PANORAMA
SOLUTIONS FOR A HEALTHY PLANET

Solutions in Focus

Ecosystem-Based Adaptation from Mountains to Oceans

How people adapt to climate change by using nature

Published by

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

On behalf of:

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

of the Federal Republic of Germany

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Global Project „Mainstreaming EbA — Strengthening Ecosystem-based Adaptation in planning and decision-making processes“

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PANORAMA
SOLUTIONS FOR A HEALTHY PLANET

Content

Acknowledgements

This publication illustrates a selection of applied EbA measures (solutions) in a variety of regions and ecosystems 'from mountain to ocean' that can be found online at the PANORAMA — Solutions for a Healthy Planet platform. We would like to sincerely thank all 30 solution providers and everyone who supported in writing-up the solutions for their contributions and time!

PANORAMA is jointly implemented by GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH), IUCN (International Union for Conservation of Nature), UN-Environment (UNEP), GRID-Arendal, Rare and IFOAM, and funded by the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) under the International Climate Initiative (IKI) and by the Global Environment Facility (GEF).

This document was produced under the leadership and oversight of Mathias Bertram of the Global Project "Mainstreaming EbA — Strengthening Ecosystem-based Adaptation in planning and decision-making processes" of GIZ.

Overview of Solutions

Mountain, grassland and forest ecosystems

River, wetland and inland water ecosystems

Agricultural and dryland ecosystems

Urban ecosystems

Marine and coastal ecosystems

PANORAMA
SOLUTIONS FOR A HEALTHY PLANET

Introduction

Inspired by Nature

Ecosystem-Based Adaptation

Healthy ecosystems are essential for human well-being and development. People worldwide depend on the services they provide, such as provision of fertile soil, clean water and food as well as extreme event buffering and climate regulation. Ecosystems are essential for protecting our climate and adapting to climate change.

Ecosystem-based Adaptation (EbA) means using biodiversity and services provided by ecosystems to help people adapt to the effects of climate change. It builds on healthy ecosystems, and thus requires managing the ecosystems for their long-term benefits.

EbA is a holistic development approach within land- and seascapes and applies to many sectors such as agriculture, forestry, tourism, city planning and water management. It involves a range of approaches for the sustainable management, conservation, and restoration of ecosystems, such as the conservation of peatlands as natural water storages for buffering increasing amounts of sudden rainfalls or the restauration of mangroves that act as natural barriers against storms and floods in coastal regions.

EbA measures play an increasingly important role in the context of climate change adaptation strategies. They complement or even substitute purely technological infrastructure approaches. They tend to offer economic, social and ecological co-benefits and opportunities for the mitigation of greenhouse gas emissions as well as biodiversity conservation, disaster risk reduction and prevention of desertification.

The „Mainstreaming EbA“ Project

The global project “Mainstreaming EbA — Strategic mainstreaming of Ecosystem-based Adaptation into planning and decision-making processes” has been established to strengthen the ability of decision-makers at international, national and local level to mainstream (ecosystem-based) adaptation into policy and planning processes.

The project provides a platform for the systematic exchange of knowledge and experiences between governments, institutions, technical experts and practitioners, and communicates lessons learnt to climate negotiators and a wider international community of practice.

In this context, the project supports the compilation of EbA good practices by following the ‘solutioning’ approach.

The 5-year project is funded through the International Climate Initiative (IKI) as a contribution of the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) and is being implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.

Inspiring Others

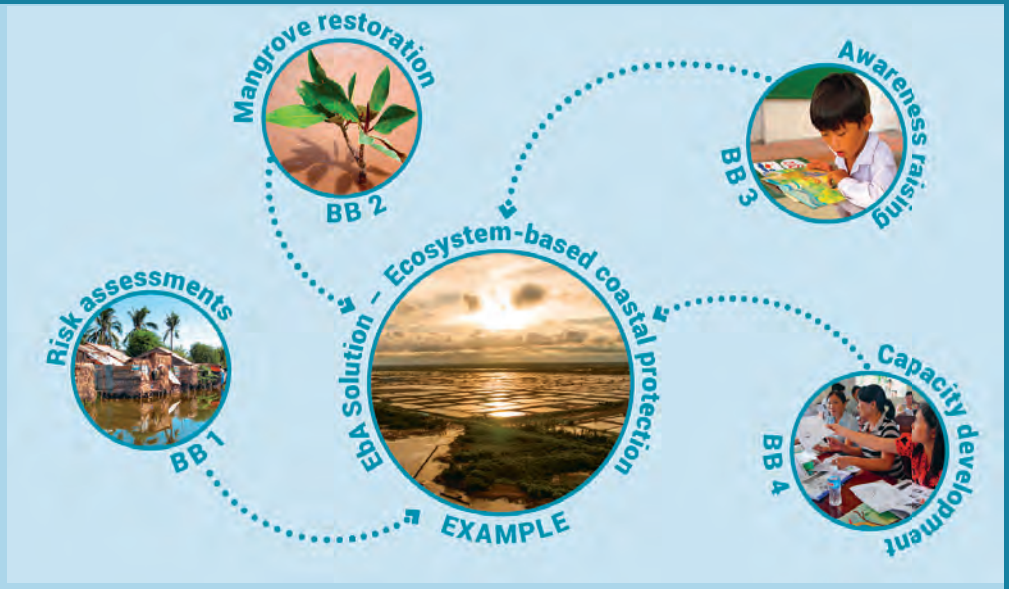
The 'Solutioning' Approach

This publication intends to inspire policy and decision makers by showcasing a selection of solutions, that have been applied in very different settings. It shows that EbA has 'many faces': It is being implemented successfully in a broad range of countries and ecosystems and it is being driven forward by all kinds of people and organizations.

EbA solutions are applied examples of successful processes or approaches to solve a specific challenge related to climate change. They address current and future climate change impacts (e.g. floods, droughts, storms, sea level rise, melting of glaciers) on human wellbeing through a sustainable management of ecosystems and the services they provide — with a proven impact. A solution usually consists of a combination of building blocks.

Building Blocks

Solution elements for replication



Building blocks (BB) are key elements of a solution, such as instruments, tools, approaches, partnerships or processes. They determine the solution's success and can potentially be adapted and/or recombined with others to address specific challenges in different socio-cultural, ecological, political or economic contexts, sectors, or geographies.

EbA measures qualify as solutions when they meet the following criteria:

1 Thematic relevance

Solutions respond to challenges to nature conservation, sustainable development and human wellbeing and contribute to maintaining or improving the health of biodiversity, ecosystems and the services they provide. A solution must be relevant to one of the thematic communities of PANORAMA, which may have defined additional selection criteria.

2 Impact

Solutions:

- provide a successful approach to problem solving.
- have an impact relevant for achieving the Sustainable Development Goals (SDGs), Aichi Targets and other targets under UN conventions (e.g. climate change, disaster risk reduction) and other global policy agendas.
- promote ecological, economic and/or social benefits.

3 Replicable and/or scalable

Elements (building blocks) of the solution have the potential for adaptation, replication or upscaling in other geographic, social or sectorial contexts.

PANORAMA — Solutions for a Healthy Planet

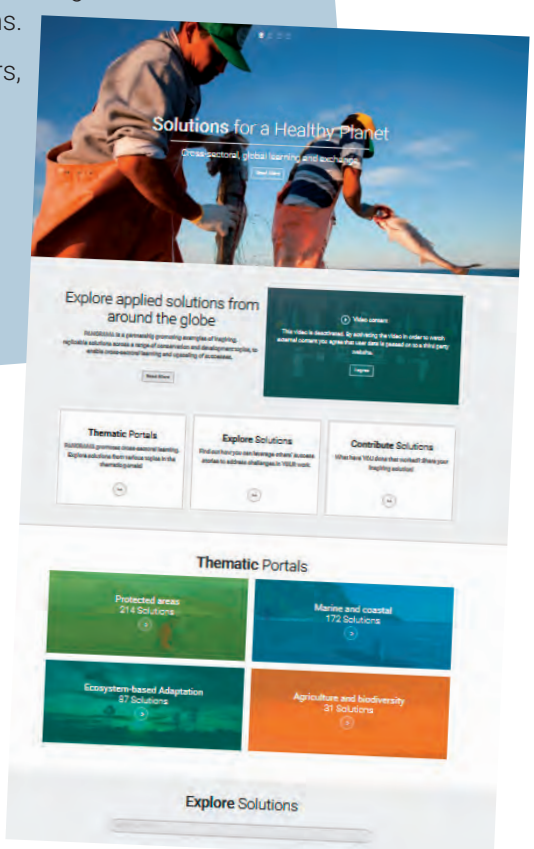
PANORAMA — Solutions for a Healthy Planet is a partnership initiative to document and promote examples of inspiring, replicable solutions across a range of conservation and sustainable development topics, enabling cross-sectoral learning and inspiration.

PANORAMA allows practitioners to share and reflect on their stories, increase recognition for successful work, and learn together with their peers how similar challenges have been addressed around the globe.

Different thematic communities contribute to PANORAMA. On the web platform these communities are represented through a) Protected areas, b) Marine and coastal, c) Sustainable agriculture and d) Ecosystem-based Adaptation solutions.

All solutions featured in this booklet, and many others, are available on the PANORAMA web platform www.panorama.solutions.

We invite everyone to visit and explore the platform, and share their own solutions!



Solutions on PANORAMA:
http://panorama.solutions/en/

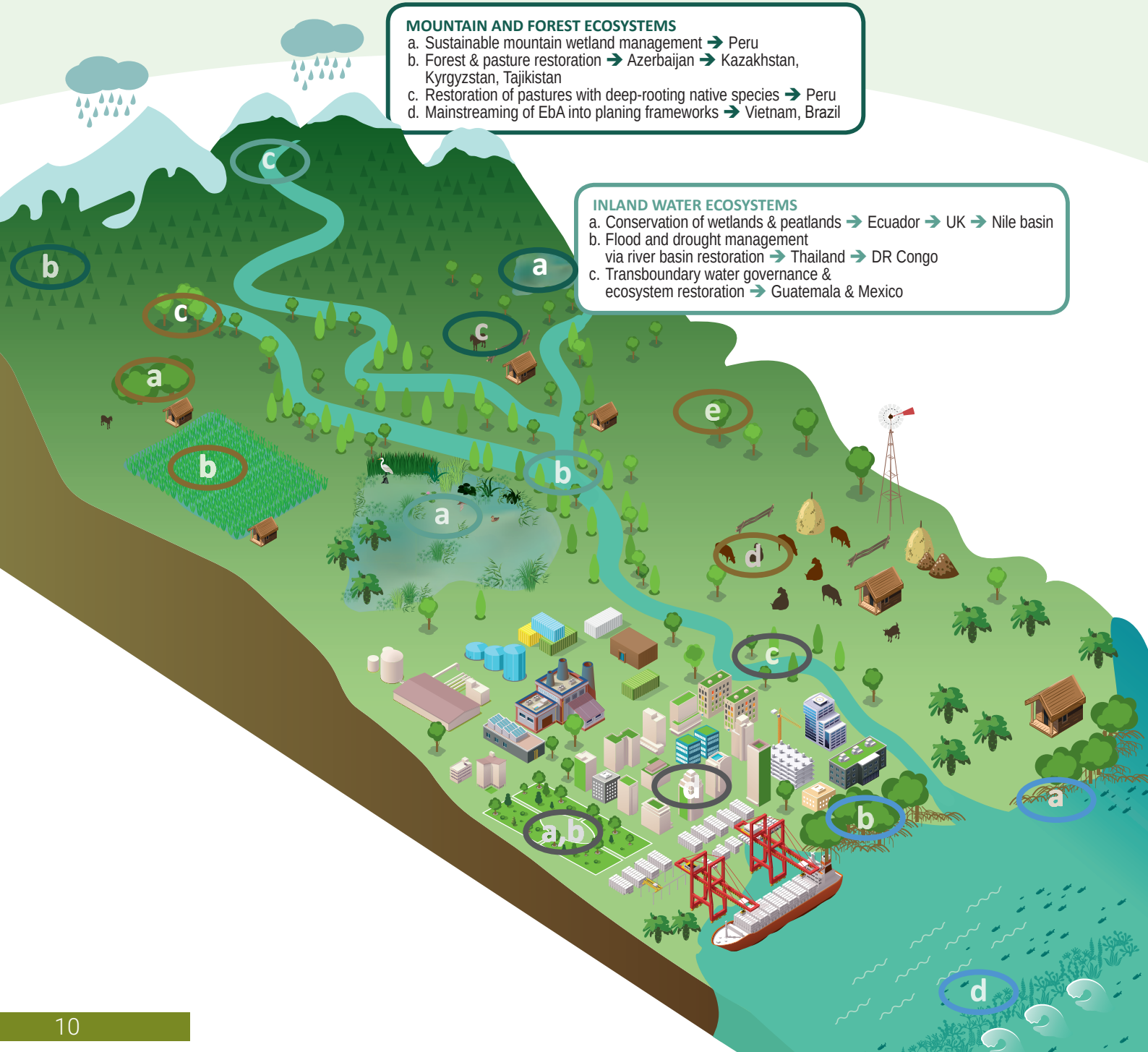
EbA Solutions addressing the Sustainable Development Goals from mountains to oceans

MOUNTAIN AND FOREST ECOSYSTEMS

a. Sustainable mountain wetland management ➔ Peru
b. Forest & pasture restoration ➔ Azerbaijan ➔ Kazakhstan, Kyrgyzstan, Tajikistan
c. Restoration of pastures with deep-rooting native species ➔ Peru
d. Mainstreaming of EbA into planing frameworks ➔ Vietnam, Brazil

INLAND WATER ECOSYSTEMS

a. Conservation of wetlands & peatlands ➔ Ecuador ➔ UK ➔ Nile basin
b. Flood and drought management via river basin restoration ➔ Thailand ➔ DR Congo
c. Transboundary water governance & ecosystem restoration ➔ Guatemala & Mexico



1 NO POVERTY

3 GOOD HEALTH AND WELL-BEING

5 GENDER EQUALITY

15 LIFE ON LAND

6 CLEAN WATER AND SANITATION

8 DECENT WORK AND ECONOMIC GROWTH

13 CLIMATE ACTION

10 REDUCED INEQUALITIES

AGRICULTURAL AND DRYLAND ECOSYSTEMS

a. Ecosystem restoration and agroforestry ➔ India ➔ Burundi
b. Intercropping of adapted species ➔ Sweden
c. Using trees to adapt to changing dry seasons ➔ Pakistan
d. Sustainable livestock management & pasture restoration ➔ S. Africa
e. Drought resilience by sustainable dryland management ➔ Sudan

2 ZERO HUNGER

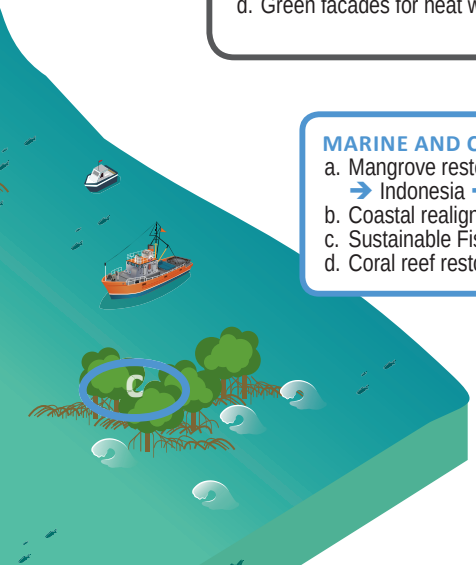
12 RESPONSIBLE CONSUMPTION AND PRODUCTION

URBAN ECOSYSTEMS

a. Heat wave buffering ➔ Egypt ➔ Germany
b. Storm water management by green spaces ➔ Sweden
c. Improving flood protection by river restoration ➔ Germany
d. Green facades for heat wave buffering ➔ Austria

11 SUSTAINABLE CITIES AND COMMUNITIES

16 PEACE, JUSTICE AND STRONG INSTITUTIONS



MARINE AND COASTAL ECOSYSTEMS

a. Mangrove restoration and coastal protection
➔ Indonesia ➔ Grenada ➔ Ecuador ➔ Colombia
b. Coastal realignment ➔ UK
c. Sustainable Fishing & mangrove rehabilitation ➔ Mexico
d. Coral reef restoration ➔ Vanuatu

14 LIFE BELOW WATER

17 PARTNERSHIPS FOR THE GOALS

Mountain, grassland and forest ecosystems

The Open Standards-Based Method for Planning and Implementing Ecosystem-Based Adaptation Projects

Solution provider Paul Schumacher, GIZ

Location Tajikistan, Kazakhstan, Kyrgyzstan

Hazards addressed Desertification, drought, erratic rainfall, floods, glacial retreat, increasing temperatures, land and forest degradation, loss of biodiversity, shift of seasons

SDGs addressed

Summary A systematic EbA planning method has been developed and applied based on the Open Standards for the Practice of Conservation. Within this method, identified dependencies and vulnerabilities, climate change information, and planning as well as monitoring of measures build on each other in a logical way. EbA measures have been applied in Central Asia before, but without systematic identification, often neglecting relevant climate information, which could even lead to maladaptation.

