



ECOSYSTEM-BASED ADAPTATION:
opportunities for public policies in climate change.



FUNDAÇÃO GRUPO BOTICÁRIO
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The Boticário Group Foundation

The Boticário Group Foundation for Nature Protection is a non-profit institution, with headquarters in Curitiba, Paraná, which acts all over Brazil. It was established in 1990 with the mission statement of promoting and performing nature conservation actions throughout Brazil, and is the brainchild of Mr. Miguel Kringsner, the founder of the Boticário Group and current chairman of its Administration Board. The Boticário Group Foundation is maintained by the Boticário Group but its administration is completely independent. The institution's actions are planned out to attend biodiversity conservation demands for the society both in Brazil and overseas, following the global objectives formulated by the UN Convention on Biological Diversity (CBD) and the UN Convention on Climate Change and organizations alike. The Boticário Group Foundation supports projects led by other organizations, owns and protects natural areas in Brazil, invests in innovative conservation strategies such as payment for environmental services, as well as disseminates knowledge raising awareness to the importance of nature conservation within society.



PRESENTATION

Climate change has become a recurrent issue in our daily life. Unfortunately, the process of its mitigation has not matched the speed with which it has developed. Torrential rains, landslides, floods and droughts – among other extreme climate events – are perceived more frequently in places where they had not been seen for many years, in the local, regional and global spheres. Due to population increase and the degradation of natural ecosystems, this situation has become more dramatic, jeopardizing people's lives, cities' infrastructure and the environment's capacity for resilience. A point has been reached at which it is necessary to adapt to the negative effects of climate change.

Protected natural ecosystems are fundamental for increasing biodiversity's – and society's – resilience to the impacts caused by climate change. Such ecosystems have greater capacity for resistance and recovery when affected by extreme climate situations, as well as providing a broad range of benefits upon which humanity depends – known as environmental services. In spite of this predominant role, studies reporting on changes in climate and alternatives for adaptation based on natural ecosystems remain scarce.

Aiming to contribute to the process of adaptation to climate change, the Boticário Group Foundation for Nature Protection developed a term of reference – constructed based on discussions held with members of the Climate Observatory and with representatives of Brazil's Department of Climate Change and Environmental Quality, of the Ministry of the Environment (MMA) – for guiding the study: "ECOSYSTEM BASED ADAPTATION: opportunities for public policies in climate change". The work was undertaken by ICLEI Brazil and was edited and revised by the Boticário Group Foundation, with the support of the Climate Observatory.

The document raises the concept of Ecosystem-based Adaptation (EbA), as well as presenting EbA practices which are ongoing in Brazil and elsewhere in the world. In some cases, a comparative analysis was made between the cost-benefit of implanting EbA projects or green infrastructure with conventional engineering solutions ("gray infrastructure"). Based on the survey undertaken, objective recommendations were indicated for including EbA strategies in public policies for adaptation to climate change, focusing on the Brazilian National Adaptation Plan – run by the MMA's Department of Climate Change and Environmental Quality, expected to be submitted to the Executive Group in June 2015.

The Boticário Group Foundation's expectation is that this study will contribute to the construction of the Brazilian national strategy for adaptation to climate change, taking into account the conservation of biodiversity – a cause for which the institution has worked since its creation in 1990. Working throughout Brazil, the institution supports other organizations' conservation initiatives, protects natural areas which it owns, invests in innovative conservation strategies such as payment for

environmental services, disseminates knowledge and raises society's awareness regarding the conservation of ecosystems.

Since 2008, the Boticário Group Foundation has made great efforts in order to generate knowledge regarding the relationship between climate change and biodiversity conservation. Besides financing – between 2008 and 2013 – projects throughout Brazil on this issue, in 2010, the institution launched 'Bio&Clima-Lagamar', a bid invitation focused on the region of the Lagamar Protected Areas Mosaic – located in the Atlantic Forest on the coast of the Brazilian state of Paraná and in the southern coastal area of the state of São Paulo. In 2011 and 2012, the bid invitation selected nine initiatives which sought to generate knowledge regarding species' and ecosystems' vulnerability and adaptation to climate change. In 2014, two more projects were selected through a public call for proposals undertaken in conjunction with the São Paulo Research Foundation (FAPESP). The knowledge generated by this initiative in the Atlantic Forest is being continually systematized, with the objective of producing management guidelines for this mosaic focused on adaptation to climate change based on the conservation of ecosystems.

Another of the Boticário Group Foundation's contributions was the undertaking, in 2012, of a scientometric study which analyzed the panorama of studies relating to climate change's impact on biodiversity in Brazil and worldwide, revealing the scarcity of scientific studies on this issue.

In the area of public policies, the Boticário Group Foundation sits on the coordination committee of the Climate Observatory. It helped found, and remains a member of, the Curitiba Forum on Climate Change, and also participates in the Paraná Forum on Climate Change and the Brazilian Forum on Climate Change. It has participated in the Steering Committee of the Brazilian National Fund on Climate Change (known as the 'Climate Fund') since 2013.

Curitiba, 2015.

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EXECUTIVE SUMMARY

1. INTRODUCTION

The current scenario of climate change raises the need to find ways of mitigating, and adapting to, the negative effects which it provokes. Although mitigation has been emphasized in the international treaties signed in recent decades, in the last few years, adaptation has come to receive greater attention (SAE, 2014). Studies have revealed the need for measures which allow populations to adapt to the already-irreversible effects of climate change, and to the inherent uncertainty – such as extreme events and changes in ecosystems (NOBRE, 2008). The study of ecosystems and their fundamental role in protecting the environment and populations was the starting point for seeking approaches based on local ecosystems in order to generate mechanisms for adaptation to climate change.

Ecosystem-based Adaptation (EbA) appears as a possibility which brings together adaptation to climate change and management of natural areas. It has been applied in various adaptation strategies worldwide. In Brazil, experiences with EbA exist and have been publicized, although these have been undertaken in a piecemeal way and, precisely because this is a new concept, the term often does not appear in projects which clearly present EbA actions in their scope.

It falls to the government to make available to society the necessary information, with support for scientific research and the standardization of norms in order to encourage local government and the private sector to implant adaptation measures, taking advantage of opportunities for improving processes and sharing information. In this regard, public policies must be proposed for fostering governmental decisions inherent to the issue, as well as guiding the actions of society, taking into account that as climate change provokes effects not only in the environmental area it must be treated intersectorially.

The Brazilian National Plan on Climate Change (PNMC) of 2009 and its regulatory decree (BRAZIL, 2009; 2010) contains provisions on adaptation which were subsequently incorporated into the Multi-annual Plan (PPA) 2012-2015. As part of the Executive Group (GEx) of the Inter-Ministerial Committee on Climate Change (CIM), instituted by Decree nº 6,263 of 2007, a Working Group (WG) was set up specifically for the construction of the National Adaptation Plan. In this context, the present report's objective is to offer support and practical recommendations to the decision-makers for the insertion of Ecosystem-based Adaptation strategies in the National



Plan for Adaptation to Climate Change, as well as in other relevant public policies and plans.

The surveying of experiences of EbA in Brazil and worldwide has been particularly based in secondary data. Information was used from the databases of the United Nations Framework Convention on Climate Change (UNFCCC)¹, Conservation International (CI)², the International Climate Initiative (IKI)³, the World Resources Institute (WRI) and the Economic Commission for Latin America and the Caribbean (CEPAL). Also used were scientific databases (SCOPUS, Web of Science (WoS) and the Scientific Electronic Library Online (SciELO), as well as reports produced in the ambit of partnership between the Department of Climate Change and Environmental Quality (SMCQ), the Ministry of the Environment, and the Center for Sustainability Studies (GVces), of the Business Administration School of São Paulo at the Getulio Vargas Foundation.

2. OPPORTUNITIES AND CHALLENGES IN THE CONTEXT OF CLIMATE CHANGE

2.1. Panorama of climate change

Studies on climate change have shown, with increasing clarity, the warming of the global system, which can be evidenced based on changes such as the warming of the atmosphere and the oceans and the increase in sealevel, among other changes already observed (PBMC, 2015). According to the Intergovernmental Panel on Climate Change (IPCC), the last three decades were progressively hotter than their predecessors. This is one of the facts which provides a scientific basis for knowledge regarding climate change on Earth (IPCC, 2013). In addition to this, the IPCC Assessment Reports have emphasized the role of man-made interference in the global warming process (PBMC, 2015).

Nobre (2008) draws attention to the fact that, although efforts for reducing greenhouse gas emissions could help in decelerating the increase in global temperature in the future, there is an urgent need to adapt to climate change, as the impact of the accumulated historical emissions has yet to be fully felt. In addition to this, the occurrence of extreme events, and their consequences, shows the

¹ Available at:

https://unfccc.int/adaptation/nairobi_work_programme/knowledge_resources_and_publications/items/6227.php

² Available at: <http://www.conservation.org/projects/Pages/adapting-to-climate-change-ecosystem-based-adaptation.aspx>

³ Available at: <http://www.international-climate-initiative.com/en/projects/projects/>



need to seek adaptation strategies for Brazil. Hence, it is necessary to manage the risks and increase the resilience of the natural and human systems.

The IPCC report (2014) indicates that the increase in resistance to climate change is directly linked to the capacity to take decisions which allow the reduction of vulnerabilities and exposure, and the consequent increase in the capacity to adapt. The evaluation of vulnerability, therefore, is a fundamental instrument for understanding where the impacts of climate change will fall, and which ecosystems will be most susceptible (IPCC, 2007). Comprehending this allows a better understanding regarding the reason for adaptation and how this adaptation is to occur, as well as regarding the interrelationship between the social, economic and environmental factors which lead to vulnerability (WWF, 2013).

2.2. International treaties on climate change and the role of Brazil in this process

Various international treaties have been signed in the last two decades by countries around the world, aiming to establish commitments to mitigating and adapting to climate change. Viola (2002) considers that Brazil had a leading role in the negotiating process of the 1992 Convention on Climate Change, although during the Kyoto Protocol Brazil was opposed to the commitment to reduce the future rate of growth in carbon emissions on the part of the emerging countries. After 2009, the position of Brazilian external environmental policy regarding climate change was altered, when it accepted voluntary commitments to reduce emissions of greenhouse gases (GHG).

During the Kyoto Protocol negotiations, although both the UNFCCC and the IPCC recognized the importance of adaptation to impacts, the main focus was always on the adoption of measures for mitigating climate change through reducing GHG emissions. This scenario began to change after 1998, when discussions on adaptation began to effectively take shape (SAE, 2014). The Special Climate Change Fund, operated by the GEF (Global Environment Facility) was established in 2001, for financing projects related to adaptation, technology transference, empowerment, management of resources and economic diversification. The objective of the Adaptation Fund, also set up in 2001, is to finance adaptation projects and programs in developing countries which are party to the Kyoto Protocol and which are particularly vulnerable to climate change.

During the ninth Conference of the Parties (COP-9) in 2003, the need was identified to undertake works involving the scientific, technical and socioeconomic aspects of the impacts of climate change, as well as ecosystems' vulnerability and adaptation to the effects provoked by changes in the climate. In 2005, the Nairobi work programme on impacts, vulnerability and adaptation to climate change was established, in COP-11.

COP-16, held in Cancun in 2010, advanced the issue still further, creating the Cancun Adaptation Framework, which aims to encourage less-developed countries to elaborate National Adaptation Plans, based on their experiences with the National Adaptation Programmes of Action, known as NAPAs (UNFCCC, 2012).

In COP-17, held in Durban in 2011, the Green Climate Fund was created, in order to support projects, programs, policies and other activities in developing countries. Also in COP-17, emphasis was placed on the launch of the Durban Adaptation Charter⁴, which summarizes the commitment of local governments to respond to the risks posed by climate change. Based on the NAPAs, the process of National Adaptation Plans was established.

Since then, ICLEI has organized conferences such as the Resilient Cities Congress, which has to do with the relevance of green infrastructure measures and the role of ecosystems. Another relevant data refers to the number of works in EbA presented during the international conference Adaptation Futures⁵, held in 2014, in Fortaleza, in the Brazilian state of Ceará, demonstrating the relevancy which the issue has gained in recent years.

During COP-20, held in 2014, the Green Climate Fund achieved the goal of raising US\$10 billion, which is to be an important contribution to the implantation of actions for the mitigation of GHG emissions and for adaptation in more vulnerable countries.

In relation to Brazil's position regarding adaptation, since Copenhagen (2009), it has been possible to observe a growing involvement with the issue, whether through accepting voluntary commitments to reducing emissions in the international plane, or through the gradual implementation of the framework established in 2009 with the National Policy on Climate Change (SAE, 2014). This being the case, Brazil has great potential for leading the adaptation agenda, due to its great biological diversity. Although various

⁴ On this occasion, the South African government, in partnership with ICLEI – Local Governments for Sustainability hosted the 'Durban Local Government Convention: adapting to a changing climate' convention.

⁵ Organized by the Earth System Science Center of the National Institute for Space Studies (CCST-INPE) and by the Programme of Research on Climate Change Vulnerability, Impacts and Adaptation (PROVIA), of PNUMA, 2014, Fortaleza-http://adaptationfutures2014.ccst.inpe.br/wp-content/uploads/2014/05/Conference_Programme_Complete_oral_May13.pdf



advances have taken place in the international negotiations regarding facing climate change, it is extremely important that actions related to adaptation, and especially EbA, should be recognized and incentivized, in order that these may form part of the various sectorial plans for mitigating and adapting to climate change, and that they may be incorporated at all levels of government.

