



Ecosystem-Based Adaptation



United Nations
Framework Convention on
Climate Change



Photo: Tom Mullier

Introduction

Healthy ecosystems play an important role in delivering services that help people adapt to climate change. This calendar showcases examples of ecosystem-based adaptation, which take a range of approaches for the sustainable management, conservation, and restoration of ecosystems to provide services that enable people to adapt to the impacts of climate change. United Nations affiliated organizations, intergovernmental and regional organizations and networks, and research institutions have been engaged in implementing these ecosystem-based approaches with an aim to maintain and increase resilience and reduce the vulnerability of ecosystems and people in the face of the adverse effects of climate change.

Ecosystem-based adaptation actions involve: initiatives to assess vulnerability; capacity building, design and policy measures; and implementation of measures, for example in the form of pilot and demonstration schemes, establishment of protected areas, etc. These local, national and regional initiatives, several undertaken in collaboration with NGOs, have demonstrated multiple economic, environmental, social and cultural benefits by ensuring livelihood sustenance and food security, conservation of biodiversity, sustainable water management, and disaster risk reduction, among other benefits.

Information on relevant adaptation activities under UNFCCC is available at <http://unfccc.int/4159.php>.

JANUARY



Photo: Skyscans

Community-based wildfire management

West Arnhem Land is a remote, tropical savanna region in Australia’s Northern Territory. Fire plays an important role in the management of the ecosystem, although uncontrolled wildfires are a risk to adjacent land managers and globally significant rock art sites, and can threaten ecosystems, overwhelming their adaptive defences. Climate change impacts are expected to increase the size, intensity and frequency of wildfires in Australia, and extend the fire season. The West Arnhem Fire Abatement project involves prescribed fire management to avoid seasonally occurring disastrous late dry season wildfires across an area of 28,000 km². The local Aboriginal community-based ranger groups use modern technology to emulate traditional fire management, resulting in a low

incidence of devastating wildfires. The outcomes achieved by this project have potential application across fire-prone tropical Australia and other fire-prone savannas of the tropics. Fire management provides co-benefits, including climate change mitigation and economic benefits through employment. However, it requires continuing annual implementation in order to be successful.

http://savanna.cdu.edu.au/information/arnhem_fire_project.html

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FEBRUARY



Photo: Jo-Ellen Parry, IISD

Comprehensive watershed management for hydroelectric power and agricultural resilience

In northern Rwanda, high dependence on agricultural activities and forests for livelihoods has contributed to land degradation within the watershed surrounding the Rugezi wetlands and its downstream lakes – Bulera and Ruhondo. In 2003–04, Rwanda experienced major decreases in electricity generation resulting in an economic crisis. This decline was attributed to water shortages impacting hydroelectric generation, caused in part by degradation and poor management of the surrounding watersheds, and reduced rainfall. To build resilience into the hydroelectric system and address uncertain climate impacts, activities to restore the degraded Rugezi-Bulera-Ruhondo watershed were initiated. Measures by the Government of Rwanda included banning all drainage, agricultural and pastoral activities within the wetlands. To offset the adverse effect of

these actions on the income of rural households, assistance was provided to farmers to implement sustainable agriculture measures and diversify their livelihoods through activities such as beekeeping. Agricultural and watershed management measures were implemented, including construction of erosion control structures, planting of a bamboo and grass belt around the wetlands, and distributing improved cook stoves (negating the need for wood fuel). Integrated policy interventions and wetland restoration resulted in the return of the hydropower station to its full operational capacity and potentially increased the resilience of local people.

<http://worldresourcesreport.org/case-studies/rwanda-ecosystem-restoration-and-sustainable-hydropower-production>

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MARCH



Photo: Richard Markham, ACIAR

Local farmers increasing taro crop diversity

Taro is a tropical root vegetable, and the staple food of Samoa, as well as an important export cash crop. As a result of climate change, Samoa will experience more extreme periods of rainfall, drought and increased coastal erosion from sea-level rise, all of which are expected to impact agriculture. Following the devastation of the taro crop by a fungal disease, taro blight, in the 1990s, the need to increase taro crop diversity became clear. A portfolio of complementary projects was initiated to reduce the vulnerability to future threats, including taro blight, along with increased drought and saline conditions that are expected under climate change scenarios.