Impacts

Together with local communities, innovative processes of climate change adaptation planning have been launched. The participatory application of the method provided clarity to local stakeholders on the potential conventional and climate change related threats, as well as adaptive capacities of local communities and their ecosystems towards current and long-term climate change trends. It allowed to identify the most promising adaptation options, robust to different climate scenarios, and primarily focusing on improved pasture and forest management as well as water conservation measures. The capacity of village institutions to flexibly plan the management of natural resources and make decisions on conservation and restoration of biodiversity has been strengthened.

Organizations involved This solution is being implemented by the regional Project Ecosystem-based Adaptation to climate change in high mountainous regions of Central Asia.

The Solution on PANORAMA:

Ecological drawing to map the village © Shaun Martin

Assessing erosion prevention potential © GIZ

Building Blocks

Solution elements for replication

1 Vulnerability assessments as a basis for EbA planning

This stage of the process aims at assessing information on conventional (non-climatic) vulnerabilities of people and ecosystems. Surveys addressed the following issues (selection):

- Relevant ecosystem services and their spatial and temporal distribution.
- Availability of ecosystem services, ecosystem health and function, and perceived changes.
- Vulnerability of livelihoods and the link to the status and availability of ecosystem services.
- Perception of climate change and its effects on the availability of ecosystem services.
- Assessment of the relevant legal and institutional framework.

Information was collected by means of interview with residents and key informants, group discussions, field surveys and participatory resource mapping. To assess overall vulnerability, the availability of ecosystem services and their contribution to local livelihoods is comparatively ranked.

2 Integrating climate information into local planning

Seasonal and annual temperature and precipitation projections for the near future were developed for specific sites. To consider inherent uncertainties in climate models, scenarios for future vulnerabilities are discussed and selected together with the community. Future vulnerabilities can be prioritized through rating of conventional and climate change related threats.

Azerbaijan

Ecosystem-Based Erosion Control

Solution provider Markus Köppler, GIZ

Location Ehen, Ismailli, Azerbaijan

Hazards addressed Desertification, drought, erratic rainfall, floods, increasing temperatures, land and forest degradation, loss of biodiversity

SDGs addressed

Summary

Pastures in the South Caucasus region are under pressure through unsustainable use and climate change processes. The GIZ Programme "Integrated Biodiversity Management, South Caucasus" inter alia implements and tests affordable solutions together with local communities, preventing erosion and managing the mountainous ecosystems in a sustainable way. Piloted measures include: stabilization of slopes and river beds, setup of hay-meadows, afforestation, orchard management and construction of a tree nursery.

Impacts

The solution fostered the knowledge of decision makers and farmers on erosion processes and the sustainable management of biodiversity. The implemented measures are used to demonstrate effective, affordable and easy to undertake erosion control measures to all stakeholders. In Ehen village in Ismayilli region, several bioengineering and engineering measures have been implemented: steep hills have been stabilized with terraces and fruit trees, several check-dams and a gabion have been constructed in eroded river beds, areas with gully erosion have been fenced and afforested and eroded pastures have been re-established as hay-meadows. Alternative income generating practices have been supported through trainings and funding: orchard management, beekeeping and hay production.

Organizations involved This solution is being implemented by the programme "Integrated biodiversity management South Caucasus".

The Solution on PANORAMA:

Farmer at a fenced eroded area © GIZ

Meeting of the community management group © GIZ

Building Blocks

Solution elements for replication

1 Erosion control measures

Different erosion control measures are conceptualized and implemented through the cooperation of national and local partners, involving relevant stakeholders, international and local experts and local villagers. In order to rehabilitate the eroded lands and avoid further land degradation locally applicable erosion control measures are introduced to the land users. Measures include 'grey' measures (terraces, fences) as well as 'green' measures (afforestation, orchard management) and are combined with alternative income generating practices.

2 Participatory land-use planning

In order to properly monitor the participatory implementation of the programme a "Community Management Group" (CMG) has been established. Members of the group were selected via an open voting involving all municipality members. The CMG members represent all economic and social groups that depend on natural resources (e.g. cattle breeders, beekeepers, gardeners) including women and youth. During the planning and implementation phase of the erosion control measures, the CMG meets regularly, informs on the current situation, discusses challenges and decides on further steps.

3 Human capacity development

Local capacities are continuously developed: Therefore, international and local experts have been invited to train local communities on implementing and maintaining erosion control measures, e.g.: afforestation, maintenance of tree nurseries, orchard management or beekeeping. Local and regional meetings among communities are used to promote activities and enhance knowledge exchange. Trainings on integrating ecosystem services into development planning are also provided to local authorities and representatives of partners.

Implementation of EbA Measures in the Nor Yauyos-Cochas Landscape Reserve

Solution provider Edith Fernandez-Baca, UNDP

Location Reserva Paisajistica Nor Yauyos-Cochas, Peru

Hazards addressed Drought, erratic rainfall, extreme heat, glacial retreat, increasing temperatures, loss of biodiversity

SDGs addressed

Summary A pilot was implemented to underpin the incorporation of an EbA approach into the planning tools for natural protected areas. The necessary methodologies and tools were developed, the vulnerability assessment was completed, the specific areas and the measures to be implemented were identified, including the communal management of native grasslands, vicuñas management (a wild relative of the llama), the expansion and conservation of wetlands and the restoration of water infrastructure.

Impacts

The project has led to improved management of water from the upper watershed, reducing its scarcity and improving the quality of the pastures. Wetlands were recovered, reducing vulnerability to climate change. At the same time, the local population has more information on climate change and adaptation processes and is organized into interest groups, research groups and also specific committees. Many community members have decided to devote time and effort to make these groups work and to implement the activities proposed by the project. The landscape reserve´s master plan includes for the first-time ecosystem-based adaptation strategies. The participation of the different actors has been strengthened, contributing to the sustainability of the project. Specific standards have been developed, such as grassland and water management plans and regional and national climate change strategies.

Organizations involved This solution is being implemented by the programme „Mountain ecosystem-based adaptation".

Implementación de medidas en la Reserva Paisajistica Nor Yauyos-Cochas © UNDP

Restoration of ancestral water infrastructure © UNDP

Building Blocks

Solution elements for replication

1 Vulnerability assessment of the protected area

As a starting point, it was considered important to understand the vulnerability to climate change of ecosystems and of populations living in the reserve and whose livelihoods depend directly on the reserve´s ecosystem services. Based on the results of the vulnerability and impact studies, the districts with higher vulnerability of ecosystems and ecosystem services — if current management practices would be continued — were identified. This information served not only to select pilot areas but also to confirm that previously identified EbA measures were adequate to increase resilience of ecosystems to climate change.

2 Holistic and participatory approach to climate change adaptation

The identification of criteria for the definition, prioritization and principles for the selection of EbA measures allowed clarifying doubts and helped to reflect, align and define concepts based on the review of relevant documentation, field observations, interviews and discussions with local actors and researchers. The set of criteria was organized into two sections. We have experienced that it is important not only to validate the results, but also to prioritize the measures in a participatory manner with the communities.

3 Implementation of EbA measures

In order to start with the implementation of measures, not only the results of the vulnerability and risk assessment were required, but also joint work between the project and the head of the landscape reserve in order to ensure that the measures were articulated and reinforcing the master plan. The prioritization of the EbA measures was carried out jointly with the local communities, who chose the measures according to their interest: community-based grassland management and domestic livestock husbandry associated with management of vicuñas in the wilderness and restoration of ancestral water infrastructure. Finally, it was important to develop local management plans for each community. These management plans are part of the commitment of each community to continue with the EbA measures. These management plans go hand in hand with the landscape reserve's master plan.

Restoring Ancient Water Management Systems in the High Andes as an Adaptation to Climate Change

Solution provider Florencia Zapata, The Mountain Institute

Location Miraflores district, Yauyos province, Peru

Hazards addressed Drought, erratic rainfall. extreme heat, glacial retreat, increasing temperatures, land and forest degradation

SDGs addressed

Summary The EbA measure in the community of Miraflores combined traditional (indigenous), local knowledge with the latest science. Working closely with conservationists, engineers and anthropologists, Miraflores community members decided to refurbish an ancient water management system designed by their ancestors. By combining grey (constructed) and green (from nature) infrastructure, water flow was restored to native grasslands/pastures and livestock and pastureland management were improved.

Impacts

The pipeline repair increased the water supply, availability and distribution to larger areas. The community agreed to preserve and recover 160 ha of native pasture for eight months annually, during the dry season. The area that protects wetlands, lagoons and ancestral dikes in Yanacancha was expanded from 3 to 5 ha. The vegetation cover in the fenced area shows a trend of improvement from 69% to 90%. A "pasture and water management plan" was developed in a participatory manner. This plan included long-term activities and identified conservation objectives that are aligned with the conservation objectives of the Nor Yauyos-Cochas Landscape Reserve's master plan. Establishing dialogue between various groups—peasant/indigenous communities, governments and government agencies, academia and researchers, NGOs and the private sector—has helped foster synergies for financing and technical support for sustainably managing grassland ecosystems (with an emphasis on the pasture and water management plan).

Organizations involved This solution is being implemented by the Mountain Institute Peru.

The Mountain Institute · UNEP · UNDP · IUCN · SERNANP

The Solution on PANORAMA:

PANORAMA SOLUTIONS FOR A HEALTHY PLANET

Community members carry posts to build fences (that protect grasslands renewed by restored water canal) © TMI

Yanacancha wetland protected by fencing © TMI

Building Blocks

Solution elements for replication

1 Strengthening community organization and institutions

A pasture and water management plan was developed to promote integrated management of pastures, water and livestock resources throughout the communal territory of Miraflores. The goal was to strengthen community organization so that water could be distributed more effectively and grazing areas could benefit from improved rotation. The process of developing a management plan was facilitated by The Mountain Institute using a methodology to strengthen capacities while also stimulating collective and social practices within the community. This plan serves as a tool for local management in the medium term and has encouraged the community to establish a committee to maintain and operate their renovated water infrastructure.

2 Strengthening local capacities and knowledge

The main goal of the capacity building and local knowledge component was to provide technical knowledge for managing and conserving water, natural pastures, and livestock. The focus was on informing community members and park rangers through evaluation workshops and training sessions about topics such as pasture fencing, water management and distribution. A 3-D model of the Miraflores community was developed in a participatory way to facilitate planning for managing pastures and water in the communal territory. Information was gathered during participatory rural appraisals that include specific studies on water, pasture, archaeology, social organization, and agricultural and livestock productivity.

3 Improvement of grey-green water infrastructure

In the infrastructure component, the fenced area in the Yanacancha wetland was expanded and the water pipeline was repaired. Five watering sites (Curiuna, Wayacaña, Pampalpa, Colulume and Tuntinia) were constructed or repaired and a “water cave” at the entrance to Huaquis village was constructed. During implementation of this component, the community contributed their labor through communal tasks. The community was also responsible for transporting construction materials to this remote work site.

Consideration of Climate Change Vulnerability and Ecosystem Services in Duque De Caxias‘ Municipal Master Plan

Solution provider Martin Becher, GIZ

Location Duque de Caxias, State of Rio de Janeiro, Brazil

Hazards addressed Erratic rainfall, floods, increasing temperatures, sea level rise, shift of seasons

SDGs addressed

Summary

In the process of revising its municipal master plan, the city of Duque de Caxias decided to include both climate change vulnerability and ecosystem services mapping in its diagnosis. This is expected to lay the foundation for incorporating more EbA measures in the master plan. Both assessments used a participative approach, in order to strengthen capacities and complete missing quantitative data.

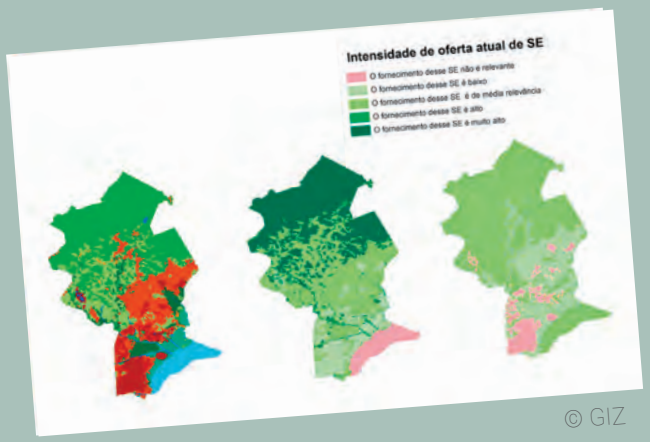
Impacts

Vulnerability to climate change and the flow of ecosystem services have been considered during the revision process. It is expected that more ecosystem-based adaptation measures will be included in the plan. Possible measures include more efforts to conserve the Atlantic Forest, wetlands, and mangroves in order to, e.g., enhance the provision of drinking water and reduce coastal erosion due to sea-level rise. Forest restoration and conservation on mountain slopes shall act as a natural barrier to reduce increasing landslide risk. The process of discussing climate change vulnerability and ecosystem services also proved to be the first topic in years to gather participants from different municipal secretariats: as climate change is impacting different sectors, and knowledge about how to deal with this issue is not existent, a climate change working group of different secretariats was established, pursuing to plan common action.

Organizations involved This solution is being implemented by the project „Biodiversity and climate change in the Mata Atlântica”.

