

Ecosystem-based Adaptation:

An effective tool for adapting to climate change in urban areas

Points to remember

- Ecosystem services are essential to the very existence and sustainability of urban settings. Urban planners and policy makers are urged to consider them when elaborating adaptation strategies to address impacts of climate change.
- EbA considers the ecosystem services that city dwellers depend on and focuses on protecting, maintaining or rehabilitating them in order to adapt to climate change.
- EbA options have often proven to be less costly to implement and result in greater environment and social benefits.

In the next five to ten years, climate change impacts are expected to affect the lives and livelihoods of hundreds of millions of Latin-American and Caribbean urban dwellers. As local governments look for tools to reduce climate change impacts on urban settings, Ecosystem-based Adaptation (EbA) a framework advocated by the UNEP, has proved to be a low-cost yet effective option. EbA reduces vulnerability while providing multiple benefits to society and the environment by protecting, maintaining and rehabilitating ecosystems and biodiversity. This policy brief aims to identify key issues and best practices that policy makers should consider when implementing EbA in urban settlements.

Why Ecosystem-based Adaptation?

Urban areas are dependent on a multitude of resources and processes, which are provided inside and outside of their political boundaries (e.g. food, water, coastal protection, fuelwood, waste decomposition and pollination). Called ecosystem services, they are essential to urban activities and population as well as to the biodiversity of urban ecosystem.

The pace of urbanization and the impacts of climate change have, however, been detrimental to ecosystem services which in turn increased vulnerability of urban inhabitants and, forcing them to adapt. Rising sea levels, increased annual precipitation, increased erosion and more frequent and intense storm events have and will continue to have important economic, social and environmental costs for cities.

With 79% of the Latin American and Caribbean population living in cities, the capacity of local governments to assess the threats of climate change, and to take action is crucial. Until recently, many of the climate change adaptation initiatives in cities have focused on the use of technologies and/or the development of infrastructure. However, those efforts have proven to be costly and often incompatible with other sustainable development initiatives.

What is Ecosystem-based Adaptation?

Ecosystem-based adaptation is a strategy which focuses on the protection, maintenance or rehabilitation of ecosystem resources and services in order to adapt to climate change. Examples include urban reforestation to limit urban heat-island effects and protection and rehabilitation of mangroves which help protect urban coasts from erosion and disasters and maintain the breeding habitats of fish and other marine organisms. In addition to reducing our vulnerability to actual or expected climate change effects, EbA is

acknowledged to have several additional benefits for city dwellers. Among them:

- ▶ Natural hazard risk reduction;
- ▶ Carbon sequestration;
- ▶ Biodiversity protection;
- ▶ Maintain water quality and availability;
- ▶ Enhance food security;
- ▶ Generate social, and cultural co-benefits through the revival and conservation of local knowledge;
- ▶ Generate economic benefits (e.g. job opportunities, tourism);
- ▶ Disease regulation.

How to integrate EbA in the policy process at the municipal scale?

While EbA has mainly been applied to rural settings, urban ecosystems can greatly benefit from them. In order to do so, policy makers first require access to relevant information needed to make strategic decisions. In that regard, Integrated Environmental Assessment (IEA), a methodology based on the DPSIR (Drivers, Pressures, State, Impact, Response) analysis could help cities “map out” ecosystem services and apprehend their vulnerability in front of climate change related events. The integration of EbA in the policy process should also involve the identification of local human and financial resources, including the promotion of creative practical solutions (e.g. green corridors inside and in-between cities to

facilitate mobilization of species, sustainable water treatment systems in cities) and innovative funding, as well as the development of partnerships with a wide range of stakeholders (the private sector, local neighborhoods, community-based organizations, non-governmental organizations and academia). To go even further in the implementation of EbA at the municipal level, the integration of sustainability into municipal plans and programs is essential. In that regard, the creation of a Municipal Adaptation Plan (MAP) for climate change has proven valuable as shown by the implementation of the Quito Strategy for Climate Change (QSCC). Keeping in mind that essential urban ecosystem services depend on a wider regional area than the city itself, policy makers should be careful when defining meaningful units of application and should ultimately consider working hand-in-hand with regional or national institutions.

