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## **ECOSYSTEM-BASED ADAPTATION: PROMOTING THE INTERLINKAGES BETWEEN SDG 15, CLIMATE CHANGE ADAPTATION AND RESILIENCE BUILDING**

Climate change is a reality and despite the international efforts to curb its impacts, predictions demonstrate the negative effects it is likely to have on vulnerable people, mostly those reliant on natural resources, particularly women. Its impacts will also affect natural resources, species and ecosystems, further reducing the opportunities for sustainable development and exacerbating poverty in the developing world.

Nature provides a natural defence against climate change and natural disasters, and natural ecosystems play an important role in climate change mitigation and adaptation. While the role of ecosystems in absorbing greenhouse gas emissions<sup>1</sup> is better known, more urgent emphasis needs to be placed on understanding the role of nature in addressing adaptation to climate impacts and on resilience building. Intact and healthy natural ecosystems and biodiversity are amongst the most readily available and cost-effective tools for adapting to a changing climate and buffering societies and communities against its impacts. Thus the sustainable management and utilisation of natural resources is essential in achieving climate goals and broader development objectives within the SDG agenda.

The focus of this particular research paper is **ecosystem-based adaptation (EbA)**, an emerging approach that leverages the potential of ecosystems as a climate adaptation solution. EbA focuses on building the resilience of socio-economic and ecological systems as viable tools for climate change adaptation. It is important to note that in this context adaptation is viewed as a process to address vulnerability, including the means to support livelihood resilience, maintain the integrity of ecosystems and their services, and build the capacity of those most vulnerable. Therefore achieving integrated and inclusive EbA will also address numerous other sustainable development goals as healthy and resilient ecosystems, such as tropical and dryland forests, wetlands, grasslands and mangrove swamps and coral reefs, all support other natural habitats and ecosystems. Besides climate change benefits, ecosystems deliver a multitude of other economic, ecological and social co-benefits that support poverty alleviation, health, job creation and other SDG objectives. However, despite the undisputed scientific evidence and an overwhelming consensus on their importance, ecosystems globally are being degraded, lost or poorly managed. The importance of maintaining these healthy ecosystems to support development objectives and climate change goals is increasingly acknowledged, and governments are beginning to implement and strengthen management and planning tools to achieve this objective. This includes tools for the creation of pro-poor activities related to conservation and protection, restoration activities, models that better value the non-market value of ecosystems, and the like.

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<sup>1</sup> Healthy natural ecosystems are crucial for a stable climate— the world's forests currently store more carbon than is in the entire atmosphere. Yet deforestation contributes 11 percent of global anthropogenic greenhouse gas emissions, more than all passenger cars combined. Halting tropical deforestation and degradation and allowing tropical forests to continue sequestering carbon and re-growing at current rates can provide at least 30 percent of all mitigation action needed to limit global warming to 2°C. To harness this potential, our response to climate change must recognise the role of natural ecosystems in mitigating emissions.

## **ECOSYSTEM-BASED ADAPTATION TO CLIMATE CHANGE**

EbA as defined by the UN's Convention for Biological Diversity, is 'the use of biodiversity and ecosystem services as part of an overall adaptation strategy to help people to adapt to the adverse effects of climate change'. This is based on the recognition that well-managed, diverse and healthy ecosystems provide multiple benefits to society with specific adaptation enhancement. EbA takes the form of conservation, restoration and the sustainable management of ecosystems, while taking into account the multiple social, economic and cultural benefits the ecosystems provide for communities (through the invaluable ecosystem services they provide such as carbon storage and pollination services). For example, EbA projects can increase the climate resilience of coastal communities by improving the health of mangrove forests, tidal marshes and coral reefs, which buffer against coastal erosion, and which provide the habitat for near-shore fisheries—a primary source of food and livelihoods. Healthy mangroves and marshes also provide surrounding communities with climate adaptation benefits such as protection from storm surges and coastal erosion during extreme weather events. These ecosystems simultaneously absorb carbon dioxide and act as natural carbon sinks and in turn reduce global carbon emissions through avoided destruction and degradation.

