Policy Briefings

BASQUE CENTRE FOR CLIMATE CHANGE
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THE ADOPTION OF ECOSYSTEM-BASED ADAPTATION IN THE INTERNATIONAL CLIMATE AGENDA

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Ecosystem-based adaptation is still a relatively new scientific and policy concept, but it is deeply rooted in long-standing approaches applied locally by communities worldwide, in response to climate changes, as well as based on lessons learnt from nature conservation, especially community-based and ecosystem-based management. This policy briefing introduces basic notions to understand the recent and growing demand for ecosystem-based adaptation to climate change and why it is a very interesting option for adaptation policy.

Key Points

- *There is a growing recognition of the role that healthy ecosystems play in helping people to adapt to climate change through the delivery of ecosystem services.*
- *Ecosystem-based Adaptation promotes the sustainable use of biodiversity and ecosystem services to adapt to climate change.*
- *Ecosystem-based Adaptation is emerging on the international agenda but more evidence from the field is needed to understand the potential range of benefits.*
- *Examples of Ecosystem-based Adaptation show that these measures have been successfully implemented and can be cost-effective alternatives and/or complements to more traditional adaptation options.*
- *Challenges and future needs are discussed in order to incorporate Ecosystem-based Adaptation into national and regional adaptation policies.*

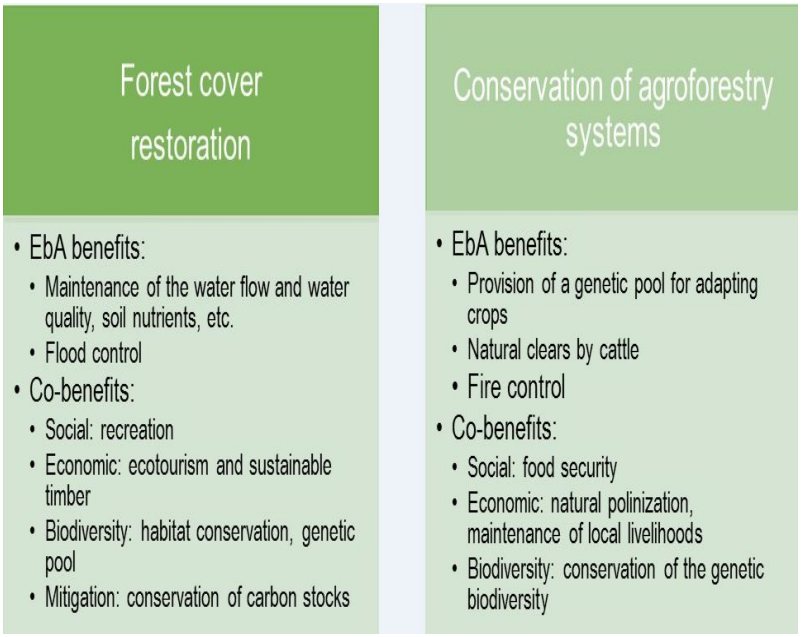
Ecosystem-based Adaptation consists on the protection and sustainable use of biodiversity and ecosystem services to help people and communities adapt to the negative effects of climate change. Ecosystem-based Adaptation (EbA here onwards) offers a valuable yet unexploited approach for climate change adaptation, complementing traditional actions, such as infrastructure development, by acknowledging the benefits of natural ecosystems on the regulation and provision of ecosystem services. This alternative is not simply about saving pristine ecosystems, but rather about using them to help people and conserve the resources on which they depend. For example, restoring vegetation in wetlands can decrease the risk of flooding and maintain biodiversity and aesthetic values, as opposed to building a dam.

Ecosystem-Based Adaptation (EbA) has been defined in the Convention on Biological Diversity as the use of "...biodiversity and ecosystem services in an overall adaptation strategy. It includes the sustainable management, conservation and restoration of ecosystems to provide services that help people adapt to the adverse effects of climate change."