Constraints

- ▶ Difficult and costly to evaluate actual value of ecosystem; policy makers opt for traditional adaptation strategies;
- ▶ Ecosystems services often come from outside the municipality itself, requiring cooperation between different government authorities;
- ▶ Lack of adequate and specific institutions, technologies and funding for climate change adaptation at the municipal level.

Classes of ecosystem services and benefits for cities

Provisioning	Food crops, livestock production, fresh water, energy crops	Increase urban food security
Regulating	Coastal protection, CO ₂ sequestration, flood attenuation, Detoxification of waste	Limit impacts on urban air, water and soil pollution, protect coastal cities against climate related natural hazard
Cultural	Recreation & amenity, aesthetic	Increase tourism and quality of life
Supporting	Natural habitat for species, pollination, energy capture	Limit energy use in cities, support urban biodiversity

What is being done and how effective is it?

Ecosystem-based Adaptation options




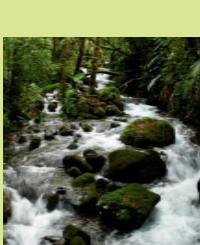
Issue		EbA Options	Additional benefits	Policy Tools
Soil erosion		<ul style="list-style-type: none"> ✓ Protect/restore local forest ✓ Urban reforestation 	<ul style="list-style-type: none"> ✓ City beautification ✓ Enhances recreational values ✓ Reduces energy use ✓ Enhance property values 	<ul style="list-style-type: none"> ✓ Adaptive management policy.
		<p style="text-align: center;">Urban Reforestation Programme in Peru</p> <p>Since 2008, the Urban Reforestation Programme (Programa de Arborización Urbana) implemented by the Environmental Management Service of Trujillo (Peru) (Servicio de Gestión Ambiental de Trujillo) has captured carbon emissions and diminished heat island effects through the annual planting of 10 000 trees inside the city limits. The project has been successful at increasing native tree cover which both protects the soil and supports urban biodiversity.</p>		
Food security		<ul style="list-style-type: none"> ✓ Urban agriculture (UA) ✓ Revival of traditional farming practices ✓ Agroforestry systems ✓ Protection of pollinators 	<ul style="list-style-type: none"> ✓ Generation of incomes ✓ Fuel wood security ✓ Water regulation and air quality 	<ul style="list-style-type: none"> ✓ Integrate UA in land use planning; ✓ Promote innovative funding (e.g. Payment for Ecosystem Services)
		<p style="text-align: center;">Urban agriculture in Cuba</p> <p>In an effort to face the impact of both economic and social crisis, the national government of Cuba created in 1994 the National Group for Urban Agriculture (<i>Grupo Nacional de Agricultura Urbana</i>) inside the Ministry of Agriculture, with strong links to the local level. UA has been integrated into the legal national framework (Environmental Law 81) as well as 28 subprograms which are divided in 12 subprograms related to crops, 7 subprograms related to livestock and 9 subprograms focused on supporting urban farmers. Presently, 40% of the city of La Havana's households are involved in UA, producing 25 000 tons of food annually.</p>		
Increase of global temperature		<ul style="list-style-type: none"> ✓ Protection of glaciers ✓ Urban reforestation 	<ul style="list-style-type: none"> ✓ Preserve habitat for vulnerable species 	<ul style="list-style-type: none"> ✓ Integrate sustainability in municipal and regional planning
		<p style="text-align: center;">Adaptation project on impacts of accelerated Andean tropical glaciers retreat in Ecuador</p> <p>The Adaptation project on impacts of accelerated Andean tropical glaciers retreat (<i>Proyecto de adaptación a los impactos del retroceso acelerado de los glaciares tropicales andinos</i>) is a joint project established by the regional institution of the Quito Metropolitan District (Ecuador) and the GEF/World Bank-MAE and focused on the small watersheds located around the Antisana volcano. This volcano, located 45km southeast from Quito, is one of the city main water supply. The main objectives of the project are: inclusion of sectoral development projects of glacier retreat impacts, the generation of data on glacier dynamics and their impact on the availability of water resources</p>		
Water quality/accessibility		<ul style="list-style-type: none"> ✓ Identify and protect ecologically critical areas ✓ Protection of glaciers 	<ul style="list-style-type: none"> ✓ Preserve habitat for vulnerable species 	<ul style="list-style-type: none"> ✓ Promote participation of all stakeholders ✓ Preserve ecosystem services outside city limits
		<p style="text-align: center;">Protection of watershed in Colombia</p> <p>85% of Bogota's (Colombia) population and its surroundings are dependent on nearby ecosystems for drinking water. To limit the impacts of climate change on the availability and accessibility of water, the national government (through the Ministry of Environment and the Colombian Wild Life National Parks) and Bogota Aqueducts Company (<i>Empresa de Acueductos de Bogota</i>) are preserving large surfaces of the natural hydrological system located in nearby moorlands (<i>páramos</i>). Those projects increase the availability of water while also ensuring the monitoring of moorlands capacity to stock water and the implementation of green corridors in order to support the mobility of species</p>		