3. ECOSYSTEM-BASED ADAPTATION

3.1 The development of the concept

Adaptation is the adjustment in natural or human systems which occurs in response to impacts from climate change, whether these are already taking place or are anticipated, in order to minimize the harm or strengthen the benefits (UNFCCC, 2012). There are various approaches for adaptation to climate change, such as a danger-based approach and management of risks, vulnerabilities, resilience and ecosystems. Ecosystem-based adaptation (EbA) is, therefore, one of the adaptation strategies existing, and can be used in combination with other strategies, taking into account the cost-benefit evaluation, the cost-effectiveness and the co-benefits – that is, the implantation measures for adaptation to climate change associated with the maintenance of environmental services and with biodiversity conservation. Well-managed ecosystems have greater potential for adaptation, and both resist and recover from the impacts of extreme climate events with less difficulty; in addition to this, they provide a greater range of benefits, upon which people depend (IUCN, 2009). The main landmarks in the development of the concept of EbA are presented in Figure 1.

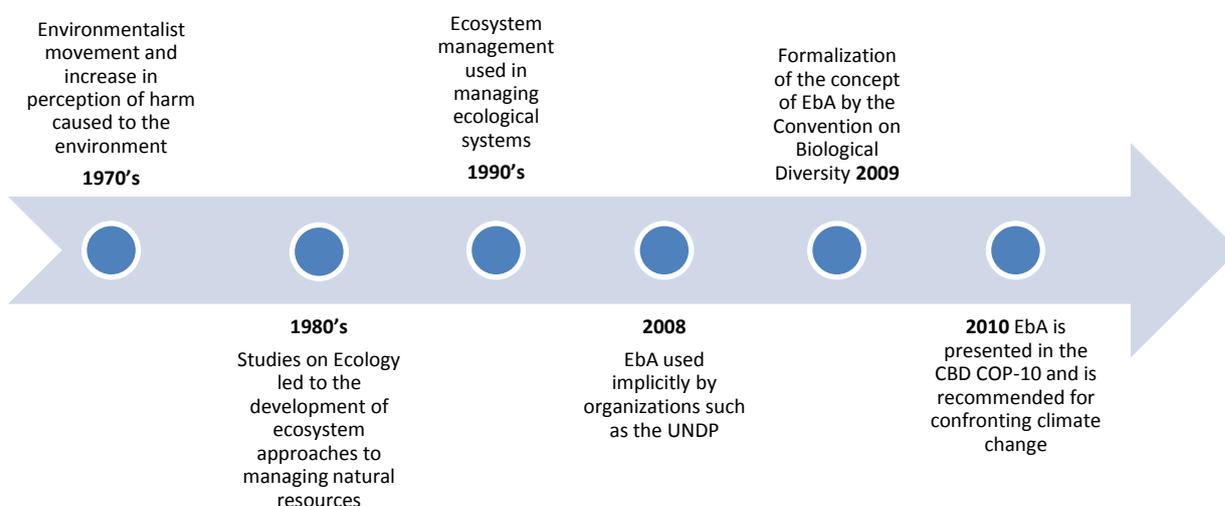


Figure 1 – Development of the concept of EbA

Source: Elaborated by the authors.

The concept of EbA presents some variations, depending on the institution which adopts it. These are the concepts used by the Convention on Biological Diversity (CBD), the United Nations Environment Programme (UNEP) and the International Union for Conservation of Nature (IUCN).

Organization	Concept of EbA
CBD	"The use of biodiversity and ecosystem services to help people adapt to the adverse effects of climate change" (RAASAKKA, 2013).
UNEP	"The use of biodiversity and ecosystem services as part of an overall adaptation strategy to help people and communities adapt to the negative effects of climate change at local, national, regional and global levels" (TRAVERS <i>et al.</i> , 2012; p. 08).
IUCN	"The use of biodiversity as part of the overall adaptation strategy to help people adapt to adverse impacts of climate change" (RAASAKKA, 2013).

Although the concept of EbA proposed by the Convention on Biological Diversity (CBD) is the most widely-known and used, in the ambit of the present study, the concept of the United Nations Environment Programme (UNEP) is adopted, as it is broader, including not only people but also communities, and raises the multiple, and necessary, geographical scales.

3.2 Criteria for classification of EbA

In order to be classified as EbA, actions, programs or projects must fulfill specified criteria. These are based on the concept of EbA itself, also varying depending on the author or institution dealing with the topic (Chart 1).

Chart 1 – Basic principles for classification of EbA, by authors and/or organizations

Author	Basic principles for EbA
Andrade <i>et al.</i> (2011)	<ul style="list-style-type: none"> • Promote the resilience of ecosystems and societies; • Promote multi-sectorial approaches; • Operate on multigeographical scales; • Allow adaptive management; • Minimize compensations and maximize benefits, with a view to development and conservation, as well as avoiding negative impacts of a social and environmental nature; • Be based on the best local and scientific knowledge available, with a view to generating and disseminating knowledge; • Use resilient ecosystems, as well as solutions based in nature which must provide a service to people – especially the most vulnerable; • Participatory, transparent and culturally appropriate processes.

Author	Basic principles for EbA
TNC (2011) mentioned by Travers <i>et al.</i> (2012)	<ul style="list-style-type: none"> • Promote resilient ecosystems; • Maintain ecosystem services; • Provide support to sectorial adaptation (including measures in the national adaptation plans, and influencing sectorial development plans, among others); • Reduce risks and disasters; • Complement the infrastructure (restoration of floodplains for avoiding flooding in cities, maintaining the original course of rivers, recovery of riparian forest, etc.); • Avoid maladaptation (learning from the results of adaptation activities undertaken previously and avoiding accidental impacts on communities and ecosystems, among others).
IUCN Report (COLLS <i>et al.</i> , 2009)	<ul style="list-style-type: none"> • Also to focus on reduction of stressors which are not related to climate; • Involve the local communities; • Elaborate development strategies with multiple partners; • Make use of good practices in the management of already-existing natural resources; • Adopt adaptive management approaches; • Integrate EbA with broader adaptation strategies; • Communicate and educate.
Convention on Biological Diversity (GIROT <i>et al.</i> , 2014)	<ul style="list-style-type: none"> • Maintenance of ecosystem services through the conservation of the ecosystems' structure and function, recognizing that the ecosystems have limits, which undergo change, and which are interlinked; • Use appropriate timescales and scales of space; • Ensure a decision-making process which is decentralized and which makes use of flexible management; • Use information from all sources, including traditional, local and scientific knowledge.

Considering the criteria in Chart 1, and based on the work undertaken by Dourojeanni (2012), the present study adopts the following basic criteria, to be taken into consideration for classifying actions or projects as EbA (Table 1):

Table 1 - Criteria for classifying EbA actions

(1) Use of biodiversity and ecosystem services – Involving actions of conservation, recovery and/or management of ecosystems
(2) Aim for adaptation measures for people and communities
(3) Apply climate lenses ⁶ - preferentially to hold vulnerability assessment studies

Source: Elaborated by the authors, adapted from Dourojeanni (2012).

⁶A climate lens is an analytical process/step/tool to examine a policy, plan or programme, indicating the risks which climate change pose for development goals in the long term (OECD, 2011).



The involvement of multiple actors in EbA projects and actions depends on each case. The guidance provided is to engage local communities when these are affected and in a situation of vulnerability. In Community-based Adaptation, the strategies for adaptation to impacts of climate change are generated based on a participatory process, based on already-existing cultural norms, aiming to combat the causes of poverty, which makes some people particularly vulnerable to the impacts of climate change (GIROT *et al.*, 2014). In this context, undertaking a participatory process with the involvement of various local actors was not considered a basic criteria for EbA, being essential only in EbA projects and/or actions which involve directly-affected and vulnerable communities (NAUMANN *et al.*, 2013; DOUROJEANNI, 2012).

4. STATE-OF-THE-ART RELATING TO EBA IN BRAZIL AND WORLDWIDE

4.1 Benchmark publications and initiatives for EbA

Publications and initiatives which propose to outline objectives, principles, and comparisons between studies and methodological guides for implementing EbA actions, were identified (Table 2), as well as initiatives which allow the sharing of information on EbA.

Table 2 – Benchmark publications and initiatives for EbA measures

Study	Description
<i>Ecosystem-based Adaptation Flagship Programme</i> (EBA - A, 2015)	Alliance between the UNEP, UNDP and IUCN for establishing programs in EbA. It includes pilot approaches, as well as comparative studies on costs and cost-benefit of EbA in relation to other adaptation strategies.
<i>Ecosystem Based Adaptation Guidance – Moving from Principles to Practice</i> (TRAVERS <i>et al.</i> , 2012)	A structured guide aiming to enable decisions regarding the use of EbA in the context of other adaptation technologies.
<i>Ecosystem-based Adaptation: a natural response to climate change</i> (COLLS <i>et al.</i> , 2009)	IUCN report, addressing the advantages of EbA. It discusses various cases involving this approach and lists principles, limits and barriers to implementing strategies of this nature.
<i>Draft Principles and Guidelines for Integrating Ecosystem-based Approaches to Adaptation in Project and Policy Design: a discussion document</i> (ANDRADE <i>et al.</i> , 2011)	Material proposing a set of principles and advice for planning EbA measures. It can serve as a guide for planning national adaptation measures, projects and studies.
<i>Framework for assessing the evidence for the effectiveness of Ecosystem-</i>	A partnership between Birdlife, UNEP-WCMC and IIED, the document defines a model for assessing EbA measures, listing questions which make it



Study	Description
<u><i>based approaches to adaptation</i></u> (MUNROE <i>et al.</i> , 2011)	possible to assess the effectiveness of the EbA for the adaptation.
<u><i>Operational Guidelines on Ecosystem-based Approaches to Adaptation</i></u> (GEF, 2012)	Provides operational guidance aiming to clarify the criteria for projects which include EbA measures. It also advises organizations wishing to obtain funds from the GEF for implementing projects.
<u><i>Climate Change Adaptation and Mitigation Methodology (CAM)</i></u> (CAREW-REID <i>et al.</i> , 2011)	This document raises an integrated approach for mitigation of, and adaptation to, climate change. The methodology applied takes into account an integrated approach for the ecosystems.
<u><i>Flowing Forward: Freshwater ecosystem adaptation to climate change in water resources management and biodiversity conservation</i></u> (QUESNE <i>et al.</i> , 2010)	Provides a guide with principles, processes and methodologies for evaluating projects linked to water resources, incorporating the implications of adaptation to climate change in the ecosystems. A partnership between the World Bank, WWF and the Water Partnership Program.
<u><i>Building Resilience to Climate Change. Ecosystem-based adaptation and lessons from the field</i></u> (PÉREZ <i>et al.</i> , 2010).	Document of the IUCN which seeks to advance the discussion related to the EbA approach, providing a selection of 11 case studies, encompassing various ecosystems and countries.
<u><i>Ecosystem-based Adaptation: a Guiding Framework for decision making criteria</i></u> (ICLEI).	Details, step-by-step, the process for decision-making regarding the adoption of EbA measures. It is a guide to be used as a reference by local governments for structuring the process of implementation, monitoring and assessment of EbA actions.
<u><i>Platform we ADAPT – Adaptation planning, Research and Practice</i></u> (WEADAPT, 2015)	Provides an online space for issues linked to adaptation and their synergy with mitigating effects of climate change. It allows the reader to access information and share experiences. Various documents and initiatives relating to EbA are available to be accessed.
<u><i>Regional Gateway for Technology Transfer and Climate Change Action in Latin America and the Caribbean</i></u> (REGATTA, 2015)	Website implemented by UNEP, whose objective is to support the transference of knowledge, technology and experience in order to help the countries of Latin America and the Caribbean to cope with challenges posed by climate change through technical assistance, access to finance, and the exchanging of information.
<u><i>Ecosystem-based Adaptation Community of Practice Portal</i></u> (EBA - B, 2015)	This website is an initiative undertaken by REGATTA (cited above) and functions as an online community of practices, bringing together a group of people in order for them to exchange experiences and knowledge regarding EbA.

Source: Elaborated by the authors.

4.2 Experiences of EbA in Brazil and worldwide

Nearly 100 case studies worldwide were identified. A complete list of the projects found in the present study, separated by region, is



provided in the Annex. Of these, 43% have occurred in Europe since 2009, many being financed by the European Commission. In the other continents, the proportion is lower, and it may be inferred that the fact that recommendations for EbA measures were included in the White Paper on Adapting to Climate Change (EUROPEAN UNION, 2009), of the European Community, in 2009, endorsed by a working document in strategies for adaptation to climate change (EUROPEAN UNION, 2013), may have positively influenced the number of experiences present (Table 3).

Table 3 also indicates a large number of EbA projects being undertaken in Africa and Asia. This is probably owed to the efforts of the IUCN, which is strongly involved in supporting projects involving adaptation to climate change, with a specific focus on EbA (RIZVI, 2014). Also in accordance with Rizvi (2014), the organization supports 45 projects related to Ecosystem-based Adaptation in 58 countries around the world.

Table 3 – Summary of EbA projects by continent and in Brazil

Place	N. of cases	State/country	Ecosystem	Objectives
Brazil	11	Bahia, Rio de Janeiro, Acre, São Paulo, Ceará, Federal District, Paraná, Amazonas, Mato Grosso.	Atlantic Forest, Cerrado, Coastal Areas, Amazon Forest, Caatinga; Urban; Wetlands; Pantanal.	Increase resilience of coral reefs, creation of systems of protected areas, biodiversity conservation, reforestation, municipal plans, conservation of wetlands, preservation of river headwaters.
Europe	19	United Kingdom, Holland, France, Austria, countries of the Danube Basin, countries of the Mediterranean, Denmark, Germany, Norway, Belgium, Sweden, Switzerland, Poland, Italy.	Interior waters, coastal areas, cities, agriculture and forests.	Reduction in floods, protection of the coast, food security, reduction in disasters, improvement of the microclimate and reduction of heat waves.
Latin America and the Caribbean	15	Argentina, Bolivia, Chile, Colombia, Costa Rica, El Salvador, Ecuador, Granada, Guatemala, Honduras, Mexico,	Agricultural, interior waters, cities, coast, forests, marine and mountains.	Increase in the capacity for adaptation, political measures for adaptation, recovery of ecosystems, training and engagement in appropriate management of ecosystems, integrated management of water resources.