Data collection

© GIZ



Land use map

© GIZ

Building Blocks

Solution elements for replication

1 Participative vulnerability assessments

Given the limited availability of sound quantitative data on climate change impacts, the focus was placed on a participatory process and the use of qualitative data. Basically, the vulnerability assessment was performed in two workshops (one for the entire municipality, another one for an especially vulnerable district) and focused on previously identified key systems of interest. As one of the key outcomes, an impact model that visualizes drivers of exposure, sensitivity and adaptive capacity, served to identify (ecosystem-based) adaptation measures to be considered in the Duque de Caxias city master plan.

2 Mapping of key ecosystem services

The aim of this step was the mapping and evaluation of ecosystem services provided by the region's ecosystems. The analysis identified conflicts between zones of the current master plan and some of the landscapes that provide important ecosystem services. Additionally, several patches of native vegetation inside urban areas have been identified as suppliers of ecosystem services, which provided new information for urban planning. The mapping also generated data with explicit information regarding cultural services for the first time.

3 Stakeholder engagement and capacity development „on the run"

A shared understanding, engagement and commitment of key stakeholders and the availability of capacities and resources are key. Right from the start, climate change and ecosystem services proved to be excellent topics to bring together expert opinions and different perspectives from stakeholders, enabling them to work together on common challenges. The participatory identification of climate change impacts fostered a common understanding of climate change as a crosscutting issue affecting all municipal sectors. The mix of inputs, discussions as well as working on the concrete case strengthened the spirit of cooperation and the search of synergies in preparing for (ecosystem-based) adaptation to climate change in the region of Duque de Caxias. The final outcome was the creation of an inter-departmental working group on climate change, which seeks for coordination and cooperation in order to enhance adaptation success.

Strategic Mainstreaming of EbA into Planning Frameworks

Solution provider Ngoc Anh Nguyen Thi, GIZ

Location Quang Binh, Ha Tinh provinces, Hanoi, Vietnam

Hazards addressed Drought, land and forest degradation

SDGs addressed

Summary

The solution supports Vietnamese government's efforts to anchor EbA solutions systemically into land use planning law as well as mainstreaming into climate change regional action plans at provincial level in Ha Tinh and Quang Binh. This helps raising awareness on EbA approaches. Many project partners have shown interest and commitments in integrating EbA solutions into current policy elaborating processes and daily works based on vulnerability assessments and capacity development measures.

Impacts

As a result of a series of orientation workshops, meetings and trainings, EbA has been integrated into provincial planning process. The capacity building work has provided basic knowledge on climate change and (ecosystem-based) adaptation and ensured their sustained integration into provincial planning processes. The understanding of local authorities and communities on climate change impacts, risks and seeking for appropriate measures was raised. The results of the vulnerability assessment provided useful and important data and information to provincial departments, leaders and policy maker to define and implement EbA pilot measures in 2 provinces incl. planting of coastal forests, mangroves and rehabilitation of natural reservoirs.

Organizations involved

This solution is being implemented by the project „Strategic mainstreaming of ecosystem-based adaptation in Viet Nam".

Participatory planning © GIZ

Vulnerability assessment at local level © GIZ

Building Blocks

Solution elements for replication

1 Vulnerability assessments for socio-ecological systems

The EbA vulnerability assessments (VA) provide an overview of climate change hotspots and identify priorities for action at the macro- (provincial-level) and micro-level (community or local-scale). The Macro-level VA uses existing information on province's ecological, social and economic assets and climate change projection and identifies specific "hot spots". The micro-level VA focuses on a selection of hot-spots and repeats the analysis, applying more conventional bottom-up methods of field work, local data collection and stakeholder participation.

2 EbA capacity development strategy and trainings

Provincial institutions (government officials and training institutions) develop capacities to mainstreaming EbA based on a capacity development strategy along four dimensions: people, organizations, networks and oopera-tion, and framework conditions. Among others, a training course has been developed which is being delivered in cooperation with training service providers.

3 Integrating EbA into the strategic environmental assessment process for the revision of the national land-use plan for 2016 – 2020

This process had been led by General Department of Land Administration and Department of Appraisal and Envi-ronmental Impact Assessment under Vietnam Environment Administration with technical support from GIZ and in collaboration with Institute of Strategy and Policy for Natural Resources and Environment (ISPONRE). SEA is con-sidered as a good opportunity/vehicle to add on EbA topic into the strategic planning process. Expected impacts include an improvement of the regulatory framework for integrating EbA into the SEA process and the planning process in Viet Nam.

4 Integrating EbA into provincial climate change response plans

Updating the Provincial Climate Change Response Action Plans (CCRAP) of Quang Binh province and Ha Tinh province for 2016 – 2020 was an important entry point for EbA mainstreaming. This process had been led by Department of Natural Resources and Environment of Quang Binh and of Ha Tinh. Findings and recommendations from the Vulnerability Assessment for Socio-Ecological Systems including recommendations of EbA have been fed into the CCRAP process at both provincial and local levels to create synergies.

5 Integrating climate change and ecosystem services into the draft Planning Bill

This process had been led by Department of Planning Management under Ministry of Planning and Investment in collaboration with ISPONRE. The draft Planning Bill is expected to constitute a comprehensive legal framework for planning in Vietnam. MPI's ambition is to bring all stakeholders and their interests in one plan and to improve the regulatory framework for integrating EbA into the planning processes. A comprehensive concept note providing a comprehensive picture/panorama on how to integrate climate change and ecosystem service considerations into the planning system in Vietnam from the law, decree, and circular levels has been made available to policy makers.

River, wetland and inland water ecosystems

Nile River Basin Transboundary Wetlands Conservation

Solution provider

Leonard Akwany, Nile Basin Initiative

Location

Kenya, Tanzania, Uganda, Rwanda, Burundi, Democratic Republic of the Congo and South Sudan

Hazards addressed

Drought, erratic rainfall, floods, glacial retreat, increasing temperatures, land and forest degradation, loss of biodiversity, vector and water borne diseases

SDGs addressed

Summary

The Nile River Basin is characterized by diverse transboundary wetlands. Our overarching approach is catchment-based water resources management and landscape approach. Our solution involves participatory wetlands assessment, modelling and climate vulnerabilities appraisal for baseline information, transboundary stakeholders' forum, transboundary wetlands integrated planning, wetlands zonation and restoration, catchment soil and water conservation, and livelihoods greening through incentives-based conservation agreements model and working with nature-based approaches.

Impacts

The implementation is ongoing and impacts include restored wetlands for biodiversity conservation, carbon sequestration and amelioration of ecosystem services such as floods control through wetlands water storage and droughts buffering through water release for domestic and livestock consumption. Enhancement of livelihoods climate resilience; fisheries, livestock and farming through wetlands restoration ensuring quality water supply, soil conservation and fish breeding areas protection. Functional transboundary wetlands integrated plan and baseline information enable informed, coordinated interventions and stakeholder engagement. Additionally, training and capacity building on mainstreaming of wetlands in sectoral development planning contribute to enhanced sustainability.

Organizations involved

This solutions is being implemented by the Nile Basin Initiative with support from the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.

NILE BASIN INITIATIVE
INITIATIVE DU BASSIN DU NIL

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

The Solution on PANORAMA:

PANORAMA
SOLUTIONS FOR A HEALTHY PLANET

Participatory wetlands assessment © Leonard Akwany

Water for livelihoods © Lenoard Akwany

Building Blocks

Solution elements for replication

1

Building a knowledge base on Nile River Basin transboundary wetlands

This building block is to avail critical information on transboundary wetlands for informed action. The information being gathered includes wetlands status and extend, prevailing biodiversity, wetlands ecosystem services and contribution to regional economies, wetlands potential in carbon sequestration, wetlands potential as green infrastructure and wetlands potential in climate change adaptation. Nile Basin Initiative and its partners have done and continue to undertake vulnerability assessments. One example is the hotspot methodology (UNEP 2013) to identify key ecosystems or regions that may be especially vulnerable to climate change. Six hotspot areas were identified as a result of this exercise — the Nile delta, Nile Valley, Ethiopian plateau, Nile confluence, the Sudd wetlands and Mt. Ruwenzori. Additionally, climate information services are provided for climate proofing of infrastructure investments.

2

Transboundary integrated wetland plans

Transboundary wetlands integrated planning is ongoing and aims at developing a road map for wise use of transboundary wetlands for ecological integrity and livelihoods climate resilience. The transboundary wetlands integrated plans involve specific transboundary wetlands inventories, stakeholders mapping, wetlands ecological and socio-economic challenges, strategic goals and interventions and action planning and costing and development of multi-stakeholder implementation plan and associated transboundary governance structure. Additionally, EbA related interventions such as riparian areas protection, watershed soil and water conservation, water sources protection and landscape greening are captured.

3

Capacity development and networking for transboundary wetlands resilience

Thematic areas include wetlands ecosystem services valuation, wetlands integrated planning, wetlands for green infrastructure, wetlands modelling, wetlands for climate change adaptation and wetlands for livelihoods among others. It also involves networking of state and non-state actors working on Nile River Basin wetlands for coordinated endeavors devoid of duplication and securing of desired critical mass for greater impact. Finally, it involves communication outreaches through multiple media on imperative of Nile Basin wetlands and associated biodiversity and ecosystem goods and services.

Guatemala, Mexico

Implementing Transboundary Water Governance through Local Community Ecosystem-Based Action

Solution provider Rebecca Welling, IUCN

Location Tacaná Watersheds, Department of San Marcos (Guatemala), State of Chiapas (Mexico)

Hazards addressed Floods, land and forest degradation

SDGs addressed

Summary

Despite their great potential and strategic importance the watersheds of the Tacaná volcano are vulnerable both ecologically and politically. IUCN (through the Water and Nature Initiative, WANI) and partners therefore set up a demonstration project in these watersheds, which combined pilot livelihood projects (water, soil and environmental conservation) and bottom-up integrated governance of water resources management (freshwater ecosystem management).

Impacts

With the support from the Tacaná Project, communities built microwatershed councils to lead watershed restoration and development that met their priorities. Empowerment of community-owned institutions is making watersheds more secure and livelihoods less vulnerable to climate change. The project also facilitated the collection and organisation of locally available information and knowledge and increased local awareness of basin dynamics and water management. The project also supported the rehabilitation and disaster preparedness plans in the Tropical Storm Stan`s immediate aftermath. Finally, alliances were developed and an integrated approach to water management was integrated from local to national levels including national Watershed Commissions.

Organizations involved The solution is implemented by the International Union for Conservation of Nature (IUCN).

IUCN

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PANORAMA
SOLUTIONS FOR A HEALTHY PLANET

Digging and collecting water © Taco Anema

Members of JEM, Jóvenes en la Misión, pose in front of project site © Taco Anema

Building Blocks

Solution elements for replication

1 Knowledge mobilization

Mobilisation was achieved through economic valuation of water resources, provision of locally available information and capacity building for learning and leadership. The project's "Living Water Partnership" established a payment for ecosystem services scheme in Guatemala to protect and restore the Tacaná Watersheds' natural resources, focussing primarily on water. WANI facilitated grassroots mobilisation in Mexico through the establishment of the 'virtual water resource libraries' in the town halls of five municipalities. These provided access to up-to-date information and knowledge on water resources and the environment in the region.

2 Water, soil and environmental conservation

Unregulated land use change in the upper watershed had been especially damaging on steep hillsides and deforestation reduced the capacity of the soils to retain water. The resulting erosion strongly increased the risk of floods and mud-slides. WANI and partners supported the design of numerous community pilot projects which addressed water, soil and environmental conservation. Women made up 90% of these groups, empowering them to take a more proactive role in the development of their communities. The pilot projects were the basis for bringing people together to organize themselves into micro-watershed committees.

3 Self-organisation for improved governance

In Guatemala, WANI was instrumental in supporting the emergence of a youth-run cooperative enterprise called "Jóvenes en la Misión" (Youth in Mission, JEM). JEM began as a Catholic environmental education initiative run by a group of young volunteers promoting sustainable water use and watershed restoration. The Tacaná project developed a water planning and community management which is inclusive, highly participatory and based on strategic collaborations.

4 Developing alliances and integration of local to national levels

At the community level in Guatemala, WANI facilitated the development of collaborations with the Community Development Committees and coordinated with Municipal and National Development Councils to enable integration of microwatershed planning and management with community-led action on development. Implementation has demonstrated that projects formulated by the communities rather than external institutions respond to the real demands of communities. As a result of the success of the Microwatershed model at the local level, the National Microwatershed Commission of Guatemala was established to lead application of governance reform through microwatershed management country-wide.

5 Drinking water systems rehabilitation and disaster preparedness

To rehabilitate, reconstruct and redesign drinking water systems damaged by Tropical Storm Stan in 2005, the Tacaná project facilitated communications, damage assessment and the organisation of donor coordination in the immediate aftermath of the disaster. In conjunction with municipalities and governmental authorities, a reconstruction plan for the Department of San Marcos was developed. WANI coordinated the rehabilitation and reconstruction of 72 drinking water systems and four small irrigation systems. Disaster preparedness plans and mechanisms were developed alongside the drinking water systems reconstruction.

Ecosystem-Based Flood and Drought Management in River Basins

Solution provider

Suthira Thongkao, Walailak University

Location

Huai Sai Bat River Basin in Khon Kaen Province, Tha Di and Lam Pha Chi River Basins in Nakhon Si Thammarat Province, Thailand

Hazards addressed

Drought, floods, loss of biodiversity

SDGs addressed

Summary

Technical and capacity development measures are applied in watersheds threatened by climate change. Relevant professionals are supported in vulnerability assessments. Inclusion of population is ensured through the involvement in stakeholder platforms. Innovative EbA approaches like the "living weir" are based on local knowledge and initiatives and are implemented for demonstration purposes. Based on the experiences, EbA approaches are fed into the national level and education format.

Impacts

Impacts include social, economic and environmental benefits: Water quality has been improved and sediments reduced. The communities are more resilient to flashfloods during the rainy season and the water from floods, which is retained in the landscape, increases water storage for consumption and irrigation during the dry season. DWR and RID as the main water organizations are prioritizing EbA solutions in their policies and plans with an DWR investment of 535,000 EUR and RID investment of 20 million EUR. The current government the National Council of Peace and Order announced upstream forest rehabilitation projects (about 7,520 ha) and soil erosion prevention projects.

Organizations involved

The solution is implemented by the project „Improved management of extreme events through ecosystem-based adaption in watersheds".

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

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Living weir construction in Nakhon Si Tammarat with revegetation of riverbanks and bamboo structures © GIZ

Field training on surveying and GPS coordinates locating tools © Ngamsing / GIZ

Building Blocks

Solution elements for replication

1 Vulnerability analysis and identification of EbA measures

For this assessment the approach was based on GIWA (Global International Water Assessment Methodology) and HSAP (Hydropower Sustainability Assessment Protocol) and followed a 6 step approach.

2 Living weirs as flood buffers

In a first stage a bamboo grid construction is constructed in the river providing structure for degradable sand bags containing a mixture of sand, coconut coir and manure. Along the riverbanks a combination of Banyan trees (*Ficus bengalensis*) and other leguminous plants is planted to stabilize soils. The wide rooting banyan trees are planted on both side of the weir, the roots that they are forming will nurture from the manure and will penetrate in the bamboo construction over the next decades to form a "living weir".