Photo: Fundación Albatros Media; Comunidad Andina (2007)

Lessons learned through the implementation of EbA in urban settings are:

- ▶ **Assess and map climate trends at the municipal level** using the DPSIR framework (Drivers-Pressures-State-Impacts-Responses) on environment and human well-being) and prioritize adaptation actions with defined spatial and temporal scales.
- ▶ **Institutional and governance networks could be envisaged** in order to facilitate data and resources sharing;
- ▶ **Establish a monitoring program** in order to **facilitate adaptive policies** that can adjust to dynamic, complex and uncertain conditions related to climate change impacts;
- ▶ **Opt for synergistic policies across sectors** (agriculture, water resource management, development, and infrastructure, among others) to ensure the protection and maintenance of ecosystem;
- ▶ **Promote innovative funding** in order to create incentives;
- ▶ **Involve all stake-holders from the beginning** (local communities, governments, scientists);
- ▶ **Capacitate** both policy makers and civil society actors on benefits of ecosystem services;
- ▶ **Mainstream ecosystem-based adaptation** into different planning levels: local, regional, national.

For further Reading

IUCN (2009), Ecosystem-based Adaptation: A natural response to climate change: http://cmsdata.iucn.org/downloads/iucn_eba_brochure.pdf
 UNEP, Integrated Environmental Assessment. Community Platform. www.unep.org/ieacp

References

Secretariat of the Convention on Biological Diversity (2009), Second Ad Hoc Technical Expert Group on Biodiversity and Climate Change: <http://www.cbd.int/doc/publications/cbd-ts-41-en.pdf>
 UNEP (2007), Geo Resource Book :A training manual on integrated environmental assessment and reporting: <http://www.pnuma.org/deat/1/pdf/GEOResourceBookcomplete.pdf>
 UNEP (2011), IEA Training Manual Volume Two, Climate Change Vulnerability and Impact Assessment in Cities: http://www.pnuma.org/deat/1/pdf/Manual_City_climatechange_assessment.pdf
 UNEP (2011), Perspectivas del ambiente y cambio climático en el medio urbano: ECCO Distrito Metropolitano de Quito: <http://www.pnuma.org/deat/1/pdf/ECCO%20DM%20Quito.pdf>
 UNEP (2004), Perspectivas del Medio Ambiente urbano GEO La Habana: <http://www.pnuma.org/deat/1/pdf/2004GEOLaHabana.pdf>
 Comunidad Andina. (2007). ¿El fin de las cumbres nevadas? Glaciares y cambio climático en la Comunidad Andina, <http://www.pnuma.org/deat/1/pdf/glaciaresandina.pdf>
 UNEP (2011), Perspectivas del ambiente y cambio climático en el medio urbano, GEO Trujillo: http://www.pnuma.org/deat/1/pdf/ECCO_Trujillo.pdf