Place	N. of cases	State/country	Ecosystem	Objectives
		Nicaragua, Panama and Peru.		
Asia	16	Bangladesh, Sri Lanka, Indonesia, India, Thailand, Malaysia, Vietnam, Fiji, the Philippines, Jordan, Japan, Mongolia, Russia, China, Armenia, Cambodia, Laos, the Maldives, Nepal and Pakistan.	Coast, marine, interior waters wetlands, forests, mountains, prairies, grasslands, urban, hydrographic basins and agricultural.	Restoration and management of damaged ecosystems, diversification of means of survival, conservation of biodiversity, sustainable agriculture, water governance, forest management, integrated management of resources, food security, sustainability of coastal communities, planning of communities for adaptation to climate change.
Africa	25	Mozambique, Uganda, Ethiopia, Tanzania, South Africa, Zambia, Namibia, Nigeria, Mauritania, Senegal, Gambia, Guinea-Bissau, Cabo Verde, Zimbabwe, Kenya, Madagascar, Rwanda, Sudan, Mali, Burkina Faso, Egypt, Jordan, Lebanon, Morocco, Palestine, Botswana, Lesotho, Seychelles, Benin, Camaroon, Chad, Central African Republic, Ivory Coast, Congo, Gabon, Ghana, Guinea, Equatorial Guinea, Sierra Leone and Togo.	Coast, rural, urban, marine, wet and dry areas, grasslands, prairies, agricultural, forests, hydrographic basins, dry areas and mountains.	Conservation and food security, forestry and agroforestry practices, management and restoration of ecosystems, water management, integrated coastal management, biodiversity conservation, diversification of means of subsistence, analysis of vulnerability, integrated management of natural resources, combating desertification, correlation between gender equality and impacts resulting from climate change, analysis of resilience of ecosystems, interactive environmental learning with a view to strengthening the decision-making process, risk mapping, increasing the resilience of protected areas, REDD+ processes and evaluation of impacts.
North America	06	Canada and the United States of	Urban, forests, agricultural,	Increasing resilience against sea level rise and



Place	N. of cases	State/country	Ecosystem	Objectives
		America	marine, coastal, interior waters.	the occurrence of extreme climate events, reduction of agriculture's vulnerability to drought, assessment of vulnerability, creation and management of open forests and parks, conservation of natural resources and reduction of risks.
Oceania	06	Papua New Guinea, Australia, Samoa and New Zealand.	Coastal, savannah, forests and woods, interior waters, agricultural.	Management of wild fires, increase in the resilience and adaptive capacity of forest areas and communities, reduction in vulnerability, restoration of ecosystems.

Source: Elaborated by the authors.

In Brazil, the number of examples of EbA projects remains incipient; however, the few experiences found demonstrate the potential which exists, this possibly reflecting Brazil's immense biological wealth and diversity, the country's tradition in relation to the involvement of communities, or the predictions regarding impacts made by the IPCC and the Brazilian Panel on Climate Change for the coming years in this region.

In Latin America and the Caribbean, the World Bank supports many biodiversity conservation projects involving EbA measures, through Green Corridors in Colombia, Ecuador, Peru, Bolivia, Argentina, Guatemala, Mexico, Panama, Nicaragua and Honduras, as well as in Brazil (WORLD BANK, 2009). It also invests in actions of maintenance and restoration of ecosystems, the development of measures directed towards climate change in natural reserves, and flood protection programs, among others.

The best practices in EbA selected in the present study have, as a common feature, the assessment of vulnerability. Among the projects found during the undertaking of the present study, some were selected as examples (Table 4), while the others may be found in the Annex, with active links so that further information may be accessed directly in the projects' websites. Each project listed in Table 4 was identified with its respective code, as specified in the Annex.

Table 4 - Examples of EbA practices in Brazil and worldwide

Project	Region/ country	Objective	Criteria to be considered as EbA
<i><u>Ecosystem-based adaptation in marine, terrestrial and coastal regions</u></i> (B.01)	Brazil, the Philippines, South Africa	Provide examples of how adaptation measures based in different ecosystems can be designed and implemented.	Climate lens; identification of adaptation measures.
<i><u>Analysis of the Ecological Risk to the Paraguay River Basin</u></i> (B.06)	Argentina, Bolivia, Brazil, Paraguay	To identify the situation of the ecological components which ensure the integrity of the aquatic systems in the River Paraguay Basin so that governments and civil societies of the countries involved may develop an agenda for adaptation of the Pantanal to climate change.	Climate lens; identifying adaptation measures for increasing the resilience of the ecosystem; recovery actions.
<i><u>Aclimar Project</u></i> (B.07)	Brazil	To design technologies which help the communities and ecosystems of the Urubu River microbasin (Federal District) to adapt better to the effects of climate change.	Recovery actions, implementation of measures of adaptation for communities and ecosystems.
<i><u>Edmonton's urban forest management plan (UFMP)</u></i> (AN.1)	Canada	To create a sustainable urban forest, to help people in the adaptation to climate change.	Climate lens; identification of adaptation measures for communities and ecosystems.
<i><u>CARPVIA project: Carpathian integrated assessment of vulnerability to Climate change and ecosystem-based adaptation measures</u></i> (E.01)	Carpathian Basin, Hungary	To assess the vulnerability of the Carpathian region to climate change, combined with other anthropogenic pressures, and to identify potential EbA measures.	Climate lens; identification and assessment of adaptation measures.
<i><u>Integrated national adaptation plan - Colombia highland Ecosystems</u></i> (ALC.04)	Colombia	To ensure the continuous supply of the vital ecosystem services – including regulation of the water flow - which are essential for the local populations and people who live in Bogota's surrounding areas.	Climate lens; actions for the recovery and conservation of ecosystems; elaboration of adaptation measures.



Project	Region/ country	Objective	Criteria to be considered as EbA
<i><u>Tonle Sap</u></i> (AS.12)	Cambodia	To increase the resilience of the Tonle Sap (a region covering 470,000 ha, formed by lakes and flooded forests) to the new rainfall and to reduce the vulnerability of the communities which depend on this ecosystem.	Climate lens; ecosystem recovery actions; implementation of adaptation measures.
<i><u>Coping with drought and climate change in the Chiredzi District</u></i> (AF.11)	Zimbabwe	To support subsistence farmers in dry areas through the promotion of sustainable ways of life, integrated with risk management of the climate	Climate lens; implementation of adaptation measures; conservation actions.
<i><u>Building Interactive Decision Support to Meet Management Objectives for Coastal Conservation and Hazard Mitigation on Long Island, New York, USA</u></i> (AN.04)	USA	To design, build and discuss alternative future scenarios for increase in sea level, extreme storms, social and ecological vulnerabilities, and conservation priorities.	Climate lens; to develop adaptation measures.
<i><u>Transforming Coral Reef Conservation - Kimbe Bay: Marine Conservation Platform Site in Papua New Guinea</u></i> (OC.02)	Papua New Guinea	To create a large network of protected marine areas in order to ensure the resilience of the coral reefs in the light of climate change.	Climate lens; ecosystem conservation actions.
<i><u>Building with nature Indonesia - reaching scale for coastal resilience</u></i> (AS.14)	Indonesia	To create a natural barrier on the north coast of the island of Java so as to stem the severe process of erosion.	Climate lens; recovery and conservation actions, implementation of adaptation measures, analysis of vulnerabilities.
<i><u>The Great Fen Project</u></i> (A wetland restoration project) (E.12)	United Kingdom	To restore more than 3000 ha of wetlands in England	Protection against floods in the communities, carbon storage. Climate lens, analysis of vulnerabilities.
<i><u>Recovery of the Riparian Forest of the River Cachoeira as a Measure of Flood Control in the Municipality of Itabuna, Litoral, South Bahia,</u></i>	Bahia, Brazil	Recovery of riparian forest on the banks of the River Cachoeira and its tributaries in order to favor the restoration of ecosystem services	Recovery and conservation actions, implementation of adaptation measures,



Project	Region/ country	Objective	Criteria to be considered as EbA
<u>Brazil B.12)</u>		and, above all, to minimize the effects of rains on the local population. It involves mapping the areas and training environmental staff, including the community, in the implantation of the project.	analysis of vulnerabilities, climate lens. Project financed by the Climate Fund.
<u>WAVE project – Water Adaptation is Valuable to Everyone.</u> (E.19)	Holland, United Kingdom, France, Belgium and Germany	To develop policies for the prevention of risks and increase in opportunities for management of water, reduction in ecosystems' and society's vulnerability to risks posed by climate change and to publicize the impacts of climate change on water resources.	Climate lens, implementation of adaptation measures, analysis of vulnerabilities.

Sources: IKI (2013); TNC and WWF (2012); ISSA (2015); CARPIVIA (2015); UNFCCC (2015-a); UNFCCC (2015-b); Pérez *et al.* (2010); TNC (2004); WETLANDS (2015); DOSWALD and OSTI (2011). Adapted by the authors.

4.3 Insertion of EbA in national, local and sectorial policies and plans

The United Kingdom was a pioneer in the insertion of Ecosystem-based Adaptation in public policies, based on information contained in the Millennium Ecosystem Assessment, in 2005, which not only demonstrated the importance of ecosystem services for human well-being, but also showed - on a global scale - that many of these services were being degraded and lost. Based on these concerns, in 2007, the British government undertook a study to allow the identification and development of effective public policies as a response to the degradation of environmental services, taking climate change into account (UK NEA, 2015).

Subsequently, in the European Community, the White Paper⁷ on *Adapting to Climate change: towards a European framework for action* (EUROPEAN UNION, 2009) recommends actions for a global adaptation strategy in the European Union (EU), divided into three

⁷White Papers of the European Commission are documents containing proposals for action for the European Community in a specific area, published after a consultation phase (Green Papers). When favorably received by the EU Council, they can lead to a program of action on the issue.

blocks: (1) physical and meteorological impacts, (2) impacts on biodiversity and ecosystems and (3) socioeconomic impacts. It includes the role performed by ecosystems in controlling the regulation of the climate and its impacts, and recommends adaptation measures directed towards the managing and conservation of water resources, of the soil, and of biological resources as a means of maintaining their vitality and making them resilient to climate change. These recommendations established the bases and principles regarding EU policy in relation to adaptation, from 2013 onward, for the application of a European Strategy on Adaptation to Climate Change. In this regard, various countries replicated the EU recommendations, suggesting adaptation measures focused on the managing and conservation of ecosystems.

One can also highlight the insertion of ecosystem services in the National Adaptation Programmes of Action (NAPAs) established in the COP 7 to the UNFCCC, in Marrakesh (UNFCCC, 2002), for less-developed countries which are among the most vulnerable to the impacts of climate change (PRAMOVA *et al*, 2012).

In Brazil, legislation requires the implantation of a National Adaptation Plan against climate change, which is in its final phase of elaboration by the Ministry of the Environment. The National Policy on Climate Change defines adaptation as a set of initiatives and measures for reducing the vulnerability of natural and human systems to the already-existing and anticipated effects of climate change (BRAZIL, 2009). According to the Ministry of the Environment, the development of an adaptation strategy, in outline, involves identifying the exposure to already-existing and future impacts, based in projections and climate scenarios, the identification and analysis of sensitivity to these possible impacts, and the defining of adaptive measures (MMA, 2015).

Of the Brazilian sectorial plans, the Sectorial Plan for Mitigation and Adaptation to Climate Change in Mining (the Low Carbon Emission Mining Plan – the MBC Plan); and the Sectorial Plan for Mitigation and Adaptation to Climate Change for the Consolidation of a Low Carbon Emission Economy in Agriculture (the Low Carbon Emission Agriculture Plan – the ABC Plan) cite actions covered under Ecosystem-based Adaptation. In this context, one can cite activities such as: development of cultures which are resistant to periods of drought, construction of flood defenses, recovery of pastureland, vulnerability studies and vulnerability mapping, and definition of resilience indicators, among others.



Regionally, there are also provisions in the Acre State Plan for Water Resources⁸, in the Climate Change Program of the Committee for the Hydrographic Basin of Lagos São João - Casimiro de Abreu – Water and Climate Attitude Project⁹ and in the Sustainable Amazon Plan¹⁰. Of 11 Municipal Plans for the Conservation and Recovery of the Atlantic Forest¹¹ researched, only the Municipal Plan for the Conservation and Recovery of the Atlantic Forest of Porto Seguro¹² presents EbA recommendations and initiatives based on the vulnerabilities identified in that municipality.

The publicizing of studies on the issue, as well as the insertion of EbA in the National Adaptation Plan, should provide greater knowledge on the concept, extending its use, given that many initiatives underway in Brazil encompass EbA criteria, without necessarily being termed as such.

Some obstacles to the implementation of EbA projects mentioned relate to shortage of resources. Sometimes, in order to implant projects, it is necessary to expropriate areas, or to relocate infrastructure. Financing opportunities do not always allow the inclusion of this type of action, prior to the actual implantation of the project; the monitoring also requires specific financing for some time subsequent to the implementation of the project. Often, it is difficult to put into effect works on this scale due to the different levels of government, and urgent measures, or measures with greater short-term visibility, end up being prioritized. Another obstacle identified is a negative perception on the part of society and even on the part of investors, resulting from fear in relation to the effectiveness of EbA actions, when compared with conventional engineering projects (DOSWALD and OSTI, 2011). The National Adaptation Plan will be a strategic tool in overcoming these obstacles.