3 Utilization of local knowledge and ownership through river basin committees

The set-up of river basin committees, representing the population within a river basin as well as academia, government and others is crucial for the success of river management. The concept of flood protection via living weirs originated from the local riparian communities and strong leaders with innovative ideas and the willingness to experiment different approaches for flood and drought protection. Combining this strong ownership with hydrological data from local universities and the administrative capacity from the regional governing institutions allows for a holistic water management approach.

4 Knowledge exchange visits at local and national level

The set-up of site visits and exchange of stakeholders and decision makers between the three different pilot river basins triggered important exchange on the feasibility of measures, their application in different locations and the possibilities for upscaling.

5 Building technical capacities on water monitoring, modeling and economic valuation methods

Key capacities for setting-up a sustainable river management, namely hydrological modeling, vulnerability assessments on future floods and droughts and economic valuation methods for identifying suitable ecosystem-based adaptation measures were built on the local and national level. The project introduced drone technology for monitoring the watershed and to improve modeling of future flood risks. A series of trainings, developed together with German research institutes and practitioners, was conducted, containing both theoretical background and practical application in the river basins.

Conservation and Sustainable Use of Páramo Ecosystems as a Response to Climate Change

Solution provider

Nadia Manasfi, GIZ

Location

Province of Tungurahua in central Ecuador

Hazards addressed

Drought, erratic rainfall, glacial retreat, land and forest degradation, loss of biodiversity, shift of seasons

SDGs addressed

Summary

The páramo — the typical moorland of the high Andes — is an important ecosystem as it provides key ecosystem services to local communities, especially regarding water regulation. Nevertheless, this ecosystem is under severe threat mainly due to overuse and climate change. With a projected reduction in annual precipitation in Tungurahua, it is ever more important to conserve the páramo ecosystem. The solution integrated climate change into planning and strengthened local management structures.

Impacts

The institutional integration of climate change has strengthened its legitimacy and has allowed economic and human resources to be allocated to it. Technical assessments, hydrological models and a hydro-meteorological monitoring system provide decision-makers with hard facts on which to base policy. Participatory assessments have allowed stakeholders to understand how climate and non-climate risks can reinforce each other. The results are clear and holistic strategies, theories of change and a monitoring system. Priority measures for the conservation and sustainable use of the ecosystems have been identified and are being implemented. These include improved inter-institutional coordination with the aim of developing a common vision and priorities for the region, the restoration of degraded páramo areas and the creation of a local forest management association ("Páramos Andinos de Pilahuín") that will manage and monitor the mentioned restored areas, among other tasks.

Organizations involved

This solution is being implemented by the Programme on Biodiversity, Climate Change and Sustainable Development.

Honorable Gobierno Provincial de Tungurahua · Ministerio del Ambiente · Ministerio de Agricultura, Ganadería, Acuacultura y Pesca · Gobierno Autónomo Descentralizado Parroquial Rural de Pilahuín · giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

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Ready for action: Members of the association „Páramos Andinos de Pilahuín" with their new equipment © Nadia Manasfi

Working on the local development plan © Nadia Manasfi

Building Blocks for replication

Solution elements

1 Integration of climate change into development planning

The institutional integration of climate change related risks and opportunities is a significant step in order to strengthen the legitimacy of any action and allows economic and human resources to be allocated to the subject and related activities. Water availability was addressed as a current (political) issue and connecting element, establishing links to other topics such as agriculture, health, biodiversity and stakeholders' engagement. Climate change was introduced in development planning as a cross-cutting issue, rather than a separate topic. A systematic approach for integrating climate change risks and opportunities in combination with capacity development measures helped to minimise the additional challenge for development planners at the practical level.

2 Institutional agreements and participatory decision-making based on the MARISCO methodology

Planning and implementing EbA requires a holistic approach and strong inter-institutional coordination and cooperation. The multi-pronged approach adopted in Tungurahua encourages the participation of policy-makers, the private sector, farmers, civil society and universities, among others. The establishment of a cross-institutional platform enables frequent meetings for exchange and follow-up, while addressing concerns of all stakeholders. Tailor-made capacity development contributes to a shared understanding of the main problems and options for action. Participatory assessments (such as the MARISCO methodology) have allowed stakeholders to better understand how climate and non-climate risks can reinforce each other and how to deal with the resulting complexity. Complementary to the participatory assessments, technical assessments, hydrological models and a hydro-meteorological monitoring system provide decision-makers with hard facts on which to base policy. The results are clear and holistic strategies, theories of change and a monitoring system accepted by the majority.

England

Dartmoor Mires Restoration Project

Solution provider McKenna Davis, Ecologic Institute

Location Dartmoor, England, United Kingdom

Hazards addressed Erratic rainfall, loss of biodiversity

SDGs addressed

Summary

The Dartmoor Mires Project was a pilot to explore the feasibility and effects of restoring degraded areas of high quality blanket bog, using experimental techniques to reduce erosion and promote regeneration of moorland bog vegetation. As part of a public-private initiative, the project aimed to conserve and enhance habitat for upland wildlife, improve water supply and increase the potential to store carbon and mitigate climate change impacts. It has spurred many similar regional projects.

Impacts

The project successfully demonstrated that it is possible to undertake restoration works on Dartmoor's peatlands and contributed significantly to the state of knowledge of these habitats, including on their condition as well as broader ecological and historical aspects. The restoration has improved the ecological conditions of the area, thereby supporting unique plant communities and nesting habitat for wading birds and other biodiversity. The healthy blanket bog helps to reduce erosion via the storage of a large volume of water within the saturated peat and slow release it slowly into rivers and streams. In addition, the accumulation of peat in bog areas is important as a carbon sink, and has been estimated to store 10 mega tonnes of carbon, thereby significantly contributing to climate change mitigation.

Organizations involved

This solution is being implemented as part of the EU research project "Bottom-Up Climate Adaptation Strategies Towards a Sustainable Europe".

The Solution on PANORAMA:

Blanket bog on Winney's Down before (left) and after (right) restoration

1 High quality baseline assessment and monitoring scheme

The Dartmoor Mires Project aimed to investigate the feasibility and effects of experimental restoration techniques on the blanket bog. Aspects such as the impacts on biodiversity, hydrology and climate change mitigation and adaptation objectives as well as the historic environment were central. To gather evidence on these aspects, the project integrated an extensive survey about the state of the resources prior to the implementation of the intervention as well as an elaborate monitoring scheme to quantify the effects of the restoration work after its completion.

2 Establishment of an inclusive partnership for steering action

The scale of restoration and broad scope of stakeholders impacted by and interested in the Dartmoor Mires project lead to a diversity of often competing interests and highlighted the need to align those interests behind a shared goal and ensure a productive environment for maximizing the efficiency and effectiveness of the planning and implementation processes. The project thus utilized an inclusive partnership — the 'Dartmoor Mires Partnership' — to enable access to the necessary resources, expertise, experience and perspectives, secure a high level of commitment and aspirations from those involved, and ensure that a wide range of interests were considered as the project developed. The project evaluation has shown that how a restoration project of this type is organised is as important to its success as the techniques it deploys on the ground.

3 Implementation of experimental restoration techniques

The Dartmoor Mires Project explores the effects of restoration work on degraded areas of high quality blanket bog, using experimental, low-key gully-blocking techniques to reduce erosion and promote regeneration of moorland bog vegetation. All sites selected within the pilot project are subject to erosion encroaching onto high quality blanket bog on peat up to seven meters in depth. To slow and ideally reverse peat loss, peat from within and immediately around the gullies is used to form small blocks across the gullies. Rainwater is held behind these, forming a series of small shallow pools enabling the water table to recover in previously degraded areas. This also protects the bog from being damaged where it is still in good condition. The pools provide ideal conditions for bog plants to naturally recolonise. Only peat/peat turves are used to form the blocks within the gullies, ensuring a low impact, unobtrusive result. The aim is that all remaining unvegetated peat will be covered by water following rainfall.

Democratic Republic of the Congo

Applying Ecosystem-Based Disaster Risk Reduction in Integrated Water Resources Management

Solution provider Marisol Estrella, UNEP

Location Lukaya Basin, Kinshasa, Democratic Republic of the Congo

Hazards addressed Floods, land and forest degradation

SDGs addressed

Summary

The project targeted disaster and climate risk reduction as an integral part of an Integrated Water Resource Management (IWRM) process conjunctly taking place in Democratic Republic of Congo. Pilot ecosystem-based measures aimed to reduce soil/gully erosion and flood risk in two sites (upstream and downstream) in the Lukaya Basin, while improving livelihoods and income. Capacity was developed locally and nationally on ecosystem-based measures and national advocacy on EbA/Eco-Disaster Risk Reduction (DRR) was supported through IWRM.

Impacts

Soil/gully erosion was mitigated in the pilot sites, reducing flood risk. Indeed, heavy rain in 2015 during implementation in the area did not result in worsening the gullies, showing successful erosion control. Drinking water supply is protected. Communities are more resilient due to increased income and diversification of livelihoods (e.g. bee keeping and fruit tree cultivation). Improved local organizational structures and capacity to address disaster risks. Local and national stakeholders are able to focus more efforts on disaster prevention and to address the multiple drivers of ecosystem degradation in the Lukaya basin that contribute to disaster risk. The project resulted in greater national commitment to mainstream Eco-DRR into national development policies, including the development of the National Water Policy.

Organizations involved This solution is being implemented by the United Nations Environment Programme and the European Commission in partnership with the National Government and the Lukaya River Users Association.

UNEP · European Commission · AUBR/L · Centre d'Appui au Developpement Integral Mbankana (CADIM) · The Vetiver Network International

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Measuring river flow

Constructing a 3D map of the Lukaya River Basin

both pictures:
© UNEP

Building Blocks

Solution elements for replication

1

Mainstreaming Eco-DDR/EbA in the development of an IWRM Action Plan

In order to establish a risk-informed and sustainable water resource management framework for the Lukaya Basin, ecosystem-based measures are mainstreamed into an IWRM Action Plan. An integral component of the Action Plan is promoting sustainable ecosystem management approaches within the overarching framework of IWRM. The development of the IWRM Action Plan emphasized the importance of linking upstream and downstream communities.

2

Agroforestry and reforestation

Reforestation and revegetation was undertaken on degraded slopes and around a water treatment plant to reduce erosion and flood risk. To provide seedlings for reforestation and agroforestry, community nurseries were set up. Community-based agroforestry was established on 15 ha to reduce forest clearing for charcoal production and to provide additional livelihood support to 20 households. It is based on an 8 year rotational cycle of crop production and forestry and includes benefit sharing arrangements between local communities, traditional authorities and local river basin user association.

3

Gully and soil erosion control

Reducing gully erosion was important to reduce siltation of springs and streams in low lying areas and destruction of infrastructure. In order to treat and arrest the formation of gullies, the project implemented a bio-engineering technique using vetiver, a grass known for its deep roots that can effectively control soil erosion. In this method, soil-filled bags are compacted in gullies to arrest progression of gullies. Vetiver are planted in the top soil-filled bags (filled with fertile soil).

4

Capacity building

As this was DRC's first experience in applying both the Eco-DRR, as well as IWRM approach, it was critically important to progressively develop and strengthen capacities over time, which involved: Awareness-raising, training and workshops, hydro-meteorological data collection and modelling, hands-on learning activities in the field, demonstration sites, field visits and study tours both in the country and in the region.

5

Supporting national advocacy on ecosystem-based measures

To support the Government of DRC in its national transition towards IWRM a roadmap was developed to guide the development of a National Water Policy. The Roadmap outlines the principal orientation and necessary steps in the elaboration of the National Water Policy, the principal stakeholders involved, an initial work plan, and a fund mobilization strategy.

Agricultural and dryland ecosystems

Burundi

Resilient Management of Water and Soil Resources

Solution provider Vincent Hornsperger, GIZ

Location Isare, Mutambu, Marangara; Burundi

Hazards addressed Erratic rainfall, land and forest degradation, loss of biodiversity, shift of seasons, vector and water borne diseases, wildfire

SDGs addressed

Summary

The project "Reducing the impact of climate change on the availability of water and land resources (ACCES)" implements adaptation measures in vulnerable watersheds. Natural resources, such as water and soil, are managed sustainably in order to reduce erosion and improve agricultural yields. "green" no-regret adaptation measures, such as agroforestry and community reforestation, are complemented by other measures such as rainwater storage and promotion of rainwater infiltration and soil conservation measures.

Impacts

The topic of ecosystem-based adaptation found its way into debates in Burundi. Facts about the relationship between the effects of climate change, environmental degradation and disaster prevention are becoming increasingly known and influence planning processes and action at national and local levels. Through the planning and participatory implementation of adaptation measures, local actors are sensitized on the benefits of climate-sensitive management of water and soil resources. The population is increasingly aware of the value of "green" adaptation measures to improve their economic situation.

Organizations involved This solution is being implemented by the project "Reducing the impact of climate change on the availability of water and land resources".

The Solution on PANORAMA:

Tree nursery © GIZ-ACCES

Capacity development © GIZ-ACCES

Building Blocks

Solution elements for replication

1 Integrated vulnerability analysis at national and local level

The vulnerability assessment (periods 2014, 2030-2060 and 2070-2100) was carried out by experts and four national workshops were held with all relevant stakeholders. A group of experts was created to advise and direct the process. Activities at the local level at the selected project sites were carried out in close collaboration with local governmental and non-governmental actors and the local population. The results of the assessment were presented in the form of vulnerability maps for the three factors of erosion, drought and malaria prevalence. Highly vulnerable areas have been identified to guide the identification of three pilot watersheds. In these watersheds, local vulnerability assessments were conducted to identify local challenges and appropriate adaptation measures.

2 Holistic and participatory approach to adaptation

The successive stages of implementation have consisted of establishing a list of adaptation measures that can respond to climatic stimuli. These measures have been categorized according to their typology: grey measures, green measures, capacity building, action research, policy framework. Capacity building measures and green measures were prioritized due to higher feasibility and sustainability. The result of participatory planning workshops was a set of consensual and specific adaptation measures for each of the zones. To ensure quality and sustainability, a follow-up technical committee was established. This committee is made up of people from the local administration, farmers leaders, association leaders, who are in charge of monitoring and sustaining the measures.

3 Adaptation, gender and the empowerment of women: an integrated approach

In Burundi, gender inequalities continue to restrict women's access to decision-making, resources and benefits (education, information, land ownership, time, jobs, credits, etc.) and the equitable distribution of tasks. Faced with this situation, women are becoming more vulnerable but are also excluded from efforts to mitigate and adapt to the effects of climate change. A gender analysis and evaluation of the status of gender mainstreaming in planning and implementation of adaptation measures, in information and early warning systems and in Community Development Community Plans yielded several recommendations. One recommendation was the climate change adaptation model household approach which suggests that couples are trained in replicating the techniques, skills and experiences gained within their respective households.