Initially, climate change adaptation focused on conventional, incremental approaches to climate risk, often centred on biophysical vulnerability, hard infrastructure-based responses and top-down management. Today, adaptation approaches also consider the social and economic drivers of risk, as well as other factors not directly related to climate. Furthermore, adaptation is viewed as a process to address vulnerability, including the means to support livelihood resilience, maintain the integrity of ecosystems and their services, and build the capacity of those most vulnerable. Newer adaptation approaches encourage the inclusion of broader development goals, hoping to better capture the complex interdependencies between human societies and their environment. While engineered and technological adaptation options are still common, there is growing recognition of ecosystem-based, institutional and social measures to promote integrated adaptation. Emerging approaches also seek to empower local people and support bottom-up, participatory decision-making and planning, within a stronger institutional context.

This approach is based on the premise that sound development and good governance, coupled with access to and the ability to use reliable information on climate risks, are prerequisites for adaptation and resilience-building. Inclusive approaches to EbA work towards addressing the shortcomings of the mainstream, top-down, hard infrastructure-based approach to adaptation, seeking a balanced and integrated framework to reflect local conditions and community priorities. While there is no 'one-size-fits-all approach', a symbiotic approach that empowers local communities to manage ecosystems under resilient governance arrangements is a good development practice.

Building adaptive capacity and promoting resilience in vulnerable communities is a long-term, cyclical process that generally consists of a mixed portfolio of interventions applicable to unique geographical and societal contexts.

## **INTEGRATING ECOSYSTEMS IN TO ADAPTATION APPROACHES**

The benefits of integrating EbA into climate change policy and risk management are recognised at both international and national levels, although there needs to be more update and integration at all levels. Adaptation to climate change has also been a central component of the international negotiations of the UN Framework Convention on Climate Change since 2007, with the Paris Agreement placing adaptation issues on par with mitigation. The majority of national climate plans submitted in advance of Paris – known as Nationally Determined Contributions (NDCs) – include not only countries’ plans to reduce emissions but also descriptions of their adaptation goals, priorities, actions and financial needs. These objectives are echoed in other international frameworks, such as the 2030 UN SDGs, the Strategic Plan for Biodiversity 2011–2020 and the Sendai Framework for Disaster Risk Reduction (2015–2030), as well as the Nairobi Work Programme – which all underline natural resources’ centrality to effective adaptation strategies. Significant work has already been undertaken by the UN Convention for Biological Diversity to link national adaptation, biodiversity planning and action processes. EbA is also central to development approaches taken by other organisations, including the World Bank and the International Union for Conservation of Nature.

In addition, many country strategies and sector-based policies recognise the important role that ecosystems play in resilience building. In African countries, EbA is most commonly applied in the agricultural and forestry sectors, and there are multiple references in national adaptation programmes of action (NAPAs) and NDCs to conservation, sustainable management and the restoration of ecosystems. For example, in semi-arid pastoral communities in South Africa’s succulent Karoo eco-region, projects focus on the rehabilitation of critical rangelands and wetlands through improved land management techniques. Madagascar is promoting sustainable livelihoods and management practices through permanent vegetation cover and ‘intensive rice system’ techniques, to reduce the vulnerability of smallholder farmers to severe weather events, while the Philippines is conserving and restoring coastal vegetation in abandoned fishponds to help reduce the vulnerability of communities to flooding, increase tourism income and provide critical habitats for fisheries. All these approaches seek to improve ecosystem functionality.

Development-oriented organisations are also increasingly integrating this approach within climate change adaptation policy, planning and implementation, building on the strengths to address the shortcomings of mainstream, top-down strategies. According to the Ecosystem and Livelihoods Adaptation Network (ELAN), by incorporating elements of EbA, development practitioners can learn how to better respect ecological complexity; incorporate ecosystem goods and services in community-led adaptation strategies; adapt management systems to ecosystem or landscape scales; build environmental integrity into monitoring and reporting systems; and ensure that interventions build rather than undermine natural capital. By reducing environmental degradation it is also possible to minimise some of the indirect negative socio-economic impacts of climate change.