5. BENEFITS AND ADVANTAGES OF EBA MEASURES

There are various direct and indirect benefits, both economically quantifiable and not, resulting from the use of EbA strategies. Besides reduction in vulnerability to the impacts provoked by climate change, EbA can generate economic, social, environmental and cultural benefits, including the reduction of risks related to disasters caused

⁸ Available at

http://d3nehc6yl9qzo4.cloudfront.net/downloads/plano_estadual_recursos_hidricos_acre.pdf

⁹ Available at <http://www.vozdasaguas.com/2011/08/atitude-agua-e-clima/>

¹⁰ Available at http://www.mma.gov.br/estruturas/sca/arquivos/plano_amazonia_sustentavel.pdf

¹¹ Available at <http://www.pmma.etc.br/>

¹² Available at http://www.pmma.etc.br/index.php?option=com_content&view=article&id=183:plano-municipal-de-porto-seguro&catid=80:my-blog&Itemid=542



by extreme climate events, food security, biodiversity conservation, carbon capture, and sustainable management of water, among others (COLLS et al., 2009).

Pérez et al. (2010) list advantages related to the adoption of EbA approaches, such as the development of an integrated view of the territory, based on ecological processes, and which goes beyond political-administrative limits, the maintenance of ecosystems' ecological integrity in terms of ecosystem services, investment in conservation, the improvement of governance, the development of a vision of adaptation to the climate inserted in a cultural dimension, and a contribution to the development of public policies at multiple levels of management.

Some of these advantages of EbA strategies can be quantified in economic terms and expressed as a cost-benefit relationship. Depending on the purpose for which they are proposed, the economic value of the ecosystem services may be included in the assessment, that is, it is necessary to identify, as well as possible, all the values involved in the decision process, taking as a basis the choices which are made in accordance with the evaluation of the costs and benefits.

Normally, the valorization of ecosystem services is expressed merely in economic terms; however, many works have indicated that this measure cannot capture the entire perception and the additional benefits generated by the ecosystem services. In this regard, it is necessary for other approaches associated with the ecological and sociological dimensions to be taken into account, appropriating methods and indicators which establish different values. The benefits generated as a result of environmental restoration or the conservation of an area (with a view to adaptation to climate change) may have local, regional, national or global coverage, as well as having characteristics of provision, support, regulation or culture. In this sense, in order to undertake the economic valuation of the benefits arising from the ecosystem services, one must define their reach both in physical and temporal terms, as well as which services they are related to.

The use of the ecosystem services ("green infrastructure") has been compared with the implantation of conventional engineering measures ("gray infrastructure") in various projects, with many not described as EbA in spite of showing a clear influence in their adaptation to climate change. The World Resources Institute (WRI), for example, presents the case of New York, which – in the 1990s – implanted improvement actions in the watershed areas, reducing costs with capture and treatment of water for the population. This option avoided the cost of eight to \$10 billion on a new water



treatment plant, and promoted an investment of approximately \$100 million in the rural economy. It is considered a success case study and a pioneering example in payment for environmental services (GARTNER *et al.*, 2013).

The methodologies for evaluating Ecosystem-based Adaptation measures follow approaches which are similar to the proposals made by TEEB (2010), with the inclusion of vulnerability analysis and evaluations of cost-benefit, comparing green and gray infrastructure, as presented below (OJEA *et al.*, 2009):

1. Identification and quantification of the direct impacts associated with climate change: quantification must be undertaken in accordance with the level of knowledge associated with the problem.
2. Identification of the vulnerable areas: climate change does not act homogeneously in all locales, as a result of which it is necessary to prioritize areas with greater potential for being affected.
3. Identification of the options for adaptation: this stage aims to identify the alternatives which reduce the impacts in the most vulnerable areas. In defining these, one must observe criteria of relevance, effectiveness, scale of action and viability.
4. Identification of the adaptation measure by unit cost: taking data from the international and national literature as a reference, it is necessary to evaluate the unit costs of the adaptation measures. The costs of adaptation must include the costs of implementation and maintenance.
5. Total costs: the final stage consists of aggregating the costs of all of the measures of adaptation for all the vulnerable areas.

There are some experiences related directly or indirectly to EbA which involve the undertaking of comparative cost-benefit analysis studies, summarized in Table 5. All the identified studies indicate that opting for EbA strategies brings a lower cost, besides additional benefits.

Table 5 - Experiences related directly or indirectly to EbA or to green infrastructure, with cost-benefit analysis

Case or location	Description	Cost/benefit
<u>Restoration of the wetlands in the lower areas of the Danube River – Bulgaria</u>	Restoration of 2,236 km ² of flooded areas made up of 37 lakes, corresponding to the total length of 9,000 km ² on the lower River Danube.	Cost of harm caused by floods: US\$396 million (2005) Cost of implementing the project: US\$299 million. Benefits generated by the project, estimated at US\$120 million per annum. Additional benefits: recovery of the ecosystem, improvement in the population’s sanitation.
<u>Benefits of the conservation of forests in Madagascar</u>	Conservation of 2.2 million ha of forest and protected areas over a 15 year period in Madagascar.	Cost of implanting the project: US\$97 million (including the opportunity cost of the land). Benefits generated by the project estimated at US\$150-180 million. Additional benefit: biodiversity conservation, maintenance of the water flow, and reduction in soil erosion. Based on the results of the project in question, Madagascar’s government resolved to expand its protected areas by more than 6 mi ha.
<u>Comparative analysis of ecosystem-based adaptation and conventional engineering in Lami Town, Fiji</u>	Comparison of costs and benefits between options for ecosystem-based adaptation and conventional engineering for reduction of the vulnerability in Lami Town, Fiji.	Building dikes or reinforcing and stabilizing riverbanks: over US\$990/m. Cost of recovering the mangrove forest and riverbanks, considering a period of 20 years: below US\$2,5/m ² .
<u>Cooling of treated water in Medford, Oregon</u>	Cooling of the urban effluent prior to its discharge in the Rogue River, through restoration of the riparian vegetation and ensuing production of shade.	One analysis showed that among the three alternatives for the cooling of the water (a storage lake, mechanical chilling or environmental recovery), the recovery of vegetation and shade had a cost/effectiveness rate which was a third of the cost. Besides the economic benefits, the recovery of natural areas contributes to maintaining the habitat for wild animals, and acts as a filter for the water which percolates into the soil. Over 10 years, the estimated cost for recovering the river banks is US\$8 million, while the lake would cost US\$16 million, and the mechanical chilling would cost US\$20 million, in addition to emitting more GHG.
<u>Recovery of the Catskill hydrographic basin- Delaware, New York</u>	Environmental recovery and implantation of sewage treatment systems in rural areas, promoting the offering of better quality water around the city of New York.	Cost of implanting water treatment plant: U\$6 billion for construction, and approximately U\$250 million for annual maintenance. Cost of program of payment for environmental services: U\$1.5 billion. Savings of billions of dollars, gains through conservation of natural areas, and investment in a rural area, with improvements in sanitation and public health, and investment in ecotourism.

Source: Adapted from DOSWALD and OSTI (2011), EMERTON *et al* (2009), GARTNER *et al* (2013), IFRC (2002), NAUMANN *et al* (2011) and RAO *et al* (2012).



Rao *et al.* (2012) undertook a comparison of the costs of measures for adaptation to climate change in Fiji, reaching the conclusion that – principally in the long-term – the cost-benefit of choosing EbA actions is enormous, reaching a rate of US\$19.50 for each dollar invested, while the implantation of conventional engineering actions has a rate of nine dollars savings for each dollar invested. The cost of potential harm caused by climate change is US\$114.8 million, while the implementation of all the adaptation actions proposed has an estimated cost of US\$11.90 million over 20 years, it being estimated that this would prevent from 10 to 50% of the harm.

Besides the economic comparison referent to the implantation of the actions, the additional benefits which can be accounted for lie in the improvement in the population’s health, reduction of harm to public and private infrastructure (roads, bridges, housing, businesses and industries, among others) and maintenance of environments which provide active systemic services and biodiversity conservation. Figure 2 illustrates the two main scenarios used for the comparison in Rao *et al.*’s study. (2012).

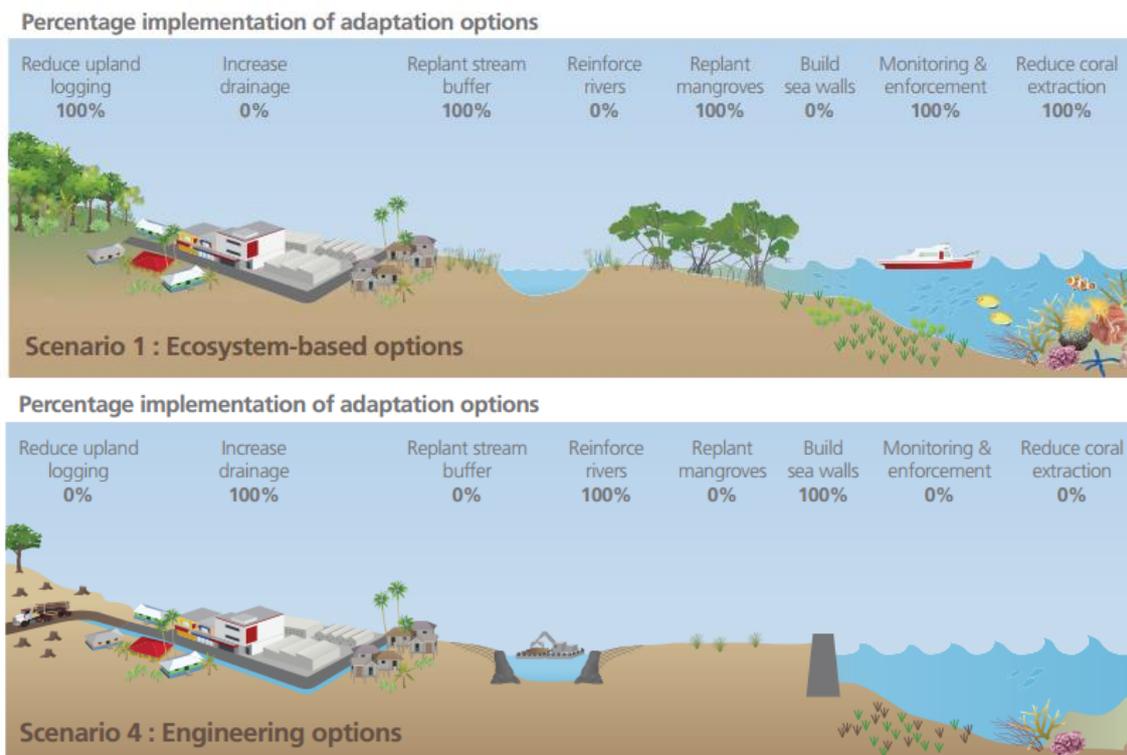


Figure 2 - scenarios of adaptation to climate change, using EbA options (scenario 1) and conventional engineering solutions (scenario 2).

Source: Adapted from Rao *et al.*, 2012.

6. THE DEVELOPMENT PROCESS OF THE BRAZILIAN NATIONAL ADAPTATION PLAN

Considering the impacts provoked by climate change, particularly in the more vulnerable countries, planning undertaken by these countries must take into account various forms of adaptation, in various sectors. In COP-17, the process was established of the National Adaptation Plan (NAP), a document which is to be elaborated dynamically and intersectorially, taking into account local vulnerabilities, medium and long-term risks, and strategies for monitoring the implantation of the actions, considering periodical reviews to incorporate new knowledge and already-implanted actions (UNFCCC, 2012).

The main objectives of the adaptation plan must be to reduce vulnerability to the impacts of climate change through the construction of adaptive capacity and resilience, and to facilitate the integration of adaptation to climate change in new policies, programs and activities, principally in planning processes and development strategies, in all sectors and at different levels (Decision 5/CP.17, UNFCCC, 2012).

In this regard, Federal Decree nº 7,390 of 2010 (BRAZIL, 2010), which regulates the National Policy on Climate Change (Federal Law nº 12,187 of 2009; BRAZIL, 2009), already regulates the following sectorial plans for mitigation and adaptation – which focus in particular on a low carbon consumption economy:

- Action Plan for Prevention and Control of the Legal Amazon Deforestation (PPCDAm);
- Action Plan for Prevention and Control of Deforestation and Forest Fires in the Cerrado (PPCerrado);
- The 10-Year Energy Expansion Plan (PDE);
- The Consolidation of a Low Carbon Economy in Agriculture Plan (the ABC Plan);
- The Plan for Reduction of Emissions from Metallurgy;
- Sectorial plans in the areas of: electric energy; urban public transport and modal systems of interstate transport of loads and passengers; transformation industry and the industry of durable consumer goods; industries producing fine and heavy chemicals; and the industries involved in paper and cellulose, mining, agriculture and stockraising.

Besides the provisions relating to adaptation of the National Policy for Climate Change, already incorporated into the Multi-annual

Plan (PPA) 2012-2015, one of the goals proposed by PPA is the construction of a National Program for Adaptation to Climate Change. As a result, in February 2013, a Working Group (WG) was set up to produce a National Adaptation Plan. This WG had to identify and integrate existing knowledge measures, as well as to define guidelines, actions and priorities for adaptation. It was also to support the Executive Group (GEx) of the Inter-Ministerial Committee on Climate Change (CIM), instituted by Federal Decree nº 6,263 of 2007 (BRAZIL, 2007). Among the CIM's objectives is to guide the operation, implementation, monitoring and assessment of the National Plan on Climate Change. For its administration, it has an Executive Group (GEx) whose purpose is to elaborate, implement, monitor and evaluate the National Plan on Climate Change.