CBD Ad Hoc Technical Expert Group (AHTEG) 2008-2009

Benefits of an Ecosystem-based Approach

The concept of using ecosystems as a basis to adapt to the impacts of climate change has emerged as an important technology in the adaptation 'toolbox', and EbA approaches are increasingly being implemented and recommended worldwide. Three forms of EbA have been defined (Munang et al., 2013): targeted management, conservation and restoration activities. Examples of EbA approaches are the restoration of the forest cover and the conservation of agroforestry systems (F1). The next figure presents two potential examples of EbA with the associated benefits and co-benefits.



F.1. Two examples of potential EbA measures and their co-benefits

Despite this rise, the potential of EbA is not yet fully recognized by national governments and more implementation and evidence is needed. In order to help incentivize the use of EbA some of the main advantages are summarized here:

•Systems perspective: it plans both for people and biodiversity, recognizing the interactions where well-managed, resilient ecosystems can provide services that enable people to adapt to the impacts of climate change.

• Resilience: Resilience is understood as the ability of a system to maintain key functions and processes in response to stressors by either resisting or adapting to change; and can be used to describe both ecological and social systems. EbA is about making the systems resilient to changes as opposed to avoiding those changes .

• Reducing threats: it aims at reducing other major threats to ecosystems, which when compounded with the effects of climate change would push a system beyond its ability to function properly. For example, climate change will have a greater impact on overexploited stocks as compared with healthy populations.

• Applicability: it has been shown to be effective for adaptation across sectors, contributing to livelihood sustenance and food security, sustainable water management, disaster risk reduction and biodiversity conservation. Additionally, EbA approaches consider that both natural and managed ecosystems can reduce vulnerability to climate-related hazards and gradual climatic changes.

• No-regrets options: restoring, conserving and enhancing ecosystems are always options that, although uncertainty is important, will carry benefits and are not irreversible.

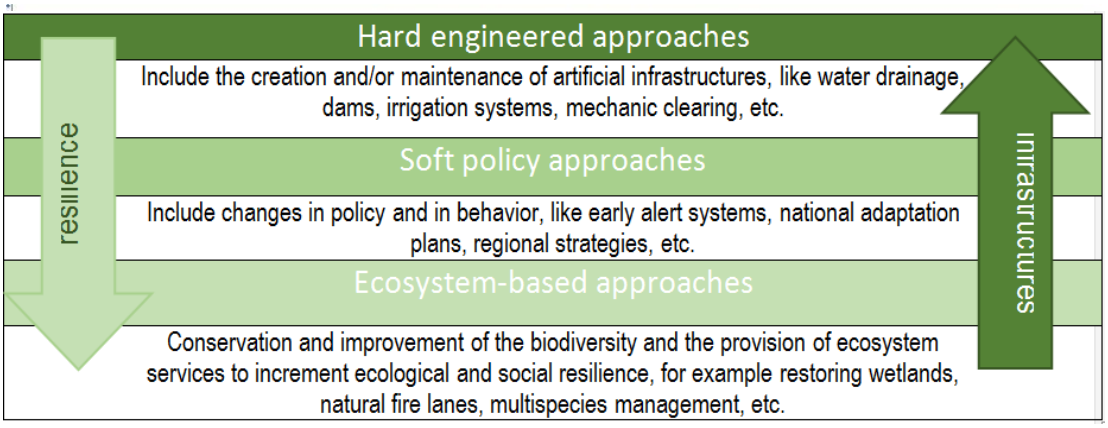
• Co-benefits: In addition to protection from climate change impacts, EbA also assures many other benefits to communities, for example through the maintenance and enhancement of ecosystem services crucial for livelihoods and human well-being, such as clean water and food, or through mitigation co-effects.