4 Innovative adaptation measures to climate change

The ACCES project promoted innovative adaptation measures in consultation with the population:

- The use of crop seeds adapted to drought or heavy rainfall helps to strengthen the resilience of the population.
- Risk management and disaster prevention: in order to reduce the population's vulnerability to extreme weather events, an information system that allows the population to access weather forecasts and an early warning system for extreme weather events were established.
- Toilets: an ecological latrine, called *Akasuga*, allows to collect and separate human excreta and their use as fertilizer.
- Improved wood burning stoves: the distribution of improved stoves contributes to reduce deforestation and the degradation of wood resources.
- Seasonal forecasts: the provision of seasonal forecast contributes to better decision-making in agriculture.

Resilient Rural Livelihoods through Eco-Restoration and Sustainable Natural Resources Management

Solution provider Somya Bhatt, GIZ

Location Mandla, Madhya Pradesh, India

Hazards addressed Erratic rainfall, increasing temperatures, land and forest degradation, loss of biodiversity

SDGs addressed

Summary

Forest degradation, loss of biodiversity, declining agricultural productivity and soil erosion, exacerbated through climate variability and change threaten natural resource dependent communities in Mandla district. The project pursues an integrated approach of eco-restoration, sustainable forest management and agriculture, combining ecosystem-based measures (forest restoration, agroforestry) with technical measures (e.g. stone bunds, seed replacement, improved farming techniques).

Impacts

Village institutions actively manage and conserve over 500 hectares of forest in the project region by overseeing the sustainable use of natural resources. In the upcoming years the implemented agro-forestry interventions on forest fringes will further support the stabilisation of the ecosystem and hence ensure that the beneficiaries have diversified livelihood sources. Stone exits and stone bunds have improved soil conservation: Within one year, a total of 37,319 cubic metres of soil was saved from being washed away. Improved farming techniques resulted in a 19 per cent productivity increase of millet and maize, and a 30 per cent productivity increase of paddy. This led to an average income increase of up to 20 per cent and resulted in decreasing sensitivity to climate variability and change.

Organizations involved This solution is being implemented by the project „Climate Change Adaptation in Rural Areas of India".

FES FOUNDATION FOR ECOLOGICAL SECURITY

EPCO Environmental Planning & Coordination Organisation (EPCO)

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

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Plantation near a forest fringe © GIZ

Collecting traditional knowledge © GIZ

Building Blocks

Solution elements for replication

1

Situation analysis and vulnerability assessment

In order to understand the vulnerability of the region, the team has taken a people-centric approach combining field work for the collection of household and village institution data with data available under public domain. The field methods applied include PRA, ecological baseline protocols, household economic analysis and farmer questionnaires.

The results were used to design and implement activities that specifically work on counteracting the impact of erratic rainfall, drought conditions, containing soil erosion and strengthening village institutions for building conservation ethic, in order to control the forest degradation and fragmentation. Building models to interlink farm and demonstrations on commons for reducing soil erosion.

2

Strengthening village institutions

A key aspect of the interventions in the villages of Mandla was the constitution of the Natural Resource Management Committees or Prakratik Sansadhan Prabandhan Samitis. The samitis, were elected by the Gram Sabhas (adult meetings) and had universal membership ensuring that every resident of the village, despite his/her social or economic standing had a say in the functioning of the Samiti. Advising the gram Sabha on natural resource management and spearheading the process of developing rules and regulations around commons is one of the duties of the committee along with planning for natural resources and land use. Village institutions arrived at a set of rules on using natural resources.

3

Agro-forestry and forest restoration

Eco-restoration through agro-forestry on forest fringes and slopes, and plantations on bunds was implemented as livelihood diversification option. Bund-plantations and agro-forestry enhance soil fertility, reduce forest fragmentation, increase soil moisture and decrease soil erosion. In addition, they ensure the provision of resources like wood and fruits, to add to the incomes of farmers in future. Tree based options are supposedly much more robust and long-lasting than crop based options for climate change adaptation, though their impacts can only be assessed in long term.

Care was taken in selecting the tree species as it was important to preserve the genetic pool of native tree species while avoiding the introduction of any alien species not conducive to the local environment.

Developing Sustainable Landscapes in Grasslands

Solution provider
Sarshen Scorgie,
Conservation South Africa

Location
Alfred Nzo, Eastern Cape, South Africa

Hazards addressed
Desertification, drought, erratic rainfall, land and forest degradation

SDGs addressed

Summary

Conservation South Africa (CSA) conducted a vulnerability assessment for the Alfred Nzo District Municipality which includes EbA priority maps and a climate change response strategy. CSA is piloting EbA by working as an implementing partner with the Department of Environment Environmental Programmes to keep areas free of alien invasive species post clearing, using ecorangers, to assist with restoration and working with restoration and working with communal farmers on sustainable grazing management.

Impacts

Communities have more access to water due to the removal of alien invasive species, and wetland and spring restoration/conservation. Women are travelling much shorter distances to fetch water compared to before. This reduced the number of incidents where women and children were being attacked and raped while walking through wattle jungle.

Farmers are more resilient as they have access to rangeland that can be grazed which was previously under alien vegetation, as well as by engaging in sustainable land management practices their livestock are more productive with better grazing lands.

Community engagements created a platform for elderly people to share indigenous knowledge with the younger people.

The river system is less susceptible to soil erosion and siltation of dams. There is a great sense of community engagement and ownership due to the direct benefits.

Organizations involved

This solution is being implemented by Conservation South Africa.

The Solution on PANORAMA:

The EbA approach allows for improved rangelands and more productive cattle © Jacques van Rooyen

Head woman for one of the villages able to allocate land © CSA

Building Blocks

Solution elements for replication

1 **National climate change response policy enables local level implementation**

CSA has been actively involved in the development of national level vulnerability assessments and policy development related to climate change, this has enabled CSA to share lessons from their participatory processes with communities and from implementation at demonstration sites into national planning. This also guides the support we provide local government around mainstreaming of climate change. Through this national level policy development, we have seen how this policy can be an enabler for action on the ground and supports the local government to implement EbA.

2 **Vulnerability assessments and EbA priority maps integrated into local policy and planning that include an index for monitoring**

CSA developed a vulnerability assessment (VA) with the Alfred Nzo District Municipality (ANDM) which included ecological, social and institutional vulnerability to climate change. In the process the layers of vulnerability were translated into GIS and an overarching EbA priority map was developed which guides decision-making within the district. The VA also contains an index which is used to monitor the vulnerability over time. CSA then also assisted the ANDM to develop a climate change response strategy guided by the VA and the maps in order to develop key adaptation (and mitigation) priorities of which EbA was part.

3 **Ecoranger programme and DEA land user incentive programme**

The Department of Environmental Affairs (DEA) land user incentive programme, along with co-finance from CSA donors, allows to fund alien clearing in priority catchments. Ecorangers are then employed to work with farmers, on rotation grazing, they control grazing of livestock and ensure rotational grazing is enforced. They keep areas alien free, they help protect cattle through mobile kraaling and also gather data on cattle and biodiversity and monitor veld condition and determine when an area needs to be closed from grazing. They also ensure compliance with rested areas and report those not compliant. Also ecorangers play a crucial role in poaching control and in ensuring that alien invasive plants do not come back. Incentives for land owners include not only ecorangers but also vaccinations and access to markets through auctions. Springs and streams that have dried started flowing again after these approaches have been implemented.

Using Trees to Adapt to a Prolonged Winter and Dry Season

Solution provider Asghar Khan, GIZ

Location Swāt District, Chitrāl District, Khyber akhtunkhwa (KP) Province, Pakistan

Hazards addressed Drought, floods, land and forest degradation, loss of biodiversity, shift of seasons

SDGs addressed

Summary

The project promoted the planting of drought-resistant olive trees. The sale of fruit generates income, thereby increasing the resilience of the local communities. The project provided planting material to, organized training on grafting and budding, and arranged an exposure visit for farmers. Furthermore, the project promoted the use of formerly unutilized mulberry fruit as livestock feed. Through training and practical demonstration farmers learned how to produce mulberry based feed-blocks.

Impacts

The local community in Chitral has learned how to prepare Mulberry fruit based feed-block and knows its nutritional and economic value. The local community is able to use the mulberry blocks when fodder availablity is lean and as supplement to increase milk production. The production of mulberry fruit based feed-blocks is being replicated by some farmers, and some of them have started marketing the feed-blocks in the area. 3,000 high-quality olive tree seedlings have been planted by farmers in Swat. The plantation sites are protected from grazing animals which has increased vegetation cover and has restored the habitat for the local fauna. The participation in the vulnerability assessments and the subsequent joint planning and implementation of adaptation measures increased the awareness of different stakeholders around biodiversity in general and, more specifically, around the interrelatedness of biodiversity, ecosystem services and climate change.

Organizations involved The solution is being implemented by the project „Conservation and sustainable management of biodiversity in Khyber Pakhtunkhwa“.

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

The Solution on PANORAMA:

PANORAMA SOLUTIONS FOR A HEALTHY PLANET

Tree nursery © GIZ

Olive trees planted in the hills of village Rangela © GIZ

Building Blocks

Solution elements for replication

1 Capitalising on best practices of similar projects

At the start of the BKP Project, 13 biodiversity conservation and natural resource management projects implemented in the mountain valleys of Northern Pakistan were analysed for their lessons and best practices. Successful practices included: raising private forest and fruit nurseries, joint forest management, district coordination mechanisms, extension cadres for livestock and agriculture, village conservation funds, community exchanges, land development and collection and post-harvest processing of medicinal and aromatic plant species.

2 Vulnerability assessments for integrated bottom-up planning

The project developed and applied a tool for the assessment of vulnerabilities of communities and ecosystems towards the impacts of climate change. The aim was to ensure that the measures implemented reflect the priorities of the community and, at the same time, consider the local climate. Based on the vulnerability assessment and consultations with the pilot communities, a set of adaptation measures were identified. The communities have been fully involved in all steps.

3 Community-based implementation of EbA measures

Adaptation measures were implemented via a multi-stakeholder process involving communities, government institutions and the project. The BKP project funded adaptation measures through local subsidy contracts with the community, which had to form a village organisation registered with the Social Welfare Department, and open a bank account. While the community was responsible for the implementation of the adaptation measures, the involved government department provided training and oversight.

4 Climate-change adapted plants

The promotion of drought-resistant and climate change-adapted plants, such as olive trees, contributes to increasing the resilience of the local communities. Pakistan is highly dependent on the import of edible oils. The establishment of small processing plants for the production of olive oil can contribute considerably to the supply of edible oils. The project provided 3000 high-quality olive tree seedlings to farmers in Swat, organized training on grafting and budding, and arranged an exposure visit for olive farmers to an olive-producing community for direct exchange with successful olive farmers.

Sweden

Ecosystem-Based Adaptation by Smallholders

Solution provider

Maria Tengö,
Stockholm Resilience Centre

Location

Roslagen, Sweden

Hazards addressed

Drought, erratic rainfall, increasing temperatures, shift of seasons

SDGs addressed

Summary

An informal network of small holder farmers cultivates high quality organic products in an area of mixed agriculture and forestry in Sweden. Cold winters, recurring dry spells and diseases affect their agricultural production. Ecosystem-based measures are used by these farmers to adaptively respond to climate variability and change to reduce crop damage and failure. Ecological information is transmitted through the network ensuring a reservoir of old and new knowledge for farming practices that enhances their resilience.

Impacts

By diversifying and adjusting ecosystem management practices, farmers can increase their resilience to climate variability and change, while also enhancing local and regional biodiversity. Moreover, by drawing on traditional knowledge and new research and through experimentation with this knowledge, farmers increase their capacity to adapt to changing conditions.

Organizations involved

This solution is being implemented by the Stockholm Resilience Centre and the Swedish Agricultural University.

The Solution on PANORAMA:

Intercropping of fababeans and wheat in Swedish organic agriculture

© ES Jensen

Building Blocks

Solution elements for replication

1 Management of multiple species

Farmers practiced polyculture, which involved mixing crops in the same field space (i.e., intercropping) and growing them at different times (i.e., crop rotation). Farmers also recognized that farm animals, non-cultivated plants, birds, and soil flora and fauna are important components in agroecosystems and therefore protect and manage these. For example, geese were used to control weeds in gardens, and hens were used to control livestock parasites. Non-cultivated plants were used as primary producers, as shade plants, as temporary stores of nutrients, and to prevent growth of visceral parasites. Certain wild fauna is also protected (prohibition to harm) as their role in regulating pests or in pollination is recognized.

2 Use of natural indicators

In order to be able to interpret and effectively respond to ecosystem variability and change, wild flora and fauna were also used as indicators. Farmers observed the development of wild plants and the development and behavior of wild animals, and used this information to plan and adjust land management. For example, in Roslagen, the size of birch leaves can give an indication of when to sow. The presence of certain plant species gives an indication on soil quality.

3 Management of the environment

Farmers manage their environment to mitigate disturbances, such as floods, drought and disease. Forests and trees in wetlands areas are protected to regulate water levels. Practices are undertaken, such as harrowing in early spring or using nurse crops or trees for shade, to preserve soil moisture. Pests and weeds are controlled through intercropping and crop rotation in fields, through alternate grazing by different species, through manual removal and by protecting or creating habitat for pest-controlling species, e.g. birds and insects. Wild trees, bushes and flowering plants, especially important for pollinators, are protected.

4 Transmission of knowledge through local networks

Farmers are part of a local network that shares information about traditional and new management practices. This pool of shared knowledge enhances resilience by increasing the capacity to respond adaptively to change.

Sudan

Food Security and Disaster Resilience through Sustainable Drylands Management

Solution provider Marisol Estrella, UNEP

Location North Darfur, Sudan

Hazards addressed Desertification, drought, erratic rainfall, floods

SDGs addressed

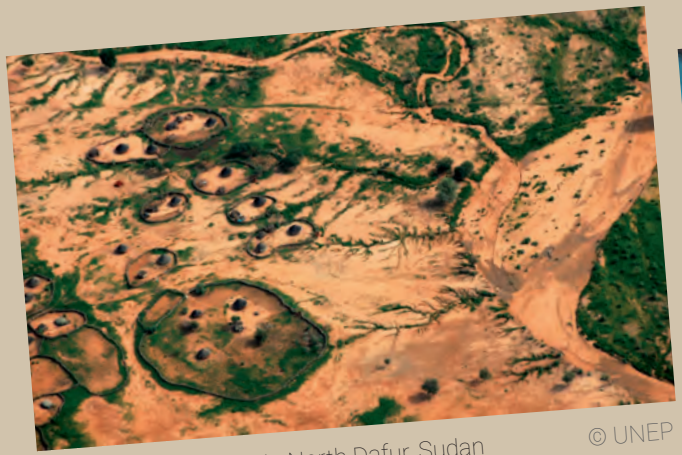
Summary

The project used a combination of ecosystem-based measures (re-vegetation and ecosystem protection) and grey infrastructure (rehabilitation of a water spreading structure) to increase food security in the face of drought and flash floods, while strengthening environmental governance at the local level. Using a green-grey hybrid approach is probably the most appropriate approach in the dryland context of Sudan. The project took an ecosystem-based disaster risk reduction (Eco-DRR) approach working within a framework of hazards (drought and flash floods), vulnerability (due to conflict zone and unsustainable practices) to reduce disaster risk (e.g. famine). However, drought and erratic rainfall is increasing due to climate change and thus the ecosystem-based measures undertaken also enable adaptation (thus are also EbA).