The NAP is to be a guidance document, with general guidelines, whose biggest principle is that of "contagion", with a view to the incorporation of these guidelines in the sectorial plans. Other principles include resilience, the "climate lens", the sectorial and territorial approach, the integration of adaptation measures, articulation of federative plans, and incremental implementation (MMA, 2015).

Regarding the participation of civil society in the process of the elaboration of the PNA, this is to occur through the Brazilian Forum on Climate Change (FBMC) which, according to the MMA, is the official body representing civil society, and which acts as a permanent channel for receiving suggestions, information and questions from society. In June 2015, a consolidated version will be forwarded for the evaluation of the Executive Group (MMA, 2014), and, subsequently, for Public Hearing. All documents and contributions sent to the MMA are available on the website <http://www.mma.gov.br/> (MMA, 2015).

6.1 Opportunities for including EbA measures in the NAP

One of the Convention's recommendations for the elaboration of the National Adaptation Plans is that the various options for adaptation available and the costs and benefits of each strategy should be analyzed and – if possible – that the co-benefits in specified options for adaptation should be identified, whether these are economic, social or environmental (UNFCCC, 2012). In this way, Ecosystem-based Adaptation must be considered, whenever possible, as it normally presents much lower costs and because it couples benefits such as biodiversity conservation and maintenance of environmental services with adaptation to climate change.



The Ministry of the Environment, in conducting the elaboration of the National Plan, states that any such Plan's objectives should be:

- To create conditions for local and regional actions;
- To define priorities for sectorial bodies and to inform subnational strategies;
- To define the direction of a considerable proportion of resources and thus to establish cost priorities, seeking efficiency in the national territory;
- To ensure the fairness of the actions throughout national territory.

As established by the Adaptation WG, the thematic divisions which are to make up the National Plan for Adaptation to Climate Change are: Transport and Logistics; Energy; Biodiversity and Ecosystems; Natural Disasters; Coastal Zones; Cities; Food security and Agriculture/Ranching; Industry; Health and Water. The already-existing sectorial plans, inserted in these divisions, shall encompass analyses of vulnerability and measures of adaptation. The MMA intends to use the PNA as a tool of "contagion", such that measures of adaptation may be implanted as part of a broader set of actions, within the already-existing plans for development and decision (MMA, 2015).

The experiences from Brazil and other countries show that EbA measures, or those related to this approach, can be applied, directly or indirectly, in all the thematic divisions proposed by the Adaptation WG. For each one of the ten thematic divisions, examples of opportunities for using EbA measures are provided below. Some of the examples listed were identified with the codes of the projects in which they were applied, as specified in the Annex. Others were identified in the adaptation plans of other countries or regions, studies and references related to the topic.

DIVISION 1: COASTAL ZONE	
Examples of ecosystem services provided	Examples of EbA
<ul style="list-style-type: none"> - Wetlands protect against erosion and storms and serve as nursery grounds for fish that feed coastal populations. - Coral reefs protect the coast against storms and are a source of food and economic resources. - Potable water and food security. - Reduction of carbon emissions and increase in carbon capture. 	<ul style="list-style-type: none"> - Empowerment of local communities for the appropriate management of coastal ecosystems and of the water, and restoration of coastal ecosystems (ALC.09). - Management, recovery and sustainable community use of coastal ecosystems (AF.03; AF.09; AS.01; AS.04). - Climate modeling studies for identification of vulnerable areas (AF.07; AF.09; AS.06). - Implementation of natural adaptation measures



DIVISION 1: COASTAL ZONE

Examples of ecosystem services provided	Examples of EbA
	<p>(e.g. planting of species for stabilizing sand dunes, creation of vegetation barriers for stabilization of coastal erosion, etc.) (AF.10; AS.04; AS.06).</p> <ul style="list-style-type: none"> - Implementation of new technologies for reduction of the pressure from degradation on coastal ecosystems (AF.10). - Construction of a mosaic of protected marine areas (OC.02). - Maintain bands of mangrove forest, sandbars and coral barriers intact, recovering degraded areas (RAO <i>et al.</i>, 2012). - Sustainable managing of fishing through the implementation of: fishing exclusion zones; monitoring and management programs; training of fishing communities regarding climate change (B.03). - Increase the resilience of the coral reefs through: promotion of sustainable tourism; monitoring of the reefs' health; and reduction in release of pollutants and sewage into the sea (B.03).

DIVISION 2: WATER

Examples of ecosystem services provided	Examples of EbA opportunities
<ul style="list-style-type: none"> - Services of water provision and regulation of the water flow. - Protection of hydrographic basins and springs benefits the quality and availability of water by reducing surface draining and consequent silting-up of the rivers. - Reduce risk of floods. 	<ul style="list-style-type: none"> - Recovery and maintenance of natural areas around rivers and springs, particularly near watersheds which supply people with water; maintenance of ecological corridors formed by the riparian forest (B.07; B.09). - Sustainable community management and use of wetlands (AF.03; AF.09). - Implementation of an integrated program for the management of water resources (AS.13). - Explore the potential of policies and measures which extend ecosystems' capacity to store water. - Use of root zone technology for treating sewage in places where there is no conventional treatment of sewage. - Identification of vulnerability to increase in sea level, considering the impact caused by the intrusion of brackish/salt water in watersheds which supply humans and in systems where water is treated for human consumption (OECD, 2015). - Monitoring of subterranean water in sensitive areas (B.03).

DIVISION 3: NATURAL DISASTERS

Examples of effective systemic services provided	Examples of EbA opportunities
<p>Some systemic services which can assist in reducing disasters:</p> <ul style="list-style-type: none"> - Along coasts: wetlands, tidal plains, deltas and estuaries absorb water from mountain zones, storms and tidal waves. - Coral reefs, sand dunes and coastal 	<ul style="list-style-type: none"> - Installation of natural permeable barriers in coastal areas, which break the waves and function as sediment traps, allowing the establishment of wetland vegetation and minimizing the erosive process (ALC.14). - Protection and conservation of wetlands, with a view to increasing resilience against sea level rise,



DIVISION 3: NATURAL DISASTERS

Examples of effective systemic services provided	Examples of EbA opportunities
<p>vegetation reduce the speed and height of the waves and the erosion caused by storms and high seas.</p> <ul style="list-style-type: none"> - Forests influence the interception of rainwater, evapotranspiration, infiltration of water into the soil and the replenishing of the water table, reducing the risk of floods, erosion, silting and droughts, among others. 	<p>hurricanes and floods (AN.03, AF.19, AS.16).</p> <ul style="list-style-type: none"> - Creation of disaster management plans.

DIVISION 4: FOOD SECURITY AND AGRICULTURE/RANCHING

Examples of systemic services provided	Examples of EbA opportunities
<ul style="list-style-type: none"> - Sustainable agriculture measures generate benefits, such as increasing the fertility of the soil, reducing soil erosion, increasing productivity and generation of products, such as fruits, timber and fodder. - Forests can provide products and income for local communities which face threats. - Pollenization is an important ecosystem service which can be improved with the recovery of areas of natural vegetation. 	<ul style="list-style-type: none"> - Increase of productivity with concomitant reduction of deforestation, rehabilitation of degraded areas and the generation of advances in the incorporation of new models and paradigms of agriculture/ranching production (PBMC, 2013). - Improvement in agricultural techniques and in the use of natural resources (AF.02). - Adoption of sustainable agriculture techniques (AF.02; AF.03; AF.11; AF.12; AF.13; AF.15; AF.17; AF.21; AS.07, AN.02). - Removal of populations from areas of risk (e.g. riverbanks, hillsides) transforming these into protected areas or leisure areas, so that they may remain permeable and unoccupied, promoting environmental services (RAO <i>et al.</i>, 2012). - Maintenance of seed banks for studies referent to the adaptation of cultivated species to climate change. - Use of natural techniques for controlling weeds which threaten agriculture. - Monitoring of the impacts which climate change can have on species. - Diversification of cultures, and use of agroforestry systems.

DIVISION 5: ECOSYSTEMS AND BIODIVERSITY

Examples of ecosystem services provided	Examples of EbA opportunities
<p>Regardless of who they are, or where they live, human beings' well-being depends on how the ecosystems function. These provide humanity with a series of services, among which many have an important role in the regulation of the environments (ensuring the flow of water and protection against floods, natural disasters and extreme climate events). Biodiversity has a fundamental role in the production of the services provided by the ecosystems (HAINES-YOUNG; POTSCHIN, 2010).</p>	<ul style="list-style-type: none"> - Improvement of ecosystem management practices (AF.03, AF.09). - Creation of a national strategy for the expansion of protected areas (AF.16), with extension and consolidation of the National System of Protected Areas. - Maintenance of nursery grounds and seed banks with a view to future actions for the adaptation of ecosystems to climate change. - Promote the control of exotic species, principally in protected areas, as climate change may create conditions which are favorable to the establishment of new invasive exotic species. - Conservation of genetic variability of species so as to facilitate adaptation of populations to climate



DIVISION 5: ECOSYSTEMS AND BIODIVERSITY

Examples of ecosystem services provided	Examples of EbA opportunities
	<p>change.</p> <ul style="list-style-type: none"> - Increase the value of forest remnants through: development of tourism in indigenous areas and other protected areas; protection against wild fires; inhibiting and monitoring of hunting and introduction/invasion of exotic species (B.03). - Elaboration of municipal plans for the protection and restoration of forests. - Payment for water provision services in specified localities.

DIVISION 6: CITIES

Examples of ecosystem services provided	Examples of EbA opportunities
<p>Some ecosystem services for urban environments which can arise through the application of EbA measures are: reduction in the risk of natural disasters, carbon sequestration, food security, clean water, absorption of water and improvement in the management of rainwater, purification of the air and removal of pollutants, coastal protection, creation of habitats for important species (e.g. pollinators), regulation of the microclimate, noise reduction and prevention of soil erosion.</p>	<ul style="list-style-type: none"> - Reforestation and the planting of trees in order to reduce heat islands and reduction in surface drainage of water (AF.05). - Increase in green areas (which can include the creation of Urban Conservation Units) and green roofs, among others (AS.08). - Increase in permeable areas, with public policies encouraging the maintenance and increasing of rates of urban permeability. - Lakes as containment basins, linear parks along riverbanks which contribute to the control of floods, also avoiding harm to physical structures (homes, commercial establishments, bridges and sidewalks, among others).

DIVISION 7: TRANSPORT AND LOGISTICS

Examples of ecosystem services provided	Examples of EbA opportunities
<p>The maintenance of the stability of hillsides, the buffering of effects on coastal infrastructure, the reduction of climate variations and the maintenance of river flow are directly related to the presence of natural vegetation.</p>	<ul style="list-style-type: none"> - EbA measures are directly associated with increases in the system's resilience, as the different modes of transport depend on more stable climate conditions, such as temperature variation, windspeed, level of precipitation and water drainage. - Recovery/conservation of hillsides close to roads. - Recovery of the hydrographic basin in order to avoid silting up of ports' canals.

DIVISION 8: ENERGY

Examples of ecosystem services provided	Examples of EbA opportunities
<p>Natural forest coverage contributes to aspects such as: regulation of the climate and the river flow, retention of erosion, treatment of pollution, stability of hillsides and maintenance of biodiversity, among others.</p>	<ul style="list-style-type: none"> - Conservation and recovery of areas of natural vegetation is fundamental, principally for cases such as Brazil, where 70% of the energy generated comes from hydroelectricity. - In case of generation of hydroelectric energy, it is fundamental to create a program for management of the hydrographic basin, including the construction of structures for controlling erosion, the planting of trees and the establishing of committees for management of the basin (AF.15).



DIVISION 9: INDUSTRY

Examples of ecosystem services provided	Examples of EbA opportunities
<p>The ecosystem services, associated with the maintenance of the stability of hillsides, the buffering of effects on the infrastructure, the reduction of climate variation and the maintenance of flow rate are indirectly related to the functioning of industrial activities.</p>	<ul style="list-style-type: none"> - The application of EbA measures to industry can take place through the sector's integration with other measures which indirectly contribute to the resilience of the systems on which industrial activities are dependent. - Foster initiatives such as the Brazilian Business and Ecosystem Services Partnership (PESE) - an initiative between companies and civil society which demonstrates the benefits of the strategic management of ecosystem services for business in Brazil.

DIVISION 10: HEALTH

Examples of ecosystem services provided	Examples of EbA opportunities
<p>The ecosystem services which arise from natural vegetation or from alternatives with green infrastructure act directly and indirectly on health, through regulation of the microclimate, broadening the capacity to absorb rains, retention of soil and treatment of pollution, stabilization of hillsides, control of weeds, and biodiversity, among others.</p>	<p>EbA strategies, associated with health, must be considered holistically, taking into account various other issues such as education, control of vectors and weeds, food security, the types of energy provision, access to water and treatment of sewage, air quality and transport, among others.</p>

Opting for Ecosystem-based Adaptation actions shows integration between the various sectors in the search for a strategy for adaptation to climate change which is appropriate to the teachings from nature for assisting communities to cope with the consequences of climate change, at lower cost and with additional benefits - such as improvement in quality of life and the conservation of nature.

6.2 Recommendations and conclusions

The following factors are considered essential if EbA strategies are to be adopted successfully on a large scale: accessibility of appropriate financing, public-private partnerships, payment for ecosystem services, alignment between the objectives foreseen at local and national levels, and effective collaboration between policy developers, local communities and organizations, as well as political will and support. The insertion of EbA in a national plan is an essential element for encouraging the adoption of EbA throughout Brazil (NAUMANN et al., 2013).



The recommendations presented here condense the state-of-the-art raised in this study and seek to offer practical paths for the institutionalization of this issue in Brazil. Next, as the plans are characterized by defining general guidelines for specified policies, the recommendations in EbA geared towards the National Adaptation Plan will be presented through process recommendations format and political recommendations, which aim for more detailed guidance for implementation of EbA initiatives.