Ecosystem-based Adaptation in International Policy

Major international environmental policy players are beginning to recognize the connection between healthy ecosystems and resilience to climate change. International organizations and institutions, both from the environmental and development sectors, have engaged in research and implementation of EbA during the last decade. These include, among others: the United Nations Framework Convention on Climate Change (UNFCCC), the United Nations Environment and Development Program (UNEP, UNDP) or the Convention on Biological Diversity (CBD) as relevant institutions, and Conservation International (CI), the World Wide Fund for Nature (WWF), the International Union for the Conservation of Nature (IUCN), the Nature Conservancy (TNC), Birdlife international (BI), the World Resources Institute (WRI), the World Bank (WB) or the Global Environment Facility (GEF) as international organizations. This rise is due to a number of reasons: 1) adaptation is increasingly important on the face of a post-Kyoto era where no agreements on the reduction of Greenhouse Gases (GHG) is in place and where only mitigation policies have been

mainstreamed for natural ecosystems so far (such as REDD+); 2) adaptation can be key for development in most vulnerable countries; 3) resilience is recognized as a very important factor for socio-ecological systems; and 4) there is already evidence on the cost-effectiveness of EbA approaches.

On a post-Kyoto era, where climate policies have so far been directed at mitigation, adaptation is gaining attention and international agreements are staring to commit important finance flows. On the 16th UNFCCC Conference in 2010, the first international agreement on Adaptation set the International Adaptation fund with $160 million. Since then, countries have committed $2.73 billion in adaptation funds to third countries, including all sectors, water, energy, health, not only ecosystems and through different channels (Schalatek et al. 2012). This is an important amount but yet smaller than the $7 billion committed to REDD+, for example, that only focus on the forestry sector and mitigation (Simula, 2010). Adaptation in ecosystems mainly consists on soft and hard options involving huge costs and irreversible infrastructure, where EbA is still a secondary goal (figure 2).



Isolating the climate finance that goes to EbA is still difficult as no general EbA investments are in place, but different initiatives exist. For example, the UNFCCC set up the Nairobi work program in 2005 to assist all countries in assessing the impacts of climate change and the practical adaptation actions (UNFCCC, 2011), including EbA with examples on the evidence of EbA worldwide from the work done by partner institutions. UNEP has teamed up with the UNDP and the IUCN to establish the Ecosystem Based Adaptation Flagship Program, which includes, among its activities, the development of pilot EbA approaches and comparisons of the costs and cost-effectiveness of EbA with other adaptation strategies (UNEP, 2012). A recent UNDP and GEF report on adaptation states that EbA will play an increasingly important role as part of the UNDPs integrated adaptation investment strategy (UNDP, 2010). The World Bank is among the organizations that have seen the number of projects and programs that emphasize the linkages between ecosystems and climate change increase in the last decade. Since 2009, many members of IUCN have promoted the use of EbA as a practical tool for climate change adaptation. In fact, evidence suggests that EbA can be cost-effective and may be a better alternative than other adaptation measures in economic terms (F3).

Adaptation measure	ES maintained	Soft measures	Hard measures	EBA
Coastal erosion control	storm protection erosion control recreation and aesthetic nutrient cycling production of atmospheric oxygen soil formation and retention water cycling	beach drainage restoration	seawalls breakwaters seawalls heighten dykes and floodwalls	beach nourishment artificial sand dunes brush mattressing re-vegetation wetland restoration mangrove forestation and conservation coral reef conservation
Coastal biodiversity and ecosystem conservation	food, fibre and fuel recreation and aesthetic nutrient cycling storm protection erosion control genetic resources invasion resistance seed dispersal	reef restoration slow-forming terraces	artificial reef construction	marine protected areas
Agricultural soil conservation and management	erosion control food, fibre and fuel water cycling nutrient cycling soil formation and retention	conservation tillage		slow-forming terraces integrated nutrient management
Agricultural sustainable crops & farming and agrobiodiversity conservation	food, fibre and fuel pest and disease control genetic resources seed dispersal pollination nutrient cycling soil formation and retention production of atmospheric oxygen climate regulation water cycling		chemical pest management inorganic fertilizers micro-irrigation drip-irrigation	crop diversification ecological pest management mixed farming agro-forestry
Water resources improvement	Freshwater provision, water cycling, soil formation and retention, food fibre and fuel		Bores/tube wells for domestic water supply during droughts Desalination Protecting wells to flooding with bunds Rainwater harvesting from rooftops	Rainwater collection from micro catchments, small reservoirs Catchment thinning

F3. Examples of soft, hard and ecosystem-based adaptation measures to climate change impacts.

