems restoration** such as mangroves and reefs, to cope with coastal erosion to face the rising sea levels and climatic events such as tropical cyclones.
- **Sustainable management** of agricultural production with agroforestry systems to diversify production at the level of productive family units, agricultural farms and landscape.

**Ecosystem-based Disaster Risk Reduction (Eco-DRR)**

Climate change increases the risk of disasters as a consequence of extreme climatic events. In this context, healthy ecosystems can serve to prevent and minimize the risk of disasters. These strategies are known as ecosystem-based disaster risk reduction (Eco-DRR).

In Central America, ecosystems such as forests and wetlands (for example, lakes, rivers and mangroves) absorbed much of the rains’ impact during Hurricane Otto, which seriously affected the territory of Costa Rica and Nicaragua at the end of 2016: “wetlands… retained excess precipitation and runoff, and played a role in retaining sediments.” Some other examples of measures that incorporate the Eco-DRR approach are the following:

- **Protection** of wetlands and flood zones for the river overflows control and protection against storms.
- **Restoration** of vegetation cover on slopes as a measure to avoid landslides.
- **Sustainable management** of forest cover to stop the advance of forest fires.

The potential of the Eco-DRR approach to reduce disaster risk requires greater consideration of the region’s natural capital as a protective barrier against extreme weather events. In addition, greater multilevel linking that allows the implementation of the multiple policies and international conservation and development agreements that have been sanctioned by the countries of the region, among them the Paris Agreement, is imperative.

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9 The IPCC (2014) defines “vulnerability” as “the propensity or predisposition to be negatively affected” (Annex II: Glossary, p. 139).

10 The IPCC (2014) defines “resilience” as “the ability of social, economic and environmental systems to cope with a dangerous phenomenon, trend or disturbance by responding or reorganizing so that they maintain their essential function, identity and structure, and preserve at the same time the ability to adapt, learn and transform” (Annex II: Glossary, p.137).

11 The IPCC (2014) defines “risk” as “the eventual consequences in situations in which something of value is in danger and the outcome is uncertain recognizing the diversity of values. Often the risk is represented as the probability of occurrence of dangerous phenomena or trends multiplied by the impacts in case such phenomena or trends occur” (Annex II: Glossary, p.137).

12 IPCC (2012), Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation. Geneva, Switzerland: IPCC.


Nature-based Solutions in the Paris Agreement

The Paris Agreement (PA) of the United Nations Framework Convention on Climate Change (UNFCCC) was adopted in 2015 by 195 countries. This Agreement received unprecedented international support and quickly entered into force in 2016. The PA arises from a complex process of global negotiation with the aim of creating a new instrument of international law to combat climate change generated by humans.

The PA has two main objectives: i) to maintain the increase in average global temperature well below 2 degrees Celsius with a view to limiting it to 1.5°C; and ii) increase the capacity of populations to adapt to the negative impacts of climate change. The PA also refers to the need to strengthen “the resilience of communities, livelihoods and ecosystems”. These goals imply transformations in the development models of the countries and nature offers us a series of solutions.

The PA marks a milestone in the momentum of NbS, considering them an indispensable means to achieve their objectives in terms of mitigation and adaptation. Thus, in the provisions of this legal instrument it is possible to identify mandates for the Parties that are oriented towards the adoption of actions for the protection, sustainable management and restoration of ecosystems.

17 Article 2 of the Paris Agreement.
18 Article 7 of the Paris Agreement.
19 Article 8, paragraph 4, subparagraph h of the Paris Agreement.
Mitigation and ecosystems in the Paris Agreement

Article 4 establishes that, in order to comply with the long-term objective of limiting global warming established in Article 2, the Parties intend to reduce greenhouse gas emissions “to achieve a balance between anthropogenic emissions by the sources and the anthropogenic absorption by the sinks in the second half of the century”. This suggests that in order to maintain the temperature rise below 2°C with respect to pre-industrial levels, it is necessary to adopt parallel actions to reduce emissions and increase absorption.

In this sense, Article 5 paragraph 1 of the PA establishes that the Parties should adopt measures to conserve and increase sinks\textsuperscript{20} and GHG deposits.\textsuperscript{21} Article 4, paragraph 1, subparagraph d) of the UNFCCC identifies the ecosystems and elements thereof that are considered to comply with these GHG sequestration functions, which are biomass, forests and oceans, as well as other ecosystems, terrestrial, coastal and marine.

Thus, although the PA does not make an explicit reference to NbS, Article 5 promotes actions for mitigation based on the conservation of forests, lands and ecosystems in general. This was recognized by the Secretariat of the UNFCCC in the results presentation related to forests in the PA, in which it expressed that said disposition:

\begin{itemize}
  \item Sends a signal of strong political character on the importance of ecosystems, in particular of forests for the implementation of the PA.
  \item Reaffirms to Parties and other stakeholders that the PA encourages the implementation of existing approaches to mitigation in the forestry sector and in the framework of REDD+.
\end{itemize}

\textsuperscript{20} The UNFCCC defines “sink” as “any process, activity or mechanism that absorbs a greenhouse gas, an aerosol or a precursor of a greenhouse gas (Article 1, paragraph 8).

\textsuperscript{21} The UNFCCC defines “deposit” as “one or more components of the climate system in which a greenhouse gas or a precursor of a greenhouse gas is stored” (Article 1, paragraph 7).