Impacts

The project improved food security and reduced vulnerability to drought for 17,500 people. Thanks to the improved water spreading system, the increased harvest during a good rainfall year in 2014 helped to bridge the food gap caused by the failure of the rainy season in 2015. Increased land for crop cultivation also targeted vulnerable households and helped them benefit from enhanced agricultural production while reducing pressure on the surrounding landscape. Environmental resilience was also increased with the establishment of community forests and pasture land re-seeding. This gave protection from erosion, revegetation and re-greening of the landscape all while providing extra household income in the future from gum arabic harvesting. Conflict over natural resources was reduced through the creation of a water management committee, the demarcation of a migratory route for pastoralists and regular stakeholder consultations including responsible state government agencies, pastoral unions and farmers.

Organizations involved This solution is being implemented by the United Nations Environment Programme and the European Commission in partnership with the National Government, the State Government of North Darfur, Practical Action, and local community-based organizations.



Aerial photo of village in North Dafur, Sudan © UNEP

Community nursery in Wad Kota village © UNEP

Building Blocks

Solution elements for replication

1 **Building partnerships and community engagement**

Building strong partnerships at the local and national level and working with the local community is essential for the implementation and overall success and sustainability of the project. Furthermore, it was essential to connect the local communities to government bodies and ensure the state takes joint ownership of the activities so that any future support that is needed can be sought from the government.

2 **Field interventions**

The field interventions inlcuded: Rehabilitation of a water structure for increased cultivation and greening of the wadi (grey infrastructure), establishment of community tree nurseries, community reforestation, re-seeding of pasture land and soil erosion control to address the gully erosion problem in the area (through terracing and check dams with local material). All were undertaken with community participation. Women's groups manage the tree nurseries and community forests.

3 **Natural resource governance**

The project aimed to improve governance of land and water resources at the community-level in order to enhance community resilience to water hazards and promote sustainable drylands management. This entailed several measures: the establishment of a water resource management committee, the demarcation of the migratory route for pastoralist communities and the establishment of revolving funds for agriculture (seed bank) and livestock drugs.

4 **Local and national capacity building**

The project invested significantly in capacity building at the local and national level through awareness raising on EbA/Eco-DRR, hands on field learning activities and training workshops. The project ensured that women were among those trained in all activities.

Farm extension agents (two in each village) were trained due to limited presence of the Government in the villages to provide agricultural extension support services and to link the communities directly with state government institutions for extension support.

Urban ecosystems

Egypt

Urban Rooftop Farming for Heat Wave Buffering

Solution provider Farida Farag, GIZ

Location Cairo, Egypt

Hazards addressed Extreme heat, increasing temperatures

SDGs addressed

Summary

In informal settlements of the Greater Cairo Region, a rooftop farming project was initiated in 2014. The goal was to reduce ambient temperatures (microclimate) in a densely populated area through green spaces on rooftops, and reduce the impacts of the urban heat island effect and increasing heat due to climate change. In addition to the environmental benefits, rooftop farming has other socio-economic benefits, adding to income generation and reducing vulnerability to price hikes.

Impacts

The green roofs improve the microclimate by contributing to the reduction of temperature inside and outside the buildings, thus providing an alternative to air condition and lack of natural ventilation. So far, food security could not be ensured on a broader level, however participating families keep a percentage of the crops for personal consumption. Additionally, rooftop farms provided a new recreational space for families and children to enjoy and learn. Rooftop farming also has a positive impact on community participation. Increased potential for income generation among local residents through selling of their produce. Starting with just 15 trainees, three years after the initial pilot phase, the number of rooftop farms has multiplied to approx. 80-100 farms.

Organizations involved This solution is being implemented by the project „Participatory Development Programme in Urban Areas“.

Participatory Development Programme in Urban Areas · RUAF Foundation · schaduf · Ministry of Housing, Utilities & Urban Communities · AOYE · giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

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Rooftop farming in Cairo © Attia

Involving children in rooftop farming activities © GIZ

Building Blocks

Solution elements for replication

1 **Rooftop farming methodology and technique**

The hydroponic technology system consists of 3–4 water beds on each rooftop. They are made of wooden frames, plastic sheets, foam panels and cups filled with peat moss and pyralite substrate. The water is supplied by a water pipe through an electricity connection from downstairs. As an alternative, the project installed boxes filled with soil, having the advantage that no electricity is needed for water circulation. The biggest challenges for the rooftop farmers were irregular water supply and electricity cuts. After the pilot phase, Schaduf company switched the foam panels to a geotextile surface. The main advantage in the usage of this new material is the sustainable water supply of the plants.

2 **Management model and cooperation between stakeholders**

In order to be able to cover the costs for the technical installations, the low-income families received repayable loans from Schaduf Company, which were repaid by monthly crop sales. Farmers were typically able to repay the loans within one year. Families keep roughly 10 percent of the crops grown for personal consumption; Schaduf Company purchase the remaining produce, reselling it to local markets with profit for the farmers. The rooftop farming activities are implemented through a partnership of community, commercial and institutional stakeholders.

3 **Awareness raising for adaption through urban agriculture**

Awareness activities are needed to raise interest and convince owners and users of the rooftops. They include information and awareness raising events at settlement and (based on first interest and suitability) on small-scale level. Interested residents are referred to the existing rooftop farming activities implemented at Ezbet El-Nasr via trainings done by the current farmers and demonstration visits to their rooftop farms. Further training was conducted by Schaduf Company. The training consisted of three sessions and subjects dealing with rooftop farming, organic farming, pests and growth problems, planting and harvesting. Later (2015-2017), NGOS working in the area took up the initial interest of residents and enlarged the scope of the project, always also referring to the environmental aspects of it and therefore raising residents' awareness of environmental impacts including climate change.

Green Façade for Heat Wave Buffering

Solution provider McKenna Davis, Ecologic Institute

Location Vienna, Austria

Hazards addressed Extreme heat, increasing temperatures

SDGs addressed

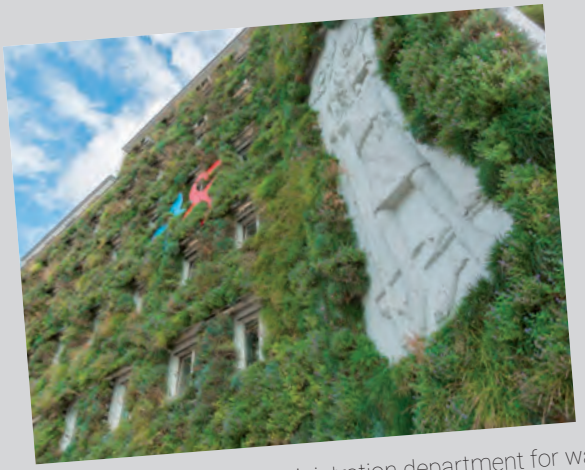
Summary

Climate change can cause heat islands in cities, affecting public health and infrastructure. Vienna thus developed a pioneer program for greening buildings, including the façade of the department for waste management, to investigate the effects on heat flow in winter and the influence on the heat transfer losses and heat demand of the building. The facades were also to create ecological niches for insects and birds and positively affect the surrounding indoor and outdoor climates.

Impacts

In total, 850 square meters of façade were mounted, totaling 2 850 meters with about 17 000 plants (mainly perennials, grasses and herbs) and increasing the amenity values of the area for the surrounding community. As a pilot project, the greening of the building façade served primarily to advance the state of knowledge on the potential effects of such an EbA measure. Within the framework of this research project (2016, TU Wien, Korjenic on behalf of MA 22), the green façade and its monitoring serve as the first step towards clear definitions of the effects of façade greening on heat demand. The green part of the wall has also improved thermal insulation by 21% (see figure 2) and led to a change in the annual transmission losses of 54.7 kWh to 45.1 kWh per square meter of green exterior wall. While impacts on biodiversity and habitat functioning still require further survey and research work, effects are estimated to be positive. There has also been a strong increase in levels of awareness of this topic amongst planners, residents and developers.

Organizations involved The Vienna environmental department — MA 22.



Green façade of the administration department for waste management (MA 48) at Einsiedlergasse 1, Vienna
© l.: MA 22 ; r.: Richard Schmögner

Building Blocks

Solution elements for replication

1 **Instructional guideline for supporting façade greening**

The guideline for façade greening was prepared by the Austrian Association for Building Construction and by the University for Soil Culture on behalf of ÖkoKauf Wien, the program for the ecological procurement of the city of Vienna. The guide offers valuable specialist information to architects, planners, developers, public institutions, as well as interested citizens and serves as a decision-making aid when choosing the ideal type of greenery for different facades. Contents include information on various facade greening systems, their ecological and technical functions and design possibilities. A system overview, funding options and a check-list serve to help users prepare and plan façade greening by examining the necessary conditions and prereq-uisites. Finally, the guideline highlights best practice examples from the Vienna area and further references to literature and regulations.

2 **Sharing risk/ responsibility in a public private partnership**

Public Private Partnerships (PPP) enable public administrations to share the tasks and risks of planning, realization and operation together with private partners in joint projects. Accordingly, the Hernals District Development Commission decided to promote the façade greening measure in the framework of “Public Private Partnership” models. With the expertise of the Viennese Environmental Protection Department - MA 22 - and the support of the district as well as the local area, a remarkable green oasis was created in the form of a green façade at a private house in the Ortliebgasse. The collaboration has proved equally valuable for the project and the public and private partners involved.

Green Aeration Corridors

Solution provider Rainer Kapp, Municipality of Stuttgart

Location Stuttgart City, Germany

Hazards addressed Extreme heat, floods, increasing temperatures, loss of biodiversity

SDGs addressed

Summary

In Stuttgart, important green belts and green divides stretch between the built-up settlement areas, mitigating the climate heat stress. Greenery now covers more than 60% of the area. Furthermore, over 39% of Stuttgart's surface area has been put under the protection of nature conservation orders. Incorporating these as important features in a Land Use Plan along with green belt policy are the most promising areas of municipal influence in respect of their impact on urban climatology and climate protection.

Impacts

The urban climate, including air quality, is improved and heat stress is mitigated through green corridors and green spaces. Communities are thus more protected from the impacts of climate change, such as raising temperatures or precipitation changes. Furthermore, the green areas provide important recreational and well-being benefits. Finally, biodiversity is conserved through maintenance of green space and green corridors, which also contributes to carbon sequestration.

Organizations involved This solution is being implemented by the Municipality of Stuttgart.

STUTTGART

View of part of the inner city of Stuttgart

Climatopes

both pictures:
© Landeshauptstadt Stuttgart, Amt für Umweltschutz, Stadtklimatologie

Building Blocks

Solution elements for replication

1

Climate atlas

The climate Atlas for the Stuttgart region was published in 2008 and comprises of standardised climatic assessments for 179 towns and municipalities in the Stuttgart region. It provides relevant information and maps required for urban climatic optimisation, such as regional wind patterns, air pollution concentrations, temperature, etc. A key element of the atlas in terms of EbA planning for airflow and cooling is an area classification based on the role that different locations play in air exchange and cool airflow in the Stuttgart region. This is based on topography, development density and character, and provision of green space. The Atlas distinguishes eight categories of areas in this manner, and for each of them different planning measures and recommendations are provided.

2

Green spaces and corridors

Topographic structures such as stream and meadow valleys provide natural green belts which at the same time represent preferred pathways for ventilation, while green spaces benefit urban climate and its protection. These green areas are protected and/or created in Stuttgart through the Land Use Plan.

3

Land use plan

A preparatory land use plan (PLUP) was undertaken, which organises land into its building and other types of uses and includes green areas and corridors. This PLUP is not legally binding, but serves as a basis for planning and information. The land use plan developed in 2010 contains essential components for sustainable urban development, envisaging urban development under the slogan “urban compact green”. Its guideline is for brownfield rather than greenfield development in a 4:1 ratio. It aims to protect green areas and develop a green network through brownfield areas.

4

KlippS — Evaluation method for the human-biometeorological quality of urban areas facing summer heat

In addition to improving overall conditions related to increasing temperatures, the city of Stuttgart has designed an innovative project “KlippS – Climate Planning Passport Stuttgart” based on quantitative findings in urban human-biometeorology, for improving human thermal comfort. The KlippS project calculates the human thermal sensation under “warm” category during the daytime in summer. KlippS is divided into two phases: the first phase is concerned with a rapid evaluation of human heat stress for the areas involving “sustainable building land management Stuttgart”, the second focuses on numerical simulations at high-risk urban areas related to heat.

5

Stakeholder participation and partnership

Partnerships and collaboration between different public bodies is necessary for the development and implementation of activities. Furthermore, public participation is required for the development of a Land Use Plan and is also part of the implementation of green strategies aimed at improving air quality and buffering heat stress. For example, a scheme has been in place since 1992 for Stuttgart residents to adopt a tree, for which they are also responsible for.

Improving Flood Protection and Recreational Opportunities by Redesigning the Isar

Solution provider

Wasserwirtschaftsamt München
(State Office of Water Management, Munich)

Location

Munich, Germany

Hazards addressed

Floods, loss of biodiversity

SDGs addressed

Summary

The project group "Isar-Plan" was initiated in 1995 to restore the Isar river in Munich from its artificial canal bed to a more natural shape and function in order to improve flood control, biodiversity and recreational opportunities. Construction started in 2000 and was finished in 2011 having restored 8 km of river and costing EUR 35 million.

Impacts

The project successfully improved protection against flooding through developing more of a natural river landscape, which allows space for the river. Indeed, a big flood in 2005 had an effect on the whole catchment area and allowed evidence to show where the restoration had mitigated flood damage. As seen through the impacts of this massive flood in other areas of southern Germany, the restoration of the river Isar has improved flood control and reduced the damage that could have been caused.

The project has also benefited biodiversity through the creation of new habitats for flora and fauna and through allowing fish to move along the river where before they were impeded.

The hydrological status has been also improved to achieve bathing water quality. This means that Munich inhabitants and visitors can swim in the river and benefit from the attractive landscape for many recreational activities.

Organizations involved

This solution is being implemented by the State Office of Water Management Munich.

Landeshauptstadt München

The Solution on PANORAMA:

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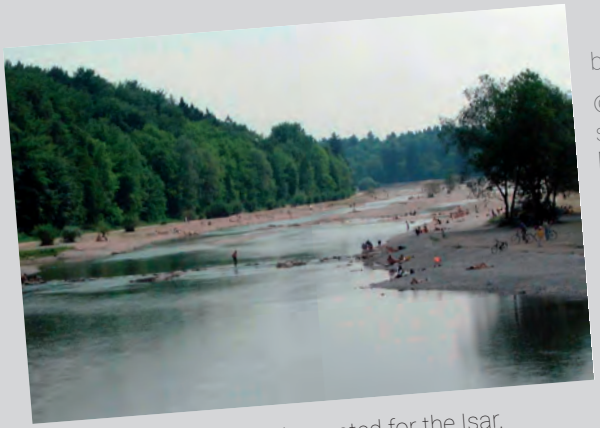
Before — the straight and canalised Isar



After — more continuity is created for the Isar.

both pictures:
© Wasserwirtschaftsamt München

Building Blocks

Solution elements for replication

1 **Partnerships and public engagement**

The project was headed by the State Office of Water Management Munich (Wasserwirtschaftsamt) and includes representatives from the Department of Public Construction (Baureferat), the Department of Urban Planning and Building Regulation (Referat für Stadtplanung und Bauordnung) and the Department of Health and Environment (Referat für Gesundheit und Umwelt). It also partnered with "Isar-Allianz" (an alliance of NGOs). Public participation was ensured through multiple mediums to encourage awareness and participation. Participation was especially encouraged during the landscape design competition for the 1.6 Km urban stretch, which allowed a voice given to the population for the design of the area as well as raising awareness of the issues of renaturalisation and flood protection.