## **DETERMINANTS OF SUCCESSFUL EBA**

## **COMMUNITY-LED ADAPTATION**

A key determinant of success for EbA is the degree to which these processes are community led or based on communities' priorities, needs, knowledge and capacities (also known as community-based adaptation). EbA must entail projects aimed at enhancing livelihood resilience (promoting, for example, hardier seed varieties, drip irrigation, expanded access to weather forecasting services, or income diversification); strengthening the capacity of local civil society and government institutions so that they can more effectively support community adaptation efforts; and increasing social mobilisation, to address the underlying causes of vulnerability. The International Institute for Environment and Development's Smallholder Innovation for Resilience projects in Kenya, India, China and Peru have shown that small-scale farmers use indigenous knowledge – or bio-cultural innovation – to preserve genetic diversity. This, in turn, significantly enhances productivity and resilience to climate change and water scarcity. In the Potato Park near Cusco, Peru, for example, Quechua communities collectively manage an indigenous territory of over 9 000 ha, based on ancestral strategies of varietal diversification. Similarly, in Guangxi province in south-west China communities have used participatory plant breeding to develop drought tolerant landraces of maize, rice and wheat, thereby strengthening food and seed security in harsh mountain areas. Genetic diversity and indigenous knowledge are important measures in a changing climate and should be supported by community seed banks, community-led landscape management and participatory plant breeding

## **UNDERSTANDING THE TRUE VALUE OF NATURE AND ECOSYSTEM HEALTH**

The global system of national accounts values natural capital inadequately in spite of the centrality of ecosystem services to human welfare. Natural capital tends to be treated as a free good. For instance, the opportunity costs and negative consequences of clearing a forest do not appear in the income statement of the logging company responsible. Also, trees, wetlands, drylands etc are not holistically valued for their non-market functions, such as erosion benefits, carbon sequestration, and spiritual value.

In the wake of Africa's extractives boom, population growth and increasing pressure on natural resources, the policy community must urgently consider tools to minimise ecological trade-offs and to reconcile economic development and environmental sustainability. Innovative mechanisms have been developed to improve baselines for global ecosystem management and to enhance scientific knowledge to strengthen legal and policy frameworks, institutions and co-operative mechanisms. Ecological assessments support decisions about the use of ecosystems and their services, acknowledging the multiplicity of these ecosystem values and making decisions that are consistent with their conservation, restoration and sustainable use. Other measures are being developed to frame ecosystems in a broader, integrated and multi-use landscape encompassing land, water and coastal resources. Some models illustrate the advantages to regulating development activities and zoning; providing for spatial development planning to convert conflicts into synergies; and rehabilitating and restoring damaged ecosystems. These interventions help policymakers plan their commercial activities to avoid potential conflicts with other habitat users, and to take biodiversity loss and resource degradation into account.

## **ECOSYSTEM ACCOUNTING AND VALUATION**

While economic opportunities can be derived from the exploration of fossil fuels or through large-scale agriculture, these benefits must be balanced against conservation, sustainable use and/or restoration. Econometric models illustrate how the total economic value associated with the sustainable management of ecosystems is higher than the value associated with its conversion into farming, mining, logging or other intensive and unsustainable practices. Ecosystem valuations and ecological accounting provide evidence to justify conservation and an increase in protected or no-use zones. Often the true significance of ecosystems is ignored when the economic values of other proposed developments are calculated. If conservation of the natural environment is to become a viable investment option, all its benefits need to be recognised and quantified. Conventional macroeconomic performance indicators do not provide adequate information about a country's natural wealth, the health of its environment and the depletion of its ecosystem services on climate impacts. Natural asset accounting and the pricing of externalities can assist policymakers in designing intervention strategies to better reflect the value of ecosystem services and the sustainability of their use. The UN Environment Programme 2011 report, *Economics of Ecosystems and Biodiversity for National and International Policymakers (TEEB)*, examines the costs of biodiversity loss and ecosystem degradation, and calls on policymakers to undertake cost–benefit analyses and to accelerate, scale up and/or embed investments in the management of important ecosystems. It is important that all natural resource management approaches enhance Africa's broader sustainable development agenda and it is equally important that an ecosystem services perspective is used when establishing management priorities. Priorities can be determined by focusing on the areas and habitats that deliver or host the most valuable ecosystem services for climate change and development more broadly, and be based on the most serious threats to ecosystem services. Tools used to assist this planning include strategic environmental assessments and environmental management frameworks.