In a collaboration between the Samoan Ministry of Agriculture and Fisheries, the University of the South Pacific and the Secretariat of the Pacific Community, with support from AusAid and the Australian Centre for International Agricultural Research, a participatory breeding programme to engage local farmers was established. Farmers were involved in the decision making process resulting in the compilation of a diverse selection of taro varieties with climate tolerant traits, ensuring resilience to predicted climate impacts and increasing food security.

http://aciar.gov.au/files/node/13748/lesson_in_diversity_from_samoa_s_taro_blight_95850.pdf

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Photo: © Ola Jennersten /N

Farmers network using ecosystem-based measures to cope with uncertain climatic conditions

Adjusting management practices, including adopting traditional farming techniques, can help to increase resilience and reduce vulnerability to the effects of climate change. The east-central area of Sweden presents difficult climatic conditions for small-scale farmers who experience long winters and frequent periods of drought. This climatic uncertainty, combined with threats from pests and disease, presents challenges for sustaining livelihoods, with climate change expected to exacerbate these conditions. To build resilience, farmers in the Roslagen region began incorporating a range of ecosystem-based practices. Measures included diversification of crops in time and space to reduce the risk of crop failure, using multiple crop varieties to

increase genetic diversity and pest resistance, incorporating crop rotation to revitalize soils and prevent pest infestations without reliance on chemical fertilizers and pesticides, and planting shade trees and cover crops to enhance seedling survival to cope with drought. In addition, by establishing an informal local network, the farmers were able to share best practice and local ecological knowledge. The ecosystem-based measures led to the farmers producing high-quality and organic products, whilst increasing their resilience to climate variability and change. Biodiversity and economic security has also been enhanced.

<http://ecologyandsociety.org/vol9/iss3/art4/>

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Photo: Tokiniaina Rasolofoarimanana

Taking a multidisciplinary approach to developing adaptation strategies

Madagascar’s rich biodiversity and high level of human dependence on agriculture, fisheries and ecological resources for survival, present immediate challenges for adapting both communities and biodiversity conservation. A project coordinated by the Government of Madagascar, Conservation International, WWF and USAID, aimed to identify the vulnerability of Madagascar’s marine and terrestrial environments and natural resource dependent livelihoods, and develop adaptation strategies. An expert workshop in 2008 engaged policy-makers, multi-disciplinary experts, Malagasy communities, academics and government agencies in examining climate change driven threats, and recommended strategies to address them. Technical recommendations included: ecological protection and restoration,

integrated coastal zone management, management at watershed scales, and ecologically sensitive agricultural intensification and diversification. Policy recommendations included: integration of climate adaptation into national and regional government policy frameworks, review of Madagascar’s NAPA, and prioritizing areas most vulnerable to climate change in rural development policy. During the second phase of this initiative, Conservation International in partnership with WWF and the Wildlife Conservation Society conducted feasibility tests of recommendations emerging from the vulnerability assessment, which will inform a comprehensive adaptation programme.

http://pdf.usaid.gov/pdf_docs/PNADW661.pdf

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Photo: Mark Godfrey, The Nature Conservancy

Adaptation for people and coral reefs:
a network of community-conserved marine protected areas

Kimbe Bay in Papua New Guinea is part of the biologically-rich Coral Triangle, an area that stretches thousands of kilometers and links Indonesia, the Philippines, Malaysia, Timor-Leste, Papua New Guinea and the Solomon Islands. Coral reefs in the Coral Triangle are the richest and most productive on earth. Tourism and fisheries throughout the region provide food and livelihoods for hundreds of millions of people. In 2007, The Nature Conservancy led the design of a resilient network of marine protected areas to conserve Kimbe Bay’s marine biodiversity and natural resources in the face of climate change, ensuring the provision of ecosystem services for local communities now and in the future. The network was the world’s first to incorporate both human needs and the principles of coral reef resilience. The network is designed to

enable coral larvae from healthy reefs to replenish those bleached by rising sea temperatures, and protects critical coastal habitats, such as mangroves, that buffer coastal communities from the onslaught of tropical storms. Today, eleven Locally Managed Marine Areas – the building blocks of the network – have been established, protecting over 110,000 hectares across Kimbe Bay. The future of the network is in the hands of local communities, local and provincial governments, and other stakeholders, who, with support from The Nature Conservancy, are working to manage the network and ensure its long-term financial sustainability.