Gaps in policy and research

Despite existing efforts, EbA is still seen as a complement to hard and soft adaptation measures and not as a substitute policy choice. This situation may be influenced by the short history of EbA in climate change (although EbA-like approaches have been implemented for conservation and development for decades), together with the lack of scientific evidence on the efficiency and effectiveness of the interventions. Here we synthesize the main challenges for a potential mainstreaming of EbA as an important pillar for national and global adaptation policy:

• Technology: there is a lack of information on EbA technologies in comparison to more 'traditional' adaptation technologies. While an increasing number of EbA resources are becoming available, information has not been yet collated to allow easy access for those who need to inform the decision making process.

• Effectiveness: on the ground data availability to assess effectiveness is still very limited and not enough to generalize findings. While the theoretical qualities or principles that underlie effectiveness are well defined, there remains limited robust evaluation in practice, and establishing an evidence base for decision making with respect to EbA remains a challenge.

• Uncertainty: there are constraints to implementing EbA that have to do with the lack of information; the uncertainty of how ecological processes will react to both climate change and different managements; the tipping points of socio-ecosystems; a lack of adequate institutions, technology and funding; and the need to deal with extreme events that affect local communities and sectors.

• Long-term solutions: hard adaptation measures are many times implemented when looking for fast solutions in the short term. In contrast, EbA involves solutions that are not immediate but that assure long-term effects and resistance to climate stressors. Recent studies have shown a negative impact of many adaptation strategies on biodiversity, especially in the case of hard defences built to prevent coastal and inland flooding. This could result in so called 'mal-adaptation' in the long term if the ecological attributes that regulate the modified ecosystems are disturbed.

• Effective finance: information on available financial flows and invested funds is not easy to access and further analysis will be needed in the future to make this information available. Also, assuring a sustainable and long-term finance mechanism for EbA is fundamental.

• Science of ecosystem services: EbA relies on a good understanding of ecosystem services and their relative importance. Ecosystem services have been many times overlooked, misunderstood or ignored in adaptation planning and there is a lack of practical guidance on how to build resilience and on how to incorporate ecosystem-based approaches to adaptation. Managing ecosystems for adaptation may require prioritization of certain services that ecosystems provide at the expenses of others. It is therefore important that decisions to implement ecosystem-based adaptation are subject to risk assessment, scenario planning and adaptive management approaches that recognize and incorporate these potential trade-offs.

F2. Types of adaptation measures in ecosystems

Policy recommendations

This review of the current status of Ecosystem-based Adaptation (EbA) in policy and practice suggests that the approaches are not without complexity, uncertainty and risk, but existing examples and discussions defend the cost-effectiveness and the non-regrets character of this adaptation strategy. International institutions and conservation agencies have been fast in adopting the new approach in terminology and the expectance for implementations examples and reviews are greater than ever before.

We have seen that EbA is still far from capturing the main attention in adaptation policy and remains under-utilized by policy makers and associated stakeholders. For a full EbA policy there is a need to involve research on the complexities of delivering ecosystem services and conservation, assuring sustainable and effective finance to adaptation and looking at the benefits for the longer term. Also, adopting this view and acknowledging the existing complexity in natural and social systems is needed where the interactions between different policy options and resiliency is still not fully

understood. But more important is the application of these approaches on the ground together with a strong commitment from international organizations and donor countries that have already started to work in this way. At present, EbA is seen as a complement of hard adaptation options, rather than an alternative and both research and implementation of initiatives are necessary to mainstream EbA into climate adaptation and ecosystems sustainability.

This policy briefing has been elaborated from Ojea, E. 2014. Chapter 9. Ecosystem-based Adaptation, form the Markandya, Galarraga and Murieta (Eds.) 2014, Routeledge Handbook of the Economics of Climate Change Adaptation.

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