## **BUILDING THE IMPACT CASE FOR EBA INITIATIVES**

EbA is a relatively new discipline and more analytical rigour is needed in terms of assessing its impact, measuring and evaluating its merits and limitations, and understanding the circumstances under which it thrive. While some anecdotal evidence corroborates the effectiveness of this approach, there is a need for more quantitative, cost-benefit analysis on the multitude of social, economic and environmental co-benefits that result from effective EbA. In the African context in particular, it is necessary to evaluate and communicate the developmental outcomes of these approaches with an emphasis on issues that have 'political currency', such as poverty reduction, economic benefits and employment. Large-scale restoration activities, for example, are at the core of rehabilitating ecosystems and reversing their losses. Some 400 000 hectares of mangroves are being restored globally, offering a multitude of job opportunities for low-skilled labourers. Restoration is generally far more expensive than protection and it is often not possible to recover them fully. South Africa's public works programmes, such as 'Working for Water', 'Working for Wetlands' and 'Working for Land', is a similar case in point. This government-

led programme looks to promote unskilled job creation through clearing invasive alien vegetation, wetland rehabilitation, waste management and fire prevention.

In many countries non-governmental organisations and communities are actively planting trees and earning revenue by collaborating with the private sector to offset carbon. Mikoko Pamoja is a community-led mangrove conservation and restoration project based in southern Kenya. It involves community-based policing of illegal mangrove harvesting, as well as the application of local expertise in mangrove planting. Along with a wide range of associated ecological benefits including improved fisheries wildlife habitat and coastal protection, the project seeks to raise income from forest resources, including carbon credits and other income generating activities such as beekeeping and ecotourism, for community benefit.

More attempts must be made to develop a network of practitioners to evaluate, synthesise and share successful nature-based adaptation strategies and experiences to specifically value their socio-economic benefits to poor communities. It is also necessary to build the capacity for such strategies to be assessed and implemented at national and sub-national levels; and advance policies and knowledge-sharing platforms that allow effective strategies to be scaled up.

In this regard Monitoring, Evaluation and Reporting (MER) frameworks are crucial in an iterative adaptation process. It can assist in understanding progress and performance, capturing and communicating lessons, and informing future policy and practice. However, the complexity of climate change adaptation and related interventions requires a modified approach to MER, as implementers need to demonstrate how their policy or programme contributes to an overall adaptation process that is largely shaped by external factors, at different scales. Climate change is a long-term process that stretches far beyond the span of traditional programme management cycles. The real impact of interventions may not be apparent for decades, and it is therefore difficult to define and measure achievements. Moreover, many aspects of adaptation and resilience building are 'soft' and qualitative assessments are often more appropriate.

## **SHARING LESSONS AND BEST PRACTICE**

There are entities that are attempting to address this evidence gap by undertaking case studies to capture the lessons emerging from EbA experiences worldwide. Although all adaptation efforts take place in very specific contexts, these studies highlight common political, policy and institutional conditions that maximise the uptake of EbA. At the local level, this evidence can help build capacity and assist people to implement transformational adaptation on the ground. At a national level, it may encourage the integration of these approaches into the wider policy discourse and help increase funding for EbA programmes and initiatives.