2 **Balancing trade-offs between different priorities**

The interdisciplinary working group "Isar-Plan" was initiated in 1995, with membership from the Munich City and the State Office of Water Management Munich and the "Isar-Allianz". The group examined the flooding situation, the need for recreational areas at the riverside and the area's biodiversity. The study included a comprehensive atlas of fauna and flora, existing public uses and spatial qualities, which later were merged into a conflict and value analysis of all aspects in relation to one another. Based on these findings, development goals were defined. Flood defense measures were chosen that mostly maintained the existing undergrowth on the dykes to conserve ecosystems and have areas for recreation. A sufficient runoff capacity was generated by broadening the main channel bed which simultaneously enables near-natural and flat river bank stabilization.

3 **"Learning by doing"**

The team took into account events during the long implementation (11 years for the construction work with 5 years preliminary work) to create a successful EbA solution. In essence, they used adaptive management for their implementation. Indeed, the big flood of 2005, in the middle of their work had a major impact both on the area and on the final implementation of the solution. They also took into account public concerns (see above) towards a final solution that is appreciated by many.

Storm Water Management and Urban Regeneration

Solution provider McKenna Davis, Ecologic Institute

Location Malmö, Sweden

Hazards addressed Erratic rainfall, floods

SDGs addressed

Summary

Augustenborg experienced socio-economic decline and floods from overflowing drainage. This collaborative solution aimed to retrofit the area with Sustainable Urban Drainage Systems (SUDS) as part of a broader regeneration project, thereby creating a more sustainable neighborhood and benefiting biodiversity. The main goal was to handle 70% of storm water from roofs and sealed areas, thus eliminating combined sewer overflow by lowering the total volume of storm water and reducing the peak flow rates.

Impacts

The project has created a resilient flood protection system and has revitalized the surrounding neighbourhood. In total, 6km of canals and water channels and ten retention ponds were created to collect rainwater in natural ditches and reservoirs before directing it into a conventional sewer system. The rainwater from roofs, roads and car parks is channelled through visible trenches, ditches, ponds and wetlands, leading to an estimated 90% of the storm water being led into the open stormwater system. In addition, the total annual runoff volume is reduced by about 20% compared to the conventional system. These landscape features are integrated into the townscape within 30 courtyard areas, which also provide recreational green spaces for the area's residents. As a result of the initiative, there have not been any floods in the area since the open stormwater system was installed. The project also targeted biodiversity conservation and has made significant contributions in this regard.

Organizations involved This solution is being implemented by the City of Malmö.

The Solution on PANORAMA:

PANORAMA
SOLUTIONS FOR A HEALTHY PLANET

Urban flood prevention via green infrastructure, Ecocity Augustenborg

Building Blocks

Solution elements for replication

1 Partnering for success: securing expertise and funding

A partnership between the Malmö housing company, Malmö water and city planners was a critical ingredient in the implementation of this project. Technical expertise was required from each of these partners to ensure appropriate design, and funding of the project was also collaboratively provided. Further components of this successful partnership included stakeholder engagement, the presence of sophisticated technical expertise, and a high level policy directive in support of experimentation. Understanding of the local ecosystems was not critical, but project designers had to possess a very detailed understanding of the frequency and severity of local floods.

2 Maximizing co-benefits through smart planning

While the core purpose of the project was to address flooding related to an over-utilized combined sewage system, the neighbourhood of Augustenborg was also in a state of socioeconomic decline prior to the urban regeneration project. Thus, the generation of socio-economic benefits became central to the project's goals, such as improving the livability and aesthetics of the neighborhood, alongside biodiversity objectives. Furthermore, the project is part of a larger regeneration initiative within the neighbourhood of Augustenborg, which is also nested within ambitious sustainability plans for the City of Malmö. More specifically, the 'Eco-city Augustenborg' initiative aimed to transform Augustenborg into a socially, ecologically, and economically sustainable settlement. Ultimately, the work has represented a significant transformation of the neighborhood, and has become emblematic of a more pervasive shift towards sustainability. It has also resulted in the development of several businesses in the area of water innovation. Media coverage and public relations value are viewed as being additional benefs to the city and its residents.

3 Engaging stakeholders to raise awareness and support

An extensive and iterative process of stakeholder engagement was initiated during the design and execution of this project. The process involved a 'rolling programme' of consultation with local residents, representatives from the local school, practitioners, city staff and many others in order to build awareness about the SuDS retrofit, its benefits and costs, and to obtain public perspectives on the desired design. This included regular meetings, community workshops, and informal gatherings at sports and cultural events. The approach became increasingly open and consultative, with approximately one fifth of the tenants in the area having participated in dialogue meetings about the project. Amongst other topics, safety issues related to open water areas (e.g. retention pools) were discussed with residents as well as the potential loss of particular recreational opportunities in the area. In many cases, comments and concerns from stakeholders were taken into account and addressed in redesigned SuDS plans.

Marine and coastal ecosystems

Indonesia

Building with Nature for Safe, Prosperous and Adaptive Coastlines

Solution provider Susanna Tol, Wetlands International

Location Demak district, Northern coastline of Central Java, Indonesia

Hazards addressed Desertification, drought, erratic rainfall, floods

SDGs addressed

Summary

The solution increases resilience along 20 km of eroding delta coastlines, combining civil engineering with mangrove rehabilitation to build safe and adaptive coastlines and by introducing sustainable land use. Building with nature means making use of the dynamics of the natural environment and provide opportunities for natural processes. Technical building with nature measures include sediment balance restoration by using permeable dams and mangrove rehabilitation. Socio-economic measures include development and introduction of sustainable aquaculture and livelihoods diversification.

Impacts

Coastal security, safety, economic growth and self-reliance of 70,000 vulnerable farmers and fishermen in Demak is enhanced by avoiding further coastal flooding and erosion and providing them with a long term perspective for sustainable economic development. The restored mangrove belt protects the villages against storm events, while sustainable multi-functional land uses enable inclusive economic growth once the coastline is stable. Extensive stakeholder dialogue and capacity building allow the integration of measures in community development plans and integral government master planning and governed under community bylaws and funding mechanisms.

Organizations involved The solution is being implemented by Wetlands International.

The Solution on PANORAMA:

Close collaboration with villagers © Nanang Sujana

Permeable dam structures for sediment capturing © Nanang Sujana

Building Blocks

Solution elements for replication

1 Construction of permeable dam structures as sediment traps and basis for mangrove rehabilitation

Technical measures to protect the coastline in Demak include restoration of the sediment balance using permeable dams, alongside mangrove rehabilitation. Grids of permeable dams are put in place to dampen erosive waves and to trap sediments, so that the disturbed soil profile is restored. In this sheltered environment mangrove forests are rehabilitated. The mangroves stabilize sediment, further build up the soil and protect against salt water intrusion and flooding. This process is reinforced in the most severely degraded sites through sustainable sediment suppletions.

2 Socio-economic measures to promote sustainable land use

This building block includes development and introduction of sustainable aquaculture and livelihoods diversification (seaweed cultivation, crab and shrimp farming). 10 community groups are supported through farmer field schools and by providing resources to initiate new aquaculture management practices and livelihood diversification. Community funds are established that: i) absorb savings from increased pond productivity (5%) in support of long-term coastal belt maintenance and up-scaling of sustainable land-use measures; ii) can absorb government support to local communities for coastal protection and sustainable land use.

3 Capacity buidling on „building with nature“ solutions

Enhanced capacity and awareness is required to enable and stimulate the target group and other actors to take an active role in planning and implementation of building measures. Three different training curricula will be developed and delivered, targeting government, private sector and communities. Trainings will address both technical (e.g. rehabilitation of mangroves, construction of permeable dams), socio-economic (e.g. improved aquaculture; livelihoods diversification) and institutional (ICZM, group organising etc.) matters.

4 Policy dialogue to develop governance arrangements

Key impediments to sustainable lowland development are the lack of integration of policies and approaches, limited translation into practice and limited community engagement. The Indonesian government has embarked on various integrated master planning processes to address these challenges. A large proportion of the solution is dedicated to supporting this process. The project is also stimulating multi-stakeholder dialogue to address rapid land subsidence problems resulting from unsustainable groundwater abstraction, against which building with nature measures may not be able to perform.

„Pesca Responsable“: Responding to Climate Change through Sustainable Responsible Fishing and Mangrove Rehabilitation

Solution provider

Edmundo Aguilar López, CONANP
(Comisión Nacional de Áreas Naturales Protegidas) and José Odón Nuñez (ENDESU)

Location

Reserva de la Biosfera La Encrucijada, Villa Comaltitlán, Huixtla, Acapetahua, Mapastepec, Pijijiapan, Chiapas, Mexico

Hazards addressed

Land and forest degradation, loss of biodiversity, salinization, tropical cyclones / typhoons

SDGs addressed

Summary

By consolidating a participatory management strategy based on the strengthening of fishing communities within the Biosphere Reserve “La Encrucijada”, the National Commission of Natural Protected Areas (CONANP) has managed to promote a high level of community self-organization. Fishing cooperatives now are able to negotiate, regulate and enforce, amongst themselves, their own agreed best practices for sustainable, responsible fishing and mangrove rehabilitation, in order to reduce climate risks such as storm events and prevent coastal erosion.

Impacts

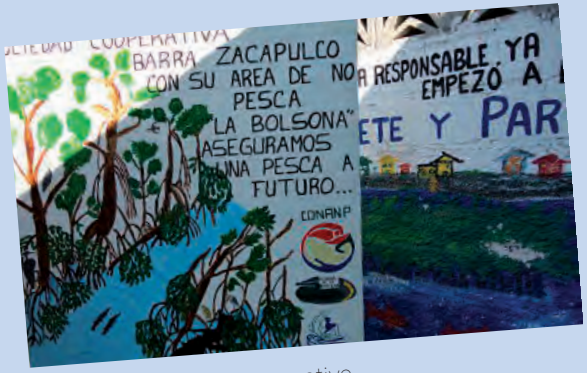
After two years of working along and of strenghtening CONANP’s processes, and with the participation of the fishing cooperatives of 8 local communities, 591 fishermen have benefitted directly. CONANP has worked to improve their capacites on improved sustainable fishing practices. Increased catches are possible because of protection and conservation actions on the mangroves systems, which have been substantially improved. For eight fishing communities, incomes have increased resulting from increased production and sale of fishery and artisanal products. In addition, a payments for ecosystem services scheme, carried out by the cooperatives, aimed at the rehabilitation of the mangrove. Furthermore, governance systems within the fishing communities have improved. As a result, social cohesion within the zone is strengthened and the communities gained the necessary confidence to initiate changes.

Organizations involved

The solution is beeing implemented by the National Commission of Natural Protected Areas of Mexico.

The Solution on PANORAMA:

Mangrove rehabilitation



Sustainable fishing cooperative

both pictures:
© Ana Elisa Peña
Del Valle Isla

Building Blocks

Solution elements for replication

1 Creating a sense of belonging to local ecosystems

CONANP has acknowledged that "without peoples' interest, you won't get anywhere" in terms of promoting sustainable community use of local ecosystems. It is therefore not only important to raise awareness within local communities of the relevant connection between mangrove ecosystems maintenance, fisheries and local livelihoods, it is of vital importance to create a sense of identity and belonging of those communities to those ecosystems.

2 Increasing community self-organization

Levels of community self-organization have been improved within fishing communities by strengthening their various capacities needed to define and self-regulate policies on sustainable fishing. This was done by training on catch limits, mentoring by NGOs and the involvement of the fishermen's wives and children in awareness-raising activities, leading to a strengthening of the learning process within families. This has led to social cohesion within the zone, allowing the fishing cooperatives to negotiate and regulate amongst themselves to agree and enforce best practices for sustainable fishing; and increasing their capacity to find direct markets for their products, without the need for intermediaries.

3 Creating adaptive capacity as a buffer against risk

CONANP is encouraging the fisherwives to diversify their families' economic activities and is supporting this diversification through capacity development to the cooperatives for example in the area of touristic business development and administration. In this way, the economic risks of the fishing communities is reduced thanks to multiple income sources.

4 Rehabilitating channels and hydrological flows in mangroves

Clear and well-maintained channels allow the hydrological flows between salt- and freshwater sources in a mangrove to find a natural balance, favouring biodiversity. They also permit the movement of fish to and from the ecosystem in rhythm to those flows, as well as facilitating the natural expansion of the mangroves via greater seed dispersal.

Vanuatu

Coral Gardening for Climate Change Adaptation

Solution provider Christopher Bartlett, GIZ

Location Pele, Shefa Province, Vanuatu

Hazards addressed Extreme heat, increasing temperatures, loss of biodiversity, ocean acidification, sea level rise, tropical cyclones / typhoons

SDGs addressed

Summary

Damaged coral reefs are restored, thereby contributing to climate change adaptation and eco-tourism revenue. Overseas visitors are invited to join in this planting activity, which allows them to contribute to a local development issue.

Impacts

Over 3,000 coral fragments have been planted on a variety of submerged structures that proved robust and resilient to severe tropical Cyclone Pam. Eroding coastlines are stabilizing with increased coral health and wave-buffering reef development. Coral-associated fish, a source of local food security, are increasing in abundance. Increased engagement with overseas visitors has opened doors for other forms of climate cooperation (e.g. sponsoring village water-supply systems, and construction of classrooms).

Organizations involved This solution is being implemented by the project „Coping with climate change in the Pacific Islands Region".

The Solution on PANORAMA:

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SOLUTIONS FOR A HEALTHY PLANET

Coral gardening © GIZ

Visitors participating in the coral gardening activities © GIZ

1 Climate resilient coral gardening

Coral gardening, also known as mariculture, is undertaken by collecting small pieces of broken coral in shallow waters and re-attaching them to so-called spiderweb cages (portable metal frames). The coral fragments are eventually transplanted to large coral frames in places where the reef has been destroyed by cyclones, crown of thorns starfish or other climate change-linked hazards. The coral beds are placed in around 6 meters of water, enough to keep them safe from cyclone swells, where they can grow into full size coral colonies. The project uses coral varieties that are particularly resilient to the climate change impacts of bleaching and ocean acidification.

2 Eco-tourism partnerships

The project has partnered with local tour operators and bungalow owners to upscale and promote the coral gardening activity. Tourists are briefed on the program, learn about climate change and its impacts on coral reefs and then snorkel together with island reef champions to collect the climate resistant coral fragment and attach them on the underwater gardening beds. Specially built coral beds were strategically placed near popular tourism snorkeling areas. The visitor adopts each fragment planted, and the money raised goes towards community climate change adaptation activities.