Adaptation and ecosystems in the Paris Agreement

Adaptation to climate change is addressed in article 7 of the PA, which establishes some defining characteristics of adaptation, some guidelines that should guide actions for adaptation and specific behaviors for the Parties to comply with their commitments in this area.

Regarding the defining characteristics, paragraph 2 establishes that the Parties recognize that adaptation is intended to protect people, livelihoods and ecosystems.27

Paragraph 5 reflects some of the characteristics and principles of governance for EbA (See Booklet N°1 –Governance Series):

- **Decentralization in decision making:** "adaptation work should be carried out through an approach that leaves control in the hands of countries."

- **Participatory:** "respond to gender issues and be participatory and fully transparent, taking into consideration vulnerable groups, communities and ecosystems".

- **Flexible:** Promotes “adaptation work should (...) be based on and inspired by the best available scientific information and, where appropriate, traditional knowledge, knowledge of indigenous peoples and local knowledge systems”.

Finally, Parties are required to submit a report to the UNFCCC Secretariat on anthropogenic uptake by GHG sinks.25 This implies that both Nationally Determined Contributions (NDCs) and communications from the Parties on compliance with their commitments must include information on both the measures they are taking for conservation and the increase in GHG deposits and sinks.26

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23 Article 5, paragraph 2 of the Paris Agreement.
25 Article 13, paragraph 7, subparagraph a of the Paris Agreement.
26 Article 13 establishes that for the reports on anthropogenic absorption, the methodologies accepted by the Intergovernmental Panel on Climate Change (IPCC) approved by the Conference of the Parties as the meeting of the Parties must be used. By this we mean the effectiveness of the measures in the framework of transparency and flexibility for the absorption of anthropogenic GHGs by sinks.
27 The other defining characteristics are: that adaptation is a global challenge that concerns all; it has local, subnational, national, regional and international dimensions (that is, it is multilevel); it is a fundamental component of the long-term global response to climate change; takes into account the urgent and immediate needs of Parties that are developing countries particularly vulnerable to the adverse effects of climate change (Article 7, paragraph 2).
It is also emphasized that adaptation work should be integrated into relevant socio-economic and environmental policies and measures. That is to say, the PA itself already guides the Parties to consider adaptation not as a purely environmental objective, but also as a socio-economic development.\textsuperscript{28} If, in addition, it is taken into account that paragraph 2 establishes that adaptation is intended to protect people, livelihoods and ecosystems, it could be understood that development policies should include measures for the protection, restoration and sustainable management of ecosystems, both for their intrinsic value and for the services they provide.

Paragraph 9 requires Parties to undertake adaptation planning processes and to take measures such as the formulation or improvement of relevant plans, policies and / or contributions, which could include:

- The evaluation of the effects of climate change and vulnerability to it, with a view to formulating its priority actions determined at the national level, taking into account vulnerable people, places and ecosystems.\textsuperscript{29}

- Increasing the resilience of socio-economic and ecological systems, in particular through economic diversification and sustainable management of natural resources.\textsuperscript{30}

As in relation to mitigation, Parties are required to submit a communication on their efforts in relation to adaptation (or include such information in their NDC). Such efforts may include, among others, the formulation of plans, programs, policies or adaptation strategies at the national level, which should include actions to support the implementation of EbA.

Risk reduction due to extreme events in the Paris Agreement

Climate change increases the threats associated with extreme climatic events, which result in impacts such as floods, droughts and storm surges.\textsuperscript{31} The risk reduction due to extreme hydro-meteorological events and slow evolution is addressed in Article 8 of the PA, which deals with the losses and damages associated with climate change. The Agreement establishes “the importance of avoiding, minimizing and dealing with losses and damages related to the adverse effects of climate change, including extreme weather events and slow-moving phenomena”.\textsuperscript{32} In addition, synergies between adaptation and ecosystems must be strengthened to reduce disaster risk in the implementation mechanisms of the PA.

In this regard, the PA recommends that the Parties strengthen cooperation to improve understanding, action and support on issues such as, among others, the resilience of communities, livelihoods and ecosystems.\textsuperscript{33} It is important to emphasize that ecosystems can play a catalytic role in the integration of the UNFCCC agendas, the Sustainable Development Goals, and the Sendai Framework for Disaster Risk Reduction.\textsuperscript{34}

\textsuperscript{28} Article 7, paragraph 5 of the Paris Agreement.
\textsuperscript{29} Article 7, paragraph 9, subparagraph c of the Paris Agreement.
\textsuperscript{30} Article 7, paragraph 9, subparagraph e of the Paris Agreement.
\textsuperscript{31} IPCC (2012). Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation. Geneva, Switzerland: IPCC.
\textsuperscript{32} Article 8, paragraph 1 of the Paris Agreement.
\textsuperscript{33} Article 8, paragraph 4, subparagraph h of the Paris Agreement.
In conclusion, the NbS are key in order to maintain the global temperature below 2°C and increase the resilience of the communities and ecosystems as established in the Paris Agreement. The NbS are not intended to be the only solution to face the challenges presented by climate change; but undoubtedly they are a fundamental component for reducing emissions, adapting and reducing the risks associated with global warming. Therefore, no long-term plan to face climate change can be successful without taking into account ecosystems.

To face climate change, the NbS must be part of a comprehensive strategy, so the participation of all sectors and actors at different levels of decision-making is fundamental. Understanding the benefits provided by the conservation of ecosystem goods and services means a paradigm shift: nature does not depend on the human being, on the contrary, we must conserve ecosystems to affirm the services they provide, and in this way, ensure our survival as a species on the planet.