There are many countries that have a long history of implementing natural resource management projects, such as community-based forest management; rangelands, water and fisheries management; and conservation agriculture. Yet older disciplines, such as community-based natural resource management (CBNRM), can also help inform EbA

practice and policymaking through lesson sharing. Although CBNRM was initially seen as a response to biodiversity loss, it has evolved to include rural development co-benefits. Now it is viewed as an institutional development programme whereby local communities are economically empowered through the sustainable use and management of natural resources. As it developed, CBNRM processes and institutions were established to promote community empowerment and ownership. This included the creation of mechanisms, laws and policies to enhance the direct and practical involvement of communities, such as devolving rights and management authority from the central government to communities; and establishing mechanisms to ensure that communities receive tangible benefits from conservation initiatives. Central to this is engagement with legitimate local institutions that incorporate traditional forms of governance.

Like CBNRM, EbA must address the broader institutional, governance and policy context in which its initiatives operate, as its ultimate success is likely to hinge on this context. This is true both at the local level – where capable local institutions are needed to make decisions and ensure active community participation – and at the higher level, as these are the institutions and policies on which communities depend.

### **SECURING IMPACT AT A WIDER SCALE**

A key challenge for EbA initiatives, many of which are localised project or programme-based activities, is securing impact at wider scales. Even those initiatives that do work closely with governments often lack the multi-sectoral engagement at higher levels needed to maximise impact. Extending beyond the project scale requires embedding activities in an enabling institutional and policy framework that facilitates their replication in different contexts, across multiple scales. For CBNRM this has meant embedding local institutions in a broader institutional and policy framework that supports the devolution of rights to communities. This approach allows replication and diversification to other sectors.

It also means systematically mainstreaming local adaptation approaches into local, regional and national government planning processes and policies is a good way to achieve impact at scale. At the national level, services must be incorporated into existing regulatory mechanisms. This requires integrating ecosystem conservation strategies into national development and poverty reduction strategies; fisheries and forestry action plans; and pre-emptive policies, such as natural disaster risk management plans and climate change adaptation strategies. Centralised interdisciplinary forums of horizontal co-ordination are being developed within, and across, departments in national governments to facilitate co-ordination, and to examine overlap between economic development, energy, water and biodiversity. Equally important is a devolved, vertical system of governance among the different spheres of government that includes partnerships and co-management structures between municipalities, local government and communities. Local communities are the key beneficiaries of these natural goods and services, and their buy-in and involvement will determine the success or failure of a given restoration, sustainable use or conservation project. It is imperative that local government incorporates indigenous knowledge solutions into policies and practices.

### **INCENTIVES FOR BEHAVIOURAL CHANGE**

Lessons from CBNRM also illustrate the importance of communities' receiving incentives or benefits from a system that aims to encourage behavioural change. For CBNRM, the long-term, non-monetary benefits from sustainable resource management had to be complemented with tangible, direct household benefits, which incentivised sustainable behaviour. EbA practitioners need to consider incentives for the adoption of adaptive practices, especially as compensation for short-term losses in periods of major uncertainty. In this regard, more research is needed to explore options in national and international adaptation microfinance, payments for environmental services and revolving funds.

## **FINANCING FOR ECOSYSTEM-BASED ADAPTATION**

New revenue options are available to support resource management and conservation. New payment mechanisms, with robust and participatory governance arrangements, could increase financing for local communities. The use of markets and market-based mechanisms has emerged to conserve and finance ecosystem services. Payment for ecosystem services (PES) schemes encompass innovative private deals (voluntary and obligatory), alternative financing schemes and government programmes. They are based on the premise that ecosystems provide valuable services and that, if marketed correctly, they would allow watershed and biodiversity conservation to pay for itself and generate income for participants. These measures would encourage behavioural change, offering, where possible, additional employment benefits and supplementary income in exchange for the sustainable use of natural resources or conservation. PES schemes can offer financial incentives to protect non-market ecosystem benefits. Finance is more readily available in international financing mechanisms. African countries are lobbying for global agreements that include the holistic value of their ecosystems. Recently, progress has been made in calculating the value of carbon for coastal ecosystems (Blue Carbon) and financing under climate change mitigation frameworks.