3 Participation of women and girls

Women in Vanuatu play a critical role in the use and management of marine and terrestrial biodiversity, deciding what resources are harvested and in what quantities for sale in markets. The coral gardening project is especially relevant for island women and girls. Many of them learned how to guide visitors to snorkel and collect fragments of coral for the climate reef garden. Since its inception, the project has worked to encourage women to take the role of resource champions in each of the Nguna-Pele committees, offering special gender-focused trainings and capacity development workshops. The obvious benefit to women is that they can earn previously unavailable income from guiding for and helping guests plant coral fragments.

Grenada

Restoration and Community Co-Management of Mangroves

Solution provider Maxine Welsh, GIZ

Location Telescope, Saint Andrew, Grenada

Hazards addressed Land and forest degradation, sea level rise, storm surges

SDGs addressed

Summary

The solution aims at increasing the health of the mangrove and associated ecosystems and reducing vulnerabilities of coastal communities to climate change. It focuses on ecosystem restoration and local capacity building for habitat conservation and increased socio-economic benefits. Technical components include replanting of mangroves, sustainable mangrove management (e.g. cultivation of fast growing alternative species), introduction of beekeeping as a sustainable alternative livelihood, promotion of ecotourism.

Impacts

Community consultations and meetings were held to inform and involve the community in the project. This resulted in high interest in the mangrove replanting/protection components, and in the project's sustainable livelihoods components (bee-keeping, sustainable charcoal management, ecotourism).

Over 1 900 mangrove seedlings, as well as other species such as neem, almond, and sea-grape, were planted at the project site between 11/2015 and 11/2016. They are continuously monitored by members of the community. The planted transects have been fitted with basic fences to improve their visibility to the users of the mangrove.

Courses on beekeeping provided participants with skills to operate as professional beekeepers. Hives were placed close to the project site, equipment was procured and the beekeepers were supported to establish a cooperative.

Specifications and designs for a boardwalk and a bird-hide to support eco-tourism activities have been developed. Training in eco-tourism will soon begin.

Awareness activities, conducted during the implementation of other activities such as mangrove planting, have targeted the broader public to inform them about the project.

Organizations involved This solution is being implemented as part of the project „Integrated climate change adaptation strategies".

The Solution on PANORAMA:

Mangrove replanting

Seedlings planted inside the mangrove continue to show good growth

both pictures:
© GIZ/ICCAS

Building Blocks

Solution elements for replication

1 Establishment of a co-management structure

To build institutional capacity and support implementation and future replication on national level, a co-management structure was established: the Northern Telescope Mangrove Management Board (NTMMB). This ensures that the community joins hands with government officials to manage the project, and also helps to enforce mangrove protection policies in Telescope.

Community ownership of the project is ensured, while the highly-constrained government staff resources are supplemented, thereby supporting long term protection of the mangroves.

NTMMB is comprised of five members from the local community and one member from the St. Andrew Development Organisation, as well as members from the Ministry of Tourism and Culture, the Ministry of Agriculture, Lands, Forestry, and Fisheries, Ministry of Education, Human Resource Development, and the Environment. Monthly board meetings are held.

2 Mangrove forest and coastal revegetation

The natural mangrove forest and coastal vegetation of the project area have been severely degraded over the past years due to the unsustainable use of members of the community paired with the adverse impact of aspects of climate change. This degradation therefore increased the coastal communities' vulnerability to the impacts of climate change such as hurricanes, storm surges, and coastal flooding. Additionally, coastal (non-mangrove) vegetation were scant which decreased the stability of the shore area (beach).

The replanting of mangrove species improves the health of the mangrove area and its ecosystem services with respect to coastal protection as well as habitat provision for various flora and fauna.

3 Apiculture development

One of the main threats to the area in question is degradation as a result of the cutting of mangrove trees to use for income generating purposes. Apiculture was introduced as an alternative livelihood which will enable the members of the community to use the resources of the mangroves without damning it, thus leaving the mangrove forest intact.

Additionally, the establishment of bee hives in the area will benefit farmers in the surrounding area. Not only will the bees assist with the pollination and ultimate health of the mangrove forest, they will assist with the pollination of crops on farms in the surrounding area. Through this, other community members can indirectly benefit from the introduction of apiculture as an alternative livelihood.

Ecuador

Restoration of Mangroves

Solution provider Aracely Salazar Antón, GIZ

Location Province of Esmeraldas, Ecuador

Hazards addressed Floods, salinization, sea level rise, storm surges

SDGs addressed

Summary

The mangroves at the Rio Esmeraldas estuary are of high ecological, economic and social value due to their direct and indirect uses. They constitute an important asset for adapting to climate change of the local population. This ecosystem is threatened by the expansion of the city of Esmeraldas and agricultural and aquaculture areas (particularly the breeding of red-bellied Pacu). Several local and national organizations have joined forces for ecosystem restoration and effective management of the protected area.

Impacts

The need to generate local information that is relevant and up-to-date and that fits the needs of sustainable mangrove management, including the impacts of climate change, is widely recognized by all stakeholders. Communities have strengthened their understanding of the impacts of climate change on the ecosystem and the interlinkages with their livelihoods. In addition, Information and dialogue spaces have fostered the coordination of management actions in the area. To date, a nursery has been set up and an area of approximately two hectares of the mangrove ecosystem has been restored.

Organizations involved

This solution is being implemented by the project “Strategies for ecosystem-based adaptation to climate change in Colombia and Ecuador” and the programme “Climate protection and biodiversity”.

Refugio de Vida Silvestre Manglares Estuario Río Esmeraldas · Esmeraldas Al Mundo · GADPE · Ministerio del Ambiente · giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

The Solution on PANORAMA:

PANORAMA SOLUTIONS FOR A HEALTHY PLANET

Mangroves at the Refugio de Vida Silvestre Manglares Estuario Río Esmeraldas © GIZ

Capacity development at the tree nursery © GIZ

1 Research: Theoretical and technical foundations

The activities that form part of this building block aim to improve knowledge about the mangrove ecosystem, the impacts of climate change and the theoretical and technical basis of mangrove restoration. It aims to articulate the compilation of scientific information with local knowledge, transferring the findings into a practical approach. As a preliminary step to the implementation of the measure, the preparation of the climate change plan of the Municipal Government of Esmeraldas was supported. In 2016 a dialogue event was held between experts and technicians from Ecuador and other countries to better understand the impacts of climate change on the mangrove ecosystem and to share experiences and lessons learned on mangrove restoration. This knowledge is used to plan the reproduction of the red mangrove (*Rhizophora harrisonii*), reforestation in situ and monitoring (see also building block III). Finally, an agreement has been established with the Pontificia Universidad Católica (Esmeraldas office) to monitor the efficiency of the trials and generate research on mangrove ecosystems linked to climate change.

2 Coordination: Capacity development and governance

This building block´s approach is reflected in various activities ranging from training measures, spaces for exchange and dialogue between stakeholders and between institutions as well as support in the development of agreements. One example is the agreement between the Ministry of Environment, the protected area management unit and the university with regard to participatory monitoring and evaluation of nurseries and restoration trials. Strengthening of the protected area management committee is another key measure that aims to improve the area's governance. In addition, the appropriation and integration of the national climate change policy in meso-level actions, such as the development of climate change plans, the implementation of adaptation measures in productive sectors and in the management of ecosystems, are reflected.

3 Action: Mangrove restoration laboratories

The underlying strategy of this building block is — instead of pursuing quantitative goals of restored areas —, to start with small, concrete actions such as mangrove seed nurseries and field trials with the communities. This helps to reduce barriers and leads to tangible and immediate results. In combination with the development and dissemination of information materials and participatory monitoring, it helps to showcase mangrove restoration as a means of adaptation to climate change by local actors. In addition, it strengthens the capacities of local stakeholders and institutions and generates synergies (see building block 2).

Colombia

Pilots for the Restoration of Mangrove Ecosystems

Solution provider Felipe Gómez, GIZ

Location Ciénaga de la Virgen, Cartagena, Colombia

Hazards addressed Drought, extreme heat, floods, loss of biodiversity, sea level rise, storm surges

SDGs addressed

Summary

The EbA program in Colombia is working together with the Mayor's office, the Botanical Gardens, local NGOs and communities in the implementation of pilot projects for the restoration of mangroves in particularly vulnerable areas of the coastal lake of Ciénaga de la Virgen. These activities are part of a broader initiative that aims at supporting the city's climate change plan (Plan 4C) and the national framework for (ecosystem-based) adaptation of Colombia´s Climate Change Policy.

Impacts

EbA — as a rather specific topic — has arrived on the political and institutional agenda in Cartagena. The Plan 4 C has been filled with life and developed into a functioning multi-stakeholder platform. Cartagena´s strategic framework for adaptation to climate change has been translated into concrete (ecosystem-based) adaptation measures and (new) alliances among stakeholders. Regular dialogue and joint capacity development activities continuously contribute to a shared understanding of challenges and opportunities for (ecosystem-based) adaptation to climate change in Cartagena. Both local communities and the private sector are becoming increasingly interested in implementing adaptation measures within Plan 4C's framework. Local authorities have incorporated the EbA approach in their plans, policies, programmes for reducing vulnerability to climate change.

Organizations involved This solution is being implemented by the project "Strategies for ecosystem-based adaptation to climate change in Colombia and Ecuador".

The Solution on PANORAMA:

Mangroves of Ciénaga de la Virgen, Cartagena-Colombia

both pictures: © Felipe Gómez

1 Alignment of activities with the existing national and subnational framework for adaptation to climate change

The general framework for adaptation to climate change in Cartagena de Indias is the "Plan 4C. Cartagena: Competitive and Climate Change Compatible" (2014). It is a long term vision and framework for planning and action to achieve climate compatible development by 2040. EbA is one of its five core strategies. By supporting the implementation of selected EbA measures as a joint learning process, the findings feed back into the strategic evolution of the Plan 4C as well as the national framework for (ecosystem-based) adaptation to climate change. The expected impacts of concrete EbA measures - such as the recovery of canals and channels - are supposed to show economic, social and environmental benefits in the short and medium term, thus contributing to a practical proof of concept.

2 Prioritizing EbA measures by combining empirical data with participatory planning

Given the existing general orientation provided by the Plan 4C, one crucial task has been to identify and prioritize key EbA measures. This planning process involved approx. 40 institutions from Cartagena and the national level. During an expert workshop, the following 4-step approach was applied. Step 1: Identification of priority ecosystems and ecosystem services Step 2: Identification of major climate threats Step 3: Assessment of exposure and localization of priority threats Step 4: Prioritization of measures considering social, environmental and economic criteria The methodology was based on a combination of tested methods for the identification of adaptation needs and options (MARISCO methodology and a multi-criteria analysis to identify priority measures). A study on the biotic characteristics of the pilot area helped to underpin the outcome of the participatory planning and provided valuable recommendations for the implementation.

3 Forming and strengthening alliances for communication, capacity development and implementation, including financing

Successful EbA planning and implementation needs strong alliances — among different public sectors and levels, with the private sector, with civil society and research institutions. The project strengthens existing partnerships and supports the formation of new ones. These alliances are the breeding ground for awareness raising and communications with regard to EbA (results are e.g. a multi-media strategy, videos and other information material) and joint capacity development measures such as training courses. The creation of the "Climate, Ecosystems and Communities Knowledge Network" for advancing in the search of EbA solutions for the recovery of the Virgen Coastal Lake and its channel system in Cartagena is one tangible result. The different initiatives have already attracted interest by the port sector, representatives from the tourism industry and the National Association of Industries, among others. A broad-based financing strategy for EbA is being worked out together with national and regional actors.

Scotland

Nigg Bay Coastal Realignment

Solution provider Steph Eliott, RSPB

Location Nigg Bay, Cromarty Firth, Scotland

Hazards addressed Floods, loss of biodiversity, sea level rise, storm surges

SDGs addressed

Summary

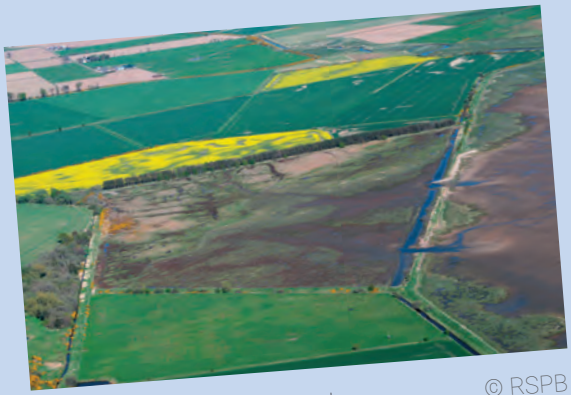
In 2003, two 20 metre breaches were created in an existing eroded sea wall to allow for the tide to re-enter a 25 ha field, known as "Meddat Marsh", on the edge of Nigg Bay. This allowed this area to be reconnected to the sea for the first time since the 1950s and intertidal habitat to be created. A second sea wall behind the field was already in existence and was raised and strengthened. The coastal realignment was a success, with salt marsh habitat and wintering water birds colonizing the area, as well as improving coastal flooding protection.

Impacts

Salt marsh has colonized the area reclaimed and thus increased the area of salt marsh by 23% in Nigg Bay. It has also added nearly a km of new saltmarsh edge and 5 hectares of intertidal mudflat – all very important for foraging birds. Indeed 25 species of water birds now use the newly created area.

Over the 10 years there has been 20-30cm of sedimentation in some parts of the site and saltmarsh creek systems have developed. The new sea defence around the site remains strong and the whole area provides greater protection from coastal flooding to inland areas than the original sea wall.

Organizations involved This solution is being implemented by the Royal Society for the Protection of Birds (RSPB).



Nigg Bay coastal realignment © RSPB

Breach in the sea wall © RSPB

Building Blocks

Solution elements for replication

1 Design and impacts study

The design and impacts study look at the feasibility of the project in terms of potential impact, design of intervention and potential results.

Potential impact: flooding of the site under various tidal conditions was modelled, and showed that the project would have a negligible effect on the tidal regime and coastal processes of Nigg Bay and the Cromarty Firth.

Design: different engineering options were considered — a single breach, two breaches, completely removing the sea wall or not doing anything. Hydraulic modelling informed the decision that two 20m breaches, lining up with the relic drainage channels, was the preferred design. It also specified some further engineering work.

Potential results: the likely zonation of saltmarsh communities within the coastal realignment site was modelled, using the elevations of the site. This showed that there was sufficient topographical variation for a full zonation of saltmarsh communities to be restored without further engineering works.

2 Coastal realignment

Two 20 m breaches in the sea wall were created over two days to allow the tides to come into the area. The secondary sea wall behind the field was raised to 1 in 50 year predicted storm surge height, before the breaches were dug. Other required engineering works, specifically the blocking of culverts to a drainage channel behind the sea wall were also undertaken from the recommendations of the “design and impacts study”.

3 Monitoring regeneration of the ecosystem

Monitoring was undertaken in four main areas:

1. Vegetation: the colonisation by saltmarsh plants, and development of saltmarsh communities
2. Benthic invertebrates: particularly of species important as food sources to wintering waterbirds
3. Use by wintering waterbirds
4. Sedimentation and geomorphology

It was undertaken pre-breach and post breach annually for 4 years (until 2007), as a PhD study. After that monitoring was completed in 2009, 2011 and 2014.

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