Various countries, and even states and cities, have already elaborated their own Adaptation Plans, considering local vulnerabilities and potentials for implantation of changes. The present study sought to adapt the recommendations of various adaptation plans, taking into account Brazil’s biological and cultural diversity, as well as its political aspects. Also were analyzed guideline documents regarding EbA, extracting information which could be applicable to Brazil. The political recommendations are presented below in summarized form in Table 6, while Table 7 contains the process recommendations.

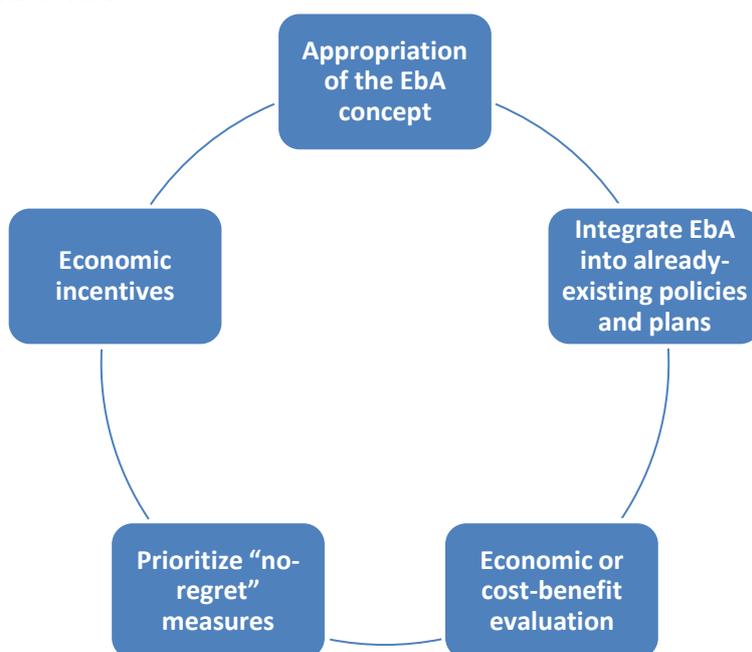


Figure 3 – Political recommendations for including EbA

Table 6 – Political recommendations for EbA, applicable to Brazil

Political recommendations for EbA, applicable to Brazil	
Appropriation of the EbA concept	<p>The concept of EbA must be appropriated by decision-makers in all sectors, rather than only in the environmental area.</p> <p>Present the PNA to decision-makers in various cases, in the public and private sectors and in society.</p> <p>The UNFCCC suggests that Adaptation Plans should encompass informative summaries to be sent to the different sectors involved, such as, for example, texts for the press and public in</p>

	<p>general, and texts accompanied by training for the different actors involved in elaborating public policies at the different levels of government.</p> <p>Encourage funding agencies (the Coordination for the Improvement of Higher Education (CAPES), the National Council of Technological and Scientific Development (CNPq) and State Foundations) to include the EbA strategy in their bids for tender, in particular encompassing cost-effectiveness and cost-benefit assessments. Also suggested are research bids for tender with (non-reimbursable) resources such as the Brazilian National Fund on Climate Change (the Climate Fund), as in the example of the Bio&Clima - Lagamar bid for tender for supporting projects, funded by the Boticário Group Foundation for Nature Protection.</p>
Integrate EbA into already-existing policies and plans	<p>EbA actions and projects and ecosystem services must be integrated into the actions, plans, strategies and public policies among the sectors – in particular those which are most vulnerable and those which benefit from the ecosystem services.</p>
	<p>Emphasis is placed on the National System of Conservation Units, the National Policy for Water Resources, TEEB Brazil, Payment for Environmental Services, the City Statute, Ecological-Economic Zoning, municipal directive plans, with the aim of defining priorities for action in the use and occupation of the soil, associated with climate vulnerabilities.</p>
	<p>Ensure technical and financial support for local governments for EbA actions. Integrated efforts, combining large scale political interventions with small-scale solutions can contribute considerably to greater effectiveness of the efforts in adaptation to climate change.</p>
Economic evaluation, or of cost-benefit	<p>Develop economic assessment tools and modeling for EbA strategies, in order to assist in the decision-making process.</p>
	<p>Develop or adapt effective public policies, with economic incentives for EbA (such as fiscal incentives for companies which adopt practices of conservation and environmental recovery, or market mechanisms, such as Payment for Ecosystem Services).</p>
Prioritize “no-regret” measures	<p>Prioritize adaptation measures which generate environmental, economic and/or social benefits, regardless of the uncertainties linked to the forecasts (“no-regret”)</p>
Economic incentives	<p>Publicize already-existing opportunities for financing, whether public or private, national or international (Green Climate Fund, World Bank, IKI and GEF, among others).</p>
	<p>Revision of legislation with a view to economic incentives (Ecological Sales Tax covering EbA and environmental compensation geared towards EbA actions, among others).</p>
	<p>Encourage the inclusion of EbA in the bids for tender of research funding agencies, as well as in governmental funds.</p>



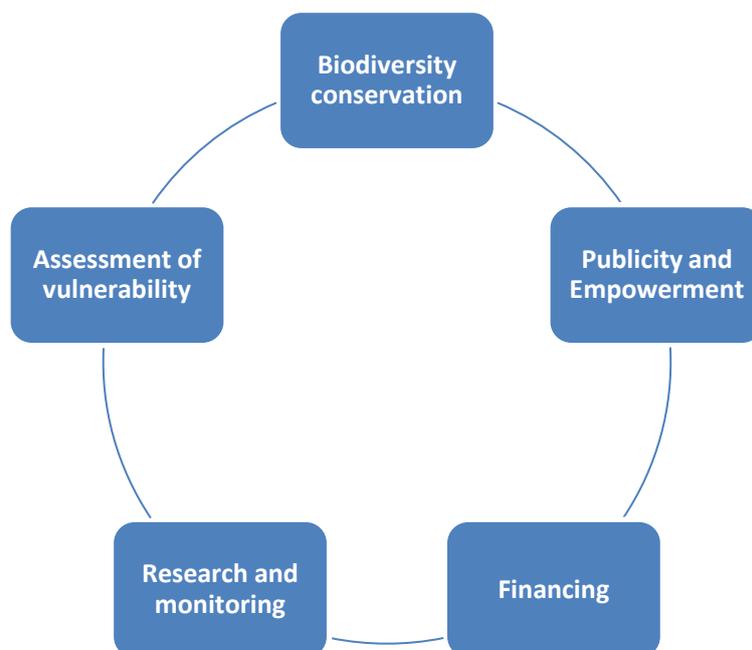


Figure 4 – Process recommendations for EbA actions

Table 7 – Process recommendations for EbA, applicable to Brazil

Process recommendations for EbA actions, applicable to Brazil	
Biodiversity conservation	<p>Prioritize conservation actions or actions for the recovery of ecosystems.</p> <p>Broadening the extent of protected areas allows an increase in the resilience of the ecosystems.</p> <p>Storage of information, gene banks, Protected Areas, among other strategies which allow actions restoring the ecosystem, in the case of modifications of habitats.</p>
Publicity and Empowerment	<p>Publicity and empowerment for local governments (states and municipalities) for the inclusion of PNA guidelines in local policies, emphasizing EbA's potential and cost-benefit assessment.</p> <p>Create channels for communication (forums, councils, etc.) and environments for publicizing and sharing experiences and success cases.</p> <p>Promote educational and training actions related to EbA in communities, in the public sector, and in private organizations, showing the impacts of climate change and the potential of EbA solutions, allied with the cost-benefit.</p>
Financing	<p>Assessment of costs of action/omission in all sectors, seeking the appropriate financing for the actions planned, and prioritizing places of greater vulnerability. Assess how the proposed measures impact on, and interact with, policies in other sectors.</p> <p>Financing of studies establishing the value of ecosystems and cost-effectiveness and cost-benefit analyses. Such analyses can serve as a tool for communication in order to promote and incentivize EbA actions among local communities and those responsible for formulating public policies.</p>
Research and monitoring	<p>Promote studies establishing the value of ecosystems, develop tools for cost-benefit assessment, elaborate goals and appropriate indicators, encouraging monitoring and publicizing of the actions implanted.</p> <p>Consolidate a strategy of research and monitoring of the</p>



	<p>biodiversity and development of scenarios at a detailed level for a more thorough analysis of the changes resulting from the climate.</p> <p>Establish goals for adaptation, and resilience indicators for social and ecological systems, under different scenarios of variability and climate change.</p>
Assessment of vulnerability	<p>Elaborate maps of vulnerability showing potential areas of risk, with level curves identifying the proportion of vulnerability in different degrees of probability of risk, with a view to priority actions in the most vulnerable areas.</p> <p>Create an integrated database for mapping vulnerabilities to climate change (geographical information system) and for evaluation of ecosystem services. Identify EbA's synergies with planning strategies, and foster integration with institutions, such as CEMADEM (National Center for Monitoring and Early Warning of Natural Disasters).</p> <p>In strategic locales, when necessary, use the combination of EbA options and conventional engineering, seeking the greatest reduction of risk possible, especially when the relocation of structures located in areas of risk is not viable.</p>

Adaptation to climate change needs to be incorporated into all the ambits of planning, and Ecosystem-based Adaptation is an intelligent way to bring together actions of adaptation to climate change and biodiversity conservation, with integration of actions and optimization of resources; whenever possible, it must be prioritized in the various spheres of planning, whether governmental or private sector.

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ANNEX



ANNEX – Ecosystem-based Adaptation Projects, by region

BRAZIL

PROJECT	OBJECTIVE	INSTITUTIONS INVOLVED	LEARN MORE
B.01 Ecosystem-based adaptation in marine, terrestrial and coastal regions	Provide examples of how adaptation measures based on different ecosystems can be designed and implemented.	Brazil: Ministry of Environment - MMA, Instituto Nacional de Pesquisas Espaciais-INPE; Philippines: local governments; communities; South Africa: Climate Action Partnership-CAP, South African National Biodiversity Institute-SANBI	http://www.international-climate-initiative.com/en/projects/projects/details/ecosystembased-adaptation-in-marine-terrestrial-and-coastal-regions-114/?b=4,4,30,0,1,0&kw=
B.02 Biodiversity and climate change in the Mata Atlântica, Brazil	Conservation of biodiversity, reduction of greenhouse gases emissions and adapting to climate change in the Atlantic Forest.	Ministry of Environment - MMA, Instituto Chico Mendes de Conservação da Biodiversidade (ICMBio), Pacto pela Restauração da Mata Atlântica	http://www.international-climate-initiative.com/en/projects/projects/details/biodiversity-and-climate-change-in-the-mata-atlantica-brazil-363/?b=4,4,30,0,1,0&kw=
B.03 Plano Municipal de Conservação e Recuperação da Mata Atlântica de Porto Seguro - Bahia	Guiding tool for environmental guidelines for municipal management to integrate projects and actions in line with laws and environmental codes.	Secretaria Municipal de Meio Ambiente - Porto Seguro; Conservation International; GAMBA; Movimento de Defesa de Porto Seguro; SOS Mata Atlântica	http://www.pmma.etc.br/index.php?option=com_jdownloads&Itemid=969&view=finish&cid=441&catid=7
B.04 Increasing the resilience of the Amazon Biome	Make the system of protected areas an integral element of climate change strategies in the Amazon Biome.	RedParques (Rede Latinoamericana de áreas protegidas); Brazil: Ministry of Environment – MMA; Equador: Ministry of Environment; Colombia: Autoridade de Parques Nacionais; Peru: Servicio Nacional de Áreas Naturales Protegidas-SERNANP	http://www.international-climate-initiative.com/en/projects/projects/details/increasing-the-resilience-of-the-amazon-biome-366/?b=4,4,30,0,1,0&kw=
B. 05 Projeto Mata Branca	Contribute to the preservation, conservation and sustainable management of biodiversity of the Caatinga Biome.	Secretaria do Meio Ambiente; Secretaria do Desenvolvimento e Integração Regional; Luís Eduardo Magalhães Foundation-Flem; Conselho Cearense de Política e Gestão do Meio Ambiente	http://www.meioambiente.ba.gov.br/conteudo.aspx?s=BIOMATAB&p=BIODIVER
B.06 Ecological Risk analysis of Paraguai River Basin	Assess the vulnerability of the Basin to climate change and analysis of risks, which may be intensified in the future.	WWF	http://d3nehc6yl9qzo4.cloudfront.net/downloads/26jan12_tnc_wwf_analise_de_risco_po_rtuques.pdf