<http://nature.org/ourinitiatives/regions/asiaandthepacific/papuanewguinea/placesweprotect/kimbe-bay.xml>

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Photo: Yus Noor

Responding to climate change impacts through restoring coastal ecosystems

Healthy coastal ecosystems are vital for fisheries and other sources of income for coastal populations such as ecotourism and agriculture. They also function as buffer zones for extreme weather events, preventing coastal erosion, flooding and saltwater intrusion. Working in areas of Indonesia, Sri Lanka, India, Thailand, and Malaysia that suffered in the 2004 tsunami, the Green Coast project, a partnership between Wetlands International, Both Ends, WWF and the International Union for Conservation of Nature, aims to restore and manage damaged coastal ecosystems to improve livelihoods and increase resilience to the impacts of climate change. Local communities were engaged in planting more than 3 million seedlings and re-establishing over 1,100 hectares of coastal forest and

mangroves, helping to protect against storm surges and sea level rise. These activities increase the resilience of 91,000 people in the coastal regions, while more than 12,000 households directly benefit from increased income through alternative livelihood activities supported by the project (fishing, aquaculture, eco-enterprises, gardening and animal husbandry). An independent assessment of the project found it to be highly cost-effective and successful, and the model is now being promoted to restore mangrove ecosystems along other vulnerable tropical coastlines, including in West Africa.

<http://wetlands.org/greencoast>

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AUGUST



Photo: Rafael Lucitante, Archives National Natural Parks of Colombia

Building community resilience through protection of medicinal biodiversity

Biodiversity conservation helps to diversify the food, medicinal and other services delivered by natural ecosystems and can provide co-benefits for local people. The Ministry for the Environment and National Natural Parks of Colombia, indigenous communities, and conservation organizations, have worked together to protect 10,200 hectares of tropical ecosystems in southwestern Colombia to form the Orito Ingi Ande Medicinal Plants Sanctuary. Climate change is expected to increase the incidence of disease, such as malaria. Preserving medicinal flora to help local communities cope with the adverse impacts of climate change also provides them with an independent and sustainable source of medicine and potential income. The Orito Ingi Ande Sanctuary is one

of very few designated areas in the world intended to protect biodiversity associated with the survival of traditional knowledge of indigenous people. The protected area adds to the more than 12 million hectares in Colombia’s National Natural Park System. The project integrates the preservation of Colombia’s natural heritage (habitat and biological resources) with its cultural heritage (traditional medicine systems) while building local people’s resilience against climate change impacts.

<http://www.parquesnacionales.gov.co/PNN/portel/libreria/php/decide.php?patron=02.0135>

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SEPTEMBER



Photo: Courtesy of the City of Edmonton

Responding to climate change through urban reforestation

In 2008, the City of Edmonton initiated the development of an Urban Forest Management Plan (UFMP) as a response to the threat of more frequent and severe weather events, including higher temperatures, heavy rainfalls, drought, disease and insect infestations, as a result of climate change. This followed an unprecedented loss of trees at a rate higher than five times the annual average, due to drought conditions and secondary pests. The urban reforestation plan aimed to create a diverse and sustainable urban forest, supporting people in the urban environments to adapt to the impacts of climate change. Forestry staff began the planning process by conducting an extensive review of best practice urban forest management plans from across

North America. An urban forest inventory was completed in 2009, enabling city planners to review and identify future management activities to increase the resilience of the urban forests to disease and extreme weather events, through provision of ecosystem services helping to keep the city cool, improving air quality, regulating stormwater run off and preventing erosion. The UFMP has already enabled the city to develop a comprehensive and integrated approach to managing the urban forest.