Despite these benefits, restoration receives sufficient funding. It is pertinent to address the barriers that can unlock restoration finance such as the systematic barriers related to the value of environmental and social benefits (having no/ little market value and the incentives to degrade land outweigh the incentives to restore land); barriers to public finance (climate finance is difficult to access and restoration funding is often confined to small environmental budgets), and barriers to private finance (restoration projects are often too small to attract private finance, require a long investment time horizons (10-20 years) and are considered to be risky investments). Tools and policies to address these barriers can include numerous options: Monetizing environmental and social benefits (ie. Carbon pricing that is gaining momentum globally. Carbon taxes are included in NDCs of 81 countries. Using some of this revenue to support restoration will increase the impact of these pricing structures); shifting incentives from land degradation to restoration (for example in Costa Rica, government phased out cattle subsidies in 1991 and began financing restoration through a 3.5% tax on fossil fuels. This helped to increase national forest cover by 29% in 1991 to 54% in 2015, and supported eco-tourism opportunities which now account for 5.8 % of national GDP); mechanisms for risk mitigation to attract the private sector interest – like loan guarantees or tax incentives (The Multilateral Investment Guarantee Agency issued



guarantees of \$27 million (2012) and \$22 million (2015) to EcoPlanet Bamboo for its restoration initiatives in Nicaragua. This protects the company for instability and civil disturbance); integrating restoration across departments in government – in Ethiopia relevant all agencies are involved in the national Climate Resilient Green Economy strategy which includes the restoration of 15 million hectares of land by 2020 (Bonn Challenge) and 100 million hectares of land in Africa into restoration by 2030, AFR 100 initiative; and quantifying the public benefits of restoration so that the true value of restoration is understood. Examples include spatial optimization analysis by the World Resources Institute in Guatemala, valuation frameworks, economic valuation methods.

## **IN CONCLUSION:**

Ecosystem-based solutions to climate adaptation and vulnerability equip decision makers with new choices and options, allowing them to plan for an uncertain future. If its core principles are respected, these approaches, when combined, will promote resilient ecosystems using nature-based solutions to provide benefits to people, especially the most vulnerable. However, much like other approaches, a key challenge in its implementation is a lack of understanding of the relative effectiveness vis-à-vis conventional alternatives. In order to ensure policy buy-in, it is necessary to improve the evidence base related to their cost-effectiveness and impact, and securing impact at scale. In addition, EbA must operate at scale. This can be achieved through mainstreaming it into government processes within regional, national and local climate and development planning. This approach should therefore be clearly reflected in national adaptation frameworks (with their principles applied in the existing country NAPAs and NDCs) and in the strategies of regional development communities. Other opportunities for scaling up EbA can be found in mainstreaming, replication and diversification within other sectors and within other organisational approaches. For example, EbA components should be integrated into the major decision support frameworks of the UN Environment Programme and other development and humanitarian organisations. Resilience building is also a priority for other regional and multilateral processes, and is a key concern in the wider donor community, the private sector and development practitioners at large.

These adaptation approaches must build on lessons and experiences from older disciplines such as CBNRM and disaster risk management, informed by the institutional, governance and policy context in which these initiatives operate. MER is one of the most promising approaches for documenting and disseminating what works, especially when knowledge is shared between and across adaptation projects and programmes, and between stakeholders and cross-sectoral partnerships.

## **Policy recommendations**

- International climate change outcomes should support the overarching objectives of the post-2015 UN development agenda and seek to establish an international framework for climate action that reconciles development aspirations for all developing countries.

- National policies must incorporate resilience and mitigation into future development planning at local and regional levels.
- Nationally Determined Contributions (NDCs) can be used as vehicles to align national contributions to sustainable development priorities and to catalyse the transition from business-as-usual pathways to climate-resilient, resource-efficient, low carbon and pro-growth development.
- NDCs can expand and embed co-benefits approaches within international and domestic policy decision-making frameworks through investment in ecosystem-based adaptation projects