B.07 Aclimar Project	Designing technologies to help communities and ecosystems of the Urubu Watershed (DF) to better adapt to the effects of climate change.	Instituto HSBC Solidariedade; Movimento Salve o Urubu; Instituto Oca do Sol; Universidade Católica de Brasília; WWF Brasil.	https://www.youtube.com/watch?v=XwBZ9PyFgAs
B.08 Projeto Valorização do mangue em pé na Rota das Emoções	Involve communities in appreciation of the mangrove, increase the resilience of both families and the biome, which is highly relevant to the adaptability of coastal communities to climate change.	CARE Brasil; Projeto Peixe Boi; Embrapa; Universidade Federal do Piauí; Instituto Floravida; NGO's.	http://www.coeplibrasil.org.br/projetosdeadaptacao/publico/visualizarProjeto.aspx?ID=3f4b08b6-0ed3-4766-97e8-676b7fdbd2d9
B.09 Movimento pelas águas do rio Cabaçal (subprojeto do B.07)	Conservation and recovery of Pantanal springs.	WWF - Brasil; Programa Cerrado-Pantanal e Programa Água para a Vida; Universidade Federal do Mato Grosso; Universidade Estadual do Mato Grosso.	http://d3nehc6yl9qzo4.cloudfront.net/downloads/publicacao_cabacal_web.pdf
B.10 Pacto em defesa das cabeceiras do Pantanal	Implement programs to ensure water quantity, quality and regularity for current and future generations and functioning of the wetland ecosystem.	-	http://pactoemdefesadopantanal.blogspot.com.br/p/entenda-o-pacto.html
B.11 Projeto Cerrado Sustentável	Provide biodiversity conservation mechanisms compatible with the agricultural development of the Upper Paraguay River Basin.	Federação da Agricultura Pecuária do Mato Grosso; The Nature Conservancy-TNC; Secretaria de Meio Ambiente de Mato Grosso (Sema-MT)	http://www.agronoticiasmt.com.br/noticias/projeto-cerrado-sustentavel-ja-apresenta-resultados-em-mato-grosso.html
B.12 Recuperação da Mata Ciliar do Rio Cachoeira como Medida de Controle de Inundações no Município de Itabuna, Litoral, Sul da Bahia	Recovery of the riparian forest at Cachoeira River margins and its tributaries to favor the restoration of ecosystem services and minimize the effects of the rains to local people. It involves mapping the areas and capacity building.	Municipality de Itabuna; Secretaria Municipal de Agricultura e Meio Ambiente (Seagrma)	http://prefeituradeitabuna.com.br/2015/noticias/21-agricultura-e-meio-ambiente/1977-projeto-de-reflorestamento-das-margens-do-cachoeira-ganha-destaque-nacional.html

CENTRAL AND LATIN AMERICA

PROJECT	OBJECTIVE	INSTITUTIONS INVOLVED	LEARN MORE
ALC.01 EbA for smallholder subsistence and coffee farming communities in Central America	Assist small farmers in adapting to climate change by identifying and testing EbA strategies. Build local capacity to support such strategies in small farms.	Conservation International; Tropical Agriculture Research and Higher Education Center-CATIE	https://unfccc.int/files/adaptation/application/pdf/eba_coffee_farming.pdf
ALC.02 Enhancing adaptive capacity in semi-arid mountainous regions, Bolivia	Improve understanding of vulnerability and adaptive capacity of local communities in semi-arid highlands of Bolivia considered susceptible to climate change.	The Netherlands Climate Assistance Programme - NCAP	https://unfccc.int/files/adaptation/application/pdf/4eba.pdf
ALC.03 The CEIBA-PILARES project	Sustainable forest management to continue to provide essential services, including the protection of communities against erosion and floods.	Nature and Culture International-NCI	https://unfccc.int/files/adaptation/application/pdf/6eba.pdf
ALC.04 Integrated National Adaptation Plan-Colombia highland ecosystems	Ensure the continuous supply of vital ecosystem services, including regulation of water flow, which are essential for local people.	GEF; World Bank; Conservation International-CI	https://unfccc.int/files/adaptation/application/pdf/8eba.pdf
ALC.05 Drought-resistant agriculture in El-Salvador	Increase the resilience of farmers to the effects of climate change.	Red Cross, UN	https://unfccc.int/files/adaptation/application/pdf/10eba.pdf
ALC.06 Integrating agro-forestry practices in the farming system in Grenada	Integration of agroforestry practices to help communities adapt to floods and storms caused by climate change.	Grenada Gov. and Ministry of Agriculture	https://unfccc.int/files/adaptation/application/pdf/14eba.pdf
ALC.07 Using the Maya Nut Tree to increase tropical agroecosystem resilience to climate change in Central America and Mexico	Use of walnut to increase resilience to climate change.	Maya Nut Institute	http://infoagro.net/archivos_Infoagro/Regatta/biblioteca/EN_maya_nut_0.pdf
ALC.08 Orito Ingi Ande Medicinal Plants Sanctuary	Increase capacity, design and policy measures, implementation of EbA measures.	Colombia Gov.; local communities	https://unfccc.int/files/adaptation/application/pdf/27eba.pdf

ALC.09 Climate Change Governance Capacity: Building Regionally and Nationally Tailored Ecosystem-Based Adaptation in Mesoamerica	Develop good governance and local capacity to adapt to climate change through applied research, awareness raising, community participation, and replication of effective models of integrated water management.	Federal Environment Ministry of Germany; International Union for Conservation of Nature-IUCN	https://cmsdata.iucn.org/downloads/ecosystem_based_adaptation_english_baja_1.pdf
ALC.10 EcoADAPT - Ecosystem-based strategies and innovations in water governance networks for adaptation to climate change in Latin American landscapes	Strengthen the adaptive capacity of regions in Latin America, aid the development of EbA strategies combining actions such as scenario analysis, exchange of experiences and watershed management.	EcoAdapt	http://cordis.europa.eu/project/rcn/100411_en.html
ALC.11 Mountain Ecosystem-Based Adaptation Project	Strengthen the country's capacity to identify and implement EbA measures to reduce the vulnerability of local communities that inhabit the montane ecosystems to climate change.	UNEP; UNDP; IUCN; Peru Ministry of Environment; Ministry of Economics of Peru.	http://www.pnuma.org/eba/Brochure_EN_VF.pdf
ALC.12 Joint Programme for Integration of Ecosystems and Adaptation to Climate Change in the Colombian Mountains	Protection of ecosystem services in the upper portion of the basin of the Cauca River to mitigate the effects of climate change and achieve the Millennium Development Goals.	-	http://www.cifor.org/publications/pdf_files/infobrief/3273-infobrief.pdf
ALC.13 Adaptation for Smallholders to Climate Change - AdapCC	Help coffee and tea farmers in developing strategies to deal with the risks and impacts of climate change.	GIZ; Cafédirect.	https://unfccc.int/files/adaptation/application/pdf/cafe_direct.pdf
ALC.14 Bolivia's National Climate Change Adaptation Mechanism	Reduce vulnerability to climate change in different sectors and a sector plan for adaptation program.	-	https://unfccc.int/files/adaptation/sbsta_agenda_item_adaptation/application/pdf/bolivia_rome_poster.pdf
ALC.15 Reduction of vulnerability to coastal flooding through ecosystem-based adaptation in the south of Artemisa and Mayabeque provinces	Reduce the vulnerability of communities in coastal areas of Artemisa and Mayabeque provinces to climate change related to coastal erosion, flooding and saltwater intrusion into the rivers.	Adaptation Fund, UNDP	http://www.undp-alm.org/projects/af-cuba

NORTH AMERICA

PROJECT	OBJECTIVE	INSTITUTIONS INVOLVED	LEARN MORE
AN1. Edmonton's urban forest management plan	Create a sustainable urban forest, to help people adapt to climate change.	Edmonton Municipality	https://unfccc.int/files/adaptation/application/pdf/9eba.pdf
AN2. Agriculture in the lower flint river basin, Georgia, USA	Reducing the vulnerability of the agricultural ecosystem drought and extreme precipitation events.	The Nature Conservancy-TNC	https://unfccc.int/files/adaptation/application/pdf/12eba.pdf
AN3. New Orleans: Preserving the wetlands to increase climate change resilience	Increase resilience against rising sea levels, hurricanes and floods.	New Orleans Governm.	https://unfccc.int/files/adaptation/application/pdf/24eba.pdf
AN4. Building Interactive Decision Support to Meet Management Objectives for Coastal Conservation and Hazard Mitigation on Long Island, New York	Build an information platform to support the local decision making process and the implementation of EbA measures.	Consortium for Climate Risk in the Urban Northeast - CCRUN	http://ccrun.org/node/1904
AN5. Gwaii Haanas National Park and Haida Human Heritage	Restoration of ecological integrity of the park to ensure the re-establishment and self-sufficiency of salmon populations, power supply and resources.	Gwaii Haanas National Park and Haida Human Heritage	http://www.parks-parcs.ca/english/CPC%20Climate%20Change%20Report%20FINAL%20engLR.pdf
AN6. Sudbury consortium on climate change	Ensure that the city of Sudbury is able to adapt to climate change.	Sudbury Municipality	http://www.sudburyclimateaction.ca/en/

AFRICA

PROJECT	OBJECTIVE	INSTITUTIONS INVOLVED	LEARN MORE
AF1. Using Ecosystem-Based adaptation actions to tackle food insecurity	Use EbA to make local communities resilient to climate change and to ensure recovery and sustainable use of mangrove ecosystem.	United Nations Environment Programme UNEP; Centre for Sustainable Development of Coastal Zones	http://www.seachangeop.org/sites/default/files/documents/2013%2001%20Using%20Ecosystem-Based%20Adaptation%20Actions%20to%20Tackle%20Food%20Insecurity.pdf
AF2. Adapting to Climate Change through Increased Water and Nutrient Use Efficiency for Increased Crop Productivity and Environmental Health	Promoting increased food security through more efficient use of water and nutrients.	National Agricultural Research Laboratory (NARL); Climate Change Adaptation and Development (CC DARE)	http://www.mdpi.com/2071-1050/3/9/1510

AF3. Ethiopia's National Adaptation Programme of Action	National Adaptation Plan, includes EbA to Ethiopia.	United Nations Development Programme UNDP, GEF	http://unfccc.int/resource/docs/napa/eth01.pdf
AF4. Pangani River Basin Management Project	Improve water management.	Pangani Basin Water Board; IUCN; Netherlands Development Organization - SNV; ONG PAMOJA; Tanzania Gov.; European Commission; UNDP.	http://www.panganibasin.com/index.php/prbmp/organization/towards_integrated_water_resource_management/
AF5. Durban's Municipal Climate Protection Programme	Adapt the city of Durban to the effects of climate change.	At first: Danish International Development Agency (DANIDA). Nowadays: eThekweni Metropolitan Municipality	http://eau.sagepub.com/content/24/1/167.full.pdf+html
AF6. Opportunities for Ecosystem-based Adaptation in Eastern Africa	Ensure that strategies and policies related to climate change culminate in adaptation activities that emphasize the role of forests and water resources in the survival of human populations.	IUCN; Ministry of Foreign Relations Finland	http://cmsdata.iucn.org/downloads/iucn_eba_brochure.pdf
AF7. Integrated Coastal Zone Management (ICZM)	Integrated coastal zone management in order to adapt to climate change.	International Council for Local Environmental Initiatives-ICLEI and local governments	http://www.unep.org/regionalseas/publications/series/unep-rsp-info-series.pdf
AF8. African Wetlands at Hadejia-Nguru, Nigeria	Combat the reduction of wetlands caused by climate change.	BirdLife Nigeria	https://portals.iucn.org/library/efiles/documents/2011-063.pdf
AF9. Ecosystem-based adaptation in marine, terrestrial and coastal regions as a means of improving conserving biodiversity in the face of climate change	Use EbA for biodiversity conservation and improved livelihoods of communities.	Conservation South Africa (Conservation International)	https://unfccc.int/files/adaptation/application/pdf/eba_marine_terrestrial_coastal.pdf
AF10. Responding to shoreline change and its human dimensions through integrated coastal area management	Increase the resilience of coastal ecosystems to climate change, to promote the conservation of fishing resources.	United Nations Development Programme-UNDP, Global Environment Facility-GEF, United Nations Organization for Education, Science and Culture-UNESCO	https://unfccc.int/files/adaptation/application/pdf/1eba.pdf
AF11. Coping with drought and climate change in the Chiredzi District	Promote adaptation among subsistence farmers located in dry areas.	Zimbabwe Gov. and United Nations Development Programme -UNDP	https://unfccc.int/files/adaptation/application/pdf/7eba.pdf
AF12. Kikuyu Escarpment Forest	Reduce the loss of forests helping communities to diversify their livelihoods and adapt to climate change.	Nature Kenya; Kenya Forest Service	https://unfccc.int/files/adaptation/application/pdf/17eba.pdf

AF13. Assessing the impacts of climate change on Madagascar's biodiversity and livelihoods	Vulnerability analysis to build an adaptation program for communities and ecosystems.	Madagascar Gov.; USAID; Conservation International; WWF	https://unfccc.int/files/adaptation/application/pdf/19eba.pdf
AF14. Ecosystem based Adaptation in Seychelles	Reduce the vulnerability of Seychelles to climate change by focusing on two key points: water shortages and floods.	United Nations Development Programme-UNDP	https://www.adaptation-fund.org/sites/default/files/RESUBMISSION_AF%20Propoal%20EBA_Seychelles_15Jan2014.pdf
AF15. Maintenance of hydropower potential in Rwanda through ecosystem restoration	Restoration of Rugezi river basin seeking greater resilience of the hydroelectric generation system to climate change.	Ruanda Gov.	https://unfccc.int/files/adaptation/application/pdf/32eba.pdf
AF16. South Africa: ecosystem-based planning for climate chance	Incorporate information on biodiversity on land use planning and decision making, to reduce the vulnerability of ecosystems and people to the effects of climate change.	South Africa Gov.	https://unfccc.int/files/adaptation/application/pdf/33eba.pdf
AF17. Community based rangeland rehabilitation	Rehabilitate pastures and promote alternative sources of survival to help communities adapt to droughts.	United Nations Development Programme-UNDP; GEF	https://unfccc.int/files/adaptation/application/pdf/34eba.pdf
AF18. PRESENCE - Participatory Restoration of Ecosystem Services and Natural Capital	Create landscapes where agriculture, nature conservation and tourism can co-exist sustainably; while at the same time the effects of climate change are mitigated.	South Africa Gov.; Netherlands Gov.	https://portals.iucn.org/library/efiles/documents/CEM-009.pdf
AF19. Fighting to Cope with Climate Change and Drought in the Faguibine System, Northern Mali	Rehabilitation and sustainable management of Faguibine system, affected by climate change impacts.	United Nations Environment Programme-UNEP	https://portals.iucn.org/library/efiles/documents/CEM-009.pdf
AF20. Adaptation to Climate Change in the Nile Delta through Integrated Coastal Zone Management	Increasing the resilience of Egypt and reducing vulnerability to the impacts of climate change.	United Nations Development Programme-UNDP	http://www.undp.org/content/dam/undp/documents/projects/EGY/00057676_Adaptation%20to%20CC%20in%20the%20Nile%20Delta%20Throug h%20ICZM.pdf
AF21. Segurança alimentar em Burkina Faso	Recovery of degraded rural areas to increase production.	-	http://www.climateaccess.org/sites/default/files/Munang_Ecosystem-based%20Adaptation_1.pdf
AF22. Rehabilitation of water reservoirs in Togo	Rehabilitation of water reservoirs.	-	http://www.climateaccess.org/sites/default/files/Munang_Ecosystem-based%20Adaptation_1.pdf