[<http://adaptation.nrcan.gc.ca/mun/edmonton_e.php>](http://adaptation.nrcan.gc.ca/mun/edmonton_e.php)

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OCTOBER



Photo: Christine Woda

Empowering communities for ecosystem resilience and food security

Climate projections for Central America predict increasingly dry conditions. In some areas, there is also an expectation of increased extreme rainfall events. Given the levels of deforestation and dependence on rainfed agriculture, climate change impacts could be significant. The Maya nut tree (*Brosimum alicastrum*) is native to the neotropics and highly drought-resistant. Maya nuts are delicious, nutritious and versatile, and can be dried and stored for five years, making them a promising famine food. With rates of malnutrition high in several Central American countries, and climate change impacts likely to further decrease food security, the Maya Nut Institute provides rural and indigenous women with information and skills to conserve and restore Maya nut forests. Expected outcomes

include increased resilience of agro-ecosystems to drought and extreme events, and development of a sustainable source of food and income from natural forests and Maya nut agroforestry. The Maya Nut Institute partners with local and national governments, NGOs, community organizations and private enterprises to empower women to sustainably manage Maya nut forests. Co-benefits include communities that better understand and value the forest and the services it provides, protection of biodiversity, soils and water sources, and enhanced carbon sequestration within the ecosystem.

<http://mayanutinstitute.org/>

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NOVEMBER



Photo: Melanie McField

Adaptation measures for coral reef ecosystems

Sea-level rise and temperature increases will negatively affect coral reefs and threaten the delivery of ecosystem services to local populations that depend on them. The Mesoamerican Reef (MAR) system extends over a length of approximately 1,000 kilometres along the eastern coast of Mexico, Belize, Guatemala and Honduras. It is ecologically and socioeconomically very significant, supporting the livelihoods of over two million people. To enhance the viability and resilience of the MAR’s diverse ecosystems, WWF implemented a project to assess reef ecosystem health, increase public awareness of climate change issues, and foster the necessary networks for advocating, identifying and implementing adaptation strategies. Activities include developing a model

to assess how to best incorporate bleaching resistance and coral resiliency into marine protected area network planning. The project has provided an important test bed for pilot adaptation approaches, raising awareness and understanding of adaptation, and building in-country networks with a wide range of stakeholders. The close collaboration between the Government of Belize and the Caribbean Climate Change Center offers an important opportunity for the adaptation options identified under this project to be integrated into national climate change policy, and local and national development plans.

<http://worldwildlife.org/what/wherewework/mesoamericanreef/WWFBinaryitem14670.pdf>

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DECEMBER



Photo: Lawrence Hislop

Nomadic herders: enhancing the resilience of pastoral ecosystems and livelihoods

The Nomadic Herders initiative started in 2010, as a joint initiative by UNEP/GRID-Arendal, Association of World Reindeer Herders and UArctic EALAT Institute at the International Centre for Reindeer Husbandry, endorsed by UNEP. The consequences of predicted temperature changes from climate change combined with habitat fragmentation caused by human activities pose significant challenges to pastoralism. This project aims to assess the impacts of land use change and climate change on nomadic pastoralists and on their adaptation options and opportunities, and improve the resilience of reindeer and yak pasture ecosystems in Russia and Mongolia. It also aims to strengthen the sustainability of pastoralist livelihoods and increase the resilience and capacity of nomadic communities to adapt to land-use change and

climate change, including utilizing nomadic herders' traditional knowledge in this respect. The project has identified issues of concern related to biodiversity, land use, resource extraction, and climate change – all of which represent challenges for sustainable land management and reindeer and yak husbandry in the Mongolian and Russian taiga. Options for enhancing the resilience of herder communities and taiga ecosystems in the region have been identified. The next phase of the project will involve the development of a GEF proposal that will focus on the opportunities for sustainable land management and for reindeer and yak husbandry in northern Mongolia and Southern Siberia in Russia.

<http://www.nomadicherders.org>
<http://reindeerportal.org>

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