ASIA

PROJECT	OBJECTIVE	INSTITUTIONS INVOLVED	LEARN MORE
AS1. Unlocking ecosystem based adaptation opportunities in coastal Bangladesh	Reducing vulnerability to climate change by increasing the resilience of coastal forests and adaptability of communities.	Bangladesh Gov., United Nations Development Programme-UNDP, Global Environment Facility - GEF	http://connection.ebscohost.com/c/articles/92563162/unlocking-ecosystem-based-adaptation-opportunities-coastal-bangladesh
AS2. Sustainable Livelihoods Enhancement and Diversification to Reduce Pressure on the Bar Reef Ecosystem	Pressure reduction on coral reefs through the expansion and strengthening of programs aimed at increasing the sustainability of livelihoods.	Sri Lanka Foundation of Marine and Coastal Resources; IUCN.	http://www.reefresilience.org/case-studies/sri-lanka-sustainable-livelihoods/
AS3. Community-based coastal habitat restoration in tsunami- affected coastal areas of Indonesia	Restoration and management of coastal ecosystems damaged by tsunami.	Oxfam Novib (Netherlands); Wetlands International; WWF, IUCN; Both ENDS.	http://cmsdata.iucn.org/downloads/iucn_eba_brochure.pdf
AS4. Mangroves in Vietnam	Planting mangrove species for protection against damage caused by waves, wind and typhoons.	Vietnam Red Cross	http://www.unep.org/regionalseas/publications/series/unep-rsp-info-series.pdf
AS5. Adaptive Ecosystem Management to Improve Resilience to Climate Change in Fiji	Develop a flexible and responsive governance model for a network of protected coral reefs.	Wildlife Conservation Society-WCS, Fiji Gov. and civil society.	https://portals.iucn.org/library/efiles/documents/2011-063.pdf
AS6. Ecosystem-based adaptation in marine, terrestrial e coastal regions as a means of improving conserving biodiversity in the face of climate change	Working with EbA in order to contribute to the livelihoods of communities and biodiversity conservation in the face of climate change.	Conservation International	https://unfccc.int/files/adaptation/application/pdf/eba_marine_terrestrial_coastal.pdf
AS7. Jordan Valley Permaculture Project	Improve human and environmental conditions in the Jordan Valley using low-tech measures and reduced cost.	National Center for Agricultural Research and Transfer of Technology, Jordan e Permaculture Research Institute of Australia	https://unfccc.int/files/adaptation/application/pdf/16eba.pdf
AS8. Nagoya water revitalisation plan	Restabilize the natural water cycle in order to manage the flow and water drainage to reduce the vulnerability of cities to floods caused by climate change.	Nagoya Municipality	https://unfccc.int/files/adaptation/application/pdf/23eba.pdf

AS9. Nomadic herders: enhancing the resilience of pastoral ecosystems and livelihoods	Increase the resilience of grassland ecosystems (creation of yak and reindeer) and nomadic communities to the effects of climate change.	UNEP/GRID-Arendal; Association of World Reindeer Herders; Uarctic; EALAT Institute	https://unfccc.int/files/adaptation/application/pdf/25eba.pdf
AS10. Conservation and management of high altitude peatlands of Ruoergai marshes for water security and climate change adaptation	Management of wetlands for water availability and improve communities livelihood.	Wetlands International	https://unfccc.int/files/adaptation/application/pdf/31eba.pdf
AS11. Adaptaion to climate change impacts in the Syunik mountain forest ecosystem of Armenia	Incorporation of adaptation to climate change to forest management to increase forest resilience to climate change; ensuring continuity of supply of ecosystem services to local communities.	Armenia Gov.; GEF; UNDP	https://unfccc.int/files/adaptation/application/pdf/35eba.pdf
AS12. Tonle Sap	Increase ecosystem resilience to altered patterns of precipitation and reduce the vulnerability of people who depend on it.	Conservation International; Camboja Gov.	https://unfccc.int/files/adaptation/application/pdf/37eba.pdf
AS13. Mainstreaming Adaptation within Integrated Water Resources Management (IWRM) in Small Island Developing States (SIDS)	Assist communities in adapting to floods and enable them to better management of water resources.	Lydia Press Research Grant, Central European University Travel Grant and European Commission Erasmus Mundus Scholarship Award	https://portals.iucn.org/library/efiles/documents/CEM-009.pdf
AS14. Building with Nature Indonesia - reaching scale for coastal resilience	Create a natural barrier on the north coast of the island of Java in order to stop the severe erosion process.	Wetlands International; Deltares; Ministry of Fishery of Indonesia	http://www.wetlands.org/Portals/0/publications/Count%20Form/Brochure/WI_brochure%20Building%20with%20Nature%20Indonesia_web.pdf
AS15. Ecosystem Based Adaptation Approach to Maintaining Water Security in Critical Water Catchments in Mongolia	Keep the water supply of mountain ecosystems and savanna.	UNDP; Ministry of Environment and Tourism of Mongolia	https://www.adaptation-fund.org/project/1630-ecosystem-based-adaptation-approach-maintaining-water-security-critical-water-catchment
AS16. A comparative analysis of ecosystem-based adaptation and engeneering options for Lami Town, Fiji	Comparative study of EbA alternatives and conventional engineering to adapt to urban environments in coastal areas to flooding caused by climate change.	UNEP; Secretariat of the Pacific Regional Environment Programme-SPREP	http://www.wetlands.org/Portals/0/publications/Count%20Form/Brochure/WI_brochure%20Building%20with%20Nature%20Indonesia_web.pdf

ANTARTIC

PROJECT	OBJECTIVE	INSTITUTIONS INVOLVED	LEARN MORE
AT1. Impacts and ecosystem-based adaptation in the Antarctic and Southern ocean	Creation and implementation of adaptation strategies.	The Antarctic and Southern Ocean Coalition-ASOC	https://portals.iucn.org/library/efiles/documents/CEM-009.pdf

EUROPE

PROJECT	OBJECTIVE	INSTITUTIONS INVOLVED	LEARN MORE
E.01 CARPIVIA project: Carpathian integrated assessment of vulnerability to climate change and ecosystem-based adaptation measures	Assess the vulnerability of the Carpathian region to climate change combined with other anthropogenic pressures and identify potential adaptation measures focusing on EbA.	Wageningen University; ECNC; ECORYS; GRONTMIJ; WWF; European Commission.	http://www.carpivia.eu/
E.02 WAVE project – Water Adaptation is Valuable to Everyone	Provide a better understanding of the impacts of climate change on water systems as well as the actions of adaptations that will be required.	Somerset Municipal Council; Farming and Wildlife Advisory Group-FWAG; Royal Society for the Protection of Birds-RSPB; Somerset Drainage Boards Consortium-SDBC and Somerset Wildlife Trust-SWT.	http://www.somersetwave.co.uk/
E.03 The Protective capacity of forests against snow Avalanches	Recognize the protection capacity of forests against avalanche of snow and landslides and increase its resilience to the effects of climate change.	Switzerland Gov.	https://unfccc.int/files/adaptation/application/pdf/3eba.pdf
E.04 Managed realignment and the reestablishment of saltmarsh habitat, Freiston shore, UK	Recover a large agriculture area into coastal wetlands in order to reduce the risk to flooding and habitat creation.	Environment Agency; Royal Society for the Protection of Birds-RSPB	https://unfccc.int/files/adaptation/application/pdf/11eba.pdf
E.05 Netherlands Ooijpolder climate buffer project	Adaptation to floods and climate change.	ARK Nature; Rivierenland Water Board; BirdLife Netherlands; National Forest Service; land owners	https://unfccc.int/files/adaptation/application/pdf/26eba.pdf
E.06 Ecosystem-based adaptation by small-holder farmers in Roslagen, Sweden	EbA measures to diversify production and increase the resilience of the region to uncertain weather conditions and possible disturbances.	-	https://unfccc.int/files/adaptation/application/pdf/30eba.pdf
E.07 Ecosystem-based coastal defense in the face of global change	EbA for flood protection.	-	http://www.nature.com/nature/journal/v504/n7478/pdf/nature12859.pdf

E.08 Green and Blue Space Adaptation for Urban Areas and Eco Towns (GRaBS) project	Regional spatial planning and urban design to make communities less vulnerable to temperature rise and flooding.	14 partners from 8 European countries	http://www.grabs-eu.org/
E.09 From restoring seaside towards integrated coastal adaptation-France	Combat coastal erosion.	EU and others	http://projects.eionet.europa.eu/training-material/library/demo-only/adaptation-in-europe/2.5-combined-adaptation-actions
E.10 Sustainable River Catchments in the South East-SuRCaSE	The project aims to demonstrate the sustainability of the management of water resources in southeast England can be improved through the application of Ecosystem Approach 12.	SWIMMER (University of Liverpool), UK Southern Water, UK Mid Kent Water, UK Westcountry Rivers Trust, UK Environment Agency, UK English Nature, UK European Union's Life Environment Programme	http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=home.createPage&ref=LIFE04%20ENV/GB/000807&area=2&yr=2004&nproj_id=2763&cfid=16603803&cftoken=fcd000dec6ff810a-B1E4D03B-03C3-2148-460C54C1AACBE5D3&mode=print&menu=false
E.11 Cornwall Rivers Project	Rehabilitation of key rivers and water supply areas in Cornwall aiming economic benefits to the communities involved.	European Agriculture Guidance and Guarantee Fund; European Union	http://www.cornwallriversproject.org.uk/
E.12 The Great Fen project	Restore more than 3,000 hectares of wetlands in southwest England.	Environment Agency; Huntingdonshire Distr.; Middle Level Commissioners; Natural England; Wildlife Trust For Bedfordshire, Cambridgeshire and Northamptonshire	http://www.greatfen.org.uk/
E.13 Restoration of Danube river banks	Restoration of river banks.	Wasserstrassendirektion Wien-Via Donau, Austria	http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=search.dspPage&nproj_id=1967
E.14 The Renaturation of the Regge River	Restoration and renaturalisation of rivers, recovery of flood plains.	EU, National Ecological Pathways Systems (EHS)	http://watergovernance.s3.amazonaws.com/files/Regge-River.pdf
E.15 Sustainable Development of Floodplains (SDF) project	Recovery of the Rhine River catchment area to ensure the sustainable development of their flood plains.	European INTERREG, 12 partner institutions, from German and Netherlands	http://www.sciencedirect.com/science/article/pii/S1462901105000377
E.16 Lower Danube Green Corridor	Protection and restoration of one thousand km at the Lower Danube River providing 1.4 million hectares in water security, flood control and recreational opportunities for an area of 29 million people in the Danube Delta.	WWF	http://wwf.panda.org/what_we_do/where_we_work/black_sea_basin/danube_carpathian/our_solutions/freshwater/floodplains/lower_danube_and_danube_delta/

OCEANIA

PROJECT	OBJECTIVE	INSTITUTIONS INVOLVED	LEARN MORE
OC1. The West Arnhem Land Fire Abatement Project	Fire management for disaster control.	Darwin Liquefied Natural Gas Pty, The Northern Territory Government, Aboriginal Traditional Owners and others, Northern Land Council, Northern Territory Bushfires Council e Tropical Savannas CRC	http://cmsdata.iucn.org/downloads/iucn_eba_brochure.pdf
OC2. Transforming Coral Reef Conservation	Recognize the threat that climate change poses to marine ecosystems and advise how to build a large mosaic of marine protected areas.	The Nature Conservancy-TNC	http://www.reefresilience.org/pdf/Kimbe_MPA_Scientific_Workshop_Report.pdf
OC3. Strengthening the Ability of Vulnerable Island Communities to adapt to climate change	Increasing the resilience through better management of resources.	AusAID. The Wildlife Conservation Society (WCS), Oxfam International e Research and Conservation Foundation of PNG	https://portals.iucn.org/library/efiles/documents/2011-063.pdf
OC4. Integration of climate change risk and resilience into forestry management (ICCRIFS)	Increase the resilience and adaptive capacity of forest areas and communities that depend on its ecosystem services.	Least Developed Countries Fund. GEF; UNDP. Ministry of Natural Resources and Environment, Ministry of Agriculture and Fisheries.	https://unfccc.int/files/adaptation/application/pdf/15eba.pdf
OC5. Increasing taro crop diversity	Vulnerability reduction in Taro production, a tropical plant important for people alimentation, to pests, drought and high salinity conditions expected under a scenario of climate change.	Secretariat of the Pacific Community (SPC), AusAid, Australian Centre for International Agricultural Research	https://unfccc.int/files/adaptation/application/pdf/36eba.pdf
OC6. Whangamarino wetlands	Wetlands restoration to increase resilience of ecosystems. The project has been going on since 1990 and is already proving benefits, wetlands that have been recovered don't suffer effects of flooding anymore.	Government of New Zealand (Department of conservation)	https://unfccc.int/files/adaptation/application/pdf/38